4 ENVIRONMENTAL IMPACTS AND MITIGATION

This chapter discusses the affected environment and environmental consequences for the environmental topics listed at the right. Each section describes the resource study area, applicable laws and regulations with which the project would comply, and the effects of each alternative considered in this Final EIS.

Environmental Topics in Chapter 4

NEPA and SEPA regulations require that an EIS disclose direct, indirect, and cumulative impacts (also called effects) of a proposed action on the environment. *Direct impacts* are caused by the action and occur at the same time and place (40 Code of Federal Regulations [CFR] 1508.8(a)). *Indirect impacts* (also called secondary impacts) are caused by the action and are later in time or farther removed in distance but still are reasonably foreseeable (40 CFR 1508.8(b)), such as changes in land use patterns and related effects on air quality. Impacts can be either temporary (short term), such as construction impacts, or permanent (long term), such as with property conversion to a transportation use, or impacts due to project operation. For this EIS, the impacts analysis for each resource is divided into long-term impacts and short-term construction impacts.

A *cumulative impact* results from the proposed action's incremental impact when added to those of other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts are considered because the public and government agencies need to evaluate a proposed action and its alternatives in a broad perspective, including how the project might interact with impacts that persist from past actions, with present-day activities, and with other projects that are planned but have not been built yet (reasonably foreseeable future actions); see Appendix H, Other Projects and Actions Considered in Cumulative Effects, for a list of the projects considered. The study area for the cumulative impact analysis is generally a combination of the study areas defined in Chapter 3 for transportation facilities and in Chapter 4 for the various environmental resources. The

exceptions are ecosystem-related resources, where expanded study areas are used to capture potential impacts to the functions of larger ecosystems.

This chapter discusses the proposed project's direct, indirect, and cumulative impacts on each resource analyzed. Mitigation measures are proposed in the following sections for all alternatives when potential impacts could not be avoided. The set of potential mitigation measures for the Preferred Alternative is presented in Appendix N, Mitigation Plan. The FTA Record of Decision for the project will confirm the mitigation commitments of the project.

4.1 Acquisitions, Displacements, and Relocations

The Lynnwood Link Extension would acquire public and private property for the light rail right-of-way and other facilities. The project also would displace and relocate some residential, commercial, and public uses. The potential property acquisitions are based on the conceptual plans Sound Transit developed for the light rail alternatives (see Appendix F, Conceptual Plans).

This section discusses two types of potential property acquisitions:

- **Partial acquisition**—Part of a parcel would be acquired, but the current use generally would not be displaced. In some instances, such as larger parcels that hold multiple uses, a business or residential unit on a parcel could be displaced, but most uses would remain.
- **Full acquisition**—The full parcel would be acquired and the current use would be displaced. Full acquisitions include parcels that might not be fully needed for the project but would be affected to the extent that current uses would be substantially impaired (e.g., loss of parking or access).

The acquisition and displacement data presented in this section are estimates based on conceptual designs for the light rail alternatives. Final determinations of the property needs for the project, including acquisitions and displacements, will be based on the project's final design after Sound Transit completes the EIS process, selects the alternative to be built, and develops final engineering and design plans. The types of acquisitions discussed in this section provide information useful for comparing alternatives. The estimates of the displaced land uses reflect the conditions at the time the analysis was conducted. Because property uses change, the number and/or type of displacements could vary between what is disclosed in the EIS and what would actually be required. If there is surplus property (property no longer needed for construction or operation of the project) once the project is complete, Sound Transit would likely sell or transfer the surplus property.

In addition to property acquisitions, the project would require temporary construction easements, permanent easements, and the permanent use of public right-of-way owned

by WSDOT and local jurisdictions. The specific areas of the construction easements are not included in the data presented here, although the impacts of these easements are considered in the analysis. Most construction staging areas would be located within areas needed for the proposed project's construction, including properties purchased for the light rail right-of-way.

According to 23 CFR 810 Part C, Making Highway Rights-of-Way Available for Mass Transit Projects, Sound Transit must submit an application to WSDOT to use the highway right-of-way. If WSDOT is amenable, WSDOT would then request FHWA to authorize it to make the right-of-way available for Sound Transit's use. The request to FHWA would be accompanied by evidence that the use of the right-of-way for light rail would not impair future highway improvements or the safety of highway users. FHWA would review the request in accordance with 23 CFR 710 and 810, and may authorize WSDOT to make the right-of-way available to Sound Transit if it is determined that:

> "(a) The evidence submitted by the State highway agency under Section 810.206 is satisfactory;
>
> (b) The public interest will be served thereby; and
>
> (c) The proposed action in urbanized areas is based on a continuing, comprehensive transportation planning process carried on in accordance with 23 U.S.C. 134 as described under 23 CFR Part 450, subpart A." (23 CFR 810.208)

In the areas where the light rail alternatives are proposed within the I-5 right-of-way, Sound Transit and WSDOT coordinated to define the potential limits to such use. The agencies' collaborative planning considered current conditions on the corridor, applicable design standards for highways and light rail, and WSDOT's ability to make future highway improvements. The planning for the project's right-of-way assumptions resulted in the *I-5 Light Rail Compatibility Report* (Sound Transit 2012), signed by both Sound Transit and WSDOT. The report's findings formed the basis for the conceptual engineering of the EIS alternatives. The estimated WSDOT right-of-way needed for the Lynnwood Link Extension is presented in Section 4.1.2, Long-Term Impacts. Ultimately, Sound Transit must secure FHWA's approval for use of the I-5 right-of-way.

Other impacts associated with acquisitions and displacements are discussed in Section 4.2, Land Use; Section 4.3, Economics; Section 4.4, Social Impacts, Community Facilities, and Neighborhoods; Section 4.16, Cultural, Archaeological, and Historic Resources; Section 4.17, Parks and Recreational Resources; and Section 4.18, Section 4(f) and Section 6(f) Evaluation.

The project would also affect properties by modifying access on some local streets. FHWA and WSDOT must review and approve any change to I-5 ramps or

interchanges, and this process could change the access requirements for streets adjacent to a freeway entrance or exit. If WSDOT and FHWA require more restricted road access in order to maintain safe and effective interchange operations, properties that completely lose their access could be acquired by Sound Transit. The proposed project will comply with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The Act and its amendments direct how federal agencies, or agencies receiving federal funding for a project, will compensate property owners or tenants who must relocate if displaced by the project. The project will also comply with Sound Transit's adopted Real Property Acquisition and Relocation Policy, Procedures, and Guidelines, and with Chapter 8.26 RCW, which establishes a uniform policy for relocation assistance for people displaced by public projects in Washington. Property acquisition will follow these laws and policies to ensure property owners and tenants are treated uniformly and fairly.

4.1.1 Affected Environment

The study area for the acquisitions, displacements, and relocations analysis includes the parcels that are within the areas where the light rail alignments, stations, related facilities, or mitigation require right-of-way. This land is heavily developed and contains residential, commercial, industrial, public, and vacant property. Most of the properties in Segments A and B are residential, while Segment C contains commercial, industrial, and public properties. Current and projected land uses adjacent to the light rail alternatives are discussed in Section 4.2, Land Use; estimates of changes in employment due to business displacements are provided in Section 4.3, Economics.

4.1.2 Long-Term Impacts

Sound Transit overlaid the proposed footprint for all the light rail alternatives over the parcel data from King and Snohomish counties to identify which parcels would be affected by each alternative, and to estimate the potential full and partial acquisitions and resulting displacements by the alternatives. Table 4.1-1 presents the estimated number of acquisitions and displacements for each alternative. Table 4.1-2 presents the estimated amount of WSDOT right-of-way Sound Transit would occupy for each light rail alternative. Further project design may change these estimates, and WSDOT and FHWA approvals may alter the amount of I-5 right-of-way that is used.

The tables and maps in Appendix I-4.1, Acquisitions, Displacements, and Relocations, identify the potentially affected properties by alternative. To estimate the number and types of uses affected, Sound Transit used tax assessor data from King and Snohomish counties and also conducted field surveys. During final design, Sound Transit would prepare detailed assessments of uses, underlying ownership, and the parties involved in displacements to support its Real Property Acquisition and Relocation Policy, Procedures, and Guidelines (see Section 4.1.7).

Table 4.1-1. Potential Property Acquisitions and Displacements

Alternative	Number of Affected Parcels	Residential – Single Family		Residential – Multifamily		Commercial and Industrial		Public and Institutional		Vacant Land		Total Full Acquisitions	Total Partial Acquisitions	Total Displacements	
		Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial			Residential (units)	Businesses and Institutional
Segment A: Seattle to Shoreline[a]															
Preferred Alternative	130	78	41	0	1	0	1	2	7	0	0	80	50	121[b]	0
A1	115	68	37	0	0	0	1	2	7	0	0	70	45	111[b]	0
A3	107	64	33	0	1	0	1	2	6	0	0	66	41	107[b]	0
A5	128	80	37	0	1	0	1	1	8	0	0	81	47	123[b]	0
A7	117	73	34	0	1	0	1	1	7	0	0	74	43	116[b]	0
A10	122	75	36	0	1	0	1	2	7	0	0	77	45	118[b]	0
A11	107	64	33	0	1	0	1	2	6	0	0	66	41	107[b]	0
Segment B: Shoreline to Mountlake Terrace															
Preferred Alternative (with 220th Street Station South Option)	15 (21)	3 (8)	5	0	0	0	0	1 (2)	2	0	4	4 (10)	11	3 (8)	0 (1)
B1	5	0	0	0	0	0	0	1	1	1	2	2	3	0	0
B2A	18	5	6	0	0	0	0	1	1	1	4	7	11	5	0
B4	6	0	0	0	0	0	1	1	1	1	2	2	4	0	0
Segment C: Mountlake Terrace to Lynnwood															
Preferred Alternative	18	0	1	0	1	4	8	1	3	0	0	5	13	0	9
C1	31	1	2	1	0	3	22	1	2	0	0	6	26	77[c]	31
C2	29	1	2	0	0	3	20	1	2	0	0	5	24	1	3
C3	15	0	1	0	0	1	10	1	2	0	0	2	13	0	1

[a] These numbers do not include the properties that could be affected if FHWA or WSDOT require interchange access modifications for the NE 130th Street Station or NE 145th Street Station.

[b] The total of displaced residential units includes individuals in rooming/boarding houses (49 displacements), which are counted under acquisitions as single-family parcels based on assessor records. The total also includes the displacement of the caretaker's house at the Seattle Latvian Evangelical Lutheran Church in Seattle and residential building at True Jesus Church in Shoreline.

[c] The total of displaced residential units includes 76 condominium units displaced by the one full multifamily residential property acquisition.

Table 4.1-2. Estimated WSDOT Right-of-Way Needs

Alternative	Estimated Right-of-Way Occupied (acre)
Segment A: Seattle to Shoreline	
Preferred Alternative	19
A1	26
A3	20
A5	20
A7	19
A10	25
A11	20
Segment B: Shoreline to Mountlake Terrace	
Preferred Alternative	17
B1	14
B2A	16
B4	15
Segment C: Mountlake Terrace to Lynnwood	
Preferred Alternative	2
C1	1
C2	1
C3	3

Source: Conceptual design right-of-way estimates.

No Build Alternative

No properties within the study area would be acquired with the No Build Alternative. No displacements or relocations would occur.

Segment A: Seattle to Shoreline

Within Segment A, Sound Transit would acquire property for right-of-way where the available WSDOT right-of-way is too narrow to completely accommodate the light rail project. In addition to land for the light rail guideway, Sound Transit would also need to acquire property for stations, stormwater facilities, ecosystems impact mitigation, street or highway modifications, relocated utilities, traction power substations, noise walls, and other project-related facilities.

Most of the properties adjacent to the Segment A alternatives are single-family residential. The alternatives in this segment would affect more residential properties than in other segments, and the majority of the potential full acquisitions is residential. Most of the affected properties contain single-family residences, but six contain rooming or boarding houses, which Sound Transit estimates would involve 49 individual residential displacements.

Alternatives A1, A5, and A10 in the Draft EIS would have occupied a Seattle city street that provided access for the Seattle Latvian Evangelical Lutheran Church, and the Draft EIS identified the church as a full acquisition. Since the publication of the Draft EIS, the alternatives were modified by redesigning the street, which maintains access to the church property. As a result, none of the Segment A alternatives would displace the church. However, two single-family residential displacements would occur as a result of the street redesign, in addition to a residential structure related to the church (the caretaker's house).

The Segment A alternatives would require similar numbers of acquisitions. The Preferred Alternative would have the highest number of full acquisitions, and most of them would be residential. Alternatives A3 and A11 would have the fewest full acquisitions of the Segment A alternatives because most of their alignments would be elevated (including their respective stations), reducing impacts on adjacent properties. Alternative A5 would have the most full acquisitions of the Segment A alternatives, including the most residential displacements, because it is mostly at-grade bordering residential areas, and its stations would also be in residential areas.

The Seattle Latvian Evangelical Lutheran Church and the True Jesus Church would be affected by the Preferred Alternative, as well as the other Segment A alternatives, but the churches would not be displaced. No commercial, industrial, or public land uses would be displaced in Segment A.

The Preferred Alternative includes an option that allows for the eventual construction of a station at NE 130th Street. Sound Transit does not expect the construction of this station to require more property than the Preferred Alternative with no station at this location. The Preferred Alternative also includes the NE 185th Street Station Shoreline Stadium Garage Option, which would place the parking garage on the current Shoreline Stadium parking lot. This would require Sound Transit to lease or buy a portion of this property from the Shoreline School District. With the Preferred Alternative, interchanges likely would be modified for the NE 145th Street Station, which would require limited access agreements for some of the adjacent properties. For the other light rail alternatives, the NE 130th Street and NE 145th Street interchanges might also be modified for stations. Alternatives A5, A7, A10, and A11 could affect additional residential properties if they are selected and their modifications approved by FHWA and WSDOT. The alternatives with the NE 145th Street Station Option 2 (A3, A10, and A11) could also have additional full acquisitions if access to the property is eliminated by interchange modifications. Figure I-4.1-2 in Appendix I-4.1 show the areas that could be affected.

Federally designated highway beautification areas are located adjacent to I-5 in this segment. Some of these designated areas could become project right-of-way. Potential visual impacts caused by the use of these beautification areas are discussed

in Section 4.5, Visual and Aesthetic Resources; any conversion of a beautification area would require replacement land along the I-5 corridor, which may be in addition to properties identified here.

Segment B: Shoreline to Mountlake Terrace

Much of the Preferred Alternative and the other Segment B alternative alignments are within the existing highway right-of-way; therefore, light rail in this segment would affect fewer parcels than in Segment A. The Preferred Alternative has fewer acquisitions compared to the Alternative B2 outlined in the Draft EIS primarily because it has modified the alignment north of 236th Street SW to be closer to I-5 after crossing to the west side of the freeway. It would still affect three single-family residential properties (instead of the five presented in the Draft EIS), near 212th Street SW.

The Segment B Preferred Alternative has an option for a 220th Street SW Station on the now vacant Edmonds School District property on the south side of the street. This option would acquire the Edmonds School District property and five residential properties to the south.

Alternatives B1 and B4 would not affect any residential properties and would only result in two full acquisitions. Alternative B2A would fully acquire five single-family residential properties.

Segment C: Mountlake Terrace to Lynnwood

The Preferred Alternative would not affect any residential properties, but it would impact four commercial properties, resulting in the displacement of nine businesses; one fully acquired parcel has six businesses on it. The Preferred Alternative would cross a portion of an Edmonds School District property, resulting in a partial impact to the property. It would cross a public parcel containing Scriber Creek and related wetlands, resulting in a partial impact to the property, but it would avoid Scriber Creek Park to the north. The Preferred Alternative also would cross a transmission line right-of-way owned by the Snohomish County Public Utilities District, which is used as part of the Interurban Trail; the crossing would be a partial impact to the property.

Alternative C1 would affect the most properties of any alternative in Segment C. It would acquire all of the Cedar Creek Condominium buildings, requiring 76 residential relocations. It would also fully acquire two office park properties, displacing 31 businesses, and it would acquire a strip of land from Scriber Creek Park.

Alternative C2 would displace three businesses and Alternative C3 would displace one business.

All Segment C alternatives would partially impact an Edmonds School District property, but to varying degrees. The Preferred Alternative would cross the eastern part of the property.

4.1.3 Construction Impacts

During construction, property will be needed in each segment for staging areas, construction access, and temporary construction easements. Most of these construction needs would be accommodated within property required for permanent rights-of-way, although some other properties would be needed. Many staging and access requirements could be fulfilled through temporary construction easements or leases, but some full acquisitions are still likely.

A temporary construction easement allows for temporary use of a property during construction. When construction is complete, the property is restored to its previous condition for the owner and the easement is terminated. Such easements would be necessary at various locations along the project corridor. The size of the easement would depend on the type of activity expected on the property and the type of land uses in the area; for example, a vacant property would provide an opportunity for a larger easement, whereas easements adjacent to developed property likely would be smaller to reduce or avoid impacts.

Off-site staging areas might be needed to stockpile excavated materials or to cast and store precast structural elements. These areas would be located close to work sites, when possible, to minimize the impact on local traffic.

The construction staging areas would primarily be adjacent to the proposed alignments. The project would use WSDOT right-of-way for construction staging where feasible and approved by FHWA and WSDOT, and could use other available lands on a temporary basis, including parts of city street rights-of-way.

As project design and construction planning are finalized, Sound Transit may identify the need for additional construction staging areas outside of the proposed project's right-of-way, requiring the acquisition of additional property. Contractors may also negotiate use of additional property directly with the property owner. Proposed staging areas are shown in Appendix F, Conceptual Plans.

4.1.4 Indirect Impacts

The project's property impacts resulting from acquisitions, displacements, and relocations would be direct. There could also be indirect impacts associated with the change in land use, as a property currently used for residential is converted to a transportation use. Acquired property could also accommodate transit-oriented developments, consistent with Sound Transit policy and local planning requirements. Sound Transit anticipates the project would fully acquire both the

Mountlake Terrace Transit Center and Lynnwood Transit Center and park-and-ride properties for this project. These properties would retain their transportation use, but they could also accommodate future transit-oriented developments. The potential indirect or secondary impacts due to transit-oriented development are discussed in more detail in Section 4.2.4, in the Land Use section of this Final EIS.

4.1.5 Cumulative Impacts

Other projects could result in additional property acquisitions and displacements in the vicinity of the Lynnwood Link Extension. Sound Transit's Northgate Link Extension from the University District to the Northgate Transit Center is acquiring property for permanent facilities and construction activities. Most of these acquisitions and easements are expected to be completed before the Lynnwood Link Extension begins construction, although in some areas early work for the Lynnwood Link Extension could use them as well. Sound Transit's Long-Range Plan also anticipates future projects to extend light rail north to Everett, which could affect properties to the north of the terminus for the Lynnwood Link Extension in Segment C. The properties that could be affected would differ by alternative in Segment C. The final design for the Lynnwood Link Extension, as well as the design for any future project, would also determine the properties potentially affected.

Additionally, Sound Transit is completing the environmental review for a separate project to develop an OMSF. One of the alternatives is in Lynnwood, on lands adjacent to the Segment C alternatives. If the Lynnwood site is developed for the maintenance facility, additional properties would be affected within the city, including the majority of the parcel owned by the Edmonds School District. In July 2014, the Sound Transit Board identified a site in Bellevue as the Preferred Alternative. The final decision on the location for the OMSF will be made after the publication of that project's Final EIS in 2015.

Otherwise, there are few sizable public or private projects in the project vicinity that would acquire properties and displace their uses; the King County Transit-Oriented Development at Thornton Place (Northgate) may be a project to note, but there are no specific development plans at this time. See Appendix H, Other Projects and Actions Considered in Cumulative Effects, for a list of other projects that could result in acquisitions and displacements in the vicinity of the Lynnwood Link Extension. Changes in property ownership due to other developments would be more likely to occur over time as market transactions take place.

4.1.6 Relocation Opportunities

To determine relocation opportunities in the project vicinity, Sound Transit researched market conditions for available residential and commercial real estate in the study area. As shown in Table 4.1-3, the research considered real estate markets within Shoreline, Mountlake Terrace, Lynnwood, and north Seattle; these areas offer the most likely relocation opportunities in the study area. Although property availability will change over time, the research indicates that there would be adequate opportunities for residents and businesses to successfully relocate within the general area, typically within the same city. Some affected properties with unique characteristics or uses (such as a property with school district uses) could prove more challenging to replace.

Table 4.1-3. Property Available for Relocation in the Study Area[a]

Type of Property	Buildings/Units	Total Square Feet[b]	Vacancy Rate[c]	Listings[d] (2014)
Apartment	31,291	—	3%	517
Single Family	86,326	—	—	456
Office	440	6,600,000	11%	33
Industrial	280	4,700,000	5%	14
Retail	1,120	16,800,000	4%	39
Hotel	36	1,400,000	—	0

[a] The study area is Shoreline, Mountlake Terrace, Lynnwood, and north Seattle (the southern boundary of north Seattle varies by market segment, and is variably the Ship Canal, NE 65th Street, or NE 85th Street).
[b] Square feet amounts rounded to nearest 1,000.
[c] Vacancy rate as of May 30, 2014, rounded to the nearest 1 percent.
[d] Number of listings as of May 30, 2014.
Sources: Costar, Dupre+Scott, NWMLS, 2014, Kidder Matthews.

The relocation of a business or residence is an inconvenience or hardship for those involved. Sound Transit would offer relocation assistance that includes compensation as well as supporting services that consider the unique needs of those being relocated, and this assistance can help reduce inconveniences or hardships. Finally, Sound Transit is required to satisfy federal requirements for residential relocation, which define a "comparable replacement dwelling" as any dwelling that is (A) decent, safe, and sanitary; (B) adequate in size to accommodate the occupants; (C) within the financial means of the displaced person; (D) functionally equivalent; (E) in an area not subject to unreasonable adverse environmental conditions; and (F) in a location generally not less desirable than the location of the displaced person's dwelling with respect to public utilities, facilities, services, and the displaced person's place of employment (42 United States Code [USC] 61).

Apartments

There are approximately 31,000 apartment units in the study area.[1] With the current vacancy rate at about 3 percent, there are about 517 available apartment units for rent along the project corridor. For displaced tenants, a sufficient supply of comparable relocation apartments is expected to be available in various locations and building types within the study area. Finding similar reasonably priced replacement property for some owners of properties with unique uses in the proximity of the displaced property may prove challenging. However, Sound Transit would provide relocation assistance and compensation; owners would be able to choose their replacement property, or they could take compensation entirely.

Single Family

There is a reasonable supply of comparable single-family homes available to meet the relocation needs of single-family home residents displaced by the project. While the local inventory for comparable homes can be limited, this does not alter Sound Transit's obligation to find replacement properties and to provide compensation and relocation assistance to ensure the properties are affordable for the displaced parties. The inventory of condominiums and townhouses is smaller, but it is also expected to be adequate for the project's relocation needs.

Office

A review of the market found sufficient office buildings available for sale each year to replace displaced buildings. A substantial amount of space is also available for lease each year to meet the needs of displaced office tenants. In addition, vacant land and underutilized properties are available for the construction of new office buildings, which can provide additional capacity.

Industrial

Adequate industrial space is available in the market to meet the needs of the few industrial building owners and tenants that would be displaced by the project. The industrial market in the study area is stable; however, the area is becoming increasingly urbanized and market forces will encourage industrial uses to give way to other uses over time. In the future, those seeking relocation opportunities for industrial space in the study area will have fewer choices.

[1] The increase in total unit count from the Draft EIS is due to a change in methodology, which included more apartment buildings in the inventory data.

Retail

Research suggests there is a substantial amount of retail space for sale and for lease to meet the relocation needs of retailers displaced by the project. Retail space users often have specific location requirements; therefore, Sound Transit would perform a case-by-case assessment to understand how the available inventory could meet the displaced retailer's needs.

Hotels

Displaced hotel property owners would have to find a property that is for sale or a substitute site on which to construct a new hotel. The study area has 36 hotels, generally located along the I-5 and SR 99 corridors. Hotels do come up for sale, but the likelihood is probably low of finding an available property matching the location requirements and physical characteristics of the displaced property. New development sites exist and may provide the best opportunity to replace an existing hotel.

4.1.7 Sound Transit Real Property Acquisition and Relocation Policy, Procedures, and Guidelines Summary

Sound Transit notified property owners whose property would be directly affected by any of the alternatives, but acquisitions of property would begin only after the Final EIS and NEPA/SEPA processes are complete. The agency is available to answer questions and provide additional information about compensation and relocation assistance services, payments, reimbursement eligibility, and the timing of the process. Sound Transit's relocation assistance and advisory services would include, but not be limited to, measures, facilities, or services that might be necessary or appropriate to determine the relocation needs and preferences of each household, business, and organization to be displaced. The agency also would provide current information on the availability, purchase prices, and rental costs of comparable replacement properties.

Sound Transit would work closely and proactively with residents and businesses to help them plan ahead for relocation, assist in finding new homes or sites, and help to solve problems that might occur. While the ultimate choice of a relocation site would be decided by the affected resident or business, the agency would help investigate possible locations, including nearby properties. Sound Transit uses interpreters to help those with limited English proficiency understand their choices and options.

Owners would not be required to relocate until they have been paid the agreed purchase price or until an amount equal to Sound Transit's estimate of just compensation has been deposited with the court. Businesses and tenants would

not be required to move operations or relocate without receiving at least 90 days written notice.

A public agency must pay "just compensation" to property owners for land and improvements acquired for public purposes. "Just compensation" must not be less than the fair market value of the property acquired, including damages or benefits to the remaining property in the case of partial acquisitions.

Sound Transit would pay for normal expenses of sale, including escrow fees, title insurance, prepayment penalties, mortgage release fees, recording fees, and typical costs incurred as part of conveying title.

Other benefits and compensation might include payment of residential moving expenses and replacement housing payments, non-residential moving expenses, and reestablishment expenses. Sound Transit's *Business and Residential Acquisition and Relocation* handbooks outline compensation and acquisition procedures in detail.

If Sound Transit recognizes special circumstances, proactive help would be made available to help resolve problems.

4.1.8 Mitigation Measures

For property that is permanently or temporarily acquired for this project, Sound Transit would compensate property owners affected by the project, according to the provisions specified in Sound Transit's Real Estate Property Acquisition and Relocation Policy, Procedures, and Guidelines; the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended; and the state of Washington's relocation and property acquisition law and regulations. Benefits would vary by property depending on the level of impact, available relocation options, and other factors. The primary mitigation for acquisitions and displacements would be payment of just compensation and relocation assistance.

For temporary construction easements, in addition to just compensation, the property would be restored to its previous condition for the owner and/or another type of compensation would be employed as outlined during the easement's negotiation process.

If federally designated highway beautification areas are converted for project rights-of-way, Sound Transit will mitigate for these impacts by providing property along I-5 to replace the converted beautification areas, or with other measures as agreed by WSDOT and FHWA.

4.2 Land Use

This section discusses existing land uses and zoning (i.e., allowable land uses), describes changes in land use that could occur as a result of the Lynnwood Link Extension alternatives, and evaluates the consistency of the project with local and regional planning policies.

The land use study area for this EIS consists of the parcels immediately adjacent to the proposed alternative routes and within a 0.50-mile radius around the stations.

For this evaluation, the project was evaluated for land use compatibility and conformance with existing land use policies of regional and state plans, and locally adopted plans listed in Table 4.2-1. Appendix I-4.2, Land Use Plan Consistency Analysis, discusses the regional, state, and local land use plans and policies pertaining to the study area.

Table 4.2-1. Locally Adopted Plans and Policies

City of Seattle
City of Seattle Comprehensive Plan, 2009a (update expected 2016)
City of Seattle Transportation Strategic Plan, 2005
Seattle Department of Transportation Northgate Coordinated Transportation Investment Plan, 2006
Seattle Pedestrian Master Plan, 2009b
Seattle Bicycle Master Plan, 2014
City of Seattle Transit Master Plan, 2012
City of Shoreline
City of Shoreline Comprehensive Plan, 2012a (update expected 2015)
City of Shoreline Southeast Neighborhoods Subarea Plan, 2010
City of Shoreline Transportation Master Plan, 2011a
City of Shoreline Environmental Sustainability Strategy, 2008
City of Shoreline Light Rail Guiding Principles, 2011b
City of Shoreline 145th Street Subarea Plan (expected 2015)
City of Shoreline 185th Street Station Subarea Plan (expected 2015)
City of Mountlake Terrace
City of Mountlake Terrace Comprehensive Plan, 2011 (update expected 2015)
Mountlake Terrace Town Center Design Standards, 2008a
Mountlake Terrace Freeway/Tourist District Design Standards, 2010a
Mountlake Terrace Multifamily Design Standards, 2010b
Mountlake Terrace Economic Vitality Strategy, 2008b
Mountlake Terrace Sustainability Strategy, 2008c
Mountlake Terrace Transit-Oriented Development Study, 2003
Mountlake Terrace Transit Service Strategy, 2010c
Melody Hill Subarea Plan, 2006
City of Lynnwood
City of Lynnwood Comprehensive Plan, 2011 (update expected 2015)
Lynnwood City Center Access Study, 2007
Lynnwood City Center Sub-Area Plan, 2005
Lynnwood City Center Design Guidelines, 2012
City of Lynnwood Mode Split for City Center Street Master Plan, 2009a
Lynnwood City Center Street Master Plan, 2009b
Lynnwood Local Improvement District (LID) Feasibility Study, 2008

4.2.1 Affected Environment

The project corridor is located within King and Snohomish counties, and the alternatives would have stations in four cities (Seattle, Shoreline, Mountlake Terrace, and Lynnwood). Existing land uses include single-family and multifamily residential, commercial (retail, services, and office uses), institutional, light industrial, and transportation uses. Many recreational and public open space uses are in the study area. Section 4.17, Parks and Recreational Resources, provides more information. The project would not affect any farm land.

The Growth Management Act (GMA) requires state and local governments to identify and protect critical areas and natural resource lands, designate urban growth areas, and prepare comprehensive plans and implement them through capital investments and development regulations. The project is within the urban growth boundaries identified by King and Snohomish counties.

PSRC's *VISION 2040*, adopted in 2009, articulates the region's integrated long-range growth management strategy. Its strategy is to guide growth, concentrate new employment in urban centers, and link the centers with a high-quality multimodal transportation system. Urban centers are the hallmark of *VISION 2040* and its regional growth strategy. Northgate and Lynnwood have been designated as regional growth centers for housing, employment, and public services growth, as well as for multimodal transportation connections and regional funding.

The following subsections describe existing land uses for each project segment. Future allowable land uses are presented as generalized zoning in Figures 4.2-1a and 4.2-1b. Existing land use and future allowable land uses are based on information from comprehensive plans and planning documents for the cities of Seattle, Shoreline, Mountlake Terrace, and Lynnwood. Section 4.3, Economics, includes information on projected residential units and business employment within 0.50 mile of the proposed stations.

Segment A: Seattle to Shoreline

Segment A begins in the Northgate area. Northgate consists of a regional shopping center and a mix of other urban uses, such as multifamily residential and commercial usage. The Northgate Apartments multifamily residential complex is just north of the shopping center. North of North 115th Street, the area is predominantly single-family residential. Several large public parks and open spaces are in Segment A, as well as several small commercial areas primarily east of I-5, generally along 15th Avenue NE.

Other larger parcels or unique uses in Segment A include the Lakeside School, the Seattle Latvian Evangelical Lutheran Church, the Shoreline Fire Station, the King County solid waste transfer facility, the King County Metro bus base, and Shoreline Center, which is part of a complex owned and operated by the Shoreline School District.

Much of the area along the alignment is otherwise residential, with little commercial uses. While the City of Seattle's policy is to consider transit-oriented development in areas with transit investments, it currently does not have specific plans or policies supporting transit-oriented development at the proposed NE 130th Street or NE 145th Street station locations.

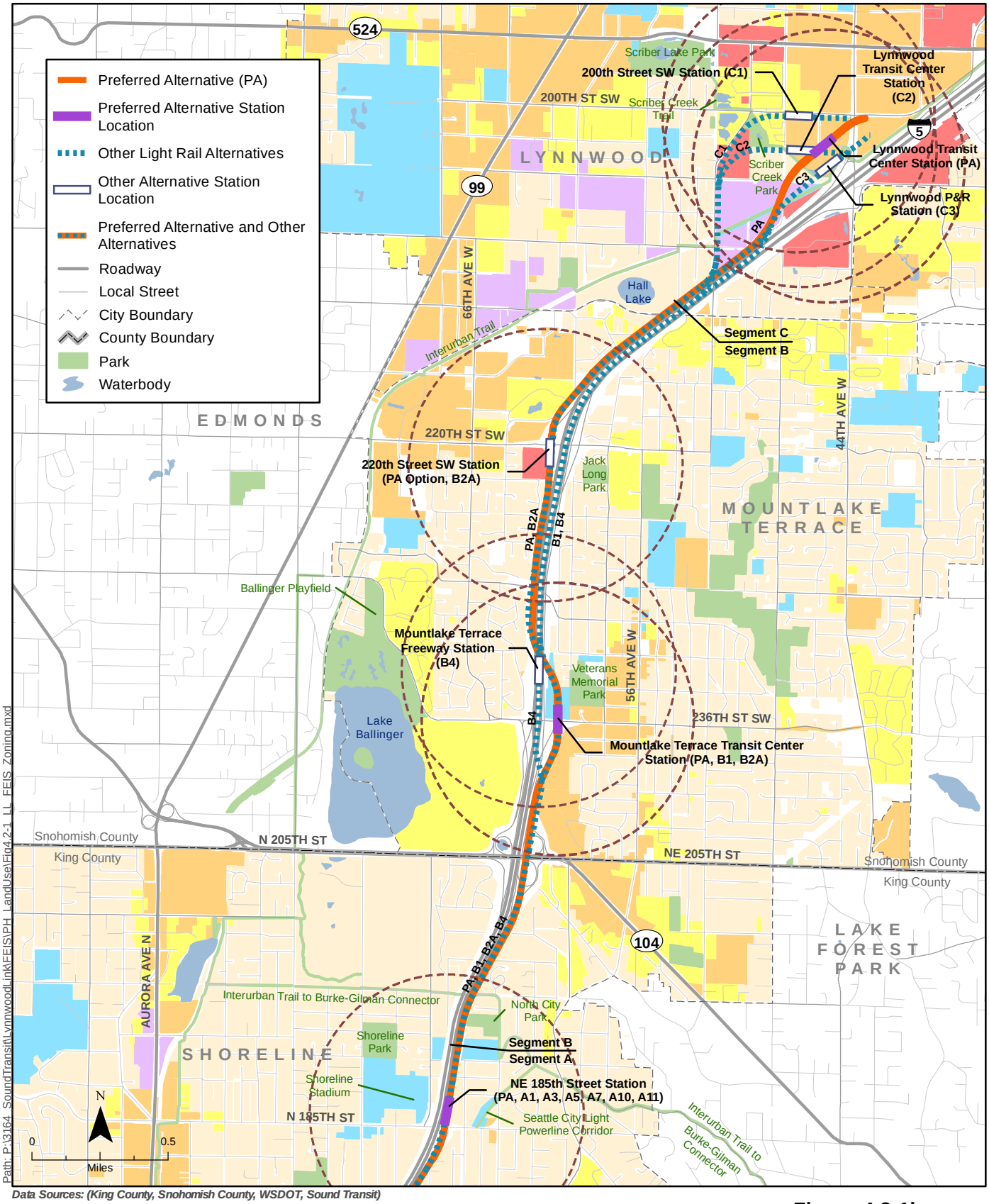
Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

Generalized Zoning

- Commercial
- Industrial/Warehouse
- Institutional/Public
- 1/2 Mile Station Study Area
- Single Family Residential
- Multi Family Residential
- Mixed Use (Residential/Commercial)

Figure 4.2-1a
Generalized Zoning
Segment A

Lynnwood Link Extension



Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_LandUse\Fig4.2-1_LL_FEIS_Zoning.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

Generalized Zoning

- Commercial
- Industrial/Warehouse
- Institutional/Public
- 1/2 Mile Station Study Area
- Single Family Residential
- Multi Family Residential
- Mixed Use (Residential/Commercial)

Figure 4.2-1b
Generalized Zoning
Segments B and C

Lynnwood Link Extension

The City of Shoreline's *Comprehensive Plan*, Land Use Element, provides policy direction for the City as it coordinates with Sound Transit on the proposed project and describes how land uses around station areas could help foster vibrant, livable, and transit-oriented communities. The land use policies are to guide land use regulations for station areas at NE 145th Street and NE 185th Street, including transit-supportive developments with residential components mixed with complementary commercial and office uses. In 2014, Shoreline prepared a subarea plan for the NE 185th Street Station area to help further define development policies for that area. A similar effort is underway for the NE 145th Street Station area. Comprehensive plan amendments for both plans and potential zoning changes are anticipated to be adopted in 2015.

Segment B: Shoreline to Mountlake Terrace

Most of Segment B consists of single-family residential communities, with interspersed areas of multifamily residential, commercial, recreational, and open space uses. The Shoreline School District has properties along the west side of I-5 between NE 185th Street and NE 191st Street, straddling Segments A and B, as well as along the east side of I-5 between NE 191st Street and NE 194th Street. Adjacent to the Shoreline School District property to the east of I-5 is a park and the single-family residential neighborhood along NE 194th Street. A pedestrian/bicycle overpass at NE 195th Street links neighborhoods east and west of I-5. The SR 104/I-5 interchange area east of I-5 consists of a shopping center and mixed multifamily residential and commercial uses.

The Mountlake Terrace Transit Center is east of I-5 at 236th Street SW. The Mountlake Terrace Town Center is along the 236th Street SW corridor to the east, and consists of a mix of uses such as multifamily residential and commercial. A park is located near the transit center, and single-family residences surround much of the area. Businesses surrounded by small parking lots are predominant. A vacant Edmonds School District property is south of the transit center and 236th Street SW. This area was recently rezoned to allow greater density, including mixed-use development. North to 220th Street SW, the land uses to the west are initially single-family residential and then mostly commercial and multifamily, while the east side of I-5 is mostly single-family residential, with interspersed multifamily residential use. The City of Mountlake Terrace identifies the intersection of 220th Street SW and 66th Avenue West as the commercial center node that will include increased pedestrian access to surrounding areas.

Mountlake Terrace has adopted a form-based code for its town center that consists of six "districts." The central district allows mixed-use development up to seven stories high. Adjacent zones step down to transition to the existing single-family neighborhoods. The City has design standards for all new development in the town center.

Segment C: Mountlake Terrace to Lynnwood

Segment C is entirely within the Lynnwood city limits. Single-family residential use predominates in the south up to the Mountlake Terrace city limit, and then transitions to a mix of uses that includes commercial use northwest of I-5 and Alderwood Mall. Industrial uses occupy the west side of I-5 between 204th Street SW and 208th Street SW.

Segment C ends in the Lynnwood City Center, inside of the PSRC-designated regional growth center. The area is anticipated to accommodate much of the growth between Northgate and Everett with commercial, industrial, and residential uses. Most of the existing commercial uses are automobile-dependent businesses set back from the street frontage surrounded by surface parking lots. Buildings range from small single businesses to "big-box" retail and strip malls. Most of the residential uses are north and west of the city center in a mix of multifamily developments and single-family neighborhoods. Except for Group Health and the parcel owned by the Edmonds School District west of the city center, there are no major institutions in Segment C. The Edmonds School District's plans for its property include administrative buildings and a bus maintenance and storage facility.

Lynnwood's zoning regulations and design guidelines support a high-density neighborhood near the existing Lynnwood Transit Center, which is composed of three districts. The types of use permitted vary among the districts. All Segment C station alternatives are located in the "City Center West" zone, envisioned to have a mix of residential, retail, restaurant, office, and high-density housing. The tail track of the Preferred Alternative and Alternative C3 would cross 44th Avenue West into the higher-density "City Center Core" zone.

4.2.2 Long-Term Impacts

This section discusses Lynnwood Link Extension's consistency with land use plans and policies, and then describes each alternative's potential impacts on the existing and future land use patterns. Direct land use impacts would occur in locations where the light rail alternatives would require private or public property acquisitions for the proposed project facilities (e.g., alignment, stations, parking lots or structures, traction power substations, and stormwater control). These property acquisitions would convert property to a transportation-related use. Direct impacts also include proximity impacts (e.g., traffic, noise, and visual impacts) that could cause changes in adjacent land uses.

Sound Transit's property acquisitions are detailed in Section 4.1, Acquisitions, Displacements, and Relocations. This land use analysis also considers findings from other environmental elements, including Chapter 3, Transportation Impacts and Mitigation, and Sections 4.3, Economics; 4.5, Visual and Aesthetic Resources;

4.6, Air Quality and Greenhouse Gases; 4.7, Noise and Vibration; and 4.17, Parks and Recreational Resources.

No Build Alternative

The No Build Alternative includes the existing transportation system and future population and employment growth assumed in adopted plans, but without the Lynnwood Link Extension. No property would be acquired; as a result, existing land use patterns and types of land uses along the study corridor would not change in the immediate future. Planned and proposed development projects within the study corridor would continue to move through the local government permitting procedures and would be constructed.

The alternative would be inconsistent with portions of the regional land use and transportation policies that call for a mass transit system connecting the region's highest growth centers, including the Northgate Mall and the Lynnwood city center. Future development could still be allowed consistent with adopted plans, policies, and land use regulations current at the time development projects receive government approvals. However, before local jurisdictions could approve developments, they must meet transportation and land use concurrency requirements of the GMA by showing that the transportation system could accommodate the increased transportation demand of new developments. Under the No Build Alternative, a major transportation investment in the local and regional plans assumed to accommodate increased transportation demand would not be in place. Other related regional and local land use plan elements calling for communities to be developed in a more walkable, bikeable, and transit-oriented way also would not occur as envisioned.

Long-Term Impacts Common to All Light Rail Alternatives

This subsection evaluates the consistency of the light rail alternatives with land use plans and policies. It identifies, by project segment, direct impacts common to all the light rail alternatives, common indirect impacts related to transit-oriented development, and direct and indirect impacts of individual alternatives. These assessments are based on existing land use patterns and current zoning along the project corridor and within station areas.

Consistency with Land Use Plans and Policies

Regional, state, and local land use plans in the study area share the goal of improving transit accessibility and encouraging transit use. The Lynnwood Link Extension would connect employment centers and provide for uninterrupted transit access among the four jurisdictions in the project corridor. Sound Transit reviewed regional, state, local, and major institution master plans to determine whether the project would be consistent with the applicable goals and policies.

All light rail alternatives would support long-range planning and growth management to varying degrees. Local plans support Vision 2040's strategy of building on current growth management plans; directing future development generally into urban growth areas and focusing new housing and jobs in cities, particularly in the designated regional growth centers. The Preferred Alternative is generally consistent with regional and local plans and policies in the study area. Some of the other light rail alternatives have alignments or features that are less consistent with some aspects of local policies. However, at the regional level, all the light rail alternatives would provide a regional transit system serving a growing transportation need in planned high-density areas. Also, PSRC's *Growing Transit Communities Strategy* (2013), which reviewed several of the region's major transit corridors, including the "North Corridor" extending from Seattle to Everett, describes regional and local actions to encourage more housing, employment, and services close to major transit investments.

Connecting Lynnwood to other designated regional growth centers, such as downtown Seattle and, eventually, Everett, is a Sound Transit Long-Range Plan goal as well as an integral component of PSRC's *Transportation 2040*. Local land use planning documents focus on the types of land uses permitted within zones and the scale to which development is allowed within these zones.

The Lynnwood Link Extension would increase transit levels of service and linkages with other jurisdictions and regional destinations. In station areas such as at NE 145th Street and NE 185th Street, potential comprehensive plan and zoning changes by the City of Shoreline could result in more intensive land uses and economic development around those proposed stations. Most mixed-use developments would include residential and commercial uses rather than industrial or larger commercial developments. All stations would help serve existing land uses with improved mobility options.

In areas where the local jurisdictions have policies to leverage the increased mobility of light rail with higher development density (including mid- and high-density mixed use), also known as transit-oriented development, the Lynnwood Link Extension would support their goals and policies. In station areas outside of the I-5 right-of-way, local zoning might allow commercial uses to be included in transit parking structures.

The Lynnwood Link Extension is an essential public facility under the GMA; therefore, when Sound Transit's routing decision has been finalized, Seattle, Shoreline, Mountlake Terrace, and Lynnwood would have a "duty to accommodate" the project in their comprehensive plans.

All light rail alternatives would be consistent with the relevant plans and policies of the City of Seattle. The City's plans and policies focus future growth and developments into areas designated as urban villages and are supportive of high-capacity transit service to and from urban villages.

In 2012, the Shoreline City Council updated its *Comprehensive Plan*, with several station area planning policies as part of the update. These policies would support developments with residential components mixed with complementary commercial and office uses. The NE 145th Street Station subarea planning is underway, with the Draft EIS issued in January 2015. The 185th Street Station Subarea Planned Action Final EIS was issued in November 2014. Both are expected to result in *Comprehensive Plan* amendments and potential zoning changes for these station subareas later in 2015.

Lynnwood and Mountlake Terrace have policies that support more intensive land uses and economic development around the proposed stations, and both are preparing for regional transit improvements in their station areas. Both are either in the process or have recently amended their comprehensive and neighborhood plans to allow a greater density and mixture of land uses near the proposed stations. All light rail alternatives are generally consistent with the plans and policies of Lynnwood and Mountlake Terrace, except that Alternative B4 would be inconsistent with Goal 8 of the Mountlake Terrace Transit Service Strategy because it would close the freeway bus station.

Consistent with Lynnwood's designation as a regional growth center, the City has developed a vision and adopted plans and policies to achieve regional growth targets with a specific focus on the city center. The City completed a *City Center Sub-Area Plan* in 2005 with the following objective: "…to create within 20 years, a compact, intense and lively city center that offers Lynnwood new opportunities for culture, commerce and habitation."

The Lynnwood Link Extension would assist the project corridor cities in achieving their desired land use changes and densities. Further information on the project's consistency with plans, goals, and policies is provided in Appendix I-4.2.

Changes in Land Use

All light rail alternatives would acquire properties to build the Lynnwood Link Extension, as shown in Table 4.2-2. The Preferred Alternative would acquire an estimated 35 acres compared to a range from 20 to 38 acres considering all of the combinations of the light rail alternatives. Property acquisitions are detailed in Section 4.1 and Appendix I-4.1, Acquisitions, Displacements and Relocations. Although property acquisitions, displacements, and the conversion of land use would occur prior to construction, they are not considered a construction impact because of their long-term effects. Any acquisition of property would convert existing land uses to public right-of-way (which is a transportation-related use) for construction and operation of the Lynnwood Link Extension (i.e., staging areas, light rail track, stations, traction power substations, and parking facilities).

Table 4.2-2. Estimated Area of Acquisitions by Current Land Use (in acres)

	Land Use[a]							
Alternatives	**Commercial**	**Industrial**	**Institutional**	**Multifamily**	**Public[b]**	**Single Family**	**Vacant**	**Total**
PA-A	<0.1	-	0.4	<0.1	1.8	9.6	-	**12.0**
A1	<0.1	-	0.3	-	0.6	8.8	-	**9.8**
A3	<0.1	-	0.3	<0.1	0.4	8.8	-	**9.7**
A5	<0.1	-	0.3	<0.1	3.0	9.7	-	**13.2**
A7	<0.1	-	0.3	<0.1	0.6	9.0	-	**10.1**
A10	<0.1	-	0.3	<0.1	<0.1	10.6	-	**11.2**
A11	<0.1	-	0.3	<0.1	0.4	8.8	-	**9.7**
PA-B	-	-	0.6	-	6.8	0.6	0.8	**8.7**
B1	-	-	0.5	-	3.3	-	0.4	**4.2**
B2A	<0.1	-	0.5	-	3.4	0.5	0.9	**5.3**
B4	<0.1	-	0.2	-	-	-	0.4	**0.7**
PA-C	5.6	1.2	-	-	7.6	<0.1	-	**14.5**
C1	5.5	3.3	-	0.8	0.6	<0.1	-	**10.3**
C2	-	3.6	-	<0.1	5.6	<0.1	-	**9.4**
C3	5.2	1.2	-	-	9.4	<0.1	-	**15.9**

[a] Land use designations developed from King County and Snohomish County assessor data.

[b] Does not include use of WSDOT property.

PA-A = Preferred Alternative for Segment A; PA-B = Preferred Alternative for Segment B; PA-C = Preferred Alternative for Segment C.

The land to be acquired would constitute only a small portion of the total land use for each category in the project vicinity and would not materially change the regional or local land use or development patterns. Following construction, remnant land originally purchased from private property owners that would not be needed for operation of the project could be made available for redevelopment consistent with local zoning. Visual and noise impacts, after mitigation, would not be at levels that would alter existing or planned future land uses.

Table 4.1-1 in Section 4.1, Acquisitions, Displacements, and Relocations, shows how many parcels in each alternative would be converted to a transportation-related use. The totals represent the number of affected parcels outside the existing transportation rights-of-way, based on conceptual design.

The development and redevelopment potential in station areas is discussed later in this section under Section 4.2.4, Indirect Impacts.

Segment A: Seattle to Shoreline

For all light rail alternatives, the conversion of properties to a transportation use for the Preferred Alternative would not markedly alter the predominant pattern of single-family land use in Segment A.

Most of the full property acquisitions in Segment A would be single-family residences. The total single-family acquisitions would range from about 8 acres to

about 10 acres, depending on the alternative. However, multifamily residential and commercial properties would also be affected. Alternative A5 would affect the most property in this segment, followed by the Preferred Alternative. Most of the affected properties would be single-family residential or parts of the I-5 right-of-way. Alternatives A3 and A11 would generally affect the least area; however, the alternatives overall would affect similar amounts and types of property.

All Segment A alternatives would realign 3rd Avenue NE in the vicinity of NE 117th Street, which would maintain access to the Seattle Latvian Evangelical Lutheran Church.

Preferred Alternative: At-grade/Elevated with NE 145th and NE 185th Stations

The Preferred Alternative would affect a similar number of single-family properties as the other Segment A alternatives.

There is an established residential neighborhood to the north and east, and a public golf course to the south of the proposed NE 145th Street Station site. The station would not alter these land uses. Shoreline's *Comprehensive Plan* and current planning encourage light rail in this area, which is consistent with City policies.

The Preferred Alternative has an optional station at NE 130th Street; this would not require more property acquisitions. With largely residential and some recreational and public land uses surrounding the station, there is a low potential for the station to change land use characteristics.

The City of Shoreline adopted policies supporting transit-oriented development as part of its updated 2012 *Comprehensive Plan,* in which the area around NE 145th Street is designated as a Light Rail Station Study Area. The plan allows redevelopment of existing land use north of NE 145th Street. The City's 145th Station subarea planning effort included a Draft EIS that was released in 2014.

With the NE 185th Street Station Option 1, the at-grade station would be east of I-5 and a park-and-ride facility in the WSDOT right-of-way west of I-5. The areas surrounding the station are largely residential, and the parking structure west of I-5 would be adjacent to the Shoreline Conference Center. No land use impacts are anticipated. The Preferred Alternative also has a NE 185th Street Station Shoreline Stadium Garage Option, which would place the parking garage on the current Shoreline Stadium parking lot. Both of these NE 185th Shoreline Stadium parking configurations would be consistent with the City's plans.

Alternative A1: At-grade/Elevated with NE 145th and NE 185th Stations

Alternative A1 would affect primarily single-family residential parcels but require fewer full single-family property acquisitions than most of the other alternatives.

Changes in land use are expected to be similar to those described above for the Preferred Alternative, except that the NE 145th Street Station Option 1 would acquire a row of single-family residences to accommodate a three-story parking structure for about 500 vehicles. The single-family residences to be acquired are along the south boundary of the neighborhood, and the conversion of properties to a transportation use would not markedly alter the predominant pattern of single-family land use.

Alternative A3: Mostly Elevated with NE 145th and NE 185th Stations

Alternative A3 is similar to Alternative A1, but is a mostly elevated profile alignment to NE 145th Street.

Land use impacts resulting from the NE 145th Street Station Option 2 or NE 185th Street Station Option 2 would be similar to those under the Preferred Alternative. While the stations differ in the number of residential properties displaced, changes in land use are expected to be similar to those described for the Preferred Alternative.

Alternative A5: At-grade/Elevated with NE 130th, NE 155th, and NE 185th Stations

Alternative A5 is similar to Alternatives A1 and A3 but would have different station sites in its southern section, and a different site configuration for the station at NE 185th Street. It would have the most full single-family property acquisitions among Segment A alternatives, largely from the at-grade alignment and the need for land to accommodate three stations.

The NE 130th Street Station Option 1 is along the western boundary of a residential area where no property acquisitions would occur. It is also west of 5th Avenue NE. Because of the physical boundary of 5th Avenue NE and the mostly single-family residential surroundings, the station would not directly change land use and development patterns in the area.

The NE 155th Street Station would include a parking structure that would displace single-family residences. The potential is low for the station to cause additional changes in land use and development patterns. The City of Shoreline has not designated this area as a Light Rail Station Study Area in its *Comprehensive Plan's* Land Use Element.

The NE 185th Street Station Option 3 would have land use impacts similar to the NE 185th Street Station with Alternative A3, except for the areas used for parking under the Seattle City Light transmission line.

Alternative A7: Mostly Elevated with NE 130th, NE 155th, and NE 185th Stations

Alternative A7 is similar to Alternative A5, but with a mostly elevated profile alignment to NE 145th Street. Property impacts would mostly involve single-family residential properties along the alignment and at station areas, with Alternative A7 in the middle of the range for impacts from Segment A alternatives.

The effects by station would be similar to Alternative A5 for the NE 130th Street Station Option 2, but Alternative A7 would avoid any residential displacement. The effects of the NE 155th Street Station would be the same as under Alternative A5, where residential displacements and the park-and-ride would be the primary changes in land use. For the NE 185th Street Station Option 2, the long-term impacts of Alternative A7 would be the same as described for Alternative A3 and would primarily be from acquiring land for the station and park-and-ride facility.

Alternative A10: At-grade/Elevated with NE 130th, NE 145th, and NE 185th Stations

Alternative A10 is similar to Alternative A1 up to NE 130th Street, then it is similar to Alternative A5. It would affect more properties than most of the other Segment A alternatives, in part because it would have three stations and more at-grade sections, which require more land.

The NE 130th Street Station Option 1 effects would be low with Alternative A10, as with Alternative A5. The NE 145th Street Station Option 1 would be the same as described for Alternative A1. The NE 185th Street Station Option 3 with Alternative A10 would have impacts similar to those described for Alternative A1. These effects would involve an at-grade station in a residential neighborhood adjacent to I-5 and parking areas that would displace residential properties and use the Seattle City Light transmission line right-of-way.

Alternative A11: Mostly Elevated with NE 130th, NE 145th, and NE 185th Stations

Alternative A11 is similar to Alternative A3, except that a NE 130th Street Station would be included. Alternative A11 would have the same level of impact on properties as Alternative A3; displaced uses would be single-family properties. Alternative A11 land use effects would be similar to those described for Alternative A3 because the NE 130th Street Station would have limited land use effects.

Segment B: Shoreline to Mountlake Terrace

Segment B would cause fewer property acquisitions and related changes to land use than Segment A, largely because Segment B has more available right-of-way to use along I-5. A small amount of single-family land use and vacant land would also be

converted to transportation-related uses. None of the light rail alternatives would alter the predominant pattern of single-family development in the area.

Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side

Much of the Preferred Alternative is within the interstate right-of-way, with relatively few direct impacts to individual properties.

An elevated station at the Mountlake Terrace Transit Center would be east of the existing parking structure, straddling 236th Street SW, and would serve the Mountlake Terrace Transit Center and park-and-ride. A small amount of institutional and public property would be acquired, mostly south of 236th Street SW, and converted to transportation use, but no displacements would occur.

The Preferred Alternative would be consistent with the City of Mountlake Terrace plans identifying this station area for future redevelopment as transit-oriented development. The City's *Town Center Plan* includes a civic center and also outlines a vision to spur development in the surrounding area. Land use and zoning have been modified to support this plan. The area south of the station has recently been rezoned to accommodate higher-density development.

The Preferred Alternative would acquire three single-family residences, but would not alter overall land use patterns.

The Preferred Alternative has an option to locate the 220th Street SW Station south of 220th Street SW, on vacant Edmonds School District property, which would require the Edmonds School District property and five residential properties to the south of it.

Alternative B1: East Side to Mountlake Terrace Transit Center to Median

Changes in land use would be similar to the Preferred Alternative. The median alignment reduces property impacts at the north end of the alignment but overall effects on land use would be similar. However, the median alignment would generally preclude a future station at 220th Street SW.

Alternative B2A: East Side to Mountlake Terrace Transit Center to West Side with 220th Street Station North Option

Alternative B2A would have impacts similar to the Preferred Alternative, except that an elevated station would be provided above 220th Street SW with a parking garage for up to 200 vehicles located on the north side of the street, with the access driveway off 60th Avenue West. The station would support the City of Mountlake Terrace's planning goals for higher-density mixed-use development in the area, which has employers such as Premera Blue Cross and the Mountlake Terrace City Hall, as well as numerous nearby multifamily developments east and west of I-5.

Alternative B4: East Side to Mountlake Terrace Freeway Station to Median

Alternative B4 would convert the least amount of land to a transportation use among the Segment B alternatives. It is primarily within the WSDOT right-of-way and would affect only six properties. Except for potential intensification of land uses east of the station area, changes in land use for Alternative B4 would be low.

The Mountlake Terrace Freeway Station would be located on I-5 at the existing flyer stop adjacent to the existing transit center. The freeway station would be extended to the north, retrofitted to accommodate light rail trains, and closed to bus use. This would be inconsistent with Goal 8 of the Mountlake Terrace Transit Service Strategy because it would close the freeway bus station, as discussed in more detail in Appendix I-4.2. The light rail station would be entirely within the median of I-5, with a new pedestrian bridge extending east over I-5 to 232nd Street SW. Small amounts of property would be acquired between I-5 and 232nd Street SW for this connection; however, no displacements would occur. North of the station, the median alignment would generally preclude a future station at 220th Street SW.

Segment C: Mountlake Terrace to Lynnwood

Segment C's proposed stations would be on the east end of the City Center West zone. The subarea plan for this zone includes a dense mix of commercial (office, retail, and service) uses and a concentration of residential units. In Alternative C3 the tail track would cross over 44th Avenue West ending in the City Center Core zone, which accommodates higher-density mixed-use development.

A key difference among the Segment C alternatives is the number of properties affected by acquisitions. The Preferred Alternative would affect 18 parcels with five full acquisitions. Alternative C1 would affect 31 parcels, with six full acquisitions, while Alternative C2 would affect 29 parcels with four full acquisitions, and Alternative C3 would affect 15 parcels with one full acquisition. Most of the acquisitions would be commercial, but multifamily, single-family, and public uses would also be converted. All alternatives would cross an Edmonds School District property, requiring a partial acquisition or easement.

Preferred Alternative: Along I-5 to Lynnwood Park-and-Ride Station

The Preferred Alternative would not displace any residences, but it would acquire one public and institutional parcel and four full commercial parcels north and east of the Lynnwood Transit Center, displacing nine businesses and acquiring parts of several other parcels. It would cross part of a property on which the Edmonds School District plans to develop a school bus base and other district administrative facilities. The elevated guideway would cut across an area planned for bus parking,

which would affect about five bus parking spaces, but circulation and the general layout of the master planned site would be maintained. The alternative would traverse the most southerly portion of Scriber Creek wetland complex. Compared to the original Alternative C3, the Preferred Alternative also would avoid bisecting a large block to the east of 44th Avenue West that the City of Lynnwood has identified for high-density development in its *City Center Sub-Area Plan.*

The Preferred Alternative would reconfigure parts of the existing park-and-ride in order to develop the light rail station and a parking garage. It would feature a plaza connecting to the intersection of 200th Street SW/Alderwood Mall Boulevard/44th Avenue West, nearer to the core of the City Center subarea. A tail track would extend across 44th Avenue West, occupying the front portion of several parcels on the south side of Alderwood Mall Boulevard, including a hotel. While the acquisition of all or part of several properties would change some of these existing land uses, the Preferred Alternative overall would not markedly alter the commercial or high-density residential character in the greater area.

Alternative C1: 52nd Avenue West to 200th Street SW Station

Alternative C1 would affect the most properties of the Segment C alternatives, acquiring all of the Cedar Creek multifamily residential condominium buildings and several single-family properties. This alternative would traverse the far northern portion of Scriber Creek Park, a Section 4(f) resource, converting these lands to a transportation use. This would affect the park but would not impact land use or development character in the Lynnwood City Center Zone area.

Commercial property would be acquired between the existing transit center and 200th Street SW and converted to transportation use as the parking structure that would serve the station. The tail tracks to the light rail terminus would displace some parking spaces that now serve commercial land uses.

The station would be compatible with existing land use and development patterns. The development of the station would not likely affect currently planned projects, most of which have transit-oriented development goals.

Alternative C2: 52nd Avenue West to Lynnwood Transit Center Station

Alternative C2 would acquire and convert slightly fewer properties than Alternative C1, and it would not convert any multifamily residential properties. It would convert parts of an existing park-and-ride facility but would provide a parking structure to increase parking capacity. The station would be at the west edge of the designated Lynnwood City Center. The alternative would traverse south of Scriber Creek Park, but through the wetland complex, with no change in land use.

The station would be compatible with existing land use and development patterns and would not likely affect currently planned projects, most of which have transit-oriented development goals.

Alternative C3: Along I-5 to Lynnwood Park-and-Ride Station

Alternative C3 would acquire and convert the most property to transportation use. The affected parcels would be mostly public with some commercial and industrial uses. These changes in land use are not expected to markedly alter land use patterns or development character in this area.

The Lynnwood Transit Center Station Options 1 and 2 have different layouts on the existing park-and-ride. Both would be compatible with area development patterns.

4.2.3 Construction Impacts

Construction impacts include changes to land use that could arise from other kinds of temporary impacts (e.g., noise, air quality, traffic, visual and aesthetic resources) on nearby properties.

Construction Impacts Common to All Light Rail Alternatives

Construction of the Lynnwood Link Extension would temporarily affect existing land uses due to construction activities (e.g., staging areas, earthmoving, and truck traffic). The temporary impacts would include increases in noise levels, dust, traffic congestion, visual changes, and increased difficulty accessing residential, commercial, and other uses. Chapter 2, Alternatives Considered, describes construction methods for the light rail alternatives. Although some businesses might experience hardship during construction, this would not affect the land use type unless the property became vacant.

For more information on construction impacts, including impacts on the existing uses (i.e., businesses and residences) and measures to avoid, minimize, and mitigate for those impacts, see Section 3.3 on transportation construction impacts, and Sections 4.3, Economics; 4.4, Social Impacts, Community Facilities, and Neighborhoods; 4.5, Visual and Aesthetic Resources; 4.6, Air Quality and Greenhouse Gases; and 4.7, Noise and Vibration.

Project construction would require temporary construction easements or acquisitions of private property and right-of-way owned by WSDOT and local jurisdictions. Any construction staging within I-5 right-of-way must also be approved by FHWA, considering factors such as safety, the environment, and potential impacts to the freeway. Construction easements would be temporary and the property returned to preconstruction conditions upon completion of the construction activities. Following construction, the undeveloped land originally purchased from private parties could be developed by Sound Transit or others consistent with local zoning.

Segment A: Seattle to Shoreline

No additional impacts would occur in Segment A other than those described above. Construction activity required for the Segment A alternatives would take place primarily on the east side of I-5, although the Preferred Alternative and Alternative A1 would realign a road and construct a parking garage on the west side of I-5. Most construction staging along the Segment A alignments would likely occur in the proposed guideway, station, and park-and-ride rights-of-way.

Segment B: Shoreline to Mountlake Terrace

No additional impacts would occur in Segment B other than those described above. Construction activity required for the Segment B alternatives would take place adjacent to the east side of I-5 (all Segment B alternatives), in the center median of I-5 (all Segment B alternatives) or on the west side of I-5 (Preferred Alternative and B2A). Most construction staging along the Segment B alignments would likely occur in the proposed guideway, station, and park-and-ride rights-of-way.

With the Preferred Alternative and Alternatives B1 and B2A, construction staging of the elevated Mountlake Terrace Transit Center Station would occupy part of the existing surface parking lot, and parking spaces would be temporarily displaced. Access to the existing parking structure would be maintained as well as bus operations that currently serve the transit center.

There may be opportunities to use vacant lots such as the vacant site south of 236th Street SW owned by the Edmonds School District for temporary replacement parking or construction staging.

Segment C: Mountlake Terrace to Lynnwood

No additional impacts would occur in Segment C other than those described above. Construction activity required for the Segment C alternatives would take place either in the center median of I-5 or on the west side of I-5, and near the Lynnwood Transit Center. Most construction staging along the Segment C alignments would likely occur in the proposed guideway, station, and park-and-ride rights-of-way.

4.2.4 Indirect Impacts

The project could indirectly affect land use by catalyzing others to develop or redevelop land near the project's facilities, and local governments may change land use codes to permit other development or redevelopment. Some of the possible indirect development might be transit-oriented development (TOD). Where appropriate, Sound Transit would facilitate TOD with local jurisdictions and potential development partners in accordance with Sound Transit's TOD policy. For areas within I-5 right of way, FHWA and WSDOT prohibit development that is unrelated to transportation.

Improved transit access can increase the convenience and desirability of surrounding residential, commercial, and office properties. Where stations have available land and supportive zoning in place, the resulting TOD would tend to be more intense, mixed-use development that supports high-density residential, commercial, and office-related uses.

Federal, state, regional, and local governments have an array of programs and policies to support transit-oriented development near mass transit projects. In 2011, Sound Transit identified key principles for its transit-oriented development program in its *Sound Transit Program TOD Strategic Plan* (Sound Transit 2011c); in 2012, the agency adopted the Transit-Oriented Development Policy (Resolution R2012 – 24). This policy has the following goals:

- Increase the value and effectiveness of transit by increasing transit ridership.
- Support implementation of state, regional, and local growth plans, policies, and strategies.
- Foster relationships with local jurisdictions, regional agencies, private developers, local residents, businesses, community groups and other stakeholders to facilitate transit-oriented development.
- Encourage convenient, safe multimodal access to the transit system, with an emphasis on non-motorized access.
- Support economic development efforts.
- Encourage creation of housing options including market-rate and affordable units.
- Support implementation of other related Sound Transit plans and policies, with an emphasis on the agency's *Sustainability Plan*.
- Protect and enhance Sound Transit's assets and investments.

The policy directs Sound Transit to consider transit-oriented development potential in the development of its transit projects. This includes identifying agency and community transit-oriented development opportunities and strategies, as well as considering opportunities for partnerships with public and private interests. The policy also encourages Sound Transit to consider transit-oriented development in its decisions about the acquisition, use, and disposition of land.

National studies of transit-oriented development typically cite three key conditions that indicate higher potential for development:

1. Stations are located in prime regional and community centers that are attractive to typical market forces.
2. Regional and local real estate markets are active.
3. Public policies and regulations allow or encourage intensive development in station areas.

The benefits of successful transit-oriented development have included improved mobility, increased supplies of affordable housing, increased transit ridership in a more

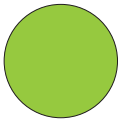
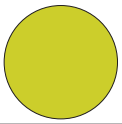
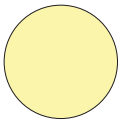
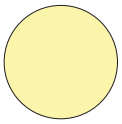
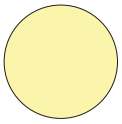
efficient urban form, and opportunities for urban redevelopment. Higher-density land uses around stations can also bring increased economic activity. Section 4.3, Economics, discusses the potential economic benefits associated with the Lynnwood Link Extension. In areas where the local jurisdictions have indicated a desire to attract transit-oriented development or have already adopted regulations consistent with this type of growth, the Lynnwood Link Extension would support their goals and policies. Sound Transit would be open for partnerships with local governments and others to develop the stations to help facilitate TOD, and would consider the potential for commercial uses in project-related parking structures located outside of the WSDOT right-of-way, and where consistent with local zoning.

Sound Transit completed a *Station Area Development Potential Report* to assess the potential for each proposed light rail station to support transit-oriented development (Sound Transit 2013a). To assess land use and economic development performance, the report considered access to regional growth centers and the station area development potential for the station areas served by each alternative. An overall rating was assigned to each station area based on its relative potential to support transit-oriented development, which was assessed according to four elements:

- Existing conditions supporting transit-oriented development
- Transit-supportive plans and policies
- Station access
- Potential development opportunities

The four elements, when considered together, allow an overall assessment of the development potential at each station area. The ratings for transit-oriented development potential are defined as limited, moderate, and strong. These qualitative ratings may change as the project design is refined and/or demographics change, new plans and policies are adopted by jurisdictions, and more detailed transit-oriented development analyses are completed. Table 4.2-3 shows the results by station area. A higher potential for transit-oriented development indicates a higher potential for indirect changes in existing land use and development patterns in station areas. However, the ratings closely relate to the types of currently allowed development within 0.50 mile of station areas based on existing plans and policies. The project would provide an opportunity for jurisdictions to implement regional policies related to mass transit (see Appendix I-4.2) as well as support increased densities, especially transit-oriented development.

Table 4.2-3. Station Area Transit-oriented Development (TOD) Potential

	Station Area	Overall TOD Potential	Existing Conditions Supporting TOD	Transit-supportive Plans & Policies	Station Access	Potential Development Opportunities
Lynnwood	**200th Street SW Station**					
	Lynnwood Transit Center Station					
	Lynnwood Park-and-Ride Station					
	Lynnwood Park-and-Ride Station - Modified (Preferred Alternative)					
Mountlake Terrace	**220th Street SW Station** (Preferred Alternative Option)					
	Mountlake Terrace Freeway Station					
	Mountlake Terrace Transit Center Station (Preferred Alternative)					
Shoreline	**NE 185th Street Station** (Preferred Alternative)					
	NE 155th Street Station					
	NE 145th Street Station (Preferred Alternative)					
Seattle	**NE 130th Street Station** (Preferred Alternative Option)					
	Northgate Station		Northgate Station not included in assessment - station constructed as part of Northgate Link project prior to Lynnwood Link Extension; overall assessment based on current development plans for the area. Northgate is a PSRC-designated Regional Growth Center and City of Seattle-designated Urban Center.			

Assess Potential

Limited Moderate Strong

Note: The station areas evaluated encompass an area 0.50 mile from the proposed station site, and the evaluation of TOD redevelopment opportunities did not consider unused land at the station site within the WSDOT right-of-way.

The Lynnwood station area has the highest development potential. Four station alternatives are being considered to serve the transit center in Lynnwood, and the potential for redevelopment is similar for each. Although the existing conditions include large blocks with automobile-dependent businesses and surface parking, the City of Lynnwood has developed specific plans and policies to achieve regional growth targets in this area. The transit station would reinforce intensification of nearby commercial and higher-density multifamily uses. Any such intensification would increase the activity levels adjacent to nearby residential properties.

The station areas with moderate development potential are those serving the Mountlake Terrace Park-and-Ride and the 220th Street SW Station (also in Mountlake Terrace). A station serving the park-and-ride has the potential to support future development in the City's proposed town center to the east and south, which could include intensifying commercial and higher-density multifamily uses primarily east of the station. The City of Mountlake Terrace has conducted more extensive transit-oriented development planning than the other jurisdictions. However, the station area development is limited by the amount of property dedicated to road rights-of-way (I-5) and the Nile Golf Course.

The remaining station areas have limited development potential, primarily because they are predominantly single-family neighborhoods, border large parks, or because current land use and comprehensive plans for these areas do not allow or encourage higher-density development. However, the City of Shoreline, as previously mentioned, has initiated light rail station area planning at NE 145th Street and NE 185th Street near I-5, which could facilitate transit-oriented development. The Comprehensive Plan and zoning changes implemented by the City of Shoreline or the Comprehensive Plan adopted by the City of Lynnwood could result in more intensive land uses and economic development around the stations.

4.2.5 Cumulative Impacts

Cumulatively, the Lynnwood Link Extension and other planned transportation and development projects would help achieve local and regional goals encouraging high-density, transit-oriented development. Other major planned developments could be attracted by the investments made by the project, and this incentive could accelerate the rate of development or redevelopment in station areas.

The Northgate Link Extension is currently under construction. King County Metro is planning a transit-oriented development project in the Northgate Station area, although details have not yet been defined. Both projects are designed to support improved transit service to designated urban centers, and both projects are consistent with land use plans for the area. The Lynnwood Link Extension, as well as other development projects around the station areas, would encourage the high-density development outlined in local and regional land use plans.

A Lynnwood site alternative is proposed for the OMSF, which is within an area that is currently zoned for commercial and light industrial uses; Alternatives C1, C2, C3, and the Preferred Alternative also would use parts of these parcels. If the Lynnwood site is chosen for the OMSF, it would increase the conflicts with the existing master plan by the Edmonds School District to develop a school bus base and other district administrative facilities. Sound Transit has identified a Bellevue location as the Preferred Alternative for the OMSF. A final decision on the site will be made after publication of the project's Final EIS in fall 2015.

4.2.6 Potential Mitigation Measures

No mitigation related to land use would be required during construction or operation of the Lynnwood Link Extension. In general, the project would not result in inconsistencies with adopted land use plans. Although Sound Transit cannot avoid all disturbances to adjacent land uses during construction, project impacts are not expected to cause substantial changes in land use. Therefore, no specific mitigation measures related to land use would be required for the project.

Refer to Section 4.1, Acquisitions, Displacements, and Relocations, for complete information on how Sound Transit would minimize the impacts associated with required acquisitions, displacements, and relocations. For measures that would minimize construction and operation impacts on adjacent land uses, refer to Chapter 3, Transportation Impacts and Mitigation, and Sections 4.3, Economics; 4.5, Visual and Aesthetic Resources; 4.6, Air Quality and Greenhouse Gases; 4.7, Noise and Vibration; and 4.17, Parks and Recreational Resources.

4.3 Economics

This analysis identifies the project's potential adverse and beneficial economic effects. Sound Transit evaluated direct and indirect economic impacts in the project area at three different levels:

- **Regional.** Economic impacts on the regional economy (such as effects on employment, traffic mobility, and congestion) were analyzed for King, Kitsap, Pierce, and Snohomish counties.
- **City.** Project effects were assessed on the tax revenue for cities with property acquisitions (Seattle, Shoreline, Mountlake Terrace, and Lynnwood).
- **Site-specific.** Site-specific impacts were evaluated for a 0.50-mile area around the light rail route and stations.

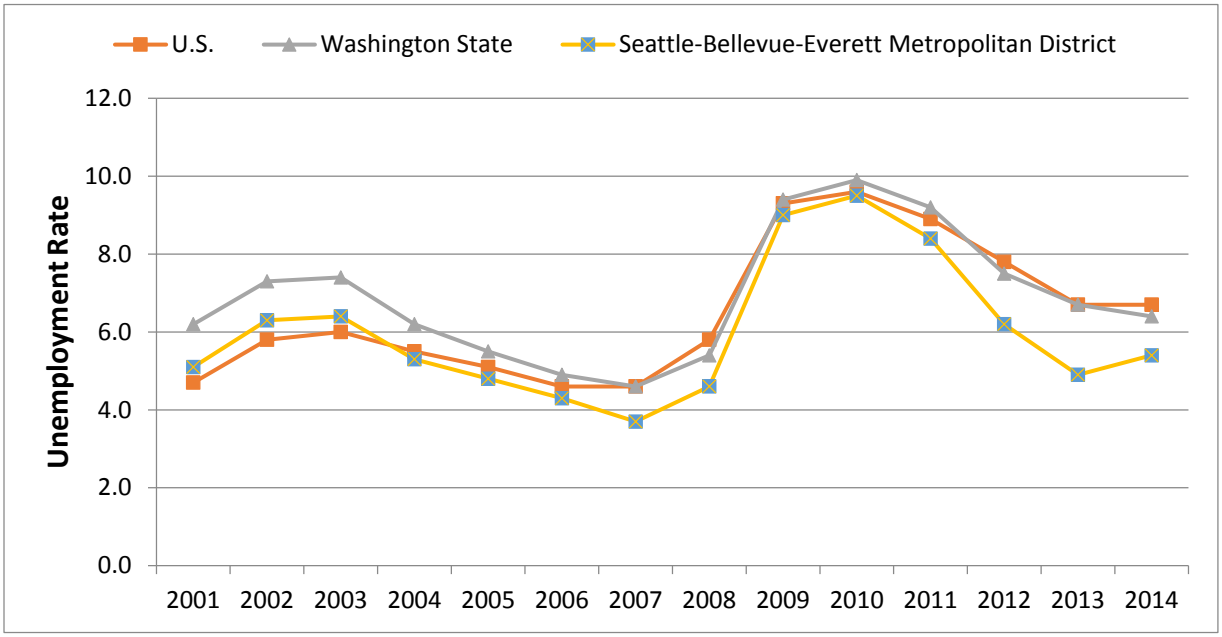
4.3.1 Affected Environment

Regional Demographic and Economic Trends

The forecast population data for King, Kitsap, Pierce, and Snohomish counties show that the region will grow by over 1.3 million inhabitants by 2040, which would total 5 million inhabitants, or about a 1 percent increase in population per year (PSRC 2013). The number of households is predicted to grow somewhat faster than the overall population, about 1.2 percent a year regionally, reflecting faster growth in smaller households. Generally, travel demand tracks more closely to the growth in the number of households than it does to population.

Median household income in the Central Puget Sound region is higher than the state average. The U.S. Census Bureau showed King County had the highest median household income in the region at about $70,000 in 2013. Snohomish County was second at about $66,000 in 2013 (Washington OFM 2014). Incomes in King County grew by 32 percent, while Snohomish County incomes increased by 24 percent, when compared to 1999 U.S. Census levels.

Employment in the region is expected to grow at an approximate average rate of 1.6 percent through 2040. The region also tends to have lower unemployment than the state or the nation, as shown in Figure 4.3-1. These trends support the predictions for generally increasing travel demand in the region and the project corridor.



Source: U.S. Department of Labor, Bureau of Labor Statistics, 2014.

Figure 4.3-1. Unemployment Rates, 2001 to 2014

Demographic and Economic Trends in Project Area

Table 4.3-1 shows population, household, and employment forecast trends for each project segment from 2010 to 2040. Segments B and C show the largest growth rates.

Table 4.3-1. Population, Housing, and Employment Forecasts by Segment

Segment	2010	2040	Average Annual Growth Rate 2010 to 2040 (percent)
Segment A: Seattle to Shoreline			
Population	67,455	88,244	0.9
Housing Units	32,116	43,288	1.0
Employment	27,232	43,842	1.6
Segment B: Shoreline to Mountlake Terrace			
Population	32,588	45,247	1.1
Housing Units	14,603	21,514	1.3
Employment	10,344	16,653	1.6
Segment C: Mountlake Terrace to Lynnwood			
Population	25,804	35,828	1.1
Housing Units	10,914	16,079	1.3
Employment	13,761	22,154	1.6

Sources: Population and housing units from 2010 U.S. Census; employment data from PSRC; and 2040 forecasts based on PSRC 2013 Land Use Baseline.

The cities within the project area—Seattle, Shoreline, Mountlake Terrace, and Lynnwood—rely heavily on property tax and sales tax revenues to fund general services for their respective jurisdictions. Revenues collected by each city, other than taxes, consist of funding from federal and state sources, such as direct federal grants and state-shared revenues, and fees collected from government-operated facilities, including the issuing of licenses and permits. In addition to funding city programs, property tax levies also provide funds for county programs, fire prevention, libraries, schools, and other governmental services. Table 4.3-2 shows funding sources for each city.

Table 4.3-2. Revenue Sources: Percent of Revenues by City

City (Budget Year)	Property Tax	Sales Tax	Other Sources
Seattle (2014)	26	19	55
Shoreline (2014)	14	9	77
Mountlake Terrace (2013 to 2014)	22	10	68
Lynnwood (2012)	20	33	47

Sources: City of Seattle 2014 Budget; City of Shoreline 2014 Budget; City of Mountlake Terrace 2013-2014 Adopted Biennial Budget; and Washington State Auditor's Office, City of Lynnwood 2012 Financial Statement

Regional Transportation of Goods and Services

Regional and interstate commerce relies on I-5, which is heavily congested. Longer travel times, increased costs, and less reliable pick-up and delivery times for truck operators result in some businesses being forced to move all or part of their business to less congested regions or avoid the Puget Sound region altogether.

In an effort to avoid moving away from the region, some transport companies are working with their customers to arrange deliveries in non-peak hours; however, many smaller customers do not find it cost-effective to extend their hours of operation. Traffic congestion also limits access to labor. As a result, companies might look to less congested parts of the metropolitan region or to other cities for future expansion. Chapter 3, Transportation Impacts and Mitigation, discusses future travel conditions, including freight, along the I-5 corridor.

4.3.2 Long-Term Impacts

A new light rail system such as the Lynnwood Link Extension can cause changes in the local business environment and surrounding neighborhoods. These changes, in turn, may benefit or adversely affect the success of existing businesses and influence future economic opportunity in the area. Direct economic impacts of each alternative could include business and employee displacements and the corresponding potential tax impacts, as well as potential changes in development patterns and regional freight mobility. Economic conditions could also change as a result of other effects such as the removal of businesses within an area, changes in parking availability, noise, visual conditions, or access. Indirect benefits could include increased economic activity around transit stations (transit-oriented development) as a result of increased pedestrian traffic, higher density and mixed land uses, and increased redevelopment opportunities.

No Build Alternative

Under the No Build Alternative, future economic development or redevelopment would be less because the project is a key element of the regional and local transportation, land use, and economic development plans. Traffic congestion would worsen, and the No Build Alternative could affect future economic development because it could make the project corridor communities comparatively less attractive as places to live or do business. The increased cost of doing business resulting from incidental and recurring delays with no alternative to avoid congestion includes the costs caused by travel delay and wasted fuel, that is, the value of lost time in passenger vehicles and the increased operating costs of commercial vehicles in congested traffic. Chapter 3, Transportation Impacts and Mitigation, provides further discussion of delays associated with future peak-period travel.

Light Rail Alternatives

Displacements

Table 4.3-3 presents estimates of the number of businesses and employees the light rail alternatives would displace due to property acquisitions in Segments A, B, and C.

In Segments A and B, the light rail alternatives would not displace businesses or employees.

In Segment C, the Preferred Alternative would displace nine businesses with an estimated 60 employees. In addition, partial acquisitions would affect parking at several parcels along 200th Street SW.

Alternative C1 would have the highest impact because Sound Transit would acquire properties holding 31 employers that provide a place of employment for an estimated 108 employees. Alternative C2 would affect three businesses with about 72 employees, and Alternative C3 would affect one business with an estimated 47 employees.

None of the Segment C alternatives affect even 1 percent of the employment within the Segment C study area (the areas within 0.50 mile of the alternative alignments), and much less than 1 percent of Lynnwood's total employment. Relative to the size of the employment base within the region, the business and employee displacements by the light rail alternatives would have a low impact on economic conditions regionally, but they would create disruptive transitions for the affected businesses and employees. Displacements are not necessarily permanent job losses because the displaced businesses would receive relocation assistance to help them continue operating, as described in Section 4.1, Acquisitions, Displacements, and Relocations. However, a business could relocate out of the area, or choose to accept compensation rather than reopening in a new location; in these cases, local jobs would be lost.

Table 4.3-3. Estimated Property Acquisition Impacts on Businesses and Employees

	Full Displacements		Commercial, Public, and Institutional Property Acquisitions	
Alternative	**Businesses**	**Employees**	**Partial**	**Full**
Segment A: Seattle to Shoreline				
Preferred Alternative: At-grade/Elevated with NE 145th and NE 185th Stations (with or without 130th Street Station Option)	0	0	8	2
Alternative A1: At-grade/Elevated with NE 145th and NE 185th Stations	0	0	4	1
Alternative A3: Mostly Elevated with NE 145th and NE 185th Stations	0	0	4	1
Alternative A5: At-grade/Elevated with NE 130th, NE155th, and NE 185th Stations	0	0	5	0
Alternative A7: Mostly Elevated with NE 130th, NE155th, and NE 185th Stations	0	0	5	0
Alternative A10: At-grade/Elevated with NE130th, NE 145th, and NE 185th Stations	0	0	4	1
Alternative A11: Mostly Elevated with NE 130th, NE 145th, and NE 185th Stations	0	0	4	1

Table 4.3-3. Estimated Property Acquisition Impacts on Businesses and Employees

Alternative	Full Displacements		Commercial, Public, and Institutional Property Acquisitions	
	Businesses	Employees	Partial	Full
Segment B: Shoreline to Mountlake Terrace				
Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side	0	0	2	1
with 220th Street Station South Option	0	0	2	2
Alternative B1: East Side to Mountlake Terrace Transit Center to Median	0	0	1	1
Alternative B2A: Optional 220th Street SW Station (elevated)	0	0	1	1
Alternative B4: East Side to Mountlake Terrace Freeway Station to Median	0	0	2	1
Segment C: Mountlake Terrace to Lynnwood				
Preferred Alternative: Along I-5 to Lynnwood Park-and-Ride	9	60	11	5
Alternative C1: 52nd Avenue West to 200th Street SW	31	108	23	4
Alternative C2: 52nd Avenue West to Lynnwood Transit Center	3	72	22	4
Alternative C3: Along I-5 to Lynnwood Park-and-Ride	1	47	12	2

Sources: King County Finance Services, Finance and Business Operations, 2012 and 2014 Real Property Tax Snohomish County Assessor's Office, 2012 and 2014 Real Property Tax.

Impacts of Displacements on Tax Base of Cities

With each light rail alternative, Sound Transit would acquire residential and commercial properties and remove those properties from tax rolls. Table 4.3-4 estimates the annual initial property tax impacts on cities resulting from the loss of taxes on fully acquired properties. These property tax impacts reflect property taxes as of 2014. When referring to the property tax impacts of acquisitions, the term "initial property tax impacts" is used because the initial impact would be lower property tax revenue (longer-term impacts are described below). In most cases, the impact would be less than 0.25 percent of the local jurisdiction's property tax revenues; in all cases, the impact would be less than 1.5 percent. If businesses relocate outside of the local jurisdiction, this would also reduce local tax revenues, affecting revenue sources ranging from business and operations taxes to sales or payroll taxes.

Table 4.3-4. Estimated Initial Property Tax Impacts on Cities by Alternative

Alternative	Annual Initial Property Tax Impact	Percent of Budgeted City Property Tax Revenue
Segment A: Seattle to Shoreline		
Preferred Alternative: At-grade/Elevated with NE 145th and NE 185th Stations	$276,000	0.1
Alternative A1: At-grade/Elevated with NE 145th and NE 185th Stations	$241,000	0.1
Alternative A3: Mostly Elevated with NE 145th and NE 185th Stations	$224,000	0.1
Alternative A5: At-grade/Elevated with NE 130th, NE 155th, and NE 185th Stations	$276,000	0.1
Alternative A7: Mostly Elevated with NE 130th, NE 155th, and NE 185th Stations	$248,000	0.1
Alternative A10: At-grade/Elevated with NE 130th, NE 145th, and NE 185th Stations	$290,000	0.1
Alternative A11: Mostly Elevated with NE 130th, NE 145th, and NE 185th Stations	$224,000	0.1
Segment B: Shoreline to Mountlake Terrace		
Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side	$6,000	0.1
with 220th Street Station South Option	$15,000	0.4
Alternative B1: East Side to Mountlake Terrace Transit Center to Median	$0	0
Alternative B2A: Optional 220th Street SW Station (elevated)	$$17,000	0.4
Alternative B4: East Side to Mountlake Terrace Freeway Station to Median	$0	0
Segment C: Mountlake Terrace to Lynnwood		
Preferred Alternative Along I-5 to Lynnwood Park-and-Ride	$127,000	1.1
Alternative C1: 52nd Avenue West to 200th Street SW	$138,000	1.2
Alternative C2: 52nd Avenue West to Lynnwood Transit Center	$40,000	0.4
Alternative C3: Along I-5 to Lynnwood Park-and-Ride	$37,000	0.3

Sources: King County Finance Services, Finance and Business Operations, 2014 Real Property Tax Snohomish County Assessor's Office, 2014 Real Property Tax.

The consequence of full parcel acquisition is typically permanent conversion from private to public ownership. Parcels in public ownership are exempt from property taxes, but they are still assessed certain fees.

The project would have similar property tax impacts for all Segment A alternatives. These impacts, however, would be relatively small (0.1 percent) when compared to the combined 2014 estimated property tax revenues for Seattle and Shoreline (about $268 million). The property tax impacts would be caused mainly by acquiring single-family residences.

The Segment B impacts on property taxes would occur with the Preferred Alternative and Alternative B2A, and have about a $6,000 to $17,000 initial property tax impact annually. The Preferred Alternative with the 220th Street Station South Option would slightly increase property tax impacts.

As shown in Table 4.3-3, for all alternatives in Segment C, Sound Transit would acquire commercial, public, or institutional properties that are currently places of employment. The Preferred Alternative is in the same range as Alternative C1: although it affects fewer total properties, several are higher value parcels. The other two alternatives (C2 and C3) have lower impacts.

The long-term fiscal impact on a jurisdiction depends on a number of factors. Initially, property taxes would no longer be collected from the properties Sound Transit would acquire along the light rail route. As a result, the rates charged to remaining taxpayers could increase slightly (less than 0.01 percent) to recover budgeted funds, or budgets for essential government services could be reduced accordingly. In the long run, some of the land purchased for the construction of the Lynnwood Link Extension may not be permanently needed and could be released for development after the project is built. In addition, some displaced businesses would likely either rebuild at a new location or relocate to an existing building elsewhere within the jurisdiction's boundary.

These positive fiscal impacts could be offset somewhat by the absence of new construction that might have occurred on properties acquired and retained by Sound Transit. Thus, the long-term property tax impacts would have too many variables to be predicted quantitatively, but they would likely be less than the initial property tax impacts. The overall property tax impact is expected to be low.

Impacts on Regional Transportation of Goods and Services

The main impacts on regional transportation of goods and services would result from changes in freight mobility on the I-5 corridor and the surface street network. Compared to the No Build Alternative, the light rail alternatives would result in similar 2035 peak-period travel times in the corridor. Freight mobility changes for the light rail alternatives would be minor along the I-5 corridor. On city streets, all alternatives have mitigation that would cause similar or better conditions than the No Build Alternative. The light rail alternatives would allow travelers to use transit to avoid congestion, but regional freight conditions would stay similar to conditions without the light rail project. Chapter 3, Transportation Impacts and Mitigation, further discusses I-5 transportation impacts.

4.3.3 Construction Impacts

Construction brings money into the economy from construction wages, the purchasing of local goods and services for construction, the money spent by

construction crews in the community where construction occurs, and related tax revenues. On the negative side, constructing any light rail alternative would result in economic impacts by blocking visibility and access to businesses, causing traffic delays, and rerouting traffic on detours that increase travel times and make access to some locations difficult.

Potential Beneficial Economic Impacts from Construction

Constructing the Preferred Alternative and any of the other light rail alternatives would increase employment and associated consumer spending in the project vicinity during construction. The extent of these impacts would depend on the source of project funding and the composition of work crews used during project construction.

In economic impact analyses, typically only inflows of funds from outside a region are considered "new money" that will lead to new employment and income in that region. Funds from local or regional sources are transfers that could be spent by residents and businesses on other economic activities.

While federal grants may provide a source of funding, the local funds required for approximately one-half to two-thirds of the light rail alternatives' construction costs are anticipated to be raised primarily in the communities benefiting from the project. The influx of federal funds (assumed to be $600 million) would account for between one-third and one-half of the total capital cost, depending on the alternative selected within each segment.

In addition, construction would lead to positive economic effects beyond the federal grants. Sound Transit would issue bonds to pay for project construction, and this money would go primarily to businesses in the region within a relatively short period. Principal and interest on the bonds would be repaid over many years using a variety of funding mechanisms. Some of the future repayments also could be made in the form of taxes, such as sales and use tax. Therefore, there would be a temporary impact because bonded funds would be spent over approximately 6 years, stimulating direct and indirect construction spending in the region, but the added taxes to pay for the project could reduce spending in other areas of the economy.

Table 4.3-5 shows the estimated magnitude of the economic stimulus for the alternatives. It gives the range of direct expenditures and direct employees who would be hired as a result of the low- and high-cost estimates, based on the combinations of alternatives for each segment. The number of direct employees was calculated using the Washington Office of Financial Management's model for predicting employment based on construction cost estimates.

Table 4.3-5. Estimated Direct Expenditures and Direct Employment from Lynnwood Link Extension Construction

Cost Estimates and Employment	Project Construction
Preferred Alternative Cost Estimate	
Total direct expenditure (million in 2014 $)	$1,510
Direct Employment	
Total direct employment	8,860
Annual direct employment	1,480
High-Cost Estimate	
Total direct expenditure (million in 2014 $)	$1,940
Direct Employment	
Total direct employment	11,380
Annual direct employment	1,900
Low-Cost Estimate	
Total direct expenditure (million in 2014 $)	$1,390
Direct Employment	
Total direct employment	8,150
Annual direct employment	1,360

Source: Sound Transit and Washington Office of Financial Management Input-Output Model, 2011.

Wages paid to workers in construction trades or supporting industries would be spent on other goods and services; these are referred to as induced impacts. Indirect and induced impacts are often called "multiplier" impacts. Multiplier estimates for the state of Washington (Washington OFM 2007) suggest that an additional 64 percent of value added (i.e., payments made by industry to workers, interest, profits, and indirect business taxes) would result from new direct construction spending in the region. Moreover, an additional 0.94 new jobs would be created for every direct job associated with the project, increasing the potential number of jobs generated in the region from approximately 15,800 to 22,100 with the high-cost estimate.

Although the typical methodology for economic impact analysis would count only the $600 million of federal grant funding as new spending for the purpose of determining economic impacts, the actual benefits would be greater because of the multiplier effects. Regardless of the specific method used to quantify economic impacts, it is clear that the project would create substantial short-term economic activity in the region during construction and that all of the light rail alternatives would provide approximately the same magnitude of short-term economic impact.

Potential Adverse Economic Impacts from Construction

Construction activity affects local businesses because of the associated changes in traffic circulation, access, parking, noise, and visual effects. The work in Segment C would likely have the greatest impact on nearby businesses in terms of noise, dust, and restricted access, and potential customers might choose to avoid businesses due to real or perceived inconvenience caused by construction activities. Along any given

area of the project corridor, major construction is anticipated to last approximately 1 to 2 years.

All alternatives would require construction access from the WSDOT rights-of-way on I-5 and from city streets adjacent to the project corridor. All light rail alternatives would affect traffic operations on arterials adjacent to the light rail guideway and stations. For all street reconstruction, travel lanes on local streets along the guideway would experience periodic daytime closures. Truck access to the guideway during construction would be along city arterials leading to streets adjacent to the guideway. Construction activities along the guideway might reduce or restrict property access, and the contractor would need to maintain access during construction or coordinate with property owners and businesses.

In some locations, I-5 shoulders might be narrowed and/or lane widths reduced, with FHWA and WSDOT approval, to provide space for construction activities adjacent to the freeway. This configuration would increase congestion and travel times on the freeway, which would result in lost productivity and higher costs for businesses operating in the corridor.

4.3.4 Indirect Impacts

Sound Transit evaluated the indirect long-term economic impacts of the light rail alternatives based on the following: field observations of each alternative route, the number of housing units and employees to be served by the stations, and information presented in Chapter 3, Transportation Impacts and Mitigation; Section 4.2, Land Use; Section 4.5, Visual and Aesthetic Resources; and Section 4.7, Noise and Vibration.

The operation of the light rail alternatives could have both positive and negative indirect economic impacts. Light rail projects can increase development and redevelopment potential adjacent to stations, with potential increases in property values. Negative indirect economic effects arise from access or traffic flow changes or restrictions, decreased parking, noise increases, or impaired visibility that could reduce patronage of a business or decrease value in property.

The availability of light rail increases transit access and pedestrian activity, especially in areas surrounding the stations and between important nodes of economic activity. Improved transit access can positively affect the convenience, visibility, and desirability of nearby residential and commercial properties. Increased pedestrian activity can increase the patronage of adjacent retail businesses. This activity might create a synergy of business owners and employees being more interested in relocating where there is convenient access to the light rail line. This would lead to more dense and mixed land uses around stations and related increased economic activity. This pattern is referred to as transit-oriented development and is addressed further in Section 4.2, Land Use. The economic impacts are summarized here.

Numerous case studies conclude that residential and commercial property values near light rail transit stations typically increase and are valued higher than similar properties that are not near the transit stations (TRB 2004). While proximity to good-quality transit is an important trait of transit-oriented development, this is not the only factor that adds value. When combined with higher-than-typical densities, consumer retail and services, and pedestrian amenities, proximity to transit can confer land-value benefits that are well above those of competitive markets. The transit-oriented development synergy of proximity, density, mixed uses, and walking-friendliness, under the right conditions, is expressed through accelerated gains in property values and overall real-estate market performance (TRB 2004).

However, these gains are not automatic; property value increases generally require a strong demand for real estate, locations in neighborhoods free from signs of stagnation and distress, and public policies such as zoning bonuses that further leverage transit-oriented development and transit system expansion to produce the spillover benefits of a highly integrated transportation network. Property values are also affected by external forces and might change in response to fluctuations in the economy, consumer confidence, and local development pressures. In addition, because transit-oriented development takes time to evolve, property value benefits will also take time to accrue (TRB 2004). While these positive effects might occur in all the project segments because the jurisdictions have either adopted or are contemplating plans that would support transit-oriented development, the benefits would most likely be experienced in Northgate (Segment A) and Lynnwood (Segment C), where major regional urban growth centers are planned.

Many studies have found property value impacts from light rail transit are usually positive, although some studies have documented decreased property values, particularly along a light rail route rather than in the vicinity of stations (e.g., Cervero 2004). Disruptive noise levels; light, shadow, and view impacts; reductions in vehicle access and parking; and spill-over parking from station parking garages can harm property values and sales for businesses that depend on vehicular access. Negative impacts on property values would most likely occur when the light rail project results in noise or visual impacts noticeably greater than what currently exists. Such impacts are often associated with elevated, and to a lesser degree, at-grade alternatives. All of the Lynnwood Link Extension light rail alternatives would be at-grade or elevated. With mitigation measures implemented for the project, the impacts from noise, vibration, and traffic would decrease such that there would be a low potential for adverse indirect effects on economic activity.

Potential adverse indirect effects would be influenced by the same external forces described in the preceding paragraphs for the positive indirect effects, such as changes in real-estate demand, local zoning, or the local economic climate.

4.3.5 Cumulative Impacts

Other major projects in the project area include the Northgate Link Extension, which is already under construction. Its construction period is scheduled to end in 2019, and could overlap with the start of the Lynnwood Link Extension construction. Cumulatively, this extends the period of construction impacts in the Northgate area for a longer period than for either project alone. However, both projects would employ similar construction impact mitigation, which would minimize impacts. In addition, the Lynnwood Link Extension's civil construction period in the Northgate area is likely to be localized around the elevated guideway. Access to area businesses would be maintained throughout the construction period.

Sound Transit is also developing an EIS for an OMSF, which includes an alternative in Lynnwood; in July 2014, the Sound Transit Board identified a Bellevue site as the Preferred Alternative. A final decision on the site will be made after publication of that project's Final EIS in fall 2015.

There are also eight other transportation projects of regional significance, such as the SR 99 Alaskan Way Viaduct Replacement Project, SR 520 Bridge Replacement and HOV Project, and five private development projects. The Edmonds School District has a district support center and bus maintenance base project planned for a site in Lynnwood. The OMSF and the larger transportation projects would have similar or greater capital expenditures and multiplier effects on the regional economy as the Lynnwood Link Extension.

If the OMSF was constructed in Lynnwood near the Segment C alternatives, the two projects could be built during the same time period, and areas such as 52nd Avenue West and Cedar Valley Road could have a greater level of construction-related and impacts. The Edmonds School District's support services facility also could be constructed at the same time as the Lynnwood Link Extension, which could increase construction period impacts.

Similarly, if the maintenance facility was built on the Lynnwood site, economic impacts from displacements would increase cumulatively for all alternatives in Segment C because Sound Transit would have to acquire additional property for the proposed maintenance facility. Some of the parcels needed for Alternatives C1 and C2 would also be needed for the maintenance facility; however, a number of the partial acquisitions would likely change to full acquisitions, thereby increasing the number of business displacements and the amount of lost property tax revenue experienced by the City of Lynnwood. The maintenance facility would also displace some of the opportunities for increased development and redevelopment potential adjacent to stations or potential increases in property values southwest of the Lynnwood Link Extension station alternatives. This

would reduce the potential indirect economic benefits in an area identified as having the highest redevelopment potential along the project corridor.

4.3.6 Potential Mitigation Measures

Businesses near construction activities might be adversely affected during construction by noise, dust, and restricted access. Any major construction project inconveniences or disturbs the residents, businesses, and business customers adjacent to project construction activities. While some businesses would suffer little or no adverse effect, others might experience a noticeable decline in sales, increase in costs, or a decrease in efficiency. Mitigation for noise and vibration impacts is described in Section 4.7, Noise and Vibration. Construction might cause adverse impacts on businesses from reduced access or general construction activity that affects local transportation; the mitigation for such impacts is discussed in Section 3.6, Potential Mitigation Measures, of Chapter 3, Transportation Impacts and Mitigation.

Businesses displaced by the project would receive relocation assistance, as described in Section 4.1, Acquisitions, Displacements, and Relocations, to mitigate adverse impacts.

Sound Transit would dedicate staff to work specifically with affected businesses during construction to minimize project-associated impacts. Construction mitigation plans would be developed to address the needs of businesses and would include, but are not limited to, the following measures:

- Provide a 24-hour construction telephone hotline.
- Provide business cleaning services on a case-by-case basis.
- Provide signage such as 'detour,' 'open for business,' and others as appropriate.
- Establish effective communications with the public through measures such as meetings and construction updates, alerts, and schedules.
- Implement promotion and marketing measures to help affected business districts maintain their customer base, consistent with Sound Transit policies, during construction.
- Maintain access as much as possible to each business and coordinate with businesses during times of limited access.
- Provide a community ombudsman.

To avoid cumulative construction impacts, Sound Transit would coordinate construction mitigation planning with other project owners and potentially affected parties in construction areas with multiple projects in the same vicinity at similar times. Examples include projects such as the Northgate Link Extension and King County's Northgate transit-oriented development program.

4.4 Social Impacts, Community Facilities, and Neighborhoods

This section discusses how the Lynnwood Link Extension might affect people, businesses, community facilities, and neighborhood character and cohesion along the project corridor. The analysis reflects the findings of other environmental analyses, including transportation, property, land use, economics, visual and aesthetic resources, air quality, noise and vibration, parks and recreational resources, and public services. The section concludes with a discussion of environmental justice, which summarizes the analysis of impacts on minority and low-income populations in Appendix C, Environmental Justice Analysis.

4.4.1 Affected Environment

The study area for the social environment extends 0.5 mile from the alternative alignments and stations, and it has 18 neighborhoods (see Figure 4.4.1). The names and boundaries of most of the neighborhoods are designated by local governments—the Cities of Seattle, Shoreline, Mountlake Terrace, and Lynnwood.

Study Area Neighborhoods

Most of the study area neighborhoods were developed as single-family housing in the decades following World War II, primarily in the 1950s and 1960s. Growth has continued in recent decades through infill and redevelopment. As of 2010, nearly 126,000 residents and an estimated 60,000 jobs were located in study area census tracts.

Minority Populations

The residents within the project corridor are diverse, with an average of over 37 percent minority residents (non-White and Hispanic persons). In comparison, the population of the Sound Transit district (urbanized King, Pierce, and Snohomish counties) is 31.13 percent minority (Sound Transit 2013b). Attachments in Appendix C provide detailed racial and ethnic composition of the study area, neighborhoods, and the alternative alignment and station impact areas. Figure 4.4-2 shows the 2010 distribution of minority populations in the study area census tract block groups.

Low-income Populations

The study area household median income is about $58,000 (Census 2010b). An estimated 11.3 percent of the study area population lives at or below the federal poverty level, whereas the Sound Transit district is 11.24 percent (Census 2010b; Sound Transit 2013b). Appendix C has detailed low-income population statistics for the study area and neighborhoods. Figure 4.4-3 shows the overall 2010 distribution of low-income populations for study area census tracts.

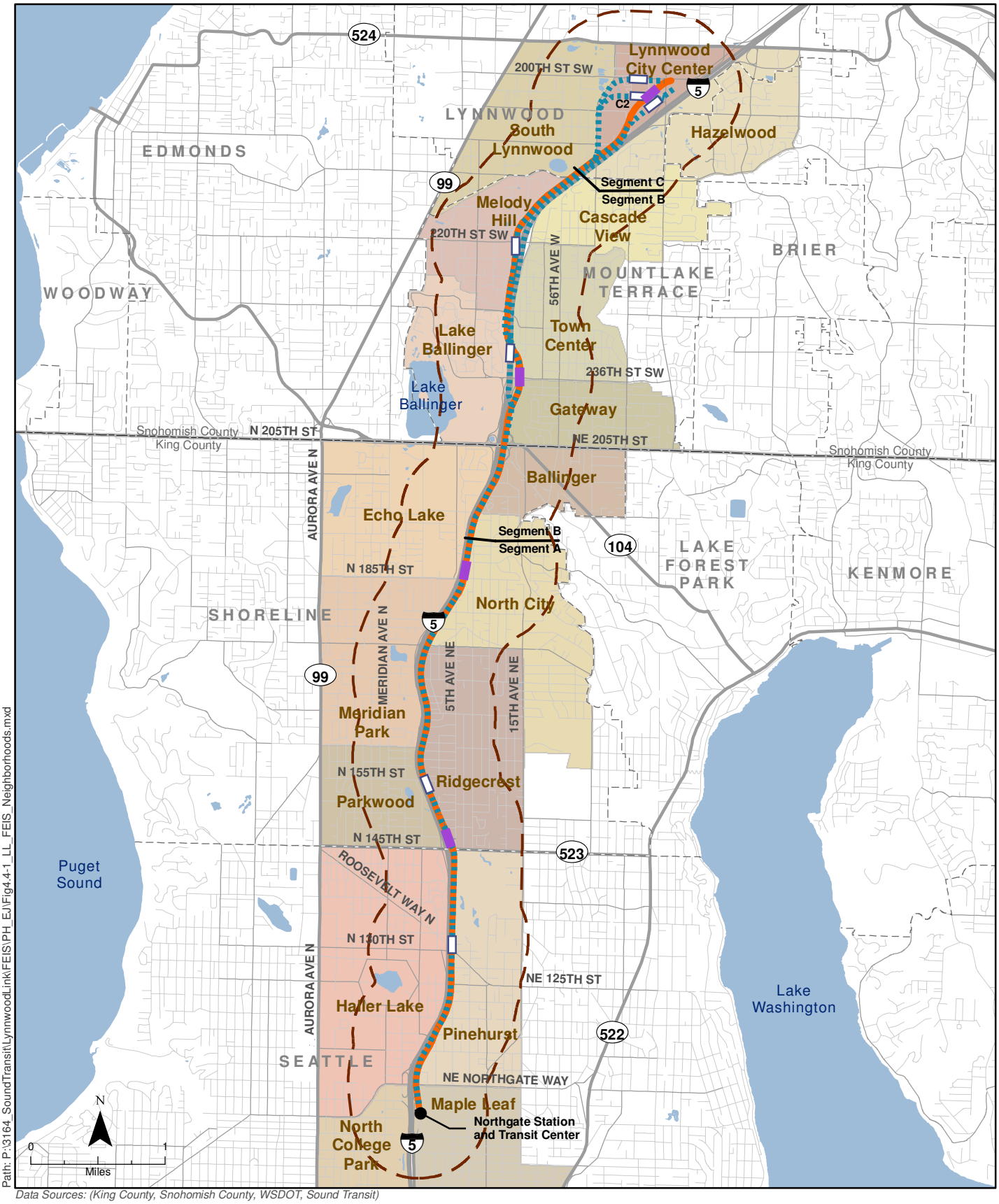


Figure 4.4-1
Neighborhoods

Lynnwood Link Extension

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Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives

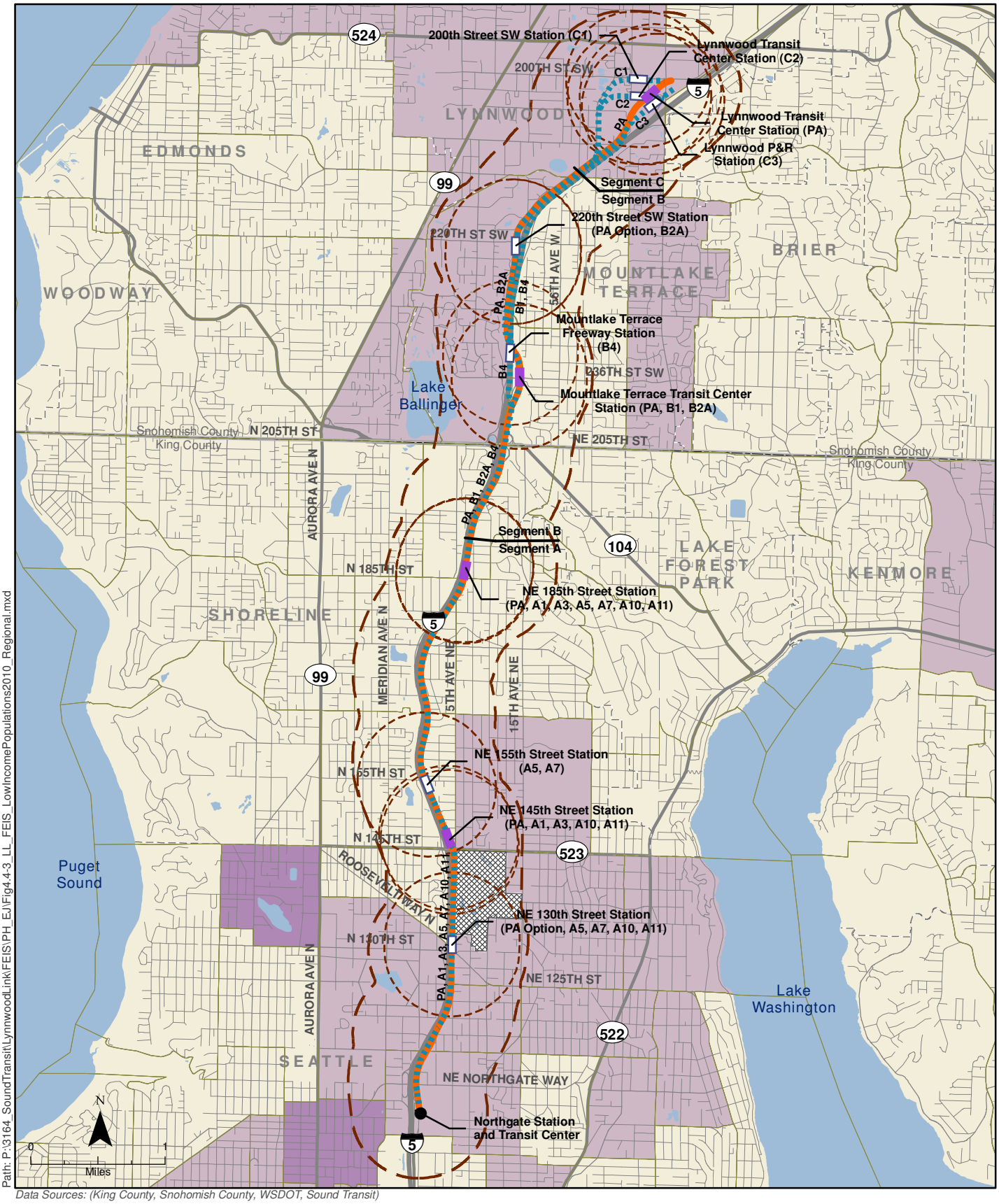
2010 Census Blocks

- 0 - 25%
- 26 - 50%
- 51 - 75%
- 76 - 100%

- Non-Populated Park Area
- 1/2 Mile Station Buffer
- Study Area

Figure 4.4-2
Minority Populations
2010 Census
(Percentage of Minority Individuals)

Lynnwood Link Extension



Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_EJ\Fig4.4-3_LL_FEIS_LowIncomePopulations2010_Regional.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives

2010 Census Tracts

- 0 - 10%
- 11 - 20%
- 21 - 30%
- 31 - 100%

- Non-Populated Park Area
- 1/2 Mile Station Buffer
- Study Area

Figure 4.4-3
Low-income Populations 2010 Census
(Percentage of Individuals Below Poverty Level)
Lynnwood Link Extension

Household Characteristics

A third of the households in the study area are one-person households (34 percent) (Census 2010a). About 12 percent of households are non-family units. Children and the elderly comprise 18 percent and 11 percent, respectively, of the study area population. An estimated 4 percent of all study area households are transit-dependent, but three neighborhoods (Pinehurst, South Lynnwood, and Lynnwood City Center) have more transit-dependent households (7 to 8 percent). Attachment C-7 in Appendix C has a detailed breakdown of these data.

About 54 percent of homes in the study area are owner-occupied and 46 percent renter-occupied (Census 2010b). Figure 4.4-4 shows the location of low- and lower-cost housing within about 0.5 mile of the corridor alternative alignments, which includes public low-income housing and mobile home communities.

Community Facilities and Linkages

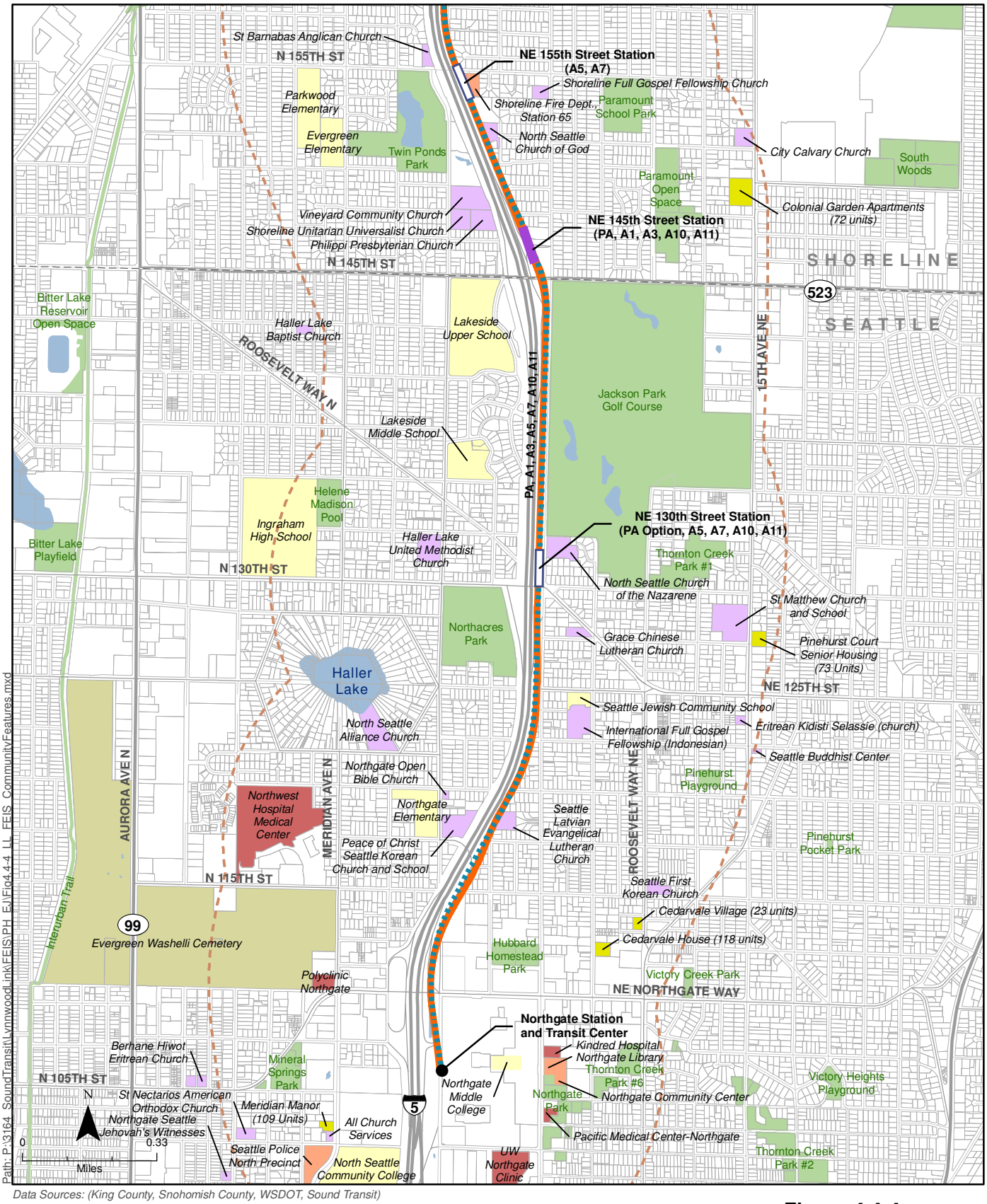
Community facilities in the study area include public and private schools, parks, recreation and community centers, senior centers, libraries, municipal buildings, fire and police emergency services, medical clinics and hospitals, religious institutions, and cemeteries. Figure 4.4-4 shows the community facilities within about 0.5 mile of the light rail alternative alignments. A list is in Attachment C-13 of Appendix C.

Transportation Network

Many parts of the Lynnwood Link Extension corridor have streets with a grid pattern, particularly in King County, but I-5 interrupts this pattern. In King County, the highway generally is parallel to major north-south arterials, but the highway angles to the northeast in Snohomish County. Public bus service runs along most major arterials. Local streets tend to lack sidewalks, but traffic volumes are generally low. Chapter 3, Transportation Impacts and Mitigation, further describes the study area transportation system.

Cohesion

Neighborhood cohesion within the study area is relatively strong, with well-defined neighborhood boundaries, good transportation connections, stable land uses and housing, and opportunities for local interaction. In all cases, I-5 is a neighborhood boundary for adjacent neighborhoods. In Seattle and Shoreline, the western boundary of adjacent neighborhoods tends to be defined by Aurora Avenue, whereas the eastern boundary of adjacent neighborhoods is defined by 15th Avenue NE. The major east-west arterials tend to form the southerly and northerly boundaries of the neighborhoods. The grid street pattern also facilitates mobility and access within neighborhoods. Moving north into Mountlake Terrace and Lynnwood, Aurora Avenue remains a common boundary for neighborhoods west of I-5; however, the



Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_EJ\Fig4.4-4_LL_FEIS_CommunityFeatures.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

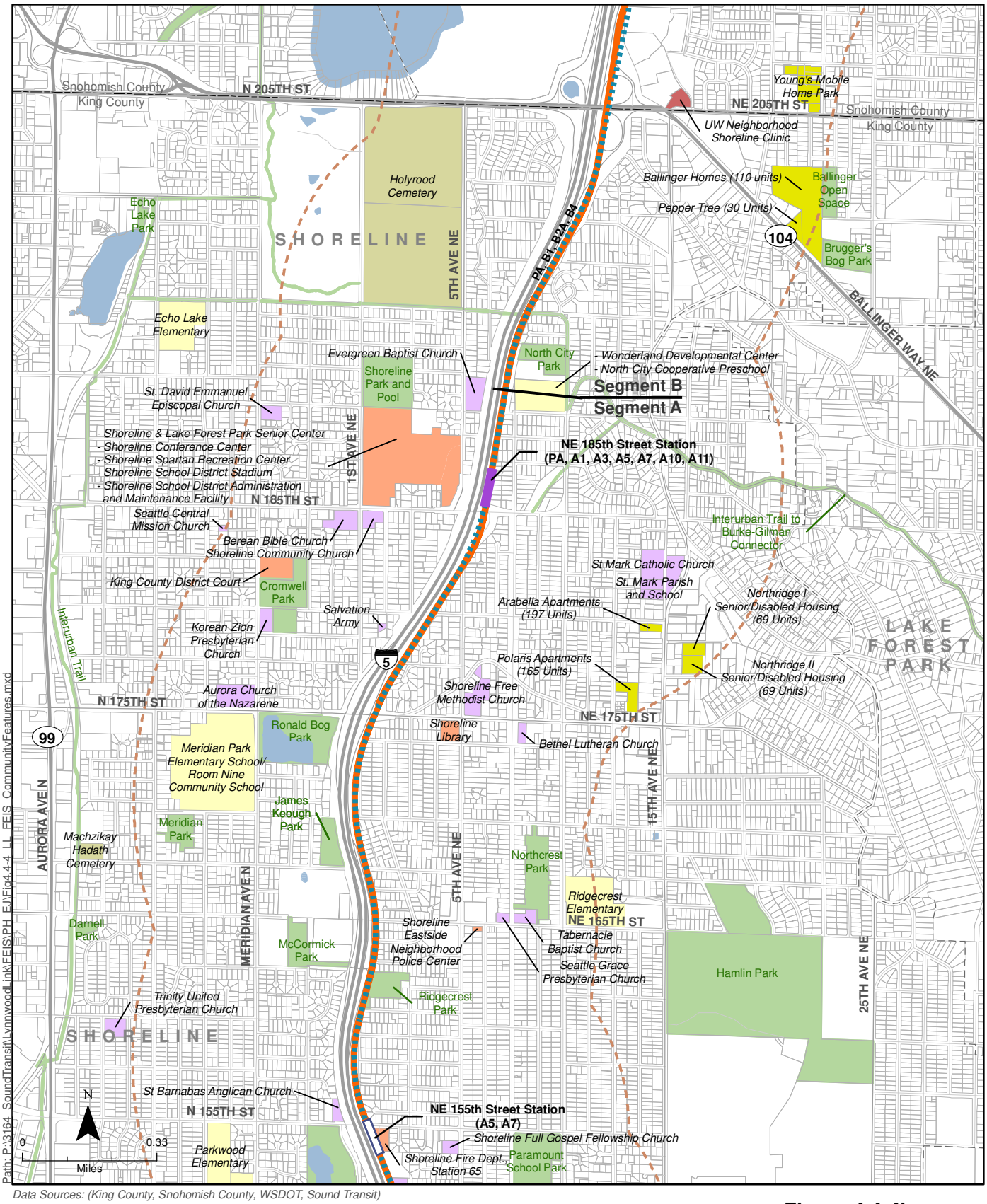
- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Half-mile Project Buffer

Community Facilities

- Community and Municipal
- Low- and Lower-Cost Housing
- Schools
- Medical
- Religious
- Cemetery
- Park
- Waterbody

Figure 4.4-4a
Community Facilities Within 0.5 Mile of Light Rail Alternatives

Lynnwood Link Extension



Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_EJ\Fig4.4-4_LL_FEIS_CommunityFeatures.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

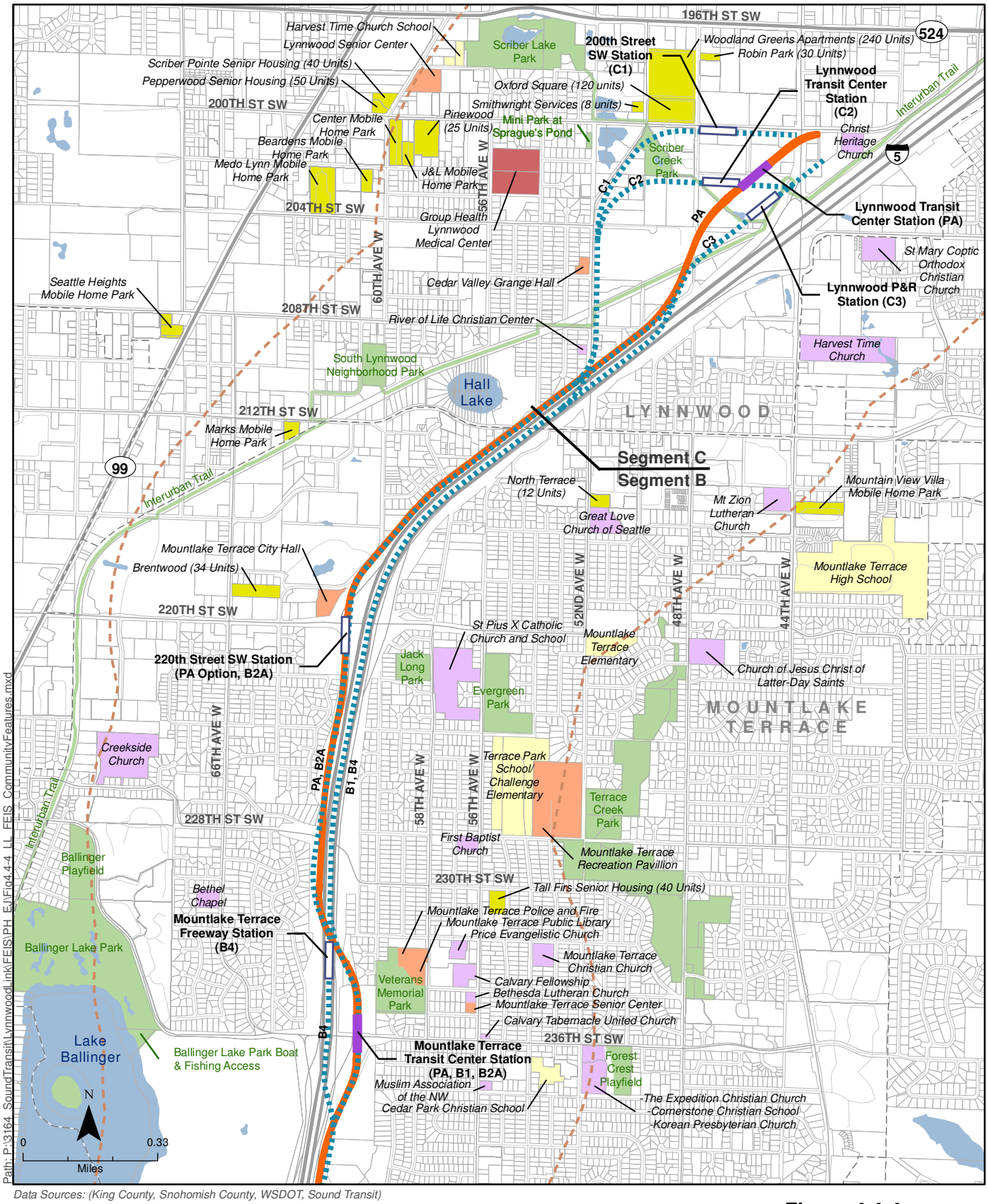
- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Half-mile Project Buffer

Community Facilities

- Community and Municipal
- Low- and Lower-Cost Housing
- Schools
- Medical
- Religious
- Cemetery
- Park
- Waterbody

Figure 4.4-4b
Community Facilities Within 0.5 Mile of Light Rail Alternatives

Lynnwood Link Extension



Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_EJ\Fig4.4-4_LL_FEIS_CommunityFeatures.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Half-mile Project Buffer

Community Facilities

- Community and Municipal
- Low- and Lower-Cost Housing
- Schools
- Medical
- Religious
- Cemetery
- Park
- Waterbody

Figure 4.4-4c
Community Facilities Within 0.5 Mile of Light Rail Alternatives

Lynnwood Link Extension

eastern boundaries of neighborhoods east of I-5 are less well defined because the streets are not in a grid pattern and the landscape includes more natural barriers such as lakes, hills, and ravines.

Originally developed in the decades following World War II, the Lynnwood Link Extension corridor neighborhoods are mature. Land uses are relatively stable and many residents have lived in their same homes for decades. The neighborhoods have many public facilities and community amenities, with many places providing opportunities for interaction. Schools, libraries, community centers, churches, and neighborhood shops foster interaction between neighborhood residents. All of the local governments have neighborhood and community planning programs that foster community interaction.

4.4.2 Long-Term Impacts

The discussion below considers long-term impacts on the social environment from the construction and operation of the light rail alternatives compared with the No Build Alternative. It is based on the impacts and mitigation described in other environmental effects analyses in this Final EIS, and it assesses how the combination of changes resulting from the project might affect corridor neighborhoods and populations.

No Build Alternative

Under the No Build Alternative, no properties would be acquired and no households or businesses would be displaced. Existing community facilities and services would not be affected. The cohesion of the 18 neighborhoods adjacent to the Lynnwood Link Extension corridor would be similar to today, although local and regional congestion would increase. Otherwise, little change would occur in air quality, noise, or transit service coverage, although transit travel times and reliability would suffer. There would be little potential for disproportionately high and adverse effects on minority and low-income populations. These populations often depend on transit more than the general population, so they would not benefit from improved transit service, decreased travel time, increased reliability, and increased access to regional community facilities and jobs as provided under the light rail alternatives.

Light Rail Alternatives

Segment A: Seattle to Shoreline

Most of the non-public property acquisitions and displacements required for the project alternatives would occur in Segment A. The impacts would primarily be residential displacements; there would be no displacements of businesses or community facilities. As the acquisitions would generally be of intermittent strips of parcels along I-5, neighborhood cohesion would remain intact.

Population and Business Changes

The Segment A alignments and stations would be on the east side of I-5, where most of the property acquisitions and displacements would occur. However, the Preferred Alternative and Alternative A1 would both include a parking garage located on the west side of I-5 at NE 185th Street.

The Preferred Alternative would acquire 80 full parcels and parts of 50 parcels (see Table 4.1-1 in Section 4.1, Acquisitions, Displacements, and Relocations). Most of the full parcels are residential, and no businesses would be displaced. A total of 121 residential units would be displaced.

Acquisitions for the other alternatives would range from 66 to 81 full parcels and parts of 41 to 47 parcels; 107 to 123 residential units would be displaced.

Community Facilities and Transportation Network Changes

The project avoids a potential displacement of the Seattle Latvian Evangelical Lutheran Church, and none of the Segment A alternatives would displace the church and social hall; a church caretaker's residence would be relocated.

All Segment A alternatives would acquire a strip of land along the west edge of Ridgecrest Park adjacent to I-5. The Preferred Alternative and Alternative A1 also would affect an edge of the Shoreline Stadium parking lot, which serves the stadium, the Spartan Recreation Center, and the Shoreline Conference Center. The community benefits of these facilities would not be affected. The Preferred Alternative's NE 185th Street Station has a stadium parking garage option, which would place the parking garage on the current Shoreline Stadium parking lot and result in the partial acquisition or lease of a larger portion of the stadium parking lot. However, the same or greater levels of parking would remain long term for stadium use. See Section 4.17, Parks and Recreational Resources, for additional information.

Several streets, bridges, and sidewalks would be modified or reconstructed in Segment A. These changes would maintain access to community facilities, and would improve access in areas that have missing sidewalks, do not meet ADA access requirements, or have other features that do not currently meet design standards.

The Preferred Alternative's proposed light rail stations at NE 145th Street and NE 185th Street would increase transit options for travel to community facilities and amenities. There are seven parks, a King County district court, a library, and multiple social services at the Shoreline School District administrative and recreation facility within 0.5 mile of these two stations. There are also several low-income apartment complexes, four schools, a preschool, 17 churches, and a neighborhood commercial district within approximately 0.5 mile of these proposed stations. Similar types of community facilities and amenities are located within 0.5 mile of the NE 130th Street and the NE 155th Street Stations. Three neighborhood commercial

districts would be within 0.5 mile of the NE 130th Street Station under the Preferred Alternative option and Alternatives A5, A7, A10, and A11. Attachment C-13 in Appendix C lists community facilities and amenities by station area. Although the alternatives vary in terms of the stations they include, they would generally have similar benefits because they would provide improved access to similar sets of community facilities and amenities.

Character and Cohesion Changes

The character and cohesion of neighborhoods adjacent to the Segment A alternatives would not be notably altered from current conditions because the new light rail would be largely within the I-5 right-of-way and would not create an additional physical barrier. The light rail facility could be perceived as reinforcing I-5 as a barrier, but there would be no physical change to neighborhood interactions, and stations servicing all surrounding neighborhoods could help offset the sense of a barrier. Noise impacts would be avoided by mitigation measures that would be incorporated into the project, including noise walls on the guideway or ground, relocated traffic noise walls, and, in some cases, sound insulation in affected residences or buildings. See Section 4.7, Noise and Vibration, for details on project noise mitigation.

The Segment A alternatives would have full and partial acquisitions in the Pinehurst, Ridgecrest, Echo Lake, and North City neighborhoods, but the acquisitions would generally be along I-5 on the periphery of these neighborhoods. Clusters of acquisitions, however, would be needed for proposed stations at NE 145th, NE 155th, and NE 185th Streets, depending on the alternative. These acquisitions would affect from half a block to a block or more of homes in the station areas, all on the edge of the affected neighborhoods. At NE 145th Street and at NE 155th Street, other non-residential parcels are already in the area of the new station, and the impact on community cohesion from these acquisitions would be low. At NE 185th Street, 17 to 23 homes, mostly east of I-5, would be acquired for the station, parking facilities, and street improvements or realignments for the Segment A alternatives. Changes to movement, interactions, and cohesion in the neighborhood would be low. While the larger residential orientation of the neighborhood would remain intact, the loss of a block or more of homes and the introduction of a station with a park-and-ride would alter part of the neighborhood.

Segment B: Shoreline to Mountlake Terrace

Minor social, community facility, and neighborhood impacts would occur in Segment B as a result of the project.

Population and Business Changes

In addition to the I-5 right-of-way, the Preferred Alternative would acquire three residential parcels. An additional six parcels, including five residences and one vacant institutional parcel, would be acquired for the optional 220th Street SW Station.

Alternatives B1 and B4 would acquire two full parcels, but neither alternative would displace any residential units. In contrast, Alternative B2A would acquire seven full parcels, and displace five single-family residences. See Table 4.1-1 in Section 4.1 for more information. No businesses would be displaced under any of the Segment B alternatives.

Community Facilities and Transportation Network Changes

No community facilities would be displaced or adversely affected by the Lynnwood Link Extension in Segment B, and portions of the street and sidewalk network near stations would be reconstructed to improve access and mobility. The Preferred Alternative option for the 220th Street SW Station would be constructed on the site of the former Melody Hill Elementary School, which was demolished in the fall of 2013.

The Mountlake Terrace Transit Center Station under the Preferred Alternative and Alternatives B1, B2A, and B4 would increase transit options to a number of community facilities and amenities. A total of three parks, a recreation pavilion, library, senior center, senior housing complex, school, 12 churches or other religious institutions, a neighborhood medical clinic, and the Mountlake Terrace town center commercial district are located within approximately 0.5 mile of this station. This benefit extends to new light rail transit riders because existing bus transit riders have access to these community amenities from the existing Mountlake Terrace Transit Center. The optional 220th Street SW Station would make light rail more accessible to five parks, Mountlake Terrace City Hall, two low- and lower-cost housing complexes, three schools, and four churches. Attachment C-13 in Appendix C lists community facilities and amenities by station area for each of the project segments.

Character and Cohesion Changes

Neighborhood character and cohesion would remain intact for the eight neighborhoods adjacent to Segment B, and no new barriers would be placed within the existing neighborhoods. While Shoreline and Mountlake Terrace have neighborhoods on either side of I-5, the new light rail largely within the highway right-of-way would not represent an additional physical barrier although it could be perceived as

reinforcing the physical separation. The transit stations would attract patrons from adjacent neighborhoods, which could help offset the sense of a barrier. Other effects such as noise and visual impacts would be mitigated, although some visual impacts may not be fully mitigated. Neighborhood character and cohesion would not be adversely affected under any Segment B alternatives.

Segment C: Mountlake Terrace to Lynnwood

Population and Business Changes

In addition to the I-5 right-of-way, the Preferred Alternative for Segment C would require acquisition of five full parcels. It would displace nine businesses with approximately 60 employees, but no residences.

Alternative C1 would displace one single-family residence and a condominium complex with 76 residences. Acquisition of three commercial properties would displace 31 businesses with 108 employees. Alternatives C2 and C3 would affect several businesses, and displace fewer employees and residences. See Table 4.1-1 in Section 4.1 for more information. For all light rail alternatives, if the affected businesses relocate within the area, the potential loss of employment from business displacements could be reduced. However, some of the businesses may relocate out of the area or choose to close, which would adversely affect the employees (see Section 4.3, Economics, on economic impacts).

Community Facilities and Transportation Network Changes

No community facilities would be acquired in Segment C. The light rail guideway would be elevated over the Interurban Trail and the Scriber Creek Trail under all Segment C alternatives, but the effects would not alter the functions or essential attributes of the trail. The Preferred Alternative would pass about 400 feet southeast of privately owned Halls Lake, but would be along the freeway. The Preferred Alternative and Alternative C3 would generally parallel I-5 and traverse the most southerly portion of the Scriber Creek wetland complex, and would be only partly visible from Scriber Creek Park to the north. Alternative C1 would traverse the far northern portion of Scriber Creek Park at the parking area. Alternative C2 would traverse to the south of the park through the wetland complex. Public comments on the Draft EIS emphasized the importance of the park to the community, as summarized in Chapter 7, Draft EIS Public Comments and Responses. Section 4.17 discusses the impacts on Scriber Creek Park.

With Alternatives C1 and C2, the elevated track would be on the east side of 52nd Avenue West across the street from the Cedar Valley Grange Hall, with no effects on the hall's activities.

All alternative stations would be located within the Lynnwood City Center neighborhood and regional commercial district. Light rail transit patrons would have access to four parks, seven low- and lower-cost housing complexes, three churches, the Cedar Valley Grange, and a major medical clinic within 0.5 mile of the station. The Lynnwood public library and civic center are located just beyond 0.5 mile from the station. The proximity of the other locations for the Lynnwood light rail station would similarly provide access to these types of community facilities and amenities. This benefit extends to new light rail transit riders as existing bus transit riders have access to these community amenities from the existing Lynnwood Transit Center. Attachment C-13 in Appendix C lists community facilities and amenities by station area for each of the project segments.

Character and Cohesion Changes

General neighborhood character and cohesion are not expected to change for the three neighborhoods adjacent to Segment C. None of the alternatives would require property acquisition or displacement impacts in the South Lynnwood or Hazelwood neighborhoods; therefore, character and cohesion would not change in these two neighborhoods. All of the Segment C acquisition and displacement impacts would occur in the Lynnwood City Center neighborhood.

Developed land uses in the Lynnwood City Center neighborhood are primarily large-lot commercial and industrial uses. The Preferred Alternative and Alternative C3 would have the least effect on this neighborhood because these two alternatives would largely be adjacent or parallel to I-5. Both would avoid displacing a condominium complex, although the Preferred Alternative would displace nine small retail businesses meeting the needs of community residents. Alternative C3 would only displace one business. See Section 4.3 for a discussion of potential economic impacts.

Alternatives C1 and C2 would travel along the east side of 52nd Avenue West, which is the eastern boundary of the neighborhood. Alternative C1 would travel through the northern part of Scriber Creek Park and displace the 76-unit condominium complex and 31 businesses and institutions. Alternative C2 would turn eastward before the park, thus avoiding all but one residential and three business impacts. Both of these alternatives would feature design measures to avoid noise impacts, but the elevated guideway would change views.

Alternative C1's displacement of the condominium complex would adversely affect the complex's property owners and residents, but would not affect the overall character and cohesion of the Lynnwood City Center neighborhood.

4.4.3 Construction Impacts

Lynnwood Link Extension construction activities that would temporarily affect the social environment are discussed below. In most sections of the project corridor where property would be acquired for permanent facilities, it could also be temporarily used for construction staging. However, where construction staging or construction activities require acquiring additional land and displacing businesses or residences, the impact is considered a long-term impact.

Population and Business Changes

During the project's approximately 6-year construction period, residents, businesses, and business employees and customers would be near construction activities. However, in any given location, major construction along the guideway would only last 1 to 2 years. In many cases, the heaviest construction activities would last less than a year, followed by train control and electrical systems development, finish work, and testing leading up to light rail operations. Construction periods would be longer at the stations and park-and-rides. As a temporary condition, construction would be unlikely to affect population levels or businesses.

Community Facilities and Transportation Network Changes

During construction, access to community facilities and general mobility for all modes of transportation would at times be affected by increased congestion, reduced use of traffic lanes or sidewalks, and closure of some streets and sidewalks. These changes would result in small increases in travel distance and travel time. North-south bus transit routes are not expected to be adversely affected, although travel on routes may be slow or detoured at times, particularly at arterial crossings of I-5 where light rail stations would be constructed, e.g., NE 145th Street, NE 185th Street, 236th Street SW, 46th Avenue West (direct access ramp), and 48th Avenue West. Access to and from neighborhood community facilities and to destinations outside of neighborhoods may be affected. Construction could also have temporary impacts on parking and local circulation.

Character and Cohesion Changes

Sound Transit plans to locate most of the staging areas and construction access within the property required for permanent rights-of-way. Some other properties may also be required for construction, including the WSDOT right-of-way (subject to WSDOT and FHWA approval), other transportation rights-of-way, and nearby vacant and/or undeveloped parcels. Construction work would create short periods of increased noise, vibration, dust, construction truck traffic, and visual changes, but generally these effects would be limited to properties immediately adjacent to the

construction areas. Section 4.7, Noise and Vibration, further discusses potential disruption to adjacent neighborhoods from construction noise and vibration.

In Segments A and B, the construction effects on social cohesion would be limited because I-5 already functions as a boundary between neighborhoods. In Segment C, Alternatives C1 and C2 follow an arterial into the Lynnwood City Center neighborhood and would be adjacent to commercial and light industrial properties as well as residences. The construction activities with these two alternatives and the related noise, vibration, dust, visual impacts, and truck traffic would be more in the center of the neighborhood than with the Preferred Alternative and Alternative C3, which continue generally adjacent to I-5. Still, only a portion of the larger Lynnwood City Center neighborhood would be affected, which would limit changes to overall neighborhood character and cohesion.

4.4.4 Indirect Impacts

Over time, implementation of the Lynnwood Link Extension could result in indirect impacts, particularly in station areas. The presence of the light rail transit facilities could result in transit-oriented development at some station locations as allowed by local zoning regulations. Several of the jurisdictions along the project corridor have initiated station area planning or already adopted plans allowing transit-oriented developments in station areas, which could result in changes to the types of development that may occur there. For example, areas that are currently low-density residential could ultimately transition to more dense residential or mixed-use developments. Section 4.2.2 in Section 4.2, Land Use, further discusses potential long-term changes in land use. These changes could alter the existing character of some neighborhoods, particularly the Lynnwood City Center neighborhood where the potential for transit-oriented development is highest. In the long term, the station areas at the edges of neighborhoods may become new neighborhood activity centers, which could support enhanced livability and sustainability.

4.4.5 Cumulative Impacts

Cumulative effects could occur in the project corridor neighborhoods if large development projects or transportation improvements were located in neighborhoods adjacent to the light rail alignment.

Other major projects could be constructed concurrently in neighborhoods that would be affected by construction of the Lynnwood Link Extension. Construction of the Northgate Link Extension guideway and station could overlap with the start of the Lynnwood Link Extension construction. King County Metro is planning a transit-oriented development project at the Northgate Station. Cumulatively, this may extend the duration of construction activities and impacts in the Northgate area. Sound Transit will coordinate the development of construction mitigation plans for the

Lynnwood Link Extension with those for the Northgate Link Extension and other projects with concurrent construction timeframes.

The OMSF alternative site in Lynnwood east of 52nd Avenue West and north of I-5 is near neighborhoods with minority and low-income populations. On June 24, 2014, the Sound Transit Board identified a site in Bellevue as the preferred site for this facility. The final decision about which project will be built will be made by the Sound Transit Board after publication of that project's Final EIS. If Sound Transit were to select the Lynnwood site for the OMSF, it would displace businesses and other enterprises in an area that is currently developed with light industrial and commercial uses. The proposed facility would not notably alter transportation conditions, including neighborhood accessibility or traffic levels. Construction impacts (such as noise, light and glare, dust, and traffic) of the two projects would affect the nearby residential areas more than impacts of just the Lynnwood Link Extension.

The Edmonds School District master plan includes a district support facility on property that includes administrative offices and bus maintenance and storage in Lynnwood. This property overlaps partly with the Lynnwood site alternative for the OMSF. The development of one or both of these projects would be within an area with other light industrial uses. With a residential neighborhood across the street, Sound Transit would undertake best practices to minimize adverse construction effects on residents, such as impacts due to construction traffic, dust, light and glare, and noise.

The impacts of the Lynnwood Link Extension alternatives, in combination with other past, present, or future projects and actions, with available mitigation applied, would not result in appreciably higher impacts on communities or neighborhoods.

4.4.6 Potential Mitigation Measures

The project's social impacts, including impacts on community facilities and neighborhoods, would generally be low.

Sound Transit would implement the design and mitigation measures identified in other chapters and sections of this Final EIS to help minimize effects on the quality of life and neighborhood cohesion, including:

- Chapter 3, Transportation Impacts and Mitigation, which describes measures to address impacts from local congestion (Section 3.6.4), parking (Section 3.6.7), and construction (Section 3.6.9)
- Section 4.1, Acquisitions, Displacements, and Relocations, which describes measures to provide compensation and assistance to affected parties
- Section 4.3, Economics, which includes measures to minimize construction impacts on businesses

- Section 4.5, Visual and Aesthetic Resources, which outlines mitigation to address areas with high visual impacts
- Section 4.6, Air Quality and Greenhouse Gases, which identifies practices to reduce construction air quality concerns
- Section 4.7, Noise and Vibration, which outlines the project's commitments to address impacts
- Section 4.15, Utilities, which describes measures to reduce impacts to utilities – both the utility system as well as area residential and commercial customers
- Section 4.17, Parks and Recreational Resources, which describes how park impacts would be reduced during construction and longer term

To reduce potential cumulative impacts of potentially concurrent construction activities in the Northgate area and in Lynnwood, Sound Transit would coordinate planning efforts with the other projects, including identifying appropriate design measures, mitigation, and community outreach to minimize adverse effects.

4.4.7 Environmental Justice Analysis and Determination

The assessment of environmental justice impacts is required by Presidential Executive Order 12898, Federal Actions to Address Environmental Justice to Minority Populations and Low-Income Populations (February 11, 1994); the U.S. Department of Transportation (USDOT) Order 5610.2, Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (April 15, 1997); and the USDOT Order 5610.2(a) (May 2, 2012), updating the USDOT policy to consider environmental justice principles in all programs, policies, and activities. The guiding principles followed by FTA, as described by FTA Circular 4703.1, are to (1) avoid, minimize, and mitigate disproportionately high and adverse effects on minority and low-income populations; (2) ensure full and fair opportunities for public involvement by members of minority and low-income populations during project planning; and (3) prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations. The discussion below summarizes the environmental justice analysis provided in Appendix C, which also describes outreach to environmental justice populations and includes detailed statistics on neighborhoods along the project corridor.

Since the start of project planning, Sound Transit has been conducting community outreach and public involvement activities that include targeted outreach to minority and low-income populations. To involve ethnic populations with limited English proficiency, mailings and handouts have included text translated into foreign languages common in the study area. FTA and Sound Transit also contacted six federally recognized tribes with interests in the area as well as non-federally recognized tribes. Appendix L, Public Involvement and Agency Coordination, includes a complete listing

of project outreach events and notices. Appendix C discusses comments and concerns from meetings in areas with low-income and minority groups.

The primary impacts of the project affecting individuals or businesses would be from property acquisition and displacement, but compensation and relocation assistance in accordance with federal regulations and Sound Transit policies would prevent these impacts from being high and adverse. Sound Transit anticipates that some low-income and minority individuals would be affected by residential and business acquisitions, based on demographic information for the corridor communities and as a result of public outreach, including meetings with property owners. While property acquisitions and the resulting displacements would be unavoidable, they would be mitigated through Sound Transit's real property acquisition policy, including its compensation and relocation assistance program. Table C-2 in Appendix C has more details on the project's impacts on minority and low-income populations.

Moreover, the Lynnwood Link Extension would have offsetting benefits, as summarized in Section C-6.2 of Appendix C. The light rail alternatives would improve access to regional activity centers and employment opportunities. Light rail transit would be more reliable and more frequent, with increased hours of service. These improvements would particularly benefit transit-dependent persons, including those having more than one job or working swing and graveyard shifts, due to extended operating hours of the light rail system compared with the bus transit systems. The light rail extension would reduce air quality criteria pollutants and mobile source air toxic pollutants compared to the No Build Alternative. Ambient noise levels may be reduced, particularly where there are no noise barriers or where replacement noise barriers would be constructed. Because of recent planned and proposed changes in municipal comprehensive and neighborhood plans, proposed stations in Mountlake Terrace, Shoreline, and especially Lynnwood could result in more intensive land uses, economic development, and mixed land uses to support neighborhood livability and sustainability. As such, the project would benefit those closest to the project even though they are most likely to be affected by the project.

Based on the findings of impacts described in this Final EIS and considering the mitigation measures to which Sound Transit is committing, project impacts would not be high and adverse. Design measures, best management practices (BMPs), offsetting benefits, and mitigation commitments would reduce the severity of individual or cumulative impacts on all populations, including minority and low-income populations, to levels that would not be high and adverse.

FTA has concluded that Sound Transit's Lynnwood Link Extension would not result in disproportionately high and adverse effects on minority and low-income populations.

4.5 Visual and Aesthetic Resources

Visual and aesthetic resources include the natural and built features of the landscape that contribute to the public's appreciative enjoyment of the environment. These resources can include individually identifiable features such as natural landmarks (for example, mountain peaks and hills, bodies of water, or stands of trees), constructed features (individual buildings or the downtown skyline), or entire landscapes such as a valley ringed by hills.

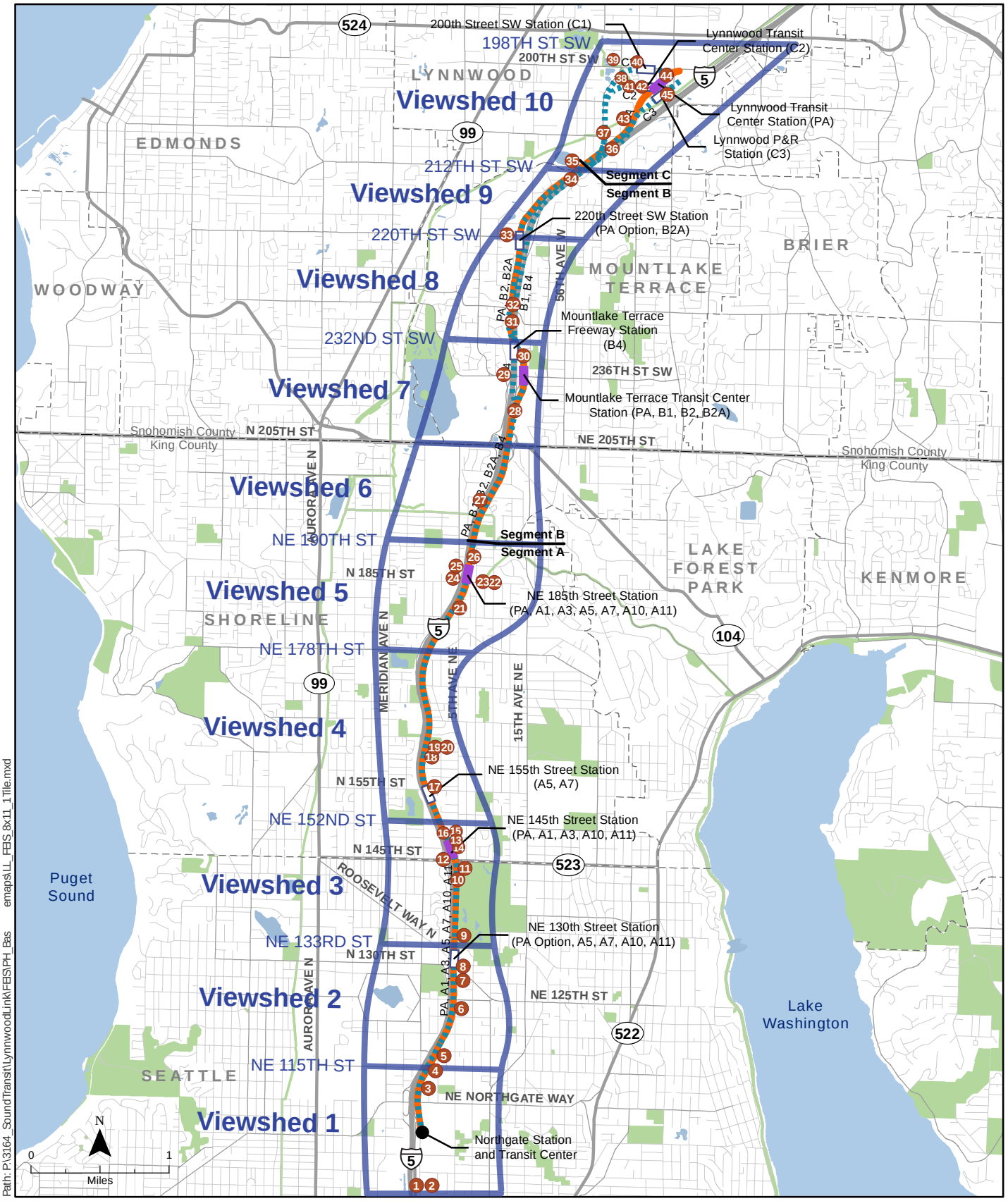
Impacts on the visual environment are defined in terms of the extent to which elements of the proposed project would change the perceived visual character and quality of the environment. Appendix G, Visual Simulations and Illustrations, provides detailed visual simulations produced for this analysis.

The study area for visual and aesthetic resources consists of viewsheds along the Lynnwood Link Extension corridor (Figure 4.5-1). These viewsheds represent distinct landscape units from which the project alternatives are visible. They encompass the travel lanes of I-5 for most of the route, and they also include areas on either side of the project corridor where people could see the project alternatives. The viewsheds are defined by changes in topography, neighborhoods, streets, bridges, or tree cover, and they range in width from a half block to up to 0.5 mile from the project corridor. The viewpoints Sound Transit used for the EIS simulations illustrate typical views of the alternatives, or locations from which project features are particularly prominent.

4.5.1 Affected Environment

Sound Transit began this visual analysis by assessing the visual character and visual quality of the landscape, and then considering how typical viewers may respond to what they see around them. The Lynnwood Link Extension EIS *Technical Analysis Methodologies* report describes the visual analysis methods in more detail, including how Sound Transit adapted FHWA's and WSDOT's guidelines for visual analysis. The FHWA guidelines provide a generally accepted methodology for preparing visual assessments for linear transportation projects and are appropriate for use on this project.

Visual character refers to identifiable visual information, including visual elements and major environmental features.



- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Viewshed Lines
- Viewpoints

Figure 4.5-1
Viewsheds and Viewpoints Locations

Visual quality refers to the evaluation of the visual experience to the public and is described in terms of vividness, intactness, and unity. *Vividness* refers to the way landscape components combine in distinctive and memorable visual patterns. *Intactness* refers to whether the natural and human-built visual patterns form a consistent landscape, or whether highly contrasting features intrude into the view. *Unity* refers to the visual coherence and compositional harmony of the landscape considered as a whole.

Viewer response reflects viewer exposure and viewer sensitivity. *Viewer exposure* refers to where viewers are and how long they are typically there, including highway users and people in the surrounding neighborhoods. *Viewer sensitivity* refers to how viewers perceive the environment and what they find important. Viewer sensitivity can be affected by what the viewer is doing; the visual context; and the values, expectations, and the interests they may have. For each viewshed and potential viewer group, viewer sensitivity is rated as high, average, or low. High sensitivity represents viewers who highly value a particular view, and low sensitivity represents viewers who do not regard the visual setting as important to their activities. For example, residential viewers are typically rated as having high sensitivity. Persons driving for pleasure or tourists visiting an area to enjoy scenic features have a high awareness of features and high sensitivity. Individuals engaged in recreation activities in parks or on trails have a high awareness and sensitivity to the surroundings. An average sensitivity rating reflects the experience of people who view the visual context as a secondary feature of other activities. For example, these could be persons at work or shopping who may value a pleasant environment but are not at a specific location for the purpose of enjoying the scenery. Drivers and vehicle occupants passing through an area are less sensitive to the visual context because they are focusing on features other than the surrounding landscape and generally have an average to low sensitivity. Low viewer sensitivity generally describes the experience of persons engaged in activities that render the quality of their surroundings as irrelevant or incidental.

Based on these visual quality considerations, different levels of visual quality have been assigned to describe the viewsheds in the corridor:

High Visual Quality describes views with vivid, memorable, distinctive features in a landscape with compositional harmony, or where elements of the landscape fit together in a visual pattern that is free from encroaching elements.

Medium Visual Quality describes views with a unity or compositional harmony between elements of the landscape that produce a pleasing overall impression in which encroaching elements are minor and do not substantially alter the perception of the landscape as a unit. These views lack vivid, memorable features and are generally characterized as common or ordinary.

Low Visual Quality describes views that lack a dominant visual character in which there is a low level of fit between disparate elements. In some cases, these views appear disorganized with features that seem out of place, or are views with some compositional harmony but include eyesore elements that can dominate one's perception.

The visual quality of an area has a complex relationship to viewer sensitivity. In an area with high visual quality, such as a spectacular view, a person who does not regularly see the view or is distracted by the driving experience may still place a high value on the view. In an area with low visual quality, persons still may object to views that fall short of their visual goals for the area.

Appendix G includes photographs from viewpoints within each viewshed. Appendix I-4.5, Visual Quality and Aesthetic Resources, has more detailed descriptions of the viewsheds and their defining characteristics.

Highway Beautification Areas

There are areas along the I-5 right-of-way that were acquired by FHWA and WSDOT for the "restoration, preservation and enhancement of scenic beauty adjacent to the highway." They were intended to preserve and perpetuate the natural character of Washington, supporting tourism and a positive sense of place for local communities, and offering benefits such as improving water quality and enhancing wildlife habitat.

Segment A, Viewshed 1—NE 92nd Street to NE 115th Street

Viewshed 1 includes the Northgate area of Seattle. Major features include the Northgate Mall, surrounding multistory buildings with residences and businesses, and the North Seattle Community College campus and I-5 to the west. This section of I-5 is generally about 20 feet higher than the surrounding area, and it has moderately dense linear stands of trees and shrubs along the margins of the corridor. Viewers include drivers and occupants of vehicles on I-5 and local arterials (low to medium viewer sensitivity), shoppers in retail areas (low to medium viewer sensitivity), occupants of office buildings (low to medium viewer sensitivity), and residential occupants of multistory buildings on both sides of the corridor (high viewer sensitivity). Visual quality in the viewshed is medium to low for all viewer groups. The urban uses have a wide variety of building sizes and character, which tends to reduce unity. Elements of the streetscape, including street trees, provide some compositional harmony through a similar street-level character over most of the area, as illustrated in Viewpoints 1, 2, and 3.

Segment A, Viewshed 2—NE 115th Street to NE 133rd Street

Viewshed 2 has single-family residential areas on both sides of I-5, along with churches on both sides and a park on the west side of the freeway. There are continuous noise walls along both the sides of I-5 that block views of the travel lanes from residential areas. Residents and park and church users are highly sensitive to changes in the landscape. Drivers and vehicle occupants on I-5 have average to low visual sensitivity. The overpass at NE 117th Street and freeway signs can be seen

from adjacent residences and streets. There is limited vegetation along I-5, but moderately dense vegetation east of the noise walls. The visual quality of views from the residential area is medium to high due to the similar building scale and moderately dense landscaping that provide a homogenous street-level character and buffers the freeway from views, as illustrated in Viewpoints 4, 5, and 6. The visual quality of I-5 is low due to the framing of the highway by noise walls that provide little visual interest.

Segment A, Viewshed 3—NE 133rd Street to NE 152nd Street

Viewshed 3 includes 5th Avenue NE and the Jackson Park Golf Course to the east, with a single-family residential area and private school campus on the west side. The freeway interchange at NE 145th Street is bounded by residential areas to the north and east. This section of I-5 has dense trees and vegetation along both sides of the freeway. Residents and golf course users are highly sensitive to changes in the landscape. The visual quality of the golf course is medium to high due to the unity and compositional harmony of a landscaped setting and mature vegetation that buffers views of encroaching features such as I-5. Residential areas are of medium visual quality due to their homogenous character. The visual character of I-5 is generally medium due to the framing of the highway by dense vegetation on both sides. The view from southbound vehicles from NE 155th Street to NE 145th Street has higher visual quality where Mount Rainier is a distinctive and memorable element in the distance, and results in medium to high visual quality. The visual character of this area is illustrated in Viewpoints 7 through 13.

Segment A, Viewshed 4—NE 152nd Street to NE 178th Street

Viewshed 4 has single-family residential neighborhoods on both sides of I-5. Ridgecrest Park is on the east side of I-5 and is partially screened from the freeway by a row of trees. Three parks on the west side of I-5 (Twin Ponds Park, James Keough Park, and Ronald Bog Park) do not have views extending to the east side of I-5. King County Metro's North Transit Base and King County's Solid Waste Transfer Station are on the west side of the freeway. The visual quality of the residential area is medium due to the visual unity of its homogenous character and moderately dense landscaping that buffers views of I-5. The visual quality of Ridgecrest Park is high due to vegetation screening from I-5. With vegetation framing both sides of I-5, the visual quality of the freeway is medium. There are WSDOT beautification areas located southeast and northwest of the NE 175th Street interchange.

Segment A, Viewshed 5—NE 178th Street to NE 190th Street

Viewshed 5 has single-family residential uses on both sides of I-5, along with churches and other uses, such as the Shoreline Conference Center and Shoreline

Stadium and a Seattle City Light transmission line corridor. This section of I-5 is bordered by noise walls, with varied vegetation. Residential areas in this viewshed have high viewer sensitivity and medium visual quality due to the unity of character and the buffering of the freeway by noise walls and vegetation. Viewers from the Shoreline Conference Center and the Shoreline Stadium are likely to have a low level of sensitivity if their focus is on other activities; moreover, the variety of urban forms generally lowers visual quality. Drivers and occupants of vehicles on I-5 are likely to have average sensitivity in viewing the medium visual quality of the highway corridor framed by moderately dense vegetation on both sides. There is a WSDOT beautification area south of NE 180th Street.

Segment B, Viewshed 6—NE 190th Street to NE 205th Street (244th Street SW, SR 104)

Viewshed 6 has single-family residential uses on both sides of I-5. North City Park and the closed North City Elementary School on the east side of the highway are separated from I-5 by a beautification area of mature forest. This section of I-5 has high visual quality because of the frame of heavy vegetation on both sides. The residential areas have high viewer sensitivity and medium visual quality and are buffered from the freeway by noise walls, topography, and distance.

Segment B, Viewshed 7—NE 205th Street (244th Street SW) to Mountlake Terrace Transit Center (232nd Street SW)

Viewshed 7 covers an area where I-5 widens for an interchange and median. Much of this viewshed has medium visual quality, as viewed from I-5, because of the consistent character due to vegetation framing on both sides and the view of vegetation on the horizon despite the complex freeway lanes, interchange ramps, and the parking structure of the Mountlake Terrace Transit Center. The Nile Golf Course is west of I-5, with residential areas located north of 236th Street SW on both sides of I-5. Both of these areas have high visual quality and high viewer sensitivity, with few views of I-5 because of buffering vegetation. The commercial and office area on the east side of the freeway has low to medium viewer sensitivity and medium visual quality due to unity of design. This commercial area is buffered from views of I-5 by a wooded area along McAleer Creek adjacent to I-5. North of this area is a vacant former school site.

Segment B, Viewshed 8—232nd Street SW to 220th Street SW

Viewshed 8 is along I-5 in an area where the freeway has high visual quality for southbound traffic due to very dense vegetation on high steep slopes that border the highway on both sides. For northbound vehicles south of 232nd Street SW, viewer sensitivity is average, and visual quality is medium rather than high because of the encroachment of roadway crossings and the pedestrian overpass to the existing

transit stop in the median. The surrounding single-family residences along both sides of I-5 are at the top of steep wooded slopes and have high viewer sensitivity and medium visual quality with unified character. These residences are buffered from views of I-5 by topography, noise walls, and vegetation, although the residences on 227th Street SW are in a valley with noise walls that only partly screen views of I-5. On the west side of I-5 from about 233rd Street SW to just south of 228th Street SW, a highway beautification area extends along the top of the densely vegetated slope.

Segment B, Viewshed 9—220th Street SW to 212th Street SW

Viewshed 9 is along a section of I-5 that is bordered by moderate to dense vegetation on either side, with medium visual quality. The bordering neighborhoods are mostly residential, are generally below the elevation of I-5, and have medium visual quality due to unity of character. These neighborhoods are buffered from I-5 by topography, noise walls, and vegetation. Offices and a multi-family residential complex on the west side of I-5 between 220th Street SW and 216th Street SW, have low to medium visual quality due to the similar character of built elements, landscaping, and street character.

Segment C, Viewshed 10—212th Street SW to 40th Avenue West

Viewshed 10 has varied landscapes as the alternative routes move away from I-5 to the Lynnwood Transit Center. Viewer sensitivity varies as well due to the mix of viewer types.

Northbound on I-5, between 212th Street SW and 52nd Avenue West has high visual quality with vivid distant views of the Cascade Mountain peaks. Northbound and southbound views are framed by moderately dense vegetation.

West of I-5 between 212th Street SW and 52nd Avenue West is a residential area with a large open space area and a lake that has medium visual quality due to the blend of open space and residential uses.

To the west of I-5, 52nd Avenue West is characterized by a residential neighborhood on the west side, with medium visual quality due to a unity of features. The industrial uses to the east of 52nd Avenue West are not a visual intrusion to the residential area due to the low profile of buildings as well as landscaping and parking areas adjacent to the street.

Scriber Creek Park on the east side of Cedar Valley Road approaching 200th Street SW has high visual quality due to the diversity of lawn areas, wetlands, and trails and the unifying homogeneous dense vegetation throughout the area. This vegetation also buffers the park from the street and adjacent urban development.

The areas on both sides of 200th Street SW east of Cedar Valley Road include multifamily buildings and offices that transition to commercial uses east of 46th Avenue West. The multifamily residential neighborhood has medium visual quality due to a unity of bulk, design, and landscaping elements that provide compatible features. The commercial areas east of 46th Avenue West have low visual quality due to the variety of building forms and the lack of visual harmony among multiple building styles and other features.

The Lynnwood Transit Center occupies a 29-acre site with pick-up and drop-off areas and several large parking lots. The transit center is bounded to the west by a large tract with wetlands adjacent to Scriber Creek. The visual quality of the transit center is low due to the predominance of parking lots, despite landscaping features and the adjacent open space area.

The 44th Avenue West corridor south of 200th Street SW includes commercial development with the Lynnwood Transit Center on the west side and a variety of commercial development on the east side. The dominant visual image is of wide streets, large parking lots, signs, and strip shopping centers. The visual quality for viewers within the commercial area is medium to low due to lack of unity. The visual quality for occupants of vehicles traveling north on the arterial is generally low because of the multiple overcrossings by I-5 and the Interurban Trail, the freeway on-ramps and adjacent parking lots, frequent signs, and strip malls with little visual interest.

The Interurban Trail crosses 52nd Avenue West and runs northeast toward the Lynnwood Transit Center, with the Scriber Creek wetlands and the Lynnwood Transit Center to the north, before it continues to cross 44th Avenue West on an overpass near I-5. The trail is bounded by moderate to dense vegetation and has a medium visual quality due to the unity of vegetation cover along the corridor.

4.5.2 Long-Term Impacts

The discussion below describes the potential visual changes that could occur with the light rail alternatives compared to the No Build Alternative, and qualitatively assesses the level of visual change and the resulting visual quality for each viewshed. To develop the visual assessments in this section, Sound Transit prepared visual simulations that are based on photographs of existing views from locations throughout the project corridor; these simulations are provided in Appendix G.

No Build Alternative

Under the No Build Alternative, the visual quality of the project corridor would be similar to that discussed above under Section 4.5.1, Affected Environment. If the I-5 corridor experiences more adjacent private development, the visual environment in the viewsheds could change over time.

Light Rail Alternatives

The Lynnwood Link Extension would result in changes in the visual environment of varying degrees throughout the project corridor, as discussed in more detail in the following subsections. Consistent with Sound Transit design guidelines, and where practical, the project would incorporate the following features to reduce and avoid visual impacts as much as possible:

- On the east side of I-5, the project would, in some locations, place the light rail guideway on the freeway side of the wall and move existing noise walls farther east, and increase their height. In other areas, the light rail guideway would be placed east of the existing noise wall and would include separate noise walls. Areas with slopes may need new retaining walls as well as relocated or new noise walls.
- New noise walls would also be needed in some cases to mitigate light rail noise impacts. Walls could be either on or adjacent to the guideway.
- Exterior lighting at stations and park-and-ride lots would be designed to minimize height and use source shielding to avoid luminaries (bulbs) that would be directly visible from residential areas, streets, and highways. Shielding would also limit spillover light and glare in residential areas.
- For the entire Lynnwood Link Extension, Sound Transit would develop design criteria that would guide project design through a balanced set of systemwide elements and contextual elements, such as a consistent architectural theme for elevated elements and stations, consistent signage, and a systemwide art program. These criteria would be developed by interdisciplinary teams with input from local communities, local jurisdictions, and WSDOT, and would be integrated with existing plans, including plans for redevelopment.
- Sound Transit would adhere to the Cities' design standards and design review process, if applicable, to promote visual unity in station areas.
- Sound Transit would plant appropriate vegetation within and adjoining the project right-of-way to replace existing street trees and other visually important vegetation that is removed for the project, and/or to provide screening for sensitive visual environments and/or sensitive viewers.
- Sound Transit would maintain remainder parcels (purchased parcels that are unused after the project) to pursue their redevelopment consistent with city plans.

Changes in visual quality can result when defining features, including mature trees and landscaping, are removed or when prominent features such as walls, stations, elevated guideways, or larger structures are added. Visual changes also occur where overhead utilities are added or raised, or where streets, bridges, or other facilities are modified or

replaced. Elevated sections of the guideway would be prominent aboveground features when viewed by traffic users on I-5 and viewers in the surrounding area. When mature vegetation framing the roadway is removed, viewers may perceive the highway corridor as wider and more prominent, and it can change the visual context of adjacent residential areas by removing the buffer from the transportation corridor.

The changes in visual quality by location are described in Table 4.5-1. Visual simulations in Appendix G illustrate existing views and projected future views with the light rail alternatives.

Visual impacts are rated as low, medium, or high, reflecting the degree of change, the quality of the views, and the sensitivity of viewers. The following criteria are used to characterize the degree of visual quality change from existing conditions in terms of changes in the elements of vividness, intactness, and unity as well as viewer sensitivity.

- **High change** would remove existing features and/or introduce visually prominent features that alter the visual character of the area. High changes include removing dense mature vegetation that contributes to high or moderately high visual quality or when vegetation provides effective screening of less attractive views. High changes may also include prominent structures that are larger in scale or higher than surrounding visual features, including views of trains passing by. A high degree of change is more likely in an area with high visual quality and high viewer sensitivity.
- **Medium change** would alter visual features but not in a way that would be perceived as intrusive or incompatible by most viewers and would not substantially change intactness and visual unity. A medium change can result from the removal of vegetation that would not affect the extent to which highway or light rail features are screened or buffered or that renders features more visible or prominent.
- **Low change** generally includes relatively minor new features or relatively minor alteration of existing features such as vegetation cover. Replacing noise walls with similar-scale walls, and/or the inclusion of light rail facilities, would result in minor changes in intactness and visual unity. In some cases, physically prominent new features might result in a low change in visual quality if the existing visual context already has low visual quality.

Impacts by Alternative

Table 4.5-1 summarizes the potential visual impacts by segment and alternative, while Figures 4.5-2 to 4.5-7 highlight areas with high impacts.

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
1. Northgate (NE 92nd Street to NE 115th Street)	Low	Average	**All Alternatives:** • The elevation of I-5 and the topography currently limits visibility from surrounding areas, and the elevated structure would cause little or no change in appearance or visual unity of the highway corridor. • Views of Northgate Mall from I-5 would not be impaired because the elevated structure would be at a similar elevation as the parking lot tree canopy and would maintain similar views of buildings and signage, with little change in visual unity. • Few areas with mature dense vegetation would be removed, although some landscaping would be removed along 1st Avenue NE to NE 115th Street, resulting in a localized impact, with new facilities visually encroaching and reducing visual unity. • The elevated structure would be a visually prominent element but would not affect any vivid and memorable features or views, nor would it reduce the limited unity in this complex and heterogeneous area. • Elevated structures would partly encroach on views from residential neighborhoods to the east.	G-5 G-7 G-8 G-9 G-10	**I-5** Low **Retail/Office** Low **Residential** Low and High
			Preferred Alternative and Alternatives A5 and A10: • Impacts would be the same as described above under All Alternatives to N. 113th Street. • Existing dense landscaping between a multi-family site and First Avenue N. would be replaced by a guideway on retaining walls about 30 feet high, with a high localized visual impact due to encroachment and reduced visual unity.	G-7 G-10	**I-5** Low **Residential** Low except High for one adjacent multi-family complex
			Alternatives A3, A7, and A11: • Impacts would be the same as described above under All Alternatives to N. 113th Street. • Continuation of the elevated guideway to the north would result in a high localized visual impact due to encroachment and reduced visual unity.	G-9	**I-5** Low **Residential** High

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
2. NE 115th Street to NE 133rd Street	**I-5** Low **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative and Alternative A1 (at-grade/elevated with no station at NE 130th Street):** • The noise wall would be relocated to the east and would be similar in scale from 117th Street to near NE 123rd Street, with low visual quality impacts to viewers from I-5. • Displaced homes and higher noise walls from NE 117th Street to NE 123rd Street would affect the unity of views from nearby residences and a church to the east. Local views would vary according to retaining wall and noise wall height and the distance between walls and residences. The greatest visual intrusion would be where noise walls are within existing back yards of residences. • Removal of buildings, street relocation, complex noise wall configuration, and loss of vegetation between NE 123rd Street and NE 130th Street would be a visual encroachment and reduce visual unity and intactness for residential areas to the east. • Loss of dense vegetation north of NE 130th Street would reduce the unity of views both from I-5 and neighborhoods to the east. • Views from residential neighborhoods to the west would not be affected.	G-12 G-13 G-15 G-17 G-18 G-21 G-24 G-29	**I-5** Low **Residential** Medium and High (mostly within 1 block from corridor)
			Alternatives A5, A10 (at-grade alternatives with station at NE 130th Street): • Impacts would be similar to Preferred Alternative and Alternative A1. • The station at NE 130th Street would be largely below grade with little additional change from the visual impacts of vegetation removal in the Preferred Alternative.	G-15 G-17 G-24 G-31	**I-5** Low **Residential** Medium and High (mostly within 1 block from corridor)
			Alternative A3 (mostly elevated with no station at NE 130th Street): • Elevated guideway and overhead catenary south of and at NE 130th Street would reduce intactness and unity of views from I-5 and the residential neighborhood and church to the east. • Removed homes and vegetation would increase the prominence of the highway corridor and affect visual unity for neighborhoods to the east, which currently have views of existing large trees and other landscaping.	G-14 G-19 G-22 G-26 G-30	**I-5** Medium and High **Residential** High (mostly within 1 block from corridor)
			Alternatives A7 and A11 (mostly elevated with NE 130th Street Station): • Impacts would be similar to Alternative A3, except the station at NE 130th Street would be more prominent. • Views of surface parking would be similar to the existing park-and-ride but could be partly screened from the view of residences by landscaping.	G-14 G-19 G-27 G-32	**I-5** Medium and High **Residential** High (mostly within 1 block from corridor)

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
3. NE 133rd Street to NE 152nd Street	**I-5 Northbound** Medium **I-5 Southbound** Medium to High **Residential** Medium **Golf Course** Medium	**I-5** Average **Residential** High **Golf Course** High	**Preferred Alternative (with NE 145th Street Station and parking garage south of relocated ramps):** • The elevated guideway and overhead catenary would remove an existing mature vegetation screen and intrude into views from some residential neighborhoods, reducing intactness and unity; the affected residential areas are mostly on the east side of the freeway. • The elevated guideway above the grade of I-5 travel lanes south of NE 145th Street would remove mature vegetation and alter the character of a heavily vegetated transportation corridor and be a prominent visual intrusion that would reduce unity as viewed from the highway. • The elevated guideway, elevated NE 145th Street Station, and parking garage would not block views of Mount Rainier from I-5 southbound and would not change the vividness of this element in views. • There would be partial views of the guideway from Jackson Park Golf Course to the west, with less screening of views of I-5, but the station and parking garage would not affect the golf course's overall internal visual character or unity. • The guideway, station, and parking garage would eliminate existing mature trees within the existing park-and-ride lot and would intrude into views from the residential areas to the east. The station and parking lot would increase the scale of visual elements as compared to existing residences across the street, reducing visual unity. • North of NE 145th Street, removed residences and vegetation, together with an elevated guideway on 10- to 20-foot-high retaining walls with additional noise walls, would be a visual intrusion and reduce the visual unity of the residential neighborhood.	G-34 G-37 G-40 G-43 G-48 G-53 G-56 G-59	**I-5** Medium **Residential** Medium and High (in vicinity of NE 145th Street) **Golf Course** Medium
			Alternatives A1 and A10 (with NE 145th Street Station and parking garage adjacent to NE 148th Street): • Impacts of the elevated guideway and station would be the same as the Preferred Alternative on views from I-5, residential neighborhoods, and Jackson Park Golf Course. • The parking garage adjacent to NE 148th Street would displace residences, eliminate existing mature trees, and be a visual intrusion into the adjacent residential neighborhood that would alter the scale of visual elements and reduce visual unity.	G-34 G-37 G-41 G-44 G-49 G-54 G-57	Same as the Preferred Alternative
			Alternative A5 (without station at NE 145th Street): • Impacts from the elevated guideway would be similar to the Preferred Alternative but with lower effects on intactness and unity near NE 145th Street because there would be no station or garage.	G-35 G-37 G-45 G-61	Same as A1, A10 except: **Residential** Medium

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
			Elevated Alternatives A3 and A11 (with station at NE 145th Street): • The guideway and overhead catenary would be higher and intrude into views more than the Preferred Alternative, affecting visual intactness and unity for views from neighborhoods on both sides of I-5. • The elevated guideway above the grade of I-5 travel lanes south of NE 145th Street would remove mature vegetation, alter the character of a heavily vegetated transportation corridor, and be a prominent visual intrusion that would reduce unity as viewed from the highway. • There would be no impacts to views of Mount Rainier from I-5 southbound. • Effects of the NE 145th Street Station would be similar to the Preferred Alternative. • The higher guideway and station would be more prominent in views from much of Jackson Park Golf Course than the Preferred Alternative, with greater effects on westerly views from the golf course. • North of NE 145th Street, the elevated guideway would intrude on views and reduce the visual unity of the residential neighborhood to the east. • The higher elevated structure would be visible and perceived as a visual intrusion from the residences and school west of I-5 despite existing vegetation screening.	G-35 G-38 G-40 G-43 G-50 G-60	**I-5** High **Golf Course** Medium and High **Residential** High
			Elevated Alternative A7 (without station at NE 145th Street): • Visual impacts would be similar to Alternative A3 due to the elevated guideway height, but with less prominent and less visual intrusion in the vicinity of NE 145th Street because there would be no station or parking garage.	G-35 G-38 G-46 G-51 G-62	Same as A-3 except **Residential** Medium (in vicinity of NE 145th Street without station and garage)
4. NE 152nd Street to NE 178th Street	**I-5** Medium **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative and Alternatives A1, A3, A10, and A11 (alternatives without station at NE 155th Street):** • Between NE 152nd and NE 178th streets, light rail facilities on retained fill structures with noise walls would intrude into views from I-5 and reduce visual unity, largely by removing the moderate to dense vegetation along the highway. • In addition to vegetation loss, some homes would be removed, and new retaining walls and noise walls would be higher than existing walls and would be a visual intrusion and reduce unity and visual integrity for residential areas to the east. These effects would be greatest between NE 152nd and NE 161st Streets. • A row of trees along the east side of Ridgecrest Park would be removed, reducing the intactness and unity of views from the park and residences directly to the east. • From Ridgecrest Park to NE 170th Street, the light rail facilities would not be visible from residential areas to the east, but unity of views from the neighborhood to the highway would be affected by the loss of mature vegetation. • Five to 10 percent of a 0.5-acre WSDOT beautification area southeast of the NE 175th Street interchange would be used by these alternatives.	G-66 G-68 G-70 G-72	**I-5** Medium **Residential** Medium and High (mostly for residences with direct views) **Ridgecrest Park** High

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
			Alternatives A5 and A7 (alternatives with station at NE 155th Street): • Impacts would be similar to the Preferred Alternative, except at the NE 155th Street Station and its garage, which would displace residences and be at a greater scale than surrounding residences. This would reduce the visual unity of the adjacent residential neighborhood and intrude on views.	G-64 G-68 G-70 G-72	**I-5** Medium **Residential** Medium and High (mostly for residences with direct views)
5. NE 178th Street to NE 190th Street	**I-5** Medium **I-5** **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative** • Loss of moderate to heavy vegetation cover, the placement of retaining walls, and a parking garage adjacent to the highway would reduce visual unity for travelers on I-5. • Removal of homes, loss of vegetation along I-5, relocated noise walls, and realignment of 5th Avenue NE would reduce visual integrity and unity for residential neighborhoods to the east, including where views of noise walls are now buffered by vegetation. • The light rail guideway and station at NE 185th Street would mostly be lower than the residential neighborhood to the west, but parts of the station and its transit facilities would be visible. This change, as well as the removal of some homes to the east of the station, would reduce the visual unity of the residential area. • The parking structure on the west side of I-5 would remove vegetation, but would not change the visual context for views from the west given the existing stadium, surface parking, and topography. The parking structure would be partly visible from the north but would be less visible from the residential area to the east. • About 20 to 30 percent of a 0.67-acre WSDOT beautification area south of NE 180th Street would be occupied by light rail facilities, reducing mature vegetation along the highway and reducing visual unity.	G-74 G-81 G-86 G-92 G-94	**I-5** Medium and High **Residential** Medium and High
			Preferred Alternative—NE 185th Street Station with Shoreline Stadium Garage Option: • Impacts to viewers on I-5 from loss of moderate to heavy vegetation cover and the placement of retaining walls near travel lanes would be the same as with the Preferred Alternative. • Visual impacts of the scale of the parking garage adjacent to I-5 southbound lanes would be avoided by this garage location, with less loss of vegetation and greater visual unity for travelers on I-5. • The parking structure on the stadium parking site on the west side of I-5 would moderately reduce visual integrity and unity of the residential neighborhood because of the scale of the building; however, the impacts would be reduced by the current context with the large-scale stadium to the north, which is higher and more prominent. • Impacts to residential neighborhoods to the east would be the same as with the Preferred Alternative.	G-87 G-90	**I-5** Medium in vicinity of NE 185th **Residential** Medium (west side in vicinity of garage)
			Alternative A1 (at-grade alternative): • Impacts would be similar to the Preferred Alternative except between NE 182nd Street and NE 188th Street, where the route is closer to I-5, resulting in more loss of mature vegetation adjacent to the highway.	G-75 G-82 G-95	**I-5** Medium and High **Residential** Medium and High

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
			Alternatives A5 and A10 (at-grade alternatives): • The guideway elements would be similar to the Preferred Alternative, with similar impacts. • The NE 185th Street Station Option 3 (at-grade) would have the at-grade station and platform similar in visibility to Alternative A1, but parking and access features would remove residences and vegetation to the east, covering about a block, with additional surface parking on the Seattle City Light parcel. These features would alter the visual intactness and unity of the residential neighborhood.	G-77 G-79 G-84 G-97	**I-5** Medium and High **Residential** Medium and High
			Alternatives A3, A7, and A11 (elevated alternatives): • The elevated alternatives would displace existing vegetation along the corridor and introduce a prominent elevated structure into views from I-5, intruding on views and reducing visual unity for the corridor that is now framed by mature vegetation. • Removal of homes, loss of mature vegetation, the elevated structure, and replacement of noise walls would affect visual unity for the first blocks of the adjacent residential neighborhoods to the east and south. • The parking structure east of I-5 would displace homes, remove vegetation, and be of greater scale than the homes in the neighborhood, reducing visual integrity and unity.	G-76 G-83 G-88 G-96	**I-5** Medium and High **Residential** Medium and High (mostly within 1 block from corridor)

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
SEGMENT B ALTERNATIVES					
6. NE 190th Street to NE 205th Street (244th Street SW, SR 104)	**I-5** High **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative and all Segment B alternatives:** • The removal of mature vegetation within existing cut slopes, the placement of retaining walls, and an elevated guideway north of NE 201st Street would reduce the visual unity of the existing corridor as viewed from I-5, where some views are now framed by wide areas of mature vegetation. • The at-grade portion of the alignment to about NE 201st Street would partly displace vegetation, but this would not alter the visual integrity and unity of adjacent residential neighborhoods to the east because views would be blocked by the existing noise walls.	G-100	**I-5** Medium and High **Residential** Low and Medium
7. NE 205th Street (244th Street SW) to Mountlake Terrace Transit Center (232nd Street SW)	**I-5** Medium **Residential** High **Commercial** Medium **Transit Center** Low	**I-5** Average **Residential** High **Commercial** Average **Transit Center** Low	**Preferred Alternative and Alternatives B1 and B2A:** • The elevated guideway would be in the periphery of views from I-5 in an interchange area with a wide expanse of pavement and complex traffic movements. It would retain some framing vegetation, reducing visual intrusion and maintaining unity for highway travelers. • The elevated structure would be prominent in views from commercial and office areas to the east, but would be largely screened by mature vegetation near McAleer Creek and would not intrude on views or reduce visual unity. • Residents to the east would not have views of the facility because of dense vegetation on the steep slope on the west side of the neighborhood; there would be no visual intrusion or reduced unity. • Similarly, views of the elevated structure from the Nile Golf Course west of I-5 would be limited and distant, with no visual intrusion or reduced unity. • The elevated structure would be noticeable but consistent with the scale, character, and visual diversity of the existing transit center.	G-102 G-105	**I-5** High **Residential** Low **Commercial** Low **Transit Center** Low
			Alternative B4: • The character of the elevated guideway would be similar to the Preferred Alternative, but the guideway would be higher and would cross to the I-5 median south of 236th Street SW. The crossing of northbound lanes would reduce the field of view from I-5; the elevated guideway and supports would cast shadows on the highway below and bring moving trains into the visual field in front of and above vehicles. The extent of perceived intrusion would be reduced somewhat by the existing context of highway overcrossings at the 236th Street SW and the pedestrian bridge to the transit center. • Visual impacts from viewpoints on either side of I-5 would be similar to other alternatives south of 238th Street SW, but the median alignment would reduce some impacts because it would involve less clearing of existing vegetation.	G-103 G106	**I-5** Medium **Residential** Low **Commercial** Low **Transit Center** Low

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
8. 232nd Street SW to 220th Street SW	**I-5 Northbound** Medium to High **I-5 Southbound** High **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative:** • North of the existing Mountlake Terrace Transit Center, the elevated guideway passing through a forested area on the east side of I-5 before crossing over the highway would be directly in the westerly view from several residences on 233rd Place SW; these residences currently have a view of mature trees. The guideway would intrude on views and reduce visual unity for these residences, resulting in a high visual impact. • The crossing over I-5 with an elevated guideway and associated support structures would be prominent in the views from I-5 in both directions and would cast shadows on the highway below and bring moving trains into the visual field in front of and above vehicles; this would intrude on views from the highway and reduce visual unity. • The clearing of existing dense vegetation on the lower portion of the slope on the west side of I-5 would change the forested character of the corridor. The loss of vegetation and the introduction of rail facilities and retaining walls would reduce the integrity and unity of views, especially for I-5 southbound. • The clearing of existing mature vegetation at the 220th Street SW interchange and the introduction of an overhead guideway would be a visual intrusion and reduce the integrity and unity of views. • There would be no impacts to views from residential areas to the west of I-5, south of 233rd Place SW, or on the east side of I-5, north of 233rd Place SW. • North of 223rd Place, the guideway would be above the elevation of the residential areas to the west, intruding on views.	G-108 G-112	**I-5** High **Residential** Low, but with some localized High
			Preferred Alternative with 220th Street SW Station Option: • Impacts would be the same as the Preferred Alternative south of 225th Place. • The option shifts the alignment to the west, displacing several residences and placing the station on a former school site (now vacant). It would be prominent in views from nearby residential areas to the west and would intrude on views and reduce visual unity.		**I-5** High **Residential** Medium (with localized high)
			Alternative B2A: • Impacts would be the same as the Preferred Alternative south of 223rd Place. Alternative B2A's 220th Street SW Station would be prominent in views from nearby residential areas to the west, and would be a high impact. The station would be visible from the commercial area to the west and northwest but would be less of a visual intrusion given the array of commercial buildings and major transportation facilities.	G-120a G-120b	**I-5** High **Residential** Medium (with localized high)

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
			Alternative B1: • North of the existing Mountlake Terrace Transit Center, the elevated guideway would pass through a forested area on the east side of the highway before crossing over to the I-5 median and crossing over the highway, with the same impacts as the Preferred Alternative on residences at 233rd Place SW. • At the crossover to the I-5 median, the views from I-5 northbound would include the elevated guideway and associated supports that would cast complex shadows on the highway below and bring moving trains into the visual field in front of and above vehicles. The perception of visual intrusion would be reduced somewhat by the existing highway overcrossings at 236th Street SW and the pedestrian bridge to the transit center. • Views from I-5 southbound would include the guideway in the median as an element similar to the existing transit stop. The mature native vegetation on the west side of the corridor would remain undisturbed. • There would be no impacts to views from residential areas to the west or on the east side north of 233rd Place NE because views are limited by trees and noise walls.	G-109 G-113 G-116 G-118	**I-5** Medium **Residential** Low, but with some localized High
			Alternative B4: • The guideway and station in the I-5 median would remove existing vegetation and add an additional transportation facility but would cause little change in the character of views from I-5 as a transportation corridor. • The additional pedestrian bridge crossing to the east at the north end of the Mountlake Terrace Freeway Station would displace some vegetation and alter the perception of the continuity of I-5. The existing context limits the effects of view encroachment because bridges, pedestrian overcrossings, and the Mountlake Terrace Transit Center already create a visually diverse setting. • The light rail facilities in the I-5 median would not be visible from residential areas.	G-110 G-114	**I-5** Medium **Residential** Low

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
9. 220th Street SW to 212th Street SW	**I-5** Medium **Commercial, Office, Multi-Family** Low and Medium **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative and Alternative B2A:** • The light rail facility on the west side of I-5 on retained fill with noise walls would displace moderate to dense vegetation, altering the context of the linear transportation corridor as seen from I-5. This would be an encroaching element at variance with the existing frame of vegetation on both sides of the corridor and would reduce unity. • The retaining walls and noise walls would replace dense vegetation in views from residential areas to the west. This would result in a greater degree of perception of the transportation corridor encroaching on the visual unity of the existing neighborhood, which is generally buffered by vegetation from views of the freeway.	G-122	**I-5** Medium **Commercial** Low **Residential** Medium
			Preferred Alternative with Station Option at 220th Street SW, Alternative B2A: • Impacts would be the same as the Preferred Alternative except that the optional station would remove additional mature vegetation, and be a more prominent visual intrusion that would reduce the integrity and unity of views, especially for I-5 southbound. • The 220th Street SW Station would be prominent in views from the commercial area to the west and northwest but would not be a visual intrusion given the existing visual character of the area.	G-123	**I-5** Medium **Commercial** Low **Residential** Medium
			Alternatives B1 and B4 (alternatives with I-5 median alignment): • The elevated guideway in the I-5 median would cause little change in the character of views from I-5; it would displace sparse vegetation in the median and add an additional transportation facility, but likely would not be perceived by users of I-5 as out of character or an encroaching element to the transportation corridor. • The light rail facilities in the median would not be visible from residential areas.		**I-5** Medium **Commercial** Low **Residential** Low

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
SEGMENT C ALTERNATIVES					
10. I-5/212th Street SW to 44th Avenue West	**I-5** Medium **Residential** Medium **Industrial** Low **Interurban Trail** Medium **Transit Center** Low	**I-5** Average **Residential** High **Industrial** Low **Interurban Trail** High **Transit Center** Low	**Preferred Alternative:** • The light rail facility on the west side of I-5 on an elevated guideway would displace moderate to dense vegetation from 212th Street SW to 48th Avenue West, altering the context of the linear transportation corridor as seen from I-5. This would be an encroaching element at variance with the existing frame of vegetation on both sides of the corridor and would reduce unity. • For the guideway location on the west side of I-5, loss of dense vegetation would affect views for part of the Hall Lake residential area, and the increased prominence of I-5 and light rail together would affect visual unity for the existing open space and single-family neighborhood. • The elevated guideway would cross an existing industrial site devoted primarily to storage and the vacant site of a future school district maintenance facility, and would be a prominent feature with little visual impact, given the low visual interest of the existing and proposed facilities. • The elevated guideway would cross the Interurban Trail diagonally near the existing Lynnwood Transit Center, remove a moderate to dense margin of trees, and add a prominent feature visible to trail users. In the context of an urban trail with many street crossings and a transit overcrossing to the north, bounded by varied landscapes (including the adjacent transit center parking lot), the additional crossing would intrude in an area with moderate visual unity. • The elevated guideway and station in the middle of the Lynnwood Transit Center, with a parking structure to south, would be prominent features in relation to the low scale of existing transit facilities and parking, but would not alter the integrity and unity of the landscape because of the low visual interest of the parking lots and existing transit center.	G-125 G-128 G-131 G-135	**I-5** Medium **Residential** High **Industrial** Low **Interurban Trail** Medium **Transit Center** Low
			Preferred Alternative (Median Option) • Crossing from the median to 52nd Avenue West would partially obscure northbound views of mountain peaks in the distance, but the short duration of obstruction likely would not be perceived as changing the visual context with the almost continuous views of mountain peaks available for several miles. • All other impacts the same as the Preferred Alternative.	G-126 G-129	**I-5** Medium **Residential** Low **Industrial** Low **Interurban Trail** Medium **Transit Center** Low

Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
I-5/212th Street SW to 52nd Avenue West	**I-5** Medium **Residential** Medium	**I-5** Average **Residential** High	**Preferred Alternative and Alternative C3 (west side of I-5 to Lynnwood Park-and-Ride):** • Loss of moderate to dense vegetation would change the visual context from I-5. • Loss of dense vegetation would affect views for part of the Hall Lake residential area, and the increased prominence of I-5 and light rail together would affect visual unity for the existing open space and single-family neighborhood. • Residences or commercial uses on the east side of I-5 would be screened by dense vegetation, except at street overcrossings.	G-127 G-135	**I-5** Medium **Residential Hall Lake Vicinity** High **Industrial** Low
			Alternatives C1 and C2 (I-5 median): • Crossing from the I-5 median to 52nd Avenue West would partially obscure northbound views of mountain peaks in the distance, but the short duration of obstruction likely would not be perceived as changing the visual context with the almost continuous views of mountain peaks available for several miles. • The light rail facilities would not be prominent from residences or commercial uses on the east side of I-5 due to screening by dense vegetation, but the elevated crossover structure would become prominent for viewers on the west side when aligned with 52nd Avenue West.	G-132 G-136	**I-5** Medium **Residential** High
			Alternatives C1 and C2 (west side of I-5): • Some loss of moderate to dense vegetation would occur, changing the visual context from I-5. • Loss of dense vegetation would affect views for part of the Hall Lake residential area, and the increased prominence of I-5 and light rail together would affect visual unity for the existing open space and single-family neighborhood. • Residences or commercial uses on the east side of I-5 would be screened by dense vegetation, but the structure crossing over I-5 lanes to 52nd Avenue West would be prominent for residential areas to the west.	G-133 G-136	**I-5** Medium **Residential** High
West side of 52nd Avenue West	**Residential** Medium	**Residential** High	**Alternatives C1 and C2 (elevated on the east side of 52nd Avenue West):** • The elevated guideway on the east side of 52nd Avenue West would visually intrude upon the integrity and unity of this residential area.	G-136	**Residential** High
			Preferred Alternative and Alternative C3 (along I-5 to Lynnwood Park-and-Ride): • No light rail facilities would be in this area; therefore, there would be no visual quality impacts.		N/A
East side of 52nd Avenue West	**Commercial/ Industrial** Low	**Commercial/ Industrial** Low	**Alternatives C1 and C2 (elevated on the east side of 52nd Avenue West):** • The elevated guideway on the east side of 52nd Avenue West would be taller and more prominent than the existing street frontage, but impacts would be lower given the lower sensitivity of users in this light industrial area.	G-136	**Commercial/ Industrial** Low and Medium
			Preferred Alternative and Alternative C3 (along I-5 to Lynnwood Park-and-Ride): • No light rail facilities would be in this area; therefore there would be no visual quality impacts in this area.		N/A

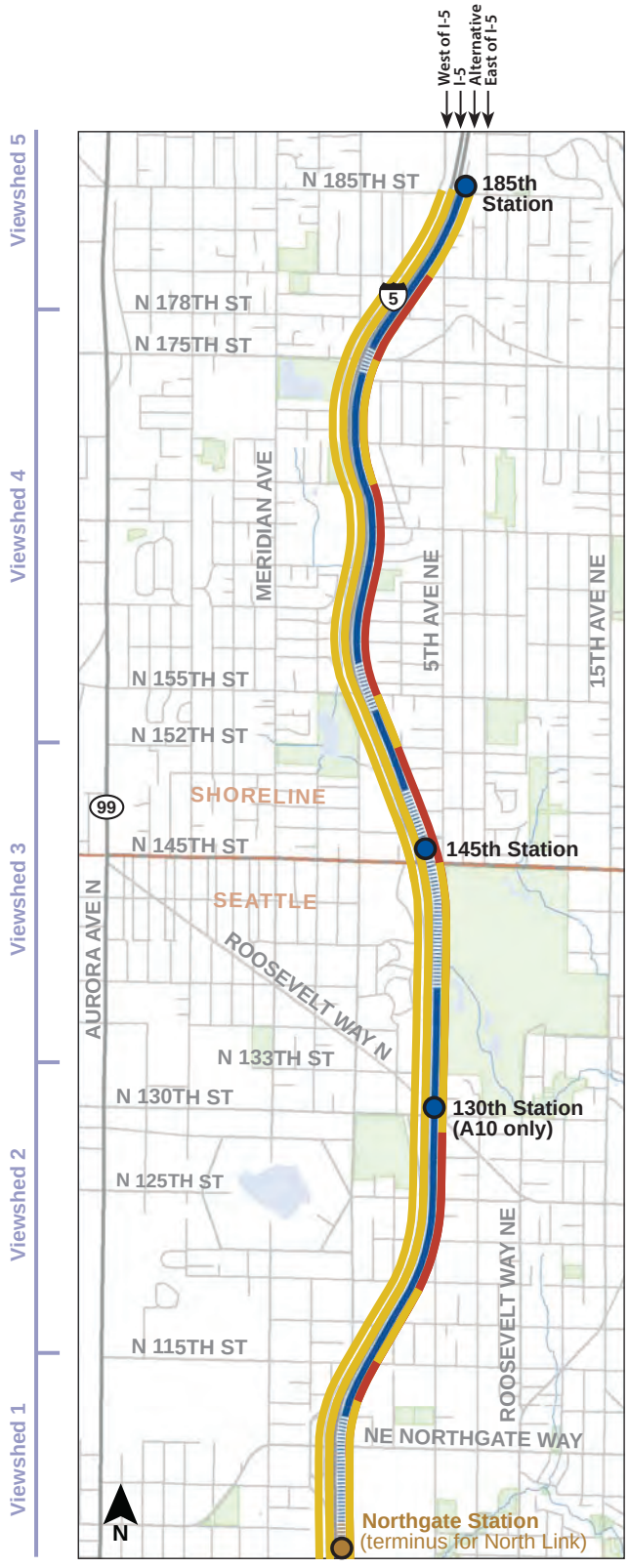
Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
Scriber Creek Park	High	High	**Alternatives C1:** • The elevated guideway would cross along the west side and across the north section of Scriber Creek Park, with loss of mature vegetation and a visual intrusion. This would reduce the existing high visual unity of the park for users.	G-138 G-140	High
			Alternative C2: • The elevated guideway in the wetland area immediately south of Scriber Creek Park would displace mature vegetation and be perceived as visual intrusion and reduced unity of views for trail users at the southern boundary and from the multifamily residential properties north of the park.	G-144 G-146	High
			Preferred Alternative and Alternative C3: • No light rail facilities would be in this area; therefore there would be no visual quality impacts in this area.		N/A
200th Street SW Cedar Valley Road to 44th Avenue West	**Multifamily** Medium **Commercial** Low	**Residential** High **Commercial** Average	**Alternative C1:** • The elevated guideway and station on the south side of 200th Street SW would be larger than existing buildings. It would encroach on the visual integrity and unity of the area, and intrude on views of the streetscape for pedestrians and occupants of vehicles. • The multistory parking garage would replace smaller-scale office buildings. • Visual encroachment would likely be perceived as less approaching 44th Avenue West because of lower visual unity in the commercial area.	G-150 G-142	**Multifamily** High **Commercial** Medium
			Preferred Alternative and Alternatives C2 and C3: • No light rail facilities would be in this area; therefore there would be no visual quality impacts in this area.		N/A
Interurban Trail and Scriber Creek Wetland	Medium	High	**Preferred Alternative and Alternative C3:** • The elevated guideway would cross the Interurban Trail diagonally near the existing Lynnwood Transit Center, remove a moderate to dense margin of trees, and add a prominent feature visible to trail users. The guideway would also cross the trail near 44th Avenue West and remove some vegetation that functions as a buffer. • In the context of an urban trail with many street crossings and a transit overcrossing to the north, bounded by varied landscapes (including the adjacent transit center parking lot), the additional crossing would be a slight visual intrusion in an area with moderate visual unity. • The elevated crossing of the Scriber Creek wetland would remove vegetation at support structures and require vegetation maintenance beneath the elevated guideway that would alter the existing natural character of the area with moderate change in visual quality, given the context in which the wetland is surrounded by industrial and transit center uses.	G-148 G-154	Medium

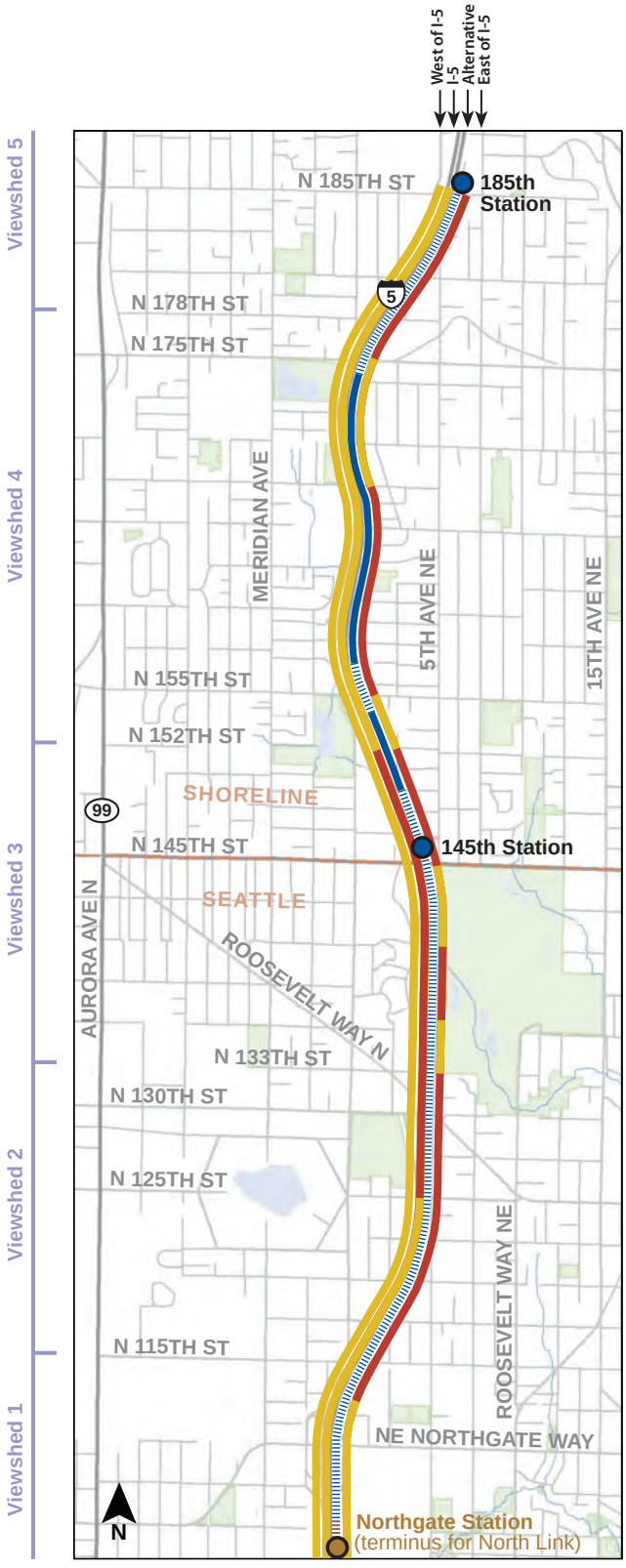
Table 4.5-1. Summary of Potential Visual Quality Impacts of the Light Rail Alternatives

Viewshed	Existing Visual Quality	Viewer Sensitivity	Changes in Landscape Elements	Figure in Appendix G	Visual Impact
			Alternatives C1 and C2: • Light rail facilities would cross over the Interurban Trail on the east side of 52nd Avenue West and remove some vegetation. In the context of an urban trail with a street crossing to the south, a transit overcrossing to the north, and varied adjacent uses including industrial, vacant, and transit center parking, the effect would be a slight visual intrusion in an area with limited visual unity. • The guideway would also cross the trail near 44th Avenue West and remove some vegetation that functions as a buffer.	G-155 G-156	Medium
Lynnwood Transit Center	Low	Low	**Preferred Alternative and Alternatives C2 and C3:** • The elevated guideway and station in the middle of the Lynnwood Transit Center, with a parking structure to the south, would be prominent features in relation to the low scale of existing transit facilities and parking, but would not alter the integrity and unity of the landscape because of the low visual interest of the parking lots and existing transit center. **Alternative C1:** • There would be no visual quality impacts in this area.		Low NA
44th Avenue West corridor	Medium to Low	Average to Low	**Preferred Alternative:** • The elevated station within the transit center with the elevated tail track crossing 44th Avenue West east of 220th Street SW would add a third crossing over the street, which the City of Lynnwood considers a gateway to the city center; however, it would not change the visual character of the street, which features other prominent transportation infrastructure elements and has a low level of visual unity.	G-152	Low
			Alternative C1: • The elevated guideway extending to 44th Avenue West would be a prominent new element in a diverse landscape but would not be an intrusion due to the low level of visual unity of this area.		Low
			Alternatives C2 and C3: • The elevated guideway and station with the tail track crossing 44th Avenue West on the general alignment of 202nd Street SW would add a third crossing over the street, which the City of Lynnwood considers a gateway to the city center; however, it would not change the visual character of the street, which features other prominent transportation infrastructure elements.	G-150	Low

N/A = Not applicable



PREFERRED ALTERNATIVE, A1, A10: AT-GRADE/ ELEVATED TO NE 145th AND NE 185th STATIONS



A3: MOSTLY ELEVATED TO NE 145th AND NE 185th STATIONS

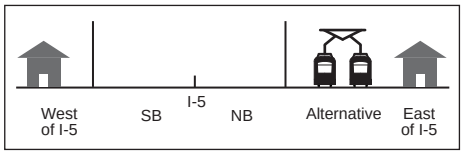
Legend

Visual Impacts

- Low to Medium Visual Impact
- High Visual Impact

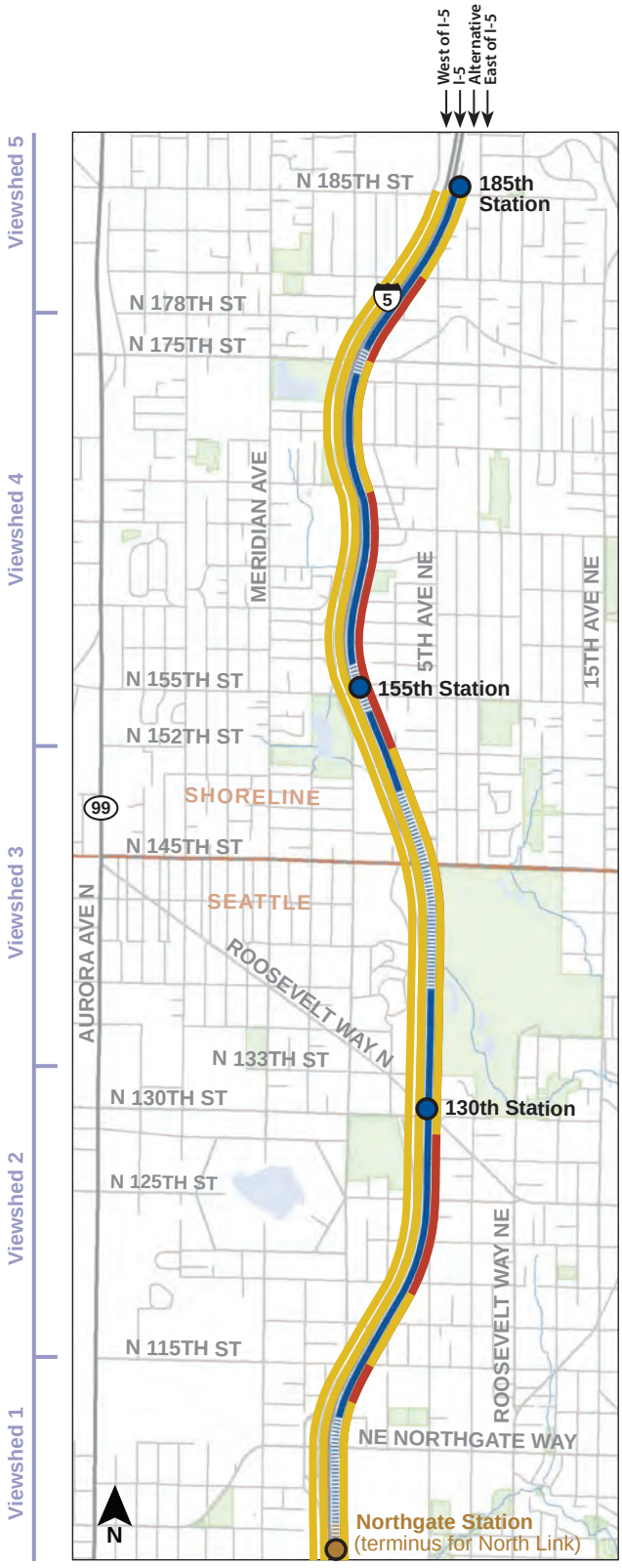
Light Rail

- Station
- At Grade
- Elevated

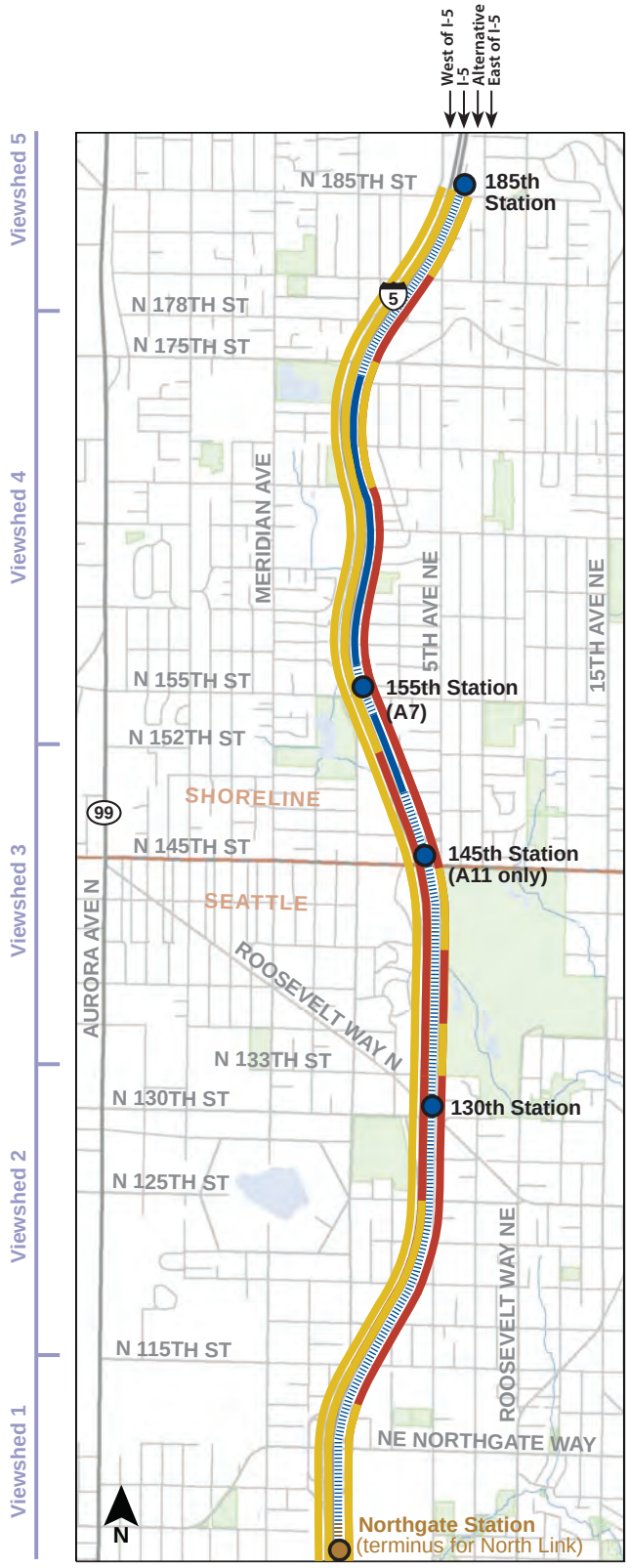


(Schematic Only - Does Not Reflect Details of Design)

Figure 4.5-2
Summary of Visual Impacts
Preferred Alternative, A1, A10 and A3



A5: AT-GRADE/ELEVATED WITH NE 130th, NE 155th AND NE 185th STATIONS



A7, A11: MOSTLY ELEVATED WITH NE 130th, NE 155th AND NE 185th STATIONS

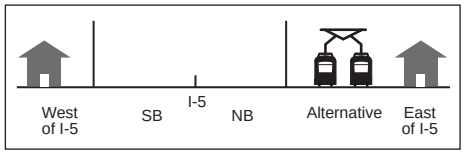
Legend

Visual Impacts

- Low to Medium Visual Impact
- High Visual Impact

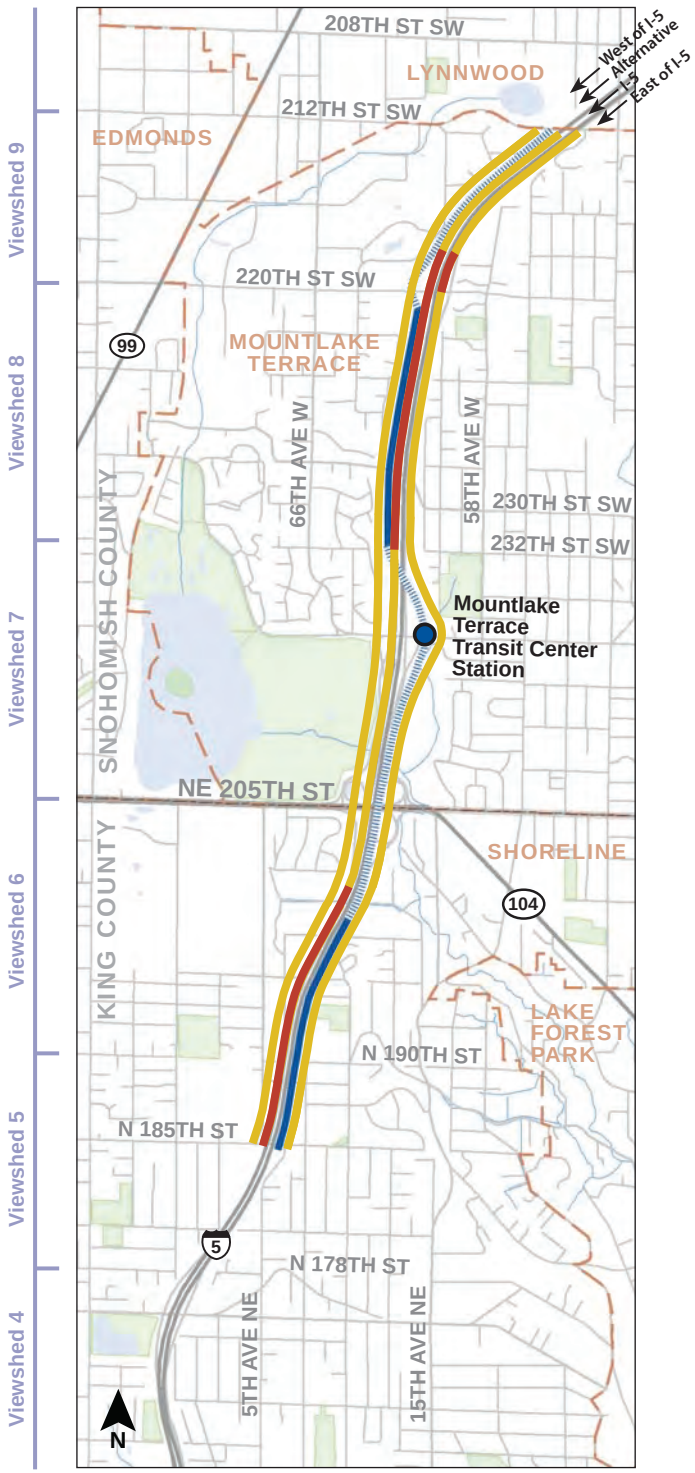
Light Rail

- Station
- At Grade
- Elevated

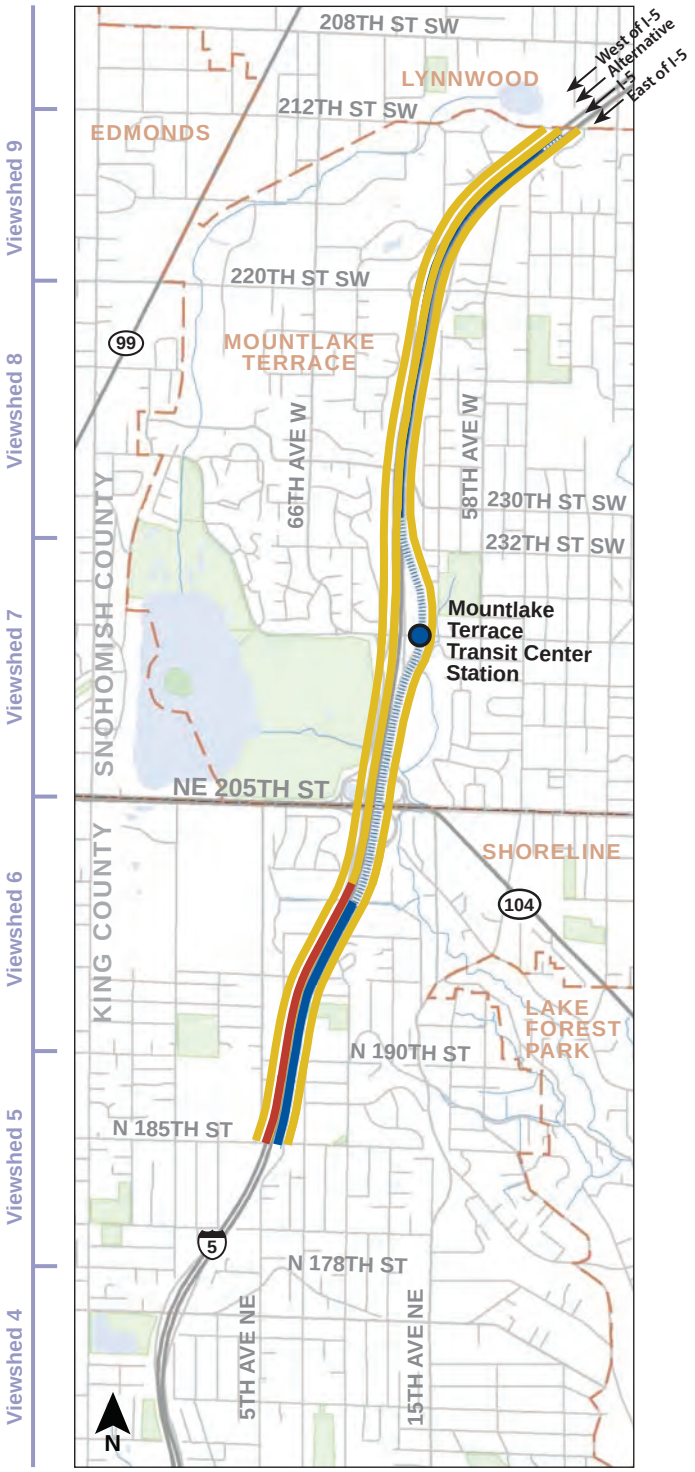


(Schematic Only - Does Not Reflect Details of Design)

Figure 4.5-3
Summary of Visual Impacts
Alternatives A5, A7 and A11



PREFERRED ALTERNATIVE: EAST SIDE TO MOUNTLAKE TERRACE TRANSIT CENTER TO WEST SIDE



B1: EAST SIDE TO MOUNTLAKE TERRACE TRANSIT CENTER TO MEDIAN

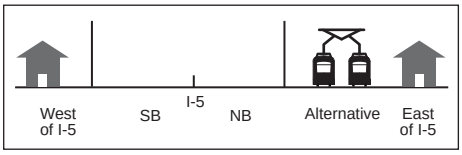
Legend

Visual Impacts

- Low to Medium Visual Impact
- High Visual Impact

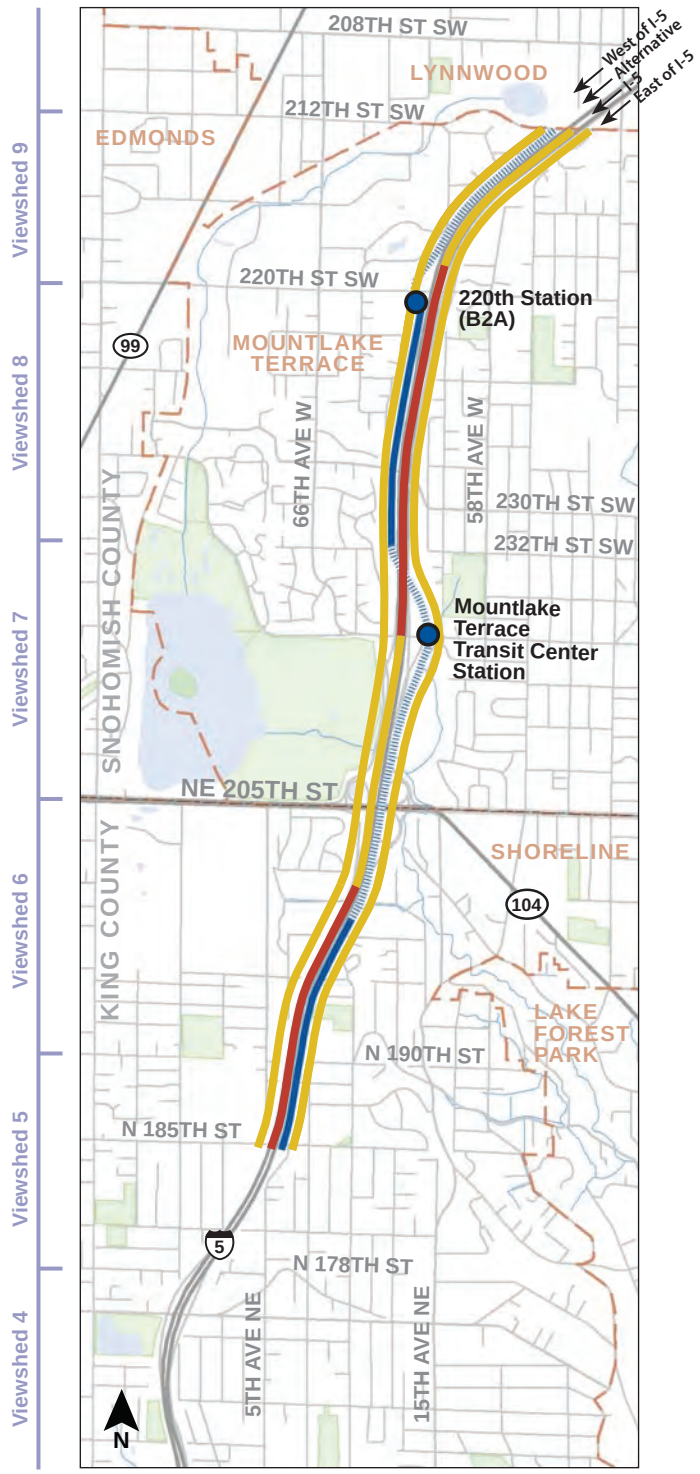
Light Rail

- Station
- At Grade
- Elevated

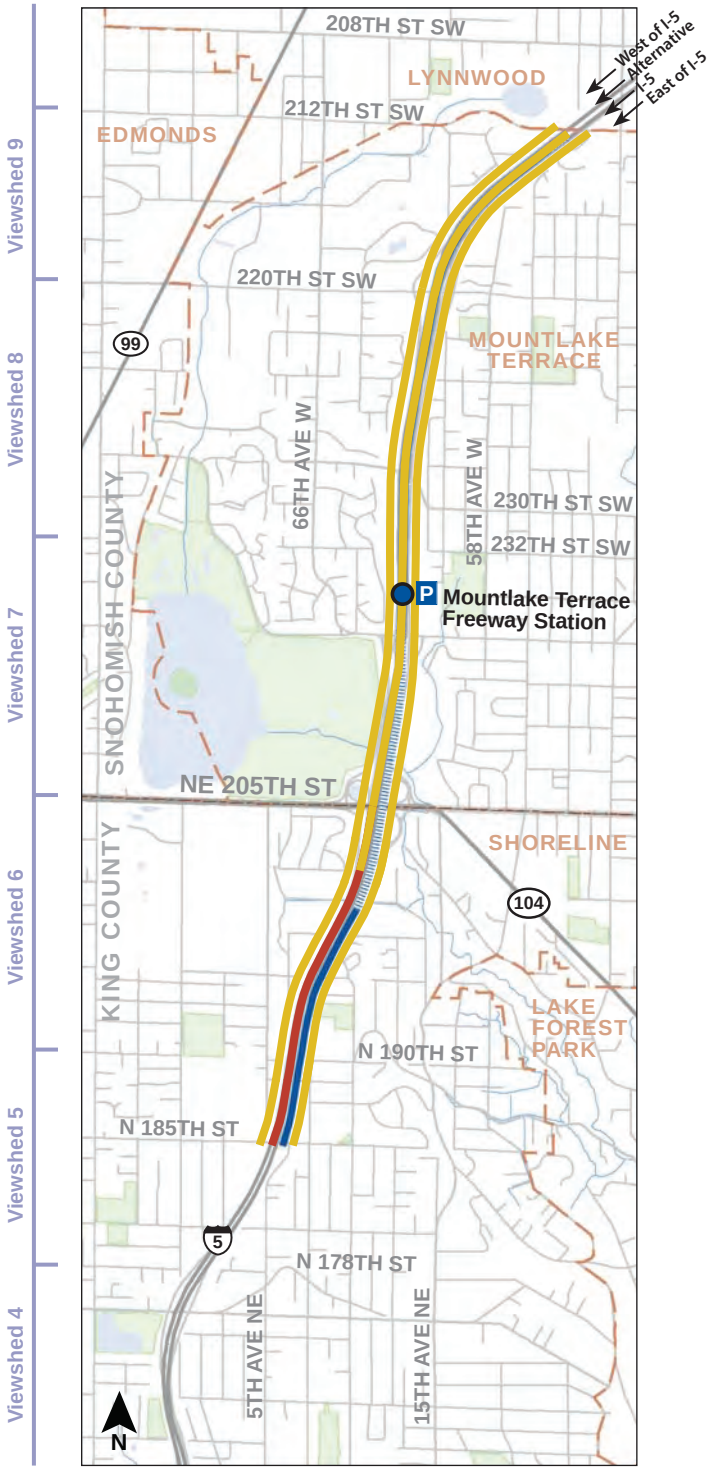


(Schematic Only - Does Not Reflect Details of Design)

Figure 4.5-4
Summary of Visual Impacts
Preferred Alternative and B1



B2A: EAST SIDE TO MOUNTLAKE TERRACE TRANSIT CENTER TO WEST SIDE



B4: EAST SIDE TO MOUNTLAKE TERRACE FREEWAY STATION TO MEDIAN

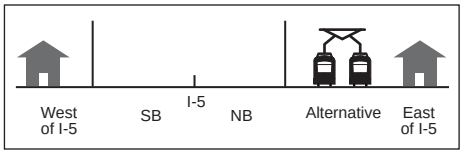
Legend

Visual Impacts

- Low to Medium Visual Impact
- High Visual Impact

Light Rail

- Station
- At Grade
- Elevated



(Schematic Only - Does Not Reflect Details of Design)

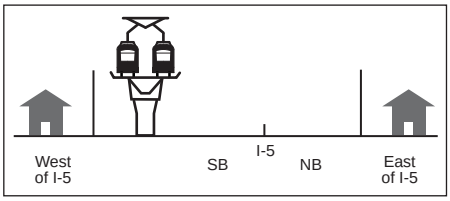
Figure 4.5-5
Summary of Visual Impacts
Alternatives B2A and B4

PREFERRED ALTERNATIVE: ALONG I-5 TO LYNNWOOD PARK & RIDE STATION

C1: 52ND AVE W TO 200TH ST STATION

Legend

- Low to Medium Visual Impact
- High Visual Impact
- Station
- At Grade
- Elevated



(Schematic Only - Does Not Reflect Details of Design)

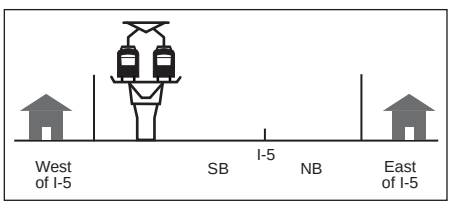
Figure 4.5-6
Summary of Visual Impacts
Preferred Alternative and C1

C2: 52ND AVE W TO LYNNWOOD TRANSIT CENTER STATION

C3: ALONG I-5 TO LYNNWOOD PARK & RIDE STATION

Legend

- Low to Medium Visual Impact
- High Visual Impact
- Station
- At Grade
- Elevated



(Schematic Only - Does Not Reflect Details of Design)

Figure 4.5-7
Summary of Visual Impacts
Alternatives C2 and C3

4.5.3 Construction Impacts

Construction impacts would vary by location and the types of construction needed for the different light rail facilities. Construction effects would be temporary but could still last for several years, and they could involve the greatest degree of visual change for the Lynnwood Link Extension. Site clearing and demolition can remove trees, ground cover, and existing structures and affect either a linear corridor or a larger site. Other sources of visual effects include construction staging areas, detours or temporary roadways, lighting, signage, heavy equipment, trailers, fences, temporary noise shielding, scaffolding, cranes, relocation of noise walls, and material storage.

Typically, visual impacts of construction occur in the same areas affected by long-term impacts, but construction has more visual clutter and little visual unity, given the variety of construction activities, equipment, and stored materials that would change throughout the construction period. The construction and staging areas would lack visual cohesion and have low visual quality compared with the existing conditions or the expected visual character after construction.

Construction of the light rail facilities at-grade or associated with retaining walls would have similar temporary visual impacts related to clearing vegetation, exposing and moving soils, constructing retaining walls, installing tracks, an overhead catenary system, and other project features. Elevated portions of the alternative routes would involve less clearing and grading. Columns and guideway sections would be constructed in various ways, ranging from being cast into forms or lifted into place with cranes. Construction access would be primarily from I-5, but adjacent roadways might be used. Light and glare impacts on adjacent areas could occur when nighttime construction is scheduled, which is most likely to take place where construction activities would disrupt I-5 traffic.

4.5.4 Indirect Impacts

Visual impacts for development and/or redevelopment, such as transit-oriented development, might occur in and near stations subject to the comprehensive plans and zoning regulations of local jurisdictions. Even where specific comprehensive plan and zoning regulations are in place, detailed visual analysis depends on the individual developments. However, when stations have available land and supportive zoning in place, there would be more potential for mixed-use development that supports high-density residential, commercial, and office-related uses. Existing properties could be redeveloped with buildings of a larger scale, but at the same time, larger expanses of surface parking could be removed. Landscaping and other visual amenities could also be developed as an integrated part of the new developments.

The station area with the highest potential for visual changes resulting from increased development would be at the Lynnwood Transit Center, based on the City of Lynnwood's plans and policies that encourage growth. The City of Mountlake

Terrace has plans around the Mountlake Terrace Transit Center and the 220th Street SW Station in Mountlake Terrace encouraging transit-oriented development. The City of Shoreline station area plans could also lead to development that would visually change the existing neighborhood. Section 4.2.4 in the Land Use Section (4.2) has a discussion of potential transit-oriented developments near stations.

4.5.5 Cumulative Impacts

The construction of I-5 in the 1960s was a major change to the visual environment in the project corridor, particularly in the neighborhoods that were already in place before the freeway was constructed. The freeway also changed other more natural or rural landscapes. The addition of the light rail alternatives to the project corridor would increase the size and visual prominence of this linear transportation corridor.

While there are no other major new transportation or development projects that run throughout the project corridor, there are sites where further development is anticipated with or without the Lynnwood Link Extension. At Northgate, the Northgate Link Extension is being constructed, and the Northgate Transit Center will be reconstructed. Adopted plans for the Northgate area call for greater mixed-use development throughout the district. Individual redevelopment proposals are expected to replace some of the existing properties with larger-scale, multi-use developments. Such redevelopment at higher densities and height would represent a larger change in views, but would also make the light rail project less prominent because background views would be of more diverse urban forms.

The Mountlake Terrace Transit Center and its multistory parking structure was also recently developed. Areas to the south and east of the station could still be redeveloped consistent with the City of Mountlake Terrace's land use plans, with or without the light rail project. However, light rail, along with other station area developments, could represent a high degree of visual change for this area.

The City of Lynnwood is targeting the city center area for increased development and redevelopment activities over time, which would alter existing visual conditions by redeveloping some existing uses. The likely future continuation of the light rail corridor would affect the character of the city center, but also may contribute to its vitality by providing a wider range of transportation options. All alternative alignments likely would displace some existing development when the light rail route extends farther north. The existing development is largely automobile-oriented with large parking lots. All alternatives would improve transportation access and contribute to the City's goal of focusing increased transit on the city center as the major regional urban center. The City's plan anticipates higher density developments that provide more visual unity, public spaces, and other amenities than the existing facilities.

If built, the OMSF alternative in Lynnwood would alter the existing frontage along 52nd Avenue West, which currently consists of parking with landscaping and low-

profile structures. Views could be changed by the removal of buildings, by changes to landscaped or vegetated areas, and by the introduction of features such as walls or fencing, maintenance buildings, lighting, and overhead catenary. For the Preferred Alternative and Alternative C3, ramps from the elevated guideway to the facility at ground level would provide access from the north, but would have little additional impact on the residential area to the west. With Alternatives C1 and C2, the addition of ramps from the elevated facility to ground level would be an additional element that would contribute to the high visual impact on residences to the west.

The City of Lynnwood's 44th Avenue West, I-5 to 194th Street SW Improvement Project proposes to widen the roadway to seven lanes, with eight lanes just south of 196th Street SW, and wider sidewalks and landscape features. However, the cumulative impacts of this project, in conjunction with the elevated guideway alternatives crossing the 44th Avenue West corridor, would not alter the overall visual context.

The City of Lynnwood's 200th Street SW, 64th Avenue West to 40th Avenue West Project would add lanes, wider sidewalks, landscape features, and bicycle facilities to accommodate future growth envisioned for the city center. This project is unlikely to alter the visual context or increase visual impacts for the light rail alternatives.

4.5.6 Potential Mitigation Measures

Long-Term Impacts

Sound Transit would incorporate specific measures to mitigate visual impacts as it develops the detailed design for the light rail facilities. Mitigation measures would be focused on areas identified as having high visual impacts. They would need to be compatible with the project's maintenance and operations requirements, which include long-term maintenance and safety and security considerations. Because the right-of-way along the project corridor is limited, there would be trade-offs between minimizing right-of-way acquisitions, providing landscaping or other mitigation, and the potential for surplus properties to be made available for redevelopment. Sound Transit's design guidelines would provide direction on how they would approach these trade-offs.

Sound Transit would adhere to jurisdictional permitting requirements, which include tree replacement and landscaping policies that WSDOT and local jurisdictions have in place. For example, within the WSDOT right-of-way, WSDOT specifies a replacement ratio of trees for small, moderate, and mature trees removed. Local jurisdictions have similar policies that would apply outside the right-of-way. The City of Seattle requires replacement trees for each significant tree (≥6-inch diameter at breast height [dbh] caliper) removed. The City of Shoreline requires four trees to be planted for each significant tree removed. The City of Mountlake Terrace requires an Essential Public Facility to retain, to the greatest extent possible, existing

significant trees (that do not constitute a safety hazard). Most of these policies encourage native plantings and younger trees because of higher opportunities for survival and ecosystem integration, compared to attempts to transplant larger and more mature trees, which have lower survival rates.

Even if larger or faster growing trees or plants are used, it may take 15 to 20 years for the plants to grow large enough to screen large facilities such as the overhead catenary wires, multistory parking garages, elevated structures, and tall retaining walls or noise walls. Mitigation for sections with mature evergreen trees could require 30 to 50 years of growth for the replacement trees.

Potential mitigation measures include:

- Sound Transit would prepare a Roadside Master Plan in accordance with WSDOT guidelines for the portion of the route on the I-5 right-of-way.
- For WSDOT's beautification areas along I-5, originally acquired under the Highway Beautification Act of 1965 that are used on this project, Sound Transit would mitigate their conversion to right-of-way with replacement property or with other measures agreed to by WSDOT and FHWA. Replacement parcels will meet the intended function of the original beautification area.
- In areas identified as having high visual impacts, Sound Transit would mitigate with landscaping or visual treatments to retaining walls and other structures, as practical, based on available land, safety, and maintenance and operational needs.

Construction Mitigation

Sound Transit would shield light sources used in nighttime construction to reduce the lighting impacts. Sound Transit would place construction screens or barriers to limit the visibility of work areas that would intrude on adjacent activities, such as public open space, community facilities, and recreational areas and trails, where practical.

4.6 Air Quality and Greenhouse Gases

This section assesses how the Lynnwood Link Extension would affect regional air quality, including greenhouse gas (GHG) emissions. It also reviews potential localized air quality impacts at arterial and local street intersections.

4.6.1 Affected Environment

The project corridor falls within the jurisdiction of the Puget Sound Clean Air Agency (PSCAA) for local air quality regulation.

The topography of the Puget Sound region is characterized by low rolling hills intermingled with a complex maze of interconnected waterways linked to the Pacific

Ocean through the Sound. The region has a mild climate with cool summers and mild, wet, and cloudy winters.

Air Quality Standards and Regulations

Air quality is regulated by federal, state, and local agencies. The air quality analyses for this project followed current guidelines developed by the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), PSCAA, and the PSRC.

The Clean Air Act (CAA) is a federal law first passed in 1963. The CAA Amendments of 1990 and the Final Transportation Conformity Rule direct the EPA to implement environmental policies and regulations that will ensure acceptable levels of air quality.

The CAA and the Final Transportation Conformity Rule affect the funding and approval of proposed transportation projects. They require federally approved or funded projects to conform to applicable State Implementation Plans (SIP).

Conformity to an implementation plan means eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards.

Under the authority of the CAA, EPA has identified several air pollutants as pollutants of concern nationwide and has established the NAAQS. These pollutants, known as criteria pollutants, are carbon monoxide (CO), particulate matter with a diameter of 10 micrometers or less (PM_{10}), particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and nitrogen dioxide (NO_2). The NAAQS specify maximum allowable concentrations for these criteria pollutants. The state of Washington and PSCAA have also adopted these standards, in addition to having a standard for total suspended particulates (TSP). Table I-4.6-1 in Appendix I-4.6, Air Quality and Greenhouse Gas, summarizes the standards applicable to transportation projects.

GHG emissions are federally regulated for large industrial sources. Because federal guidance on how to address GHG emissions in environmental documents for other types of sources is currently being developed. Sound Transit is analyzing GHG emissions for this project consistent with best practices and its own policies.

Conformity Requirements

Areas that meet the NAAQS are deemed *attainment areas*. Areas not in compliance with the NAAQS are deemed *nonattainment areas*. Areas that were formerly classified as nonattainment areas but have since demonstrated attainment with the NAAQS are classified as *maintenance areas*. Because the Puget Sound region is a maintenance area for CO, the project must demonstrate conformance with the NAAQS for CO. The region is in an attainment area for all of the other criteria pollutants; therefore,

further conformity analysis of criteria pollutants (SO_2, NO_2, O_3, particulates, and Pb) is not required.

The CAA requires states to develop a State Implementation Plan (SIP) for protecting and maintaining air quality in all areas of the state.

The Lynnwood Link Extension is currently included in PSRC's regional transportation improvement program (RTIP) as project RTA-78, which demonstrates its conformity with the SIP. A project demonstrates project-level conformity by showing that it would not cause or contribute to any new violation of any NAAQS, increase the frequency or severity of any existing NAAQS violations, or delay timely attainment of the NAAQS.

Pollutants of Concern for this Project

Motor vehicles are the largest contributors of air pollution from transportation projects. The main criteria pollutants emitted from motor vehicles are CO, PM_{10}, $PM_{2.5}$, and the O_3 precursors—volatile organic compounds (VOCs) and oxides of nitrogen (NO_X). GHGs and air toxic emissions are also pollutants of concern. This subsection discusses how the main pollutants of concern affect public health and the environment for this project.

Carbon Monoxide

CO is a colorless and odorless gas that interferes with the transfer of oxygen to the brain. It is emitted almost exclusively from the incomplete combustion of fossil fuels. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Consequently, CO concentrations are predicted on a localized, or microscale, basis.

Particulate Matter

Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. Of particular concern are those particles that are smaller than, or equal to, 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$). Particulates can include smoke, soot, dust, salts, acids, and metals. Particulate pollution also forms when gases emitted from motor vehicles react in the atmosphere.

When inhaled, these particles can damage the respiratory tract. Particles 2.5 to 10 micrometers in diameter tend to collect in the upper portion of the respiratory

system, whereas particles 2.5 micrometers or less in diameter are so tiny that they can penetrate deeper into the lungs and damage lung tissue.

Ozone

O_3 is a colorless toxic gas that enters the bloodstream and interferes with the transfer of oxygen. It also damages plants by inhibiting their growth. Although O_3 is not directly emitted, it forms in the atmosphere through a chemical reaction between reactive VOCs and NO_X. O_3 is also produced from industrial sources and automobile emissions.

Greenhouse Gases

Gases that trap heat in the atmosphere are often referred to as GHGs. These gases are necessary because they keep the planet's surface warmer than it would be otherwise. As concentrations of these gases increase, however, the Earth's temperature rises. Vehicles emit a variety of gases during their operation; some of these are GHGs. The GHGs associated with transportation are water vapor, carbon dioxide (CO_2), methane, and nitrous oxide. Nationally, the transportation sector (including on-road vehicles, construction activities, airplanes, and boats) accounts for almost 30 percent of total domestic CO_2 emissions, but in the state of Washington, it accounts for nearly 50 percent of emissions.

Mobile Source Air Toxic Pollutants

Air toxics are pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human sources, including on-road mobile sources, airplanes, and certain kinds of businesses or industries. There are seven priority mobile source air toxic (MSAT) pollutants: acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter (POM).

Monitored Air Quality Concentrations and Trends

Regional air pollutant trends have generally followed national patterns over the last 20 years. While the average weekday VMT in the Central Puget Sound region has increased from 30 million in 1981 to 80 million in 2009 (PSRC 2010), pollutant emissions associated with transportation sources have decreased. CO is the criteria pollutant most closely tied to transportation. Regionally, the maximum measured CO concentrations have decreased considerably over the past 20 years as a result of greater vehicle fuel efficiency and EPA's national control programs. Other transportation-related pollutants have followed similar but less pronounced trends.

Air quality data were compiled using EPA Air Data (EPA 2014) databases for 2011 to 2013—the latest calendar years for which these data are available. Table 4.6-1 shows the highest recorded ambient air quality levels from representative sites that were monitored for these data and are located within or near the study area. The

monitored concentrations for CO do not exceed national and state ambient air quality standards in the study area.

Table 4.6-1. Monitored Ambient Air Quality Levels

Pollutant	Averaging Time	2011 Maximum Concentration	2012 Maximum Concentration	2013 Maximum Concentration	NAAQS
CO	8 hours	0.9 ppm	0.7 ppm	1.4 ppm	9 ppm
	1 hour	1.0 ppm	1.0 ppm	1.8 ppm	35 ppm
O_3	8 hours	0.046 ppm	0.049 ppm	0.047 ppm	0.075 ppm
$PM_{2.5}$	Annual	5.7 µg/m^3	5.9 µg/m^3	6.2 µg/m^3	15 µg/m^3
	24 hours	16.5 µg/m^3	16.6 µg/m^3	20.7 µg/m^3	35 µg/m^3
PM_{10}	24 hours	23 µg/m^3	28 µg/m^3	30 µg/m^3	150 µg/m^3

Sources: http://www.ecy.wa.gov/programs/air/air_monitoring_data/WAQA_Intro_Page.html and http://www.epa.gov/airdata/
Notes: Monitoring location was at 4103 Beacon Avenue South, Seattle, WA.
Values shown correspond to NAAQS time periods.
CO = carbon monoxide
µg/m^3 = micrograms per cubic meter
NAAQS = National Ambient Air Quality Standards
O_3 = ozone
$PM_{2.5}$ = particulate matter with diameter less than or equal to 2.5 micrometers
PM_{10} = particulate matter with diameter less than or equal to 10 micrometers
ppm = parts per million

4.6.2 Long-Term Regional Operational Impacts

Long-term regional operational impacts have been evaluated for future scenarios in forecast year 2035 for all the alternatives. Regional traffic data were developed using PSRC's travel demand model for a representative project alternative that shows the expected effects of all the light rail alternatives. As discussed in Chapter 3, Transportation Impacts and Mitigation, the light rail alternatives have only minor differences in their mode split, travel patterns, and roadway speeds, and they all perform similarly when compared to the No Build Alternative.

Pollutant and GHG emission rates were developed using EPA's Motor Vehicle Emission Simulator (MOVES), model version 2010b. PSRC provided regionally specific MOVES input files, and national defaults were used when regionally specific inputs were not available.

Criteria Pollutant Emissions

Table 4.6-2 summarizes and compares predicted emission burdens for existing conditions (2011), the future 2035 No Build Alternative, and the Preferred Alternative in 2035. (The other potential combinations of light rail alternatives from Segments A through C would be similar to the Preferred Alternative.) Vehicle emissions in 2035 are predicted to be lower than existing levels due to EPA's national emission control programs and regulations. As shown in Table 4.6-2, all predicted criteria pollutants under the light rail alternatives would be below existing conditions and below the No Build Alternative pollutant levels in 2035.

Table 4.6-2. Daily Regional Emission Burden Assessment for Forecast Year 2035

Criteria Pollutant	Existing 2011 (kg/day)	No Build Alternative (kg/day)	Preferred Alternative (kg/day)	Percent Change from Existing (2011) to No Build Alternative	Percent Change from No Build Alternative to Preferred and Other Alternatives
VMT	79,442,960	100,592,498	100,307,852	26.26%	-0.28%
CO	501,626	274,061	273,279	-45.52%	-0.29%
$PM_{2.5}$	5,421	2,174	2,162	-60.11%	-0.55%
PM_{10}	7,233	4,722	4,688	-35.19%	-0.72%
VOCs	20,112	5,606	5,574		
NO_X	142,952	36,020	35,893	-74.89%	-0.45%

Source for 2011 conditions: PSRC Travel Demand Model; EPA MOVES model 2010b
kg/day = kilograms per day
VMT = vehicle miles traveled
CO = carbon monoxide
$PM_{2.5}$ = particulate matter with diameter less than or equal to 2.5 micrometers
PM_{10} = particulate matter with diameter less than or equal to 10 micrometers
VOCs = volatile organic compounds
NOx = nitrogen oxides

Mobile Source Air Toxic Emissions

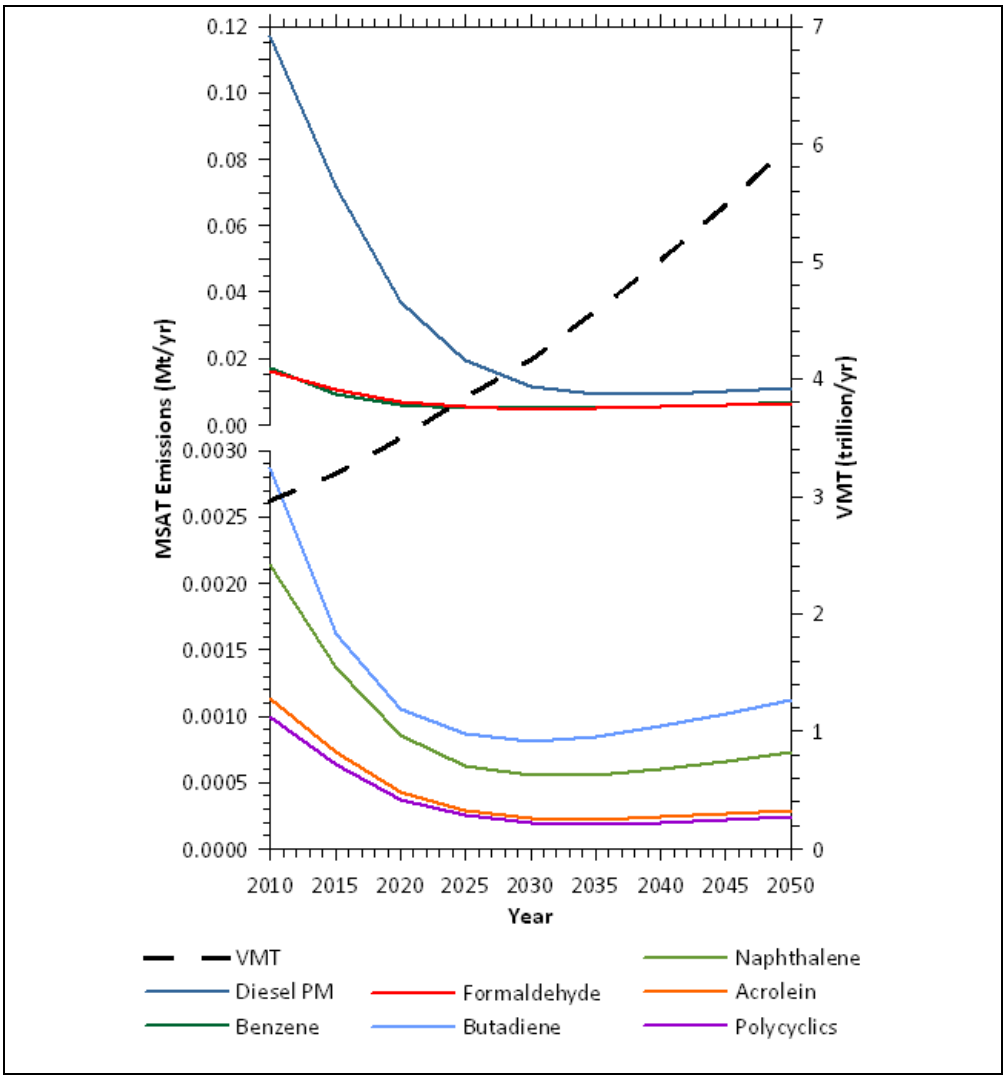
As compared to criteria pollutants, future MSAT emissions would experience greater reductions from present levels, with or without the Lynnwood Link Extension. As shown in Figure 4.6-1, EPA's national control programs are projected to reduce MSAT emissions by 83 percent from 2010 to 2050 even if the VMT increases by 102 percent (FHWA 2012). The reduced VMT predicted for the Preferred Alternative (Table 4.6-2) would enhance these MSAT emission reductions, although on a regional scale the percentage difference is small compared with the No Build Alternative in 2035.

Greenhouse Gases

GHG emission rates for the electricity required to operate the light rail were developed using emission factors from local electricity vendors (PSE 2013). Sound Transit's long-term target is to use only carbon neutral electricity. Currently, only electricity from one vendor (Seattle City Light) is carbon neutral. If only carbon-neutral electricity from all vendors is used, light rail GHG emissions would be much lower than those used in this analysis.

GHG emissions for commuter rail and buses were developed using EPA's Emission Factors for Greenhouse Gas Inventories (EPA 2011).

GHG emission rates for highway and road vehicles were developed using EPA's MOVES, model version 2010b. PSRC provided regionally specific MOVES input files, and national defaults were used when regionally specific inputs were not available. EPA's Emission Factors for Greenhouse Gas Inventories and MOVES do not take into account recent and likely future updates to EPA's fuel economy and emission standards. Other state and federal legislation also could reduce future emission rates. Therefore, future GHG emissions from commuter rail, buses, and highway and road vehicles could be lower than the model's estimates.



Source: Federal Highway Administration's Interim Guidance Update on Air Toxic Analysis in NEPA Documents (FHWA 2012); EPA MOVES 2010b model runs conducted during May–June 2012 by FHWA

Note: Trends for specific locations may be different, depending on locally derived information representing vehicle miles traveled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Figure 4.6-1. Mobile Source Air Toxic Emissions Trends

GHG emissions are normally presented as the total CO_2 equivalent (CO_{2e}) released. The CO_{2e} emissions take into account the global warming potential of chemical emissions from a source. The analysis of the GHG emission impacts included evaluating the vehicle movements occurring in King, Pierce, Snohomish, and Kitsap counties. Chapter 3, Transportation Impacts and Mitigation, describes how the changes in vehicle movements were determined.

Table 4.6-3 summarizes the total projected GHG emissions for the No Build Alternative and the Preferred Alternative (representing all other light rail alternatives as well) for projected scenarios in 2035. CO_{2e} emissions are predicted to decrease by

76,285 metric tons annually in the region due to the reduction of VMT, a 0.5 percent reduction in CO_{2e}, as shown in Table 4.6-4.

Table 4.6-3. Daily Transportation Greenhouse Gas Emissions in Terms of CO_{2e} for Forecast Year 2035

Emission Source	Existing Vehicle Miles Traveled	Existing Daily CO_{2e} Emissions (metric tons)	No Build Alternative Vehicle Miles Traveled	No Build Alternative[a] Daily CO_{2e} Emissions (metric tons)	Preferred Alternative and Other Alternatives (vehicle miles traveled)	Preferred Alternative and Other Alternatives[a] Daily CO_{2e} Emissions (metric tons)
Non-transit Highway and Road Vehicles	79,442,960	40,730	100,592,498	45,192	100,307,852	44,988
Bus	254,100	706	243,000	675	240,400	667
Heavy Rail	960	7	1,470	10	1,470	10
Light Rail	4,430	4	13,600	33	17,900	36
Daily Total	**79,702,450**	**41,447**	**100,850,568**	**45,910**	**100,567,622**	**45,701**

CO_{2e} = total carbon dioxide equivalent

Table 4.6-4. Total Greenhouse Gas Emissions in Terms of CO_{2e} for Forecast Year 2035

Emission	No Build Alternative[a]	Preferred Alternative and Other Alternatives[a]
Daily CO_{2e}	45,910	45,701
Daily CO_{2e} Reduction	Not applicable	209
Annual CO_{2e} Reduction	Not applicable	76,285

[a] Unit of measure is metric tons CO_{2e} emissions

CO_{2e} = total carbon dioxide equivalent

Sound Transit published a *Sustainability Plan* in 2011 that builds on the 2007 Sustainability Initiative. According to the *Sustainability Plan*, Sound Transit will integrate efficient operating practices at existing and new facilities, use energy-saving equipment to reduce energy demand, and maximize intermodal transit connections to reduce automobile VMT. The implementation of the *Sustainability Plan* will reduce Sound Transit energy consumption, resulting in lower emissions burdens from light rail operation than currently predicted.

4.6.3 Long-Term Localized Operational Impacts

Long-term localized operational impacts on air quality and GHG emissions were evaluated using EPA's MOVES model to calculate vehicular emissions, and EPA's CAL3QHC dispersion model to calculate CO concentrations at sensitive receptors.

Sound Transit conducted CO modeling on the intersection in each project segment with the highest potential CO emissions. Intersections evaluated are presented in Appendix I-4.6. Traffic data were used to identify intersections with the highest traffic volume and a LOS of D or worse under the light rail alternatives for forecast year 2035. If one intersection had the highest volume under several of the alternatives, then that intersection was only evaluated under the alternative with the highest volume, representing the highest potential CO concentrations at that intersection. In addition to the forecast year conditions, each evaluated intersection was modeled for existing conditions, none of which showed CO concentrations above the NAAQS.

No Build Alternative

The modeled CO concentrations did not exceed the NAAQS for CO with the No Build Alternative in forecast year 2035; however, they increased slightly compared to 2011 due to increased traffic volumes. The results of the CO modeling are presented in Appendix I-4.6.

Long-Term Impacts Common to All Light Rail Alternatives

The modeled CO concentrations did not exceed the NAAQS in forecast year 2035. Therefore, none of the light rail alternatives would have intersections with CO concentrations above the NAAQS. Modeled Lynnwood Link Extension CO emissions were similar to the No Build Alternative because only slight variations in traffic would occur at the highest-volume intersections. The results of the CO modeling are presented in Appendix I-4.6.

4.6.4 Construction Impacts

Air Quality Pollutants

Construction-related air quality effects would result primarily from emissions from heavy-duty construction equipment (e.g., bulldozers, backhoes, and cranes), diesel-fueled mobile sources (e.g., trucks, brooms, and sweepers), diesel- and gasoline-fueled generators, and on-site and off-site project-related vehicles (e.g., service trucks and pickups).

Fugitive PM_{10} emissions are associated with land clearing, ground excavation, grading, cut-and-fill operations, and structure erection. PM_{10} emissions would vary from day to day, depending on the level of activity, specific operations, and weather conditions. Fugitive PM_{10} emissions from construction activities could be noticeable if uncontrolled. Mud and particulates from trucks may also be of concern if construction trucks are routed through streets near sensitive land uses (e.g., residences, schools, and parks).

Heavy trucks and construction equipment powered by gasoline and diesel engines would also generate $PM_{2.5}$, CO, and NO_x in exhaust emissions. If construction traffic and lane closures increase congestion and reduce the speed of other vehicles in the area, emissions would increase temporarily during delays. The effects would generally be limited to the immediate area in which the congestion occurs.

Some construction phases (particularly paving operations using asphalt) would result in short-term odors, which might be detectable to some people near the site. However, these odors would be diluted as distance from the site increases.

Greenhouse Gases

The generation of GHG emissions is directly related to the amount of fossil fuel burned. During construction, GHG emissions would be generated by diesel engines used to power most of the construction equipment. Sound Transit estimated GHG emissions during construction by using several sources, including information based on the agency's own projects that are similar in scale and construction methods to the Lynnwood Link Extension. Table 4.10-5 in Section 4.10, Energy Impacts, estimates overall energy use during construction as well, but it is based on a more general method of using general transportation or highway construction costs, and uses broader categories of factors to reach an energy estimate. Sound Transit's method calculates construction GHG emissions based on the agency's records of fuel costs and related construction activities on a per mile basis by alignment type (at-grade or elevated). It shows the estimated minimum and maximum construction-related GHG emissions for two representative alternatives from each project segment (Table 4.6-5).

Table 4.6-5. Estimated Construction Greenhouse Gas Emissions

Description	Segment A	Segment B	Segment C	Total
GHG emissions: Preferred Alternative (metric tons of CO_{2e})	32,489	18,884	13,050	64,423
GHG emissions: Other alternatives[a] (metric tons of CO_{2e})	30,264 to 32,489	18,492 to 20,365	10,349 to 13,050	59,105 to 65,904

[a] Segment A used Alternatives A5 (low) and A11 (high). Segment B used Alternatives B4 (low) and B2 (high). Segment C used Alternatives C3, Option 1 (low) and C3, Option 2 (high).

CO_{2e} = total carbon dioxide equivalent

The low estimate for the alternatives with the least construction-related GHG emissions is the sum of Alternatives A5, B4, and C3 Option 1. The high estimate for the alternatives with the highest construction-related GHG emissions is the sum of the Preferred Alternative in Segment A, Alternative B2A, and the Preferred Alternative in Segment C.

Conformity Determination

In the Puget Sound region, PSRC determines regional conformity by including a project in the Metropolitan Transportation Plan (MTP) and the RTIP. The Lynnwood Link Extension is identified and described in the region's MTP, *VISION 2040*, *Transportation 2040*, and in the 2013-2016 RTIP (PSRC 2012). It is designated in PSRC's RTIP as project RTA-78.

In addition to the long-term localized operational impacts (2035), Sound Transit predicted localized worst-case CO concentrations from the Lynnwood Link Extension for initial operations (2023) and the long-range RTP analysis year (2040) to demonstrate project-level CO conformity. The results of the CO modeling are presented in Appendix I-4.6. None of the Lynnwood Link Extension alternatives, including the Preferred Alternative, would have intersections with CO concentrations above the NAAQS. The project corridor is in an attainment area for all the other criteria pollutants (including PM_{10} and $PM_{2.5}$); therefore, further analysis of the other criteria pollutants is not required. Based on the results of the localized CO analysis presented in Appendix I-4.6, the Lynnwood Link Extension, including the Preferred Alternative, would not cause the NAAQS for CO to be exceeded or exacerbated. It would meet the project-level conformity requirements of the CAA.

4.6.5 Indirect Impacts

The traffic analyses for the Lynnwood Link Extension considered the long-term traffic forecasted to operate within the study area. Minor indirect air quality benefits would occur because the project would help to reduce future traffic volumes and levels of congestion within the study area compared with the No Build Alternative, as well as reduce traffic-related air pollutant and GHG emissions. Negative indirect air quality effects would be unlikely.

Producing and disposing of materials needed to build the project will release GHGs, which would be an indirect effect of the project. However, at this time, there is no accurate and standardized methodology for calculating the embodied and lifecycle emissions from transportation projects.

4.6.6 Cumulative Impacts

Cumulative air quality effects include those from the project when combined with those of other past, present, and reasonably foreseeable projects. The project's air quality analysis of 2035 conditions includes the transportation-related emissions related to the region's reasonably foreseeable population and employment growth. Therefore, the preceding findings about 2035 conditions reflect the cumulative effects.

On a very small scale, other projects could affect transportation and, therefore, air quality at specific intersections. For example, Sound Transit's OMSF, if sited in

Lynnwood, would alter traffic in Lynnwood, although that project's Draft EIS found no NAAQS exceedances (Sound Transit 2014).

Also, Sound Transit is developing the Northgate Link Extension. While this project is scheduled to be completed and in operation prior to completion of the Lynnwood Link Extension, some overlapping periods of construction could occur at Northgate. To address this, the construction phasing and the construction mitigation plans between the two projects will be coordinated to minimize any combined impacts, minimizing typical construction period air quality impacts such as dust or diesel emissions, or emissions from increased traffic congestion. King County's high-density transit-oriented development at Northgate could create additional construction-related impacts in the area. Construction of this development will need to be coordinated with construction activities related to the light rail projects in order to minimize overall impacts.

Localized construction pollutants and GHG emissions would be higher with concurrent projects, but would probably not exceed air quality standards because Sound Transit would employ mitigation measures and BMPs to minimize any impacts.

4.6.7 Potential Mitigation Measures

Operational Mitigation

Because no adverse air quality impacts are expected, no specific mitigation is proposed.

Construction Mitigation

Consistent with PSCAA requirements, Sound Transit would use BMPs to prevent and reduce air quality impacts resulting from construction activities. Construction activities must comply with local regulations governing air quality, including those for controlling fugitive dust during construction. The following mitigation measures would be used, as necessary, and in accordance with standard practice to control PM_{10}, $PM_{2.5}$, and emissions of CO and NO_x during construction. Several of these measures would also reduce GHG emissions:

- Spray exposed soil with a dust control agent, such as water.
- Cover all transported loads of soils and wet materials before transport, or provide adequate freeboard (i.e., space from the top of the material to the top of the truck).
- Install wheel washes or manually wash truck wheels, where needed.
- Remove the dust and mud that are deposited on paved, public roads.
- Route and schedule high volumes of construction traffic, where practicable.

- Require appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel.
- Use well-maintained heavy equipment.
- Cover, install mulch, or plant vegetation as soon as practicable after grading.
- Encourage contractors to employ emission-reduction technologies and practices for both on-road and off-road equipment and vehicles (e.g., retrofit equipment with diesel control technology and/or use ultra-low sulfur diesel).
- Implement idling restrictions for construction trucks.
- Locate construction equipment and truck staging zones away from sensitive receptors, as practicable, and in consideration of other factors such as noise and safety.

4.7 Noise and Vibration

This section describes the project's noise and vibration effects during construction and operation, including mitigation measures Sound Transit would implement to address impacts from the project. For more information and reference sources, see the *Noise and Vibration Technical Report*.

4.7.1 Background and Criteria

Noise and vibration are caused by waves of energy being transmitted through a material such as air or the ground. Noise, which is unwanted sound, includes vibrations that can be detected by the ear. Groundborne vibration differs from airborne noise in that it consists of energy transmitted through the earth rather than the air.

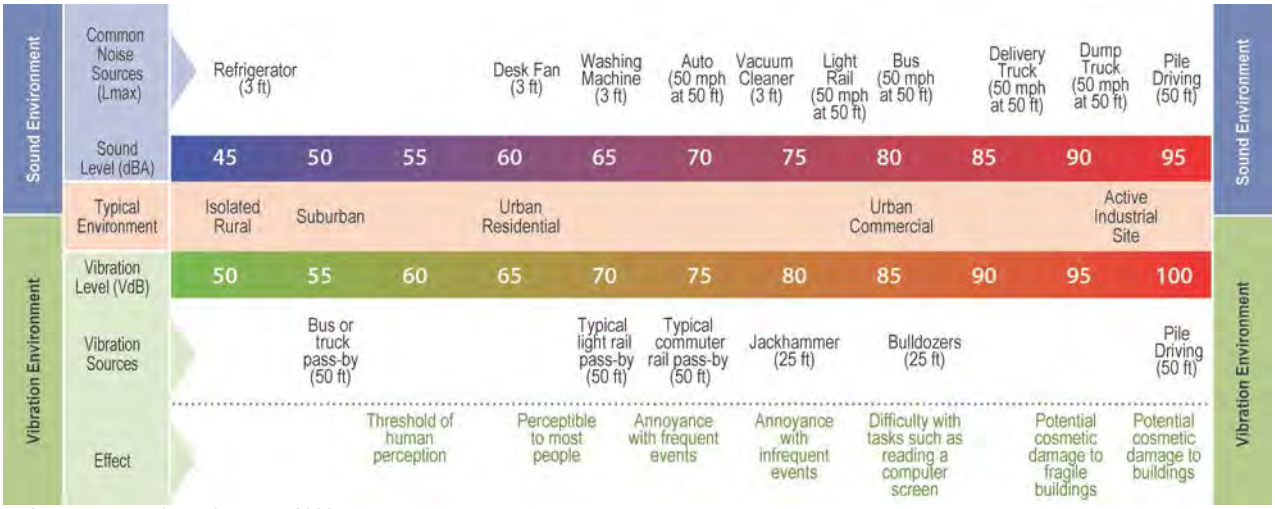
Sound Transit evaluates noise and vibration impacts for transit projects according to the FTA *Transit Noise and Vibration Impact Assessment* guidance manual (FTA 2006). FTA's standards for noise and vibration impacts are based on several decades of studying community reaction to environmental noise and vibration exposure (FTA 2006). The FTA manual categorizes land uses based on their sensitivity to noise or vibration.

Noise

Environmental noise is composed of many frequencies, each occurring simultaneously at its own sound pressure level. The range of magnitude, from the faintest to the loudest sound the ear can hear, is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). The commonly used frequency weighting of environmental noise is A-weighting (dBA), which is a measure of how an average person hears changes in sound levels; people can typically detect a 2 dBA change in sound levels. The human ear perceives a 10 dBA

change in sound level as a doubling of loudness. However, adding two sounds of the same loudness together does not double the decibel value.

A common noise descriptor for environmental noise is the equivalent sound level (Leq). Leq is a measure of total noise, a summation of all sounds, during a period of time and averaged over that period of time. Leq measured over a 1-hour period is the hourly Leq [Leq(h)]. The day/night noise level (Ldn) describes the cumulative 24-hour exposure to sound, with a penalty applied to noise exposure between 10 pm and 7 am. Lmax is the maximum noise level during an event. Ldn is used by the EPA and FTA to evaluate noise levels in residential areas. Typical sound and vibration levels experienced in urban environments are shown in Figure 4.7-1.



Sources: EPA 1971, 1974; FTA 2006

Figure 4.7-1
Typical Sound and Vibration Levels

Noise from light rail operations is generated by the interaction of wheels and rails, warning devices, motive power, rail substructure vibration, associated park-and-rides, and the operation of traction power substations. The interaction between steel wheels and rails generates four different types of light rail noise depending on track work: (1) noise generated by passing trains on the track, (2) wheel squeal on a tightly curved track (common for a curve radius of less than 600 feet and possible for a curve radius between 600 and 1,000 feet), (3) noise generated from wheel flanging caused by the centrifugal force from an unbalanced car body, and (4) noise generated on special trackway sections, such as at crossovers or turnouts. Warning bells are another source of light rail noise; bells are sounded when trains enter or leave the stations. Noise levels near a project may also be affected by changes to traffic patterns, roadway alignments, noise walls, and other shielding.

The level at which project noise (called project noise exposure) creates an impact varies, depending on the existing (pre-project) noise environment and on the type of land use that is affected. Future noise exposure is the combination of existing noise exposure and the additional noise exposure caused by a project. Many land uses are not noise-sensitive. FTA guidance categorizes noise-sensitive land uses as shown in Table 4.7-1.

Table 4.7-1. FTA Land Use Categories for Noise Impact Analysis

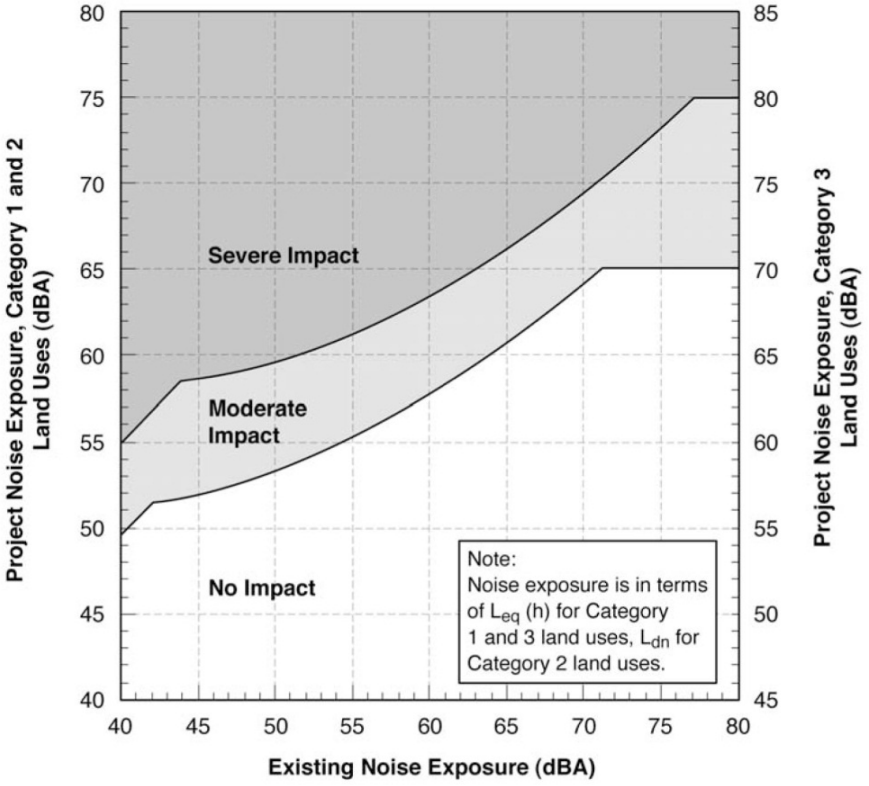
Category	Metric	Land Use Description
1	Leq(h)[a] (dBA)	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, land uses such as outdoor amphitheaters and concert pavilions, and National Historic Landmarks with substantial outdoor use.
2	Ldn (dBA)	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Leq(h)[a] (dBA)	Institutional land uses with primary daytime and evening use. This category includes schools, libraries, and churches where it is important to consider interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where a quiet environment is important, such as medical offices, conference rooms, recording studios, and concert halls, fall into this category. It also includes places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included. However, parks are not noise-sensitive if they feature active recreation or sporting facilities.

[a] Leq for the noisiest hour of transit-related activity during hours of noise sensitivity.

Source: FTA 2006

The FTA noise impact criteria recognize that in a loud environment, even a small increase in noise can increase annoyance. The criteria are shown by category on Figure 4.7-2. Impact criteria for highly-sensitive uses (Category 1, measured in Leq[h]) and residential uses (Category 2, measured in Ldn) are shown on the left side of the graph. Impact criteria for noise-sensitive institutional uses (Category 3, measured in Leq[h]) are shown on the right. The graph shows, for example, that if the existing noise level in a residential area is 60 dBA Ldn, then a project that generates less than 58 dBA Ldn will not have an effect. If the project generates between 58 and 63 dBA Ldn, it will cause a moderate impact, and if it generates more than 63 dBA Ldn, it will cause a severe impact. Above the severe impact criteria, most people would be highly annoyed by the noise.

FTA requires that mitigation be considered for both moderate and severe impacts. Sound Transit's practice is to mitigate both moderate and severe impacts to meet applicable FTA, state, and local noise criteria using a prioritized approach to measures beginning with source treatment, to treatments in the noise path, and then sound insulation as the last option (Motion No. M2004-08, Sound Transit 2004).



Source: FTA 2006

Figure 4.7-2
FTA Transit Project Noise Exposure Impact Criteria

FTA's guidance is to follow FHWA noise assessment procedures and abatement criteria when a project is a joint FTA and FHWA project, the transit operations are adjacent to or on the highway, and highway noise dominates the transit noise over the 24-hour day. The Lynnwood Link Extension Project is not a joint project; therefore, FTA criteria are applicable. Where a project could change traffic noise levels experienced at sensitive receivers because it would include activities such as relocating existing highway noise walls, making changes to ramps, or removing existing noise-blocking structures, FTA's guidance is to consider both potential transit noise impacts using the FTA criteria and traffic noise impacts using FHWA's criteria included in 23 CFR 772.

FTA has general guidance on construction noise assessment that considers the nature and duration of the construction as well as local community factors. State or local noise regulations apply to construction noise and operational noise from stationary sources, such as park-and-rides and traction power substations. Seattle and Lynnwood have adopted noise control ordinances based on the Washington State Noise Control Rule (Washington Administrative Code [WAC] 173-60). The rule includes property-line noise limits (Table 4.7-2), but does not apply to warning devices or to motor vehicles that are regulated under WAC 173-60 as individual noise sources. Shoreline and Mountlake Terrace regulate noise as a public

disturbance. Sound Transit will apply the Washington State noise limits as noise impact criteria for stationary sources within those jurisdictions. The *Noise and Vibration Technical Report* discusses the requirements of the individual local ordinances when they differ from the WAC regulations.

Table 4.7-2. Washington State Noise Limits

	Maximum Allowable Sound Level (dBA)[a] at Property Line		
Property Usage	**Residential**	**Commercial**	**Industrial**
Residential	55	57	60
Commercial	57	60	65
Industrial	60	65	70

[a] Between 10 pm and 7 am, the levels given above are reduced by 10 dBA for residential receiving property.

Source: WAC Chapter 173-60-040; excludes transportation sources on public right-of-way.

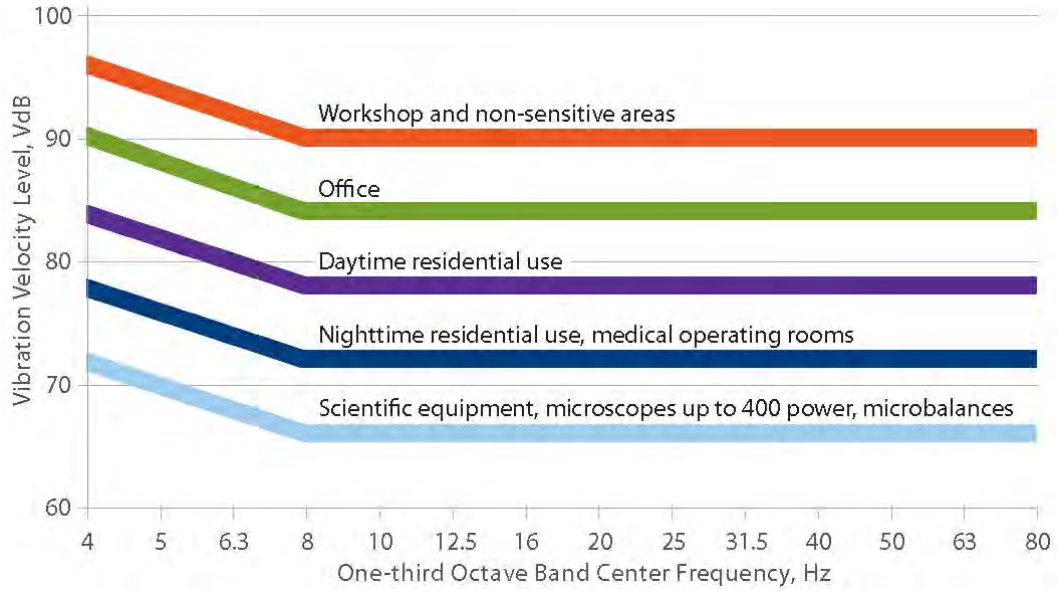
Note: Local noise ordinances can include different noise limits than state law.

Vibration

Vibration is an oscillatory (back-and-forth) motion that is often characterized by the velocity of the back-and-forth motions (measured in inches per second) and their frequency. Root-mean-square characterizes the average vibration velocity over time and may be reported on a logarithmic scale as vibration decibels (VdB), which is a good indicator of how people perceive vibration. Groundborne vibration generally occurs within a frequency range between approximately 1 and 200 hertz (Hz). The FTA groundborne vibration impact criteria are based on land use and train passage frequency. Typical vibration levels experienced in urban environments are shown in Figure 4.7-1.

Vibration is generated by motion at the wheel and rail interface, and is affected by rail condition or roughness, track geometry, vehicle suspension, train speed, rail substructure type and geometry, special trackwork, and soil conditions. Vibration from a passing train can move through the ground and transfer this motion to a building's foundation. This type of vibration does not damage buildings but can be annoying to building occupants. Detailed vibration analysis criteria consider the frequency (Hz) and velocity (VdB) of the back-and-forth motions of vibration. Figure 4.7-3 shows the detailed vibration impact criteria for land uses found within the project corridor (FTA 2006).

Short-term impacts caused by construction vibration are evaluated for their potential to cause cosmetic damage to nearby structures; however, the vibration levels are temporary and do not require an analysis based on the uses inside the structures. Also, most construction processes involve vibration well below the levels that could cause building damage, even if vibrations are felt.



Source: FTA 2006

Figure 4.7-3
FTA Detailed Vibration Analysis Impact Criteria

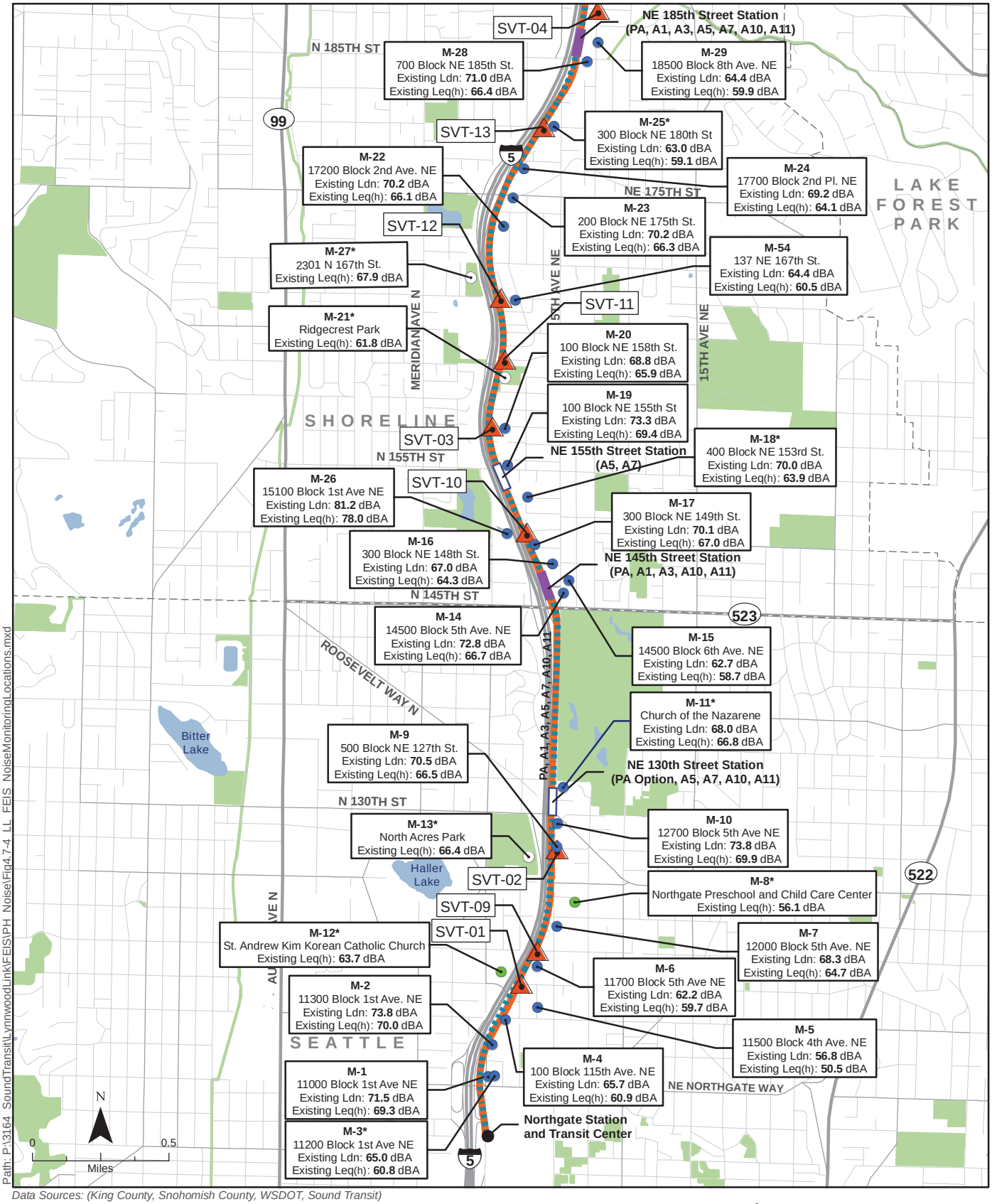
4.7.2 Affected Environment

To provide a baseline for comparing future project-generated noise and vibration levels, Sound Transit measured noise levels at 59 locations, and took vibration propagation measurements at 14 locations, as shown in Figures 4.7-4a and 4.7-4b.

Traffic on I-5 is the dominant noise source and traffic on local streets is the dominant vibration source in the project corridor. Existing noise walls reduce the freeway noise reaching neighboring residential areas through several areas of the corridor, particularly in Segment A in Seattle and Shoreline. While land use in the corridor is largely suburban, sound levels were typical of urban residential environments because of the proximity to I-5.

The majority of the project corridor includes single- and multifamily residential uses. Non-residential noise-sensitive uses in the corridor include schools and churches. Parks are noise sensitive when the primary use of the park is noise sensitive, but not when the primary use is active recreation. Uses in Scriber Creek Park have been classified as noise sensitive. There are no FTA Category 1 uses in the study area.

Two vibration-sensitive commercial uses, including one business that does laser etching and one for phonograph restoration, are at 20815 52nd Avenue West in Lynnwood.



Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

Noise Monitor Locations

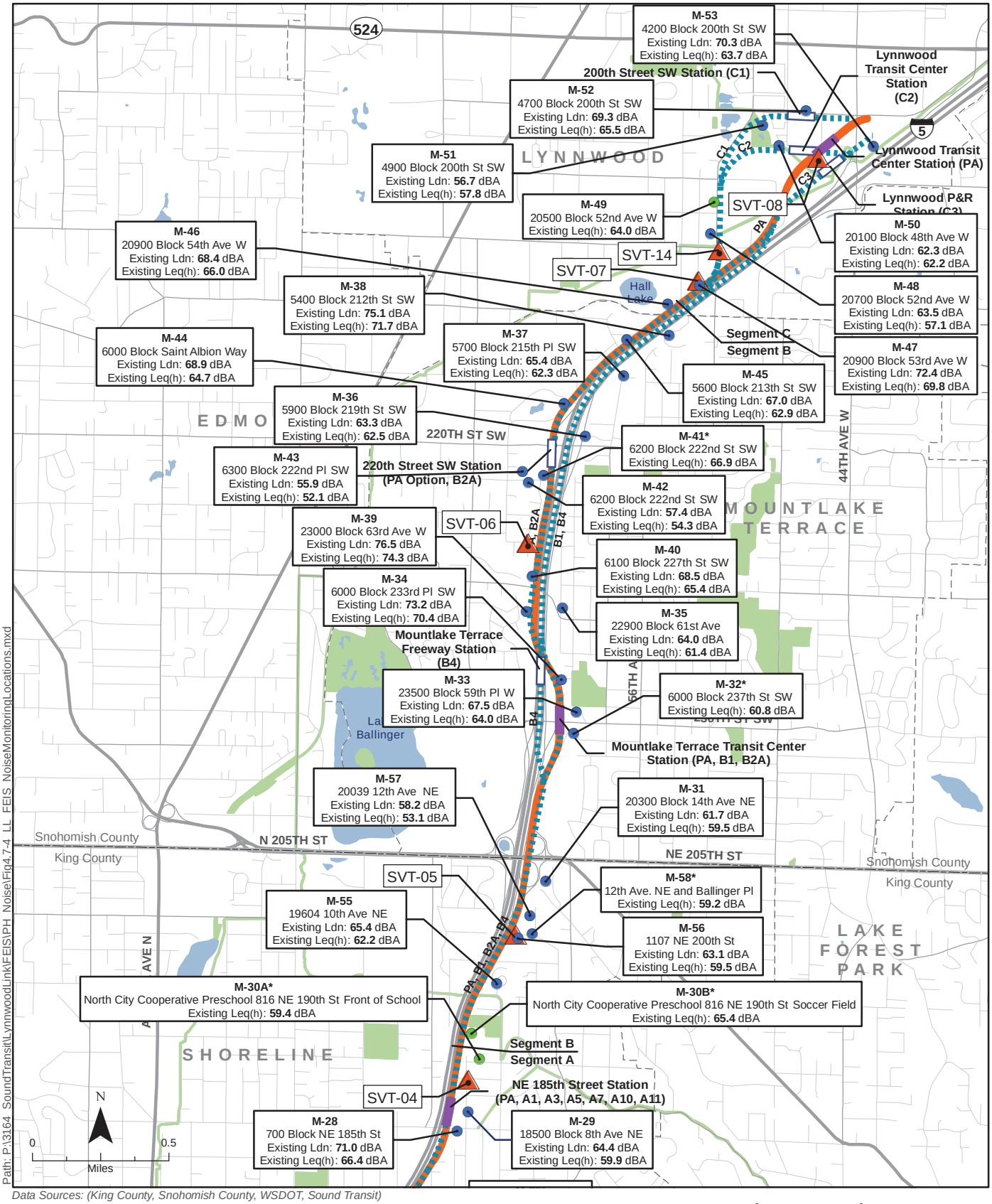
- FTA Land-use Category 2
- FTA Land-use Category 3
- General Ambient Noise Location
- Surface Vibration Test Location

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives

Notes: - Ldn values for residences and hotels only.
- Noise Monitor Locations displayed with an asterisk (M-32*) are short term (Leq only) monitoring sites.

Figure 4.7-4a
Noise Monitor and Surface Vibration Test Locations
Segment A

Lynnwood Link Extension



Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

Noise Monitor Locations

- FTA Land-use Category 2
- FTA Land-use Category 3
- General Ambient Noise Location
- Surface Vibration Test Location

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives

Notes: - Ldn values for residences and hotels only.
- Noise Monitor Locations displayed with an asterisk (M-32*) are short term (Leq only) monitoring sites.

Figure 4.7-4b
Noise Monitor and Surface Vibration Test Locations Segments B and C

Lynnwood Link Extension

4.7.3 Long-Term Impacts

The noise impact analysis considers noise from passenger service train operation, wheel squeal from curves, warning bells, and the effects of crossover switches. The alternatives do not include any at-grade crossings; therefore, warning devices would only be used for trains entering and leaving stations. In addition to assessing transit noise, the impact analysis includes areas where the project could change traffic noise levels experienced at sensitive receivers as a result of relocating existing highway noise walls, changing ramps, or removing existing structures to accommodate the construction and operation of light rail (primarily in Segment A). Relocated traffic noise walls are included in the project design as shown in Appendix F, Conceptual Plans.

The vibration analysis takes into account the location and structures for the guideway (at-grade or elevated), distance to sensitive receivers, soil conditions, and trackwork, such as switches.

Noise and vibration impacts identified in this EIS are those that would occur absent any mitigation; however, as detailed in Section 4.7.7, Sound Transit would provide mitigation for all vibration and moderate or severe noise impacts caused by the project. Residual impacts would occur where typical mitigation approaches could not reduce project noise exposure levels to below the moderate impact criteria. These locations may be eligible for sound insulation to further reduce interior noise levels. Figures 4.7-5a through 4.7-5d show the potential noise and vibration impacts along the project corridor for each light rail alternative.

For the Final EIS, the number of noise and vibration impacts associated with the light rail alternatives has increased since the Draft EIS because Sound Transit adjusted the assumed operating plan to reflect the potential need for four-car trains running during all operating hours (the Draft EIS assumed that two-car trains would be run after 6:30 pm).

No Build Alternative

Noise in the corridor would continue to be dominated by I-5 and would not be affected by the construction of a new transit project.

Segment A: Seattle to Shoreline

As shown in Table 4.7-3, moderate to severe noise impacts would occur at between 306 and 309 locations along the Preferred Alternative, while the other Segment A alternatives would affect 234 to 493 properties. Elevated sections would have the most noise impacts; however, the elevated sections would create fewer vibration impacts.

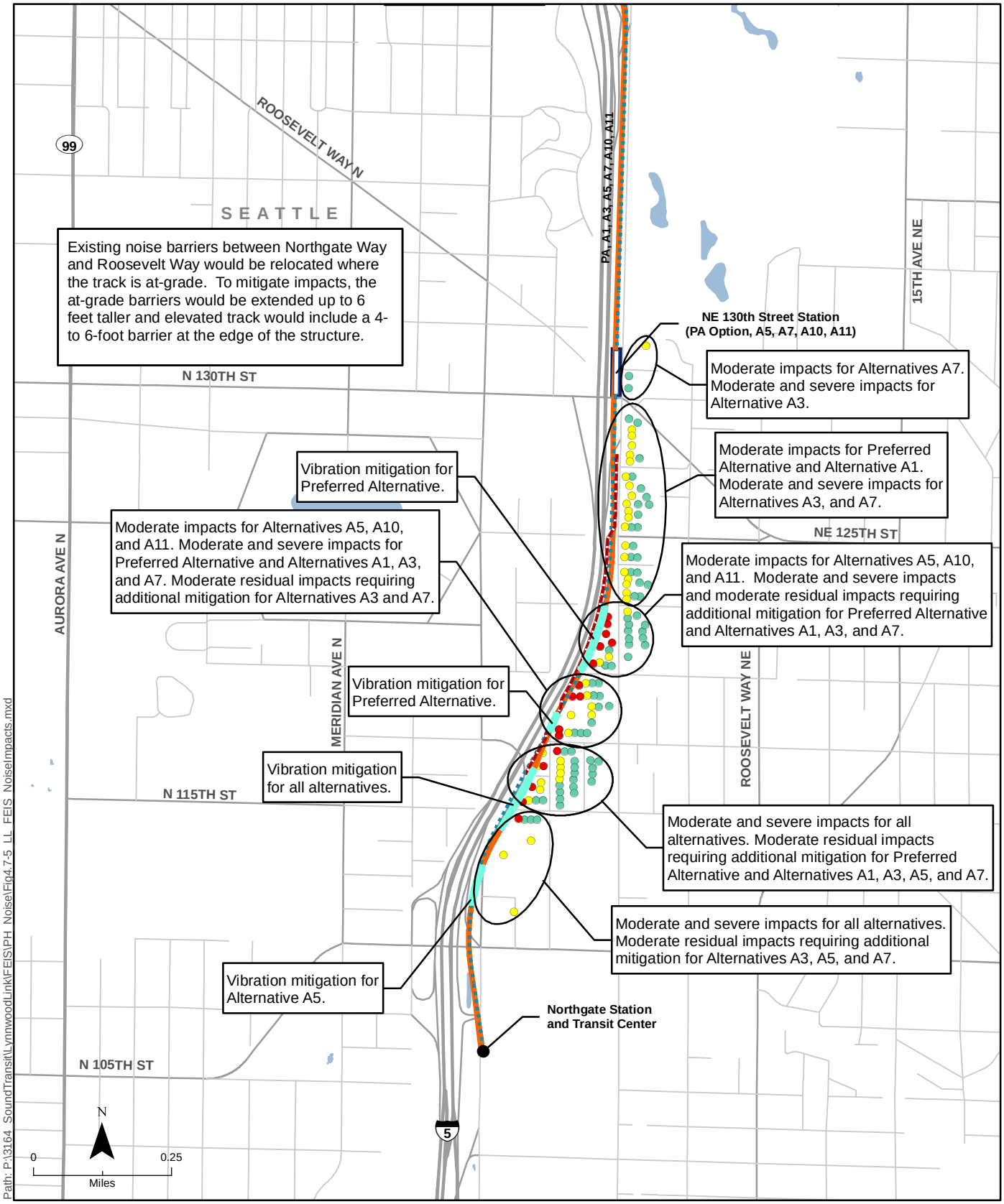


Figure 4.7-5a
Potential Noise and Vibration Impacts

Lynnwood Link Extension

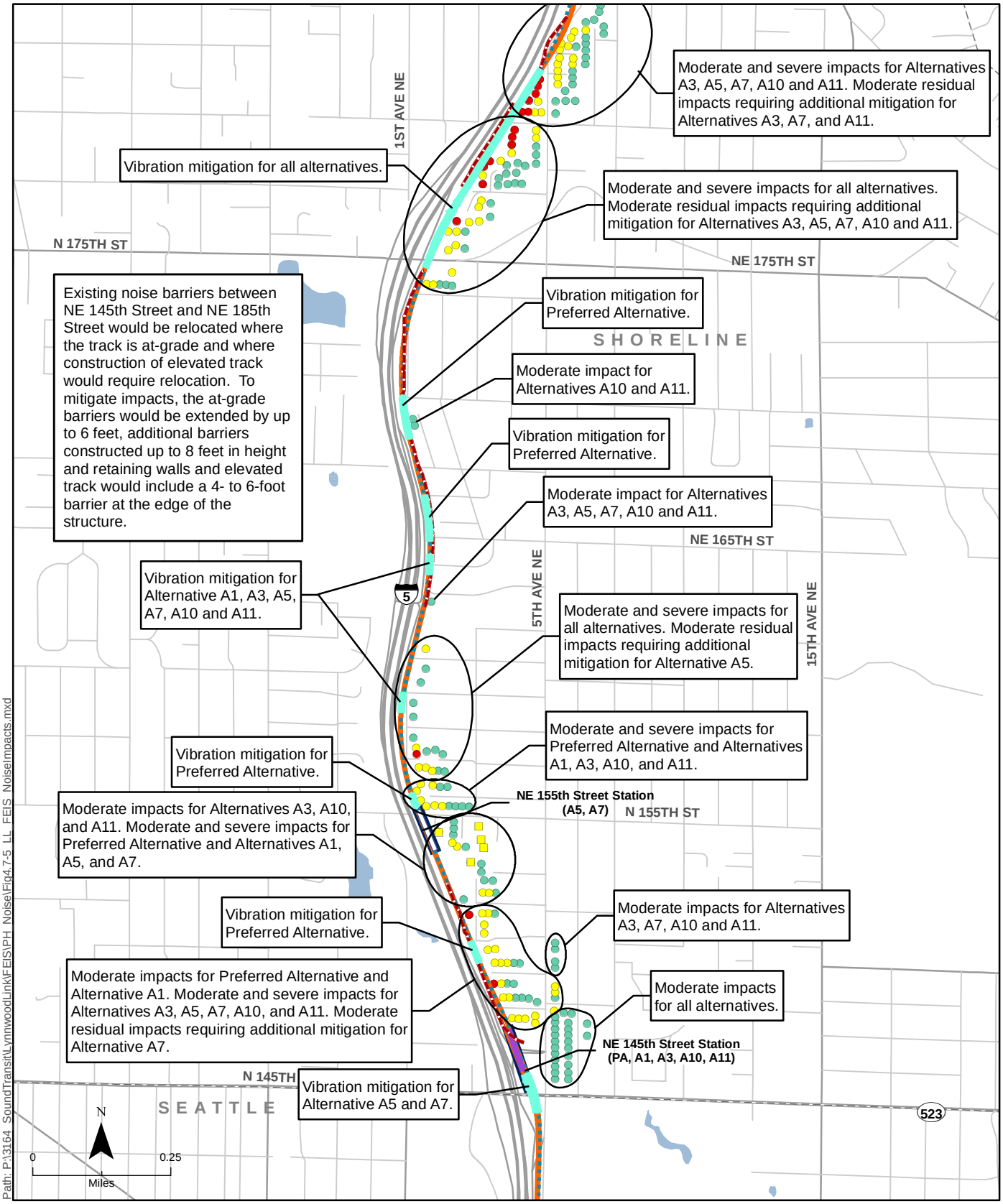


Figure 4.7-5b
Potential Noise and Vibration Impacts

Lynnwood Link Extension

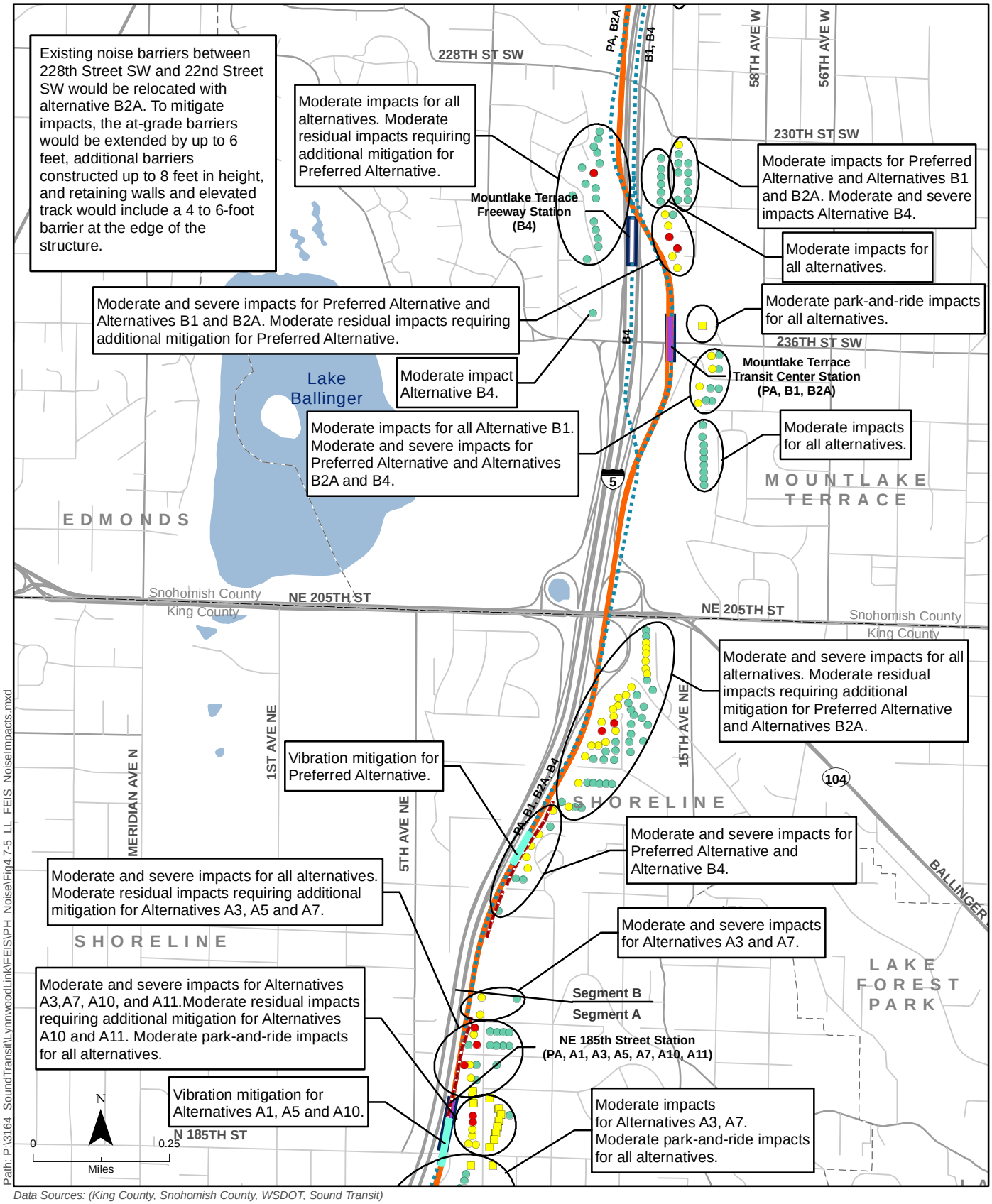


Figure 4.7-5c
Potential Noise and Vibration Impacts

Lynnwood Link Extension

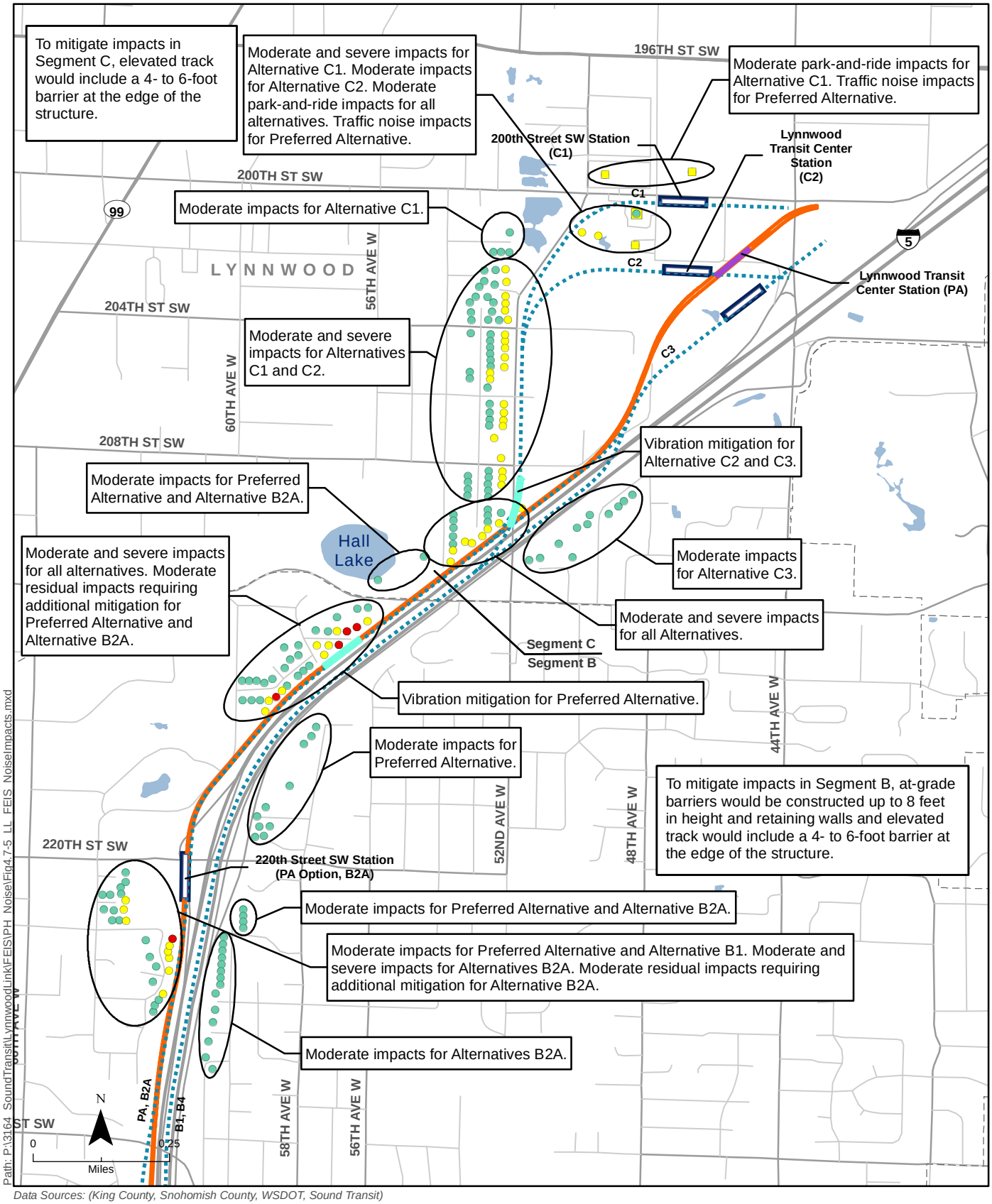


Figure 4.7-5d
Potential Noise and Vibration Impacts

Lynnwood Link Extension

Table 4.7-3 shows noise impacts for all alternatives from buses within the park-and-rides and off-street transfer points at the NE 185th Street Station. Noise levels at this location would not exceed the FTA impact criteria but would exceed local noise limits.

For all alternatives, the project would remove, relocate, and replace existing noise walls along I-5. The replacement noise-reduction treatments would be designed to provide at least as much noise reduction of highway noise as the walls being removed; where feasible, the walls also would reduce noise from light rail whether or not the light rail noise would otherwise create an impact.

Table 4.7-3. Number of Properties with Projected Transit Noise and Vibration Impacts in Segment A (Before/After Mitigation) [a,b]

Alternative	Moderate Noise Impacts	Severe Noise Impacts	Station and Park-and-Ride Access Impacts	Total Noise Impacts	Vibration Impacts
Preferred Alternative	181/0	112/0	13/0	306/0	27/0
Preferred Alternative With Shoreline Stadium Parking Garage Option	181/0	112/0	16/0	309/0	27/0
A1	190/0	29/0	15/0	234/0	9/0
A3	269/0	198/0	9/0	476/0	8/0
A5	181/0	105/0	17/0	303/0	16/0
A7	296/0	183/0	14/0	493/0	9/0
A10	161/0	110/0	12/0	283/0	14/0
A11	272/0	195/0	9/0	476/0	8/0

[a] Properties that are planned to be acquired are not included in the noise impact analysis.

[b] Noise levels that are not reduced to below the applicable criteria through source and path treatments (such as noise walls on the ground or noise barriers on the light rail guideway) may be eligible for sound insulation.

With the Preferred Alternative and other mostly at-grade alternatives, Sound Transit would need to relocate four to six sections of the existing noise walls on the east side of I-5 in Segment A. The elevated alternatives would relocate and rebuild sections as well. The Preferred Alternative would replace approximately 11,900 linear feet of noise wall (see Appendix F, Conceptual Plans) while the other alternatives would replace between 2,100 and 8,200 feet of noise wall. Most of the replacement walls would be east of their current locations and reduce both rail noise and traffic noise reaching the residents. For light rail sections that are elevated, some existing noise walls along I-5 could be maintained in place where they do not conflict with the construction of the elevated guideway, but there are areas where noise walls still would need to be replaced. Ground-level freeway noise walls would not reduce transit noise from an elevated structure; therefore, the elevated structures would have noise barriers incorporated into the guideway when transit noise levels exceed criteria at nearby properties.

Rail track curves within Segment A have more than a 1,000-foot radius; therefore, no wheel squeal is anticipated in Segment A. All of the Segment A alternatives have crossover switches, which are an additional source of wheel-track noise.

Vibration levels before mitigation would affect between 8 and 27 properties, with more properties affected by the Preferred Alternative and other mostly at-grade alternatives (Table 4.7-3).

Preferred Alternative: At-grade/Elevated with NW 145th and NE 185th Stations

The Preferred Alternative would cause noise impacts at single- and multifamily residences and two churches (the Seattle Latvian Evangelical Lutheran Church and the True Jesus Church/Resurrection Fellowship Church of God). Most of the impacts would occur between Northgate Way and NE 127th Street and in sections where the guideway is elevated, such as near NE 145th Street and NE 155th Street. Bus noise would impact residences near the NE 185th Street Station with either of the parking garages located west of I-5; however, there would be three additional impacts with the Shoreline Stadium parking garage option. Relocated noise walls would mitigate any traffic noise impacts associated with project changes requiring movement of the existing noise walls.

Alternative A1: At-grade/Elevated with NE 145th and NE 185th Stations

Alternative A1 would cause transit noise impacts at single- and multifamily residences, mostly located between NE Northgate Way and NE 117th Street and in sections where the guideway is elevated, such as near NE 145th Street, NE 155th Street, and NE 175th Street. These impacts include residences near the NE 185th Street Station that would be affected by noise from buses accessing the station.

Alternative A3: Mostly Elevated with NE 145th and NE 185th Stations

Alternative A3 would cause transit noise impacts at single- and multifamily residences, and two churches—the Seattle Latvian Evangelical Lutheran Church and the North Seattle Church of the Nazarene. Impacted receivers also include residences near the NE 185th Street Station park-and-ride. The longer stretches of elevated guideway are the primary reason that Alternative A3 would have more impacts than the mostly at-grade Preferred Alternative, which already would benefit from existing noise walls along at-grade sections.

Alternative A5: At-grade/Elevated with NE 130th, NE 155th, and NE 185th Stations

Alternative A5 would cause transit noise impacts at single- and multifamily residences and one church—the True Jesus Church/Resurrection Fellowship Church

of God. Park-and-ride noise would affect residences near the NE 155th Street and the NE 185th Street Stations. Alternative A5 would cause more severe impacts than the Preferred Alternative in the area between NE Northgate Way and NE 117th Street because the alignment would be closer to residences. Compared with the Preferred Alternative, impacts would be greater at NE 145th Street because train speeds would be higher and fewer properties would be displaced without the NE 145th Street Station. Fewer impacts, however, would occur between NE 149th Street and NE 156th Street because train speeds would be lower near the NE 155th Street Station.

Alternative A7: Mostly Elevated with NE 130th, NE 155th, and NE 185th Stations

Alternative A7 transit noise impacts would be similar to Alternative A3, including park-and-ride noise impacts to residences near the NE 155th Street and NE 185th Street Stations. Compared to Alternative A3, fewer light rail noise impacts would occur in the vicinity of NE 155th Street, but more impacts would be experienced between NE 145th Street and NE 151st Street because of differences in speed, alignment, and the number of residential properties near the different station sites.

Alternative A10: At-grade/Elevated with NE 130th, NE 145th, and NE 185th Stations

Alternative A10 transit noise impacts would be similar to Alternative A5, with slightly fewer impacts between NE 145th Street and NE 151st Street.

Alternative A11: Mostly Elevated with NE 130th, NE 145th, and NE 185th Stations

Transit noise impacts with Alternative A11 would be similar to Alternative A3, including park-and-ride noise impacts near the NE 185th Street Station.

Segment B: Shoreline to Mountlake Terrace

The Preferred Alternative in Segment B would cause between 202 and 217 moderate or severe noise impacts, depending on the station option, while other alternatives would cause 110 to 192 noise impacts (Table 4.7-4 and previous Figures 4.7-5c through 4.7-5d). These impacts include noise from rail operations and from bus service to the Mountlake Terrace Station.

Each Segment B alternative includes a park-and-ride at Mountlake Terrace Station, where noise limits are governed by state code, as previously shown in Table 4.7-2. Although noise from the park-and-ride would not exceed the FTA impact criteria, noise levels at four residences adjacent to the park-and-ride would exceed noise limits under state code as a result of modified bus service to the station. Only Alternative B2A would relocate existing noise walls in Segment B.

Table 4.7-4. Number of Properties with Transit Noise and Vibration Impacts in Segment B (Before/After Mitigation)[a,b]

Alternative	Moderate Noise Impacts	Severe Noise Impacts	Station and Park-and-Ride Access Impacts	Total Noise Impacts	Vibration Impacts
Preferred Alternative	148/0	65/0	4/0	217/0	3/0
Preferred Alternative with 220th Street Station South Option	133/0	65/0	4/0	202	3/0
B1	89/0	29/0	4/0	122/0	0
B2A	138/0	50/0	4/0	192/0	0
B4	73/0	33/0	4/0	110/0	0

[a] Properties that are planned to be acquired are not included in the noise impact analysis.

[b] Noise levels that are not reduced to below the applicable criteria through source and path treatments (such as noise walls on the ground or noise barriers on the light rail guideway) may be eligible for sound insulation.

Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side

The Preferred Alternative would affect single- and multifamily residences along the guideway and the Mountlake Terrace Preschool. Moderate park-and-ride noise impacts would occur near the Mountlake Terrace Station. An 800-foot radius curve south of the Mountlake Terrace Transit Center could generate wheel squeal. The options for a station south of 220th Street SW would result in fewer noise impacts than the Preferred Alternative with no 220th Street SW Station because of changes in vehicle speed and alignment in the vicinity of the station, and because the guideway to the station would shift west and displace five residences that would otherwise experience noise impacts with the Preferred Alternative.

Alternative B1: East Side to Mountlake Terrace Transit Center to Median

Transit noise levels would cause impacts to single- and multifamily residences, including park-and-ride noise impacts near the Mountlake Terrace Station. Alternative B1 would have fewer noise impacts than the Preferred Alternative because the alignment would follow the I-5 median for the majority of Segment B, relatively distant from noise-sensitive uses. An 800-foot radius curve south of the Mountlake Terrace Transit Center could generate wheel squeal.

Alternative B2A: East Side to Mountlake Terrace Transit Center to West Side

Lower train speeds near the 220th Street SW Station would reduce noise impacts compared with the Preferred Alternative. Sound Transit would replace approximately 900 linear feet of existing highway noise wall along I-5.

Alternative B4: East Side to Mountlake Terrace Freeway Station to Median

Noise impacts would occur along the alignment and near the Mountlake Terrace Station. An 800-foot radius curve at 236th Street SW could generate wheel squeal.

Segment C: Mountlake Terrace to Lynnwood

The Preferred Alternative would have noise impacts at 115 properties, while other alternatives in Segment C would cause between 29 and 234 such impacts (Table 4.7-5 and previous Figure 4.7-5d).

All of the alternatives would reconfigure the existing park-and-ride at 200th Street SW and would modify the transit center operations. While noise from the park-and-ride would not exceed the FTA impact criteria, noise levels at up to 58 multifamily residential units adjacent to the park-and-ride would exceed City of Lynnwood noise limits before mitigation is applied. The Preferred Alternative would include roadway changes to improve access to the Lynnwood Transit Center that would cause traffic noise impacts to 23 residential units.

Because the alternatives would be elevated, there is limited potential for vibration impacts; however, Alternatives C1 and C2 could cause one or two vibration impacts, depending on the option, because the elevated guideway columns would be close to vibration-sensitive properties.

Table 4.7-5. Number of Properties with Transit Noise and Vibration Impacts in Segment C (Before/After Mitigation)[a,b]

Alternative	Moderate Noise Impacts	Severe Noise Impacts	Station and Park-and-Ride Access Impacts	Total Noise Impacts	Vibration Impacts
Preferred Alternative	26/0	8/0	81[c]/0	115/0	0
C1 (Option 1: Median)	159/0	24/0	51/0	234/0	2/0
C1 (Option 2: West of I-5)	152/0	23/0	51/0	226/0	1/0
C2 (Option 1: Median)	52/0	41/0	58/0	151/0	2/0
C2 (Option 2: West of I-5)	49/0	41/0	58/0	148/0	1/0
C3 (Option 1: Median)	16/0	1/0	12 - 58/0	29 - 75/0	0
C3 (Option 2: West of I-5)	13/0	8/0	12 - 58/0	33 - 79/0	0

[a] Properties that are planned to be acquired are not included in the noise impact analysis.

[b] Noise levels that are not reduced to below the applicable criteria through source and path treatments (such as noise walls on the ground or noise barriers on the light rail guideway) may be eligible for sound insulation.

[c] Twenty three multi-family residential units would be affected by traffic noise resulting from roadway changes to 200th Street SW related to access to the Lynnwood Transit Center.

Preferred Alternative: West Side to Lynnwood Park-and-Ride Station

The Preferred Alternative would have moderate or severe transit noise impacts to 34 noise-sensitive properties west of 52nd Avenue West and 81 additional noise impacts from roadway changes to improve access to the Lynnwood Transit Center and from bus access to the transit center.

Alternative C1: 52nd Avenue West to 200th Street SW

Transit noise impacts would occur at single- and multifamily residences adjacent to the guideway and one church (the River of Life Christian Center), including noise impacts from a revised bus facility at the Lynnwood Park-and-Ride. An 800-foot-radius curve between Cedar Valley Road and 200th Street SW could cause wheel squeal. With Option 1 (median), impacts would occur at an additional eight residences along I-5 and 52nd Avenue West compared with Option 2 (west of I-5) because Option 2 would operate at a lower speed through the curve onto 52nd Avenue West. Option 2 also includes an 800-foot radius curve as the guideway turns from I-5 to 52nd Avenue West, which may generate wheel squeal.

Alternative C2: 52nd Avenue West to Lynnwood Transit Center Station

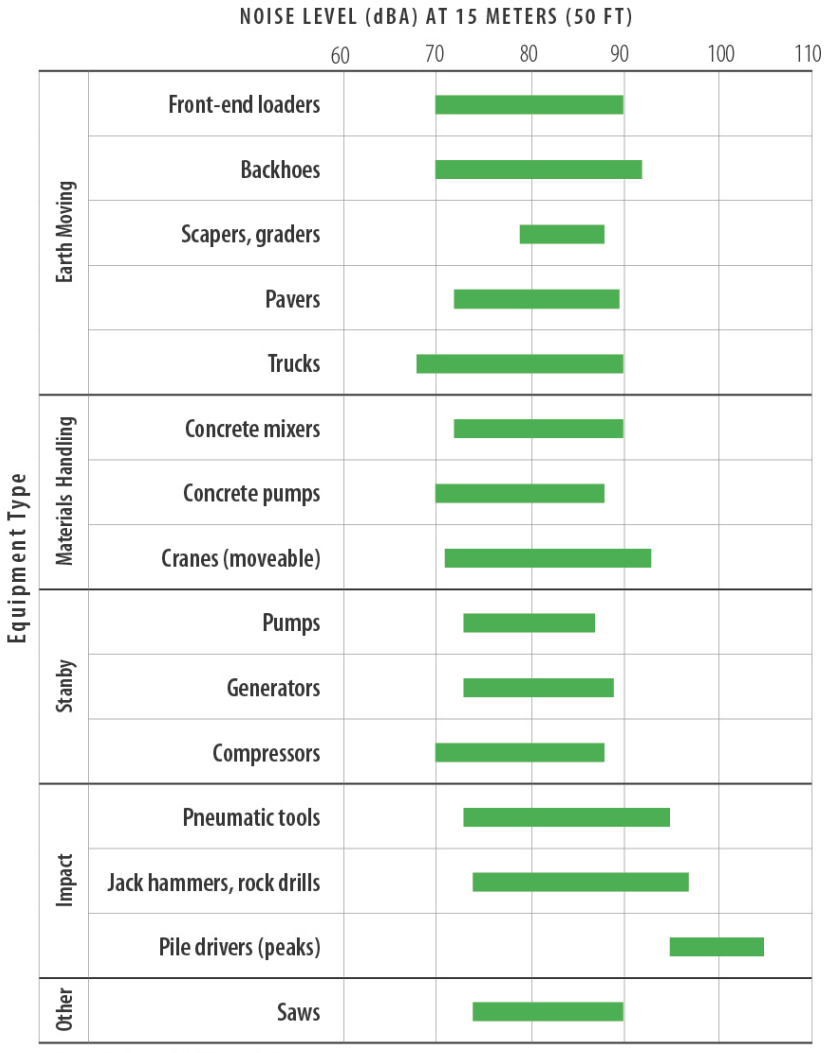
Alternative C2 would pass near fewer noise-sensitive properties than Alternative C1, although its initial section along 52nd Avenue West is the same. Properties that would experience transit noise impacts include single- and multifamily residences adjacent to the guideway and one church (the River of Life Christian Center). These impacts include residences affected by park-and-ride noise. Alternative C2 has the same two options for departing from I-5 as Alternative C1, with Option 1 (median) having more impacts than Option 2 (west of I-5). As with Alternative C1, Option 2 also includes an 800-foot radius curve as the guideway turns from I-5 to 52nd Avenue West, which may generate wheel squeal.

Alternative C3: Along I-5 to Lynnwood Park-and-Ride Station

Alternative C3 would have noise impacts similar to the Preferred Alternative. Option 1 (median) would have fewer impacts because the alignment would be located farther from residences along 52nd Avenue West and 53rd Avenue West. These impacts include residences affected by park-and-ride noise. Alternative C3 would not generate wheel squeal because it does not include any curves of less than 1,000 feet. With Alternative C3, there are two options for the Lynnwood Transit Center. Option 1, which maintains the current transit center configuration, would create noise impacts at 58 multifamily residential units, while Option 2, which would reconfigure the transit center around the light rail station, would create noise impacts at 12 multifamily residential units.

4.7.4 Construction Impacts

Construction-related noise, which is regulated by state or local ordinances, would be produced by earthmoving equipment, pneumatic tools, generators, concrete pumps, and similar equipment (Figure 4.7-6). While most construction activity would be completed during daytime hours, some activities, including any that would require lane closure of major roadways, including I-5, likely would be completed at night and would need noise permits or variances, as required by local ordinance. Construction impacts would be similar for all alternatives, but vary in time and location of the noise and vibration. Construction noise and vibration are evaluated in the *Noise and Vibration Technical Report*.



Source: EPA, 1971 and WSDOT, 1991.

Figure 4.7-6
Typical Construction Equipment Noise Levels

Construction would occur in several phases. During the loudest phases of work, which include demolition, grading, structure erection, and track installation, Leq noise levels would be approximately 88 dBA at 50 feet from the construction, with shorter work periods reaching 94 dBA. Each phase of guideway construction would occur over a short period in each area, with construction activities progressing from multiple starting points along the alignment. Areas requiring considerable demolition, grading, and construction activity would experience the longest periods of disruption.

Common sources of vibration during construction activities include jackhammers, pavement breakers, hoe rams, bulldozers, backhoes, and soil compactors. Pavement breaking and soil compacting would likely produce the highest levels of vibration.

Elevated sections would generally be constructed on drilled-shaft foundations, which generate less noise and vibration than driving piles. Limited pile driving could be required for some foundations and for retaining wall construction. Depending on soil conditions, pile driving could produce Lmax noise levels reaching 105 dBA at 50 feet, with vibration levels reaching a peak-particle velocity of 0.5 inch per second. No pile driving is anticipated within 80 feet of buildings. Pile driving conducted at more than 80 feet from buildings in the corridor would not damage buildings but could still cause temporary annoyance.

Segment A Alternatives

There are many single- and multifamily residences along the Segment A alternatives. At adjacent residences, maximum noise levels exceeding 80 dBA Lmax could occur for short periods of the day during some construction activities. In locations where the noise walls would conflict with the light rail tracks or guideway, replacing the noise walls could generate short periods of construction noise and increased traffic noise until the new walls are in place. Unless the replacement noise walls can be constructed prior to removal of the existing walls, and if temporary barriers are not practical, traffic noise levels would increase temporarily between approximately 5 and 10 dBA Leq. The affected noise wall locations are primarily in Segment A. In Segment A, the area that would experience the most guideway construction noise is between NE Northgate Way and North 117th Street. Station construction would produce similar noise levels as guideway construction, but constructing the station would occur over a longer period in the same location. The Preferred Alternative and Alternative A1 would widen or reconstruct the NE 185th Street bridge and include construction both east and west of I-5. Alternatives A5 and A7 would include the construction of a station and multi-story parking facility at NE 155th Street, which could result in a longer period of construction than alternatives without stations at this location. The NE 185th Street Station options with a parking garage

are more complex than options with surface parking and would have longer construction periods.

Guideway and station construction would not cause vibration damage to adjacent buildings unless vibratory pile driving occurs within 80 feet or vibratory rollers are used within 40 feet of sensitive structures. Vibration could cause annoyance at locations near stations where construction activity would occur over a longer period than that for guideway construction.

Segment B Alternatives

In Segment B, the area south of Ballinger Way would more likely experience guideway construction noise, as would the west side of I-5 in the western alignment for the Preferred Alternative and Alternative B2A. Alternatives B1 and B4 follow the median of I-5 for the majority of Segment B; therefore, construction noise with those alternatives would be farther from residences. Activities and noise levels would be similar to Segment A. The types of vibration impacts expected with any of the alternatives would be similar to Segment A.

Segment C Alternatives

In Segment C, the major noise sources would be associated with foundation, column, and guideway erection rather than grading activity and retaining wall construction. Alternatives C1 and C2 would cause more construction noise disruption than the Preferred Alternative and Alternative C3 because they are closer to residences. A crossing of the Scriber Creek stream and wetland complex could involve pile driving for the Preferred Alternative and Alternatives C2 and C3, which would be a source of temporary noise and vibration. Noise levels and typical vibration impacts would be similar to Segment A.

4.7.5 Indirect Impacts

Indirect effects of the project on noise and vibration could include noise or vibration caused by changes in development or travel patterns influenced by the project.

The project would lessen the future transportation demand on the roadway system compared to the No Build Alternative, but with or without the light rail project, traffic volumes and traffic noise would still be higher than today.

Transit-oriented development facilitated by the additional transportation options and accessibility provided by the project would generate noise consistent with the land use developed in accordance with local comprehensive plans and zoning regulations.

4.7.6 Cumulative Impacts

Previous projects have introduced noise and vibration sources in the corridor. The greatest existing source of noise in the corridor is I-5 and it will continue to be the major source. Areas that do not have existing or planned noise walls could experience increased traffic noise levels. Similarly, local roads will continue to be a source of noise or vibration in the corridor. Future expansion of I-5 and other transportation facilities envisioned in *Transportation 2040* (PSRC 2010a), including the Northgate Link Extension currently under construction, may contribute to future noise and vibration in the corridor.

In addition to the facilities identified in *Transportation 2040* (PSRC 2010a), the Sound Transit OMSF, with a site alternative in Lynnwood, could be an additional source of noise or vibration in the area; Sound Transit has identified a Bellevue site as the Preferred Alternative for that project. If constructed in Lynnwood, the OMSF would remove light industrial and commercial properties and replace them with the light rail guideway, surface tracks, and buildings, which could generate localized noise and vibration impacts. The OMSF would be farther from the closest sensitive receivers than would some of the Segment C light rail alternatives. In any event, in accordance with Sound Transit noise mitigation policy, severe and moderate impacts would be mitigated for both projects, and no cumulative effects are expected. If constructed concurrently with the Lynnwood Link Extension, construction of the OMSF could contribute additional temporary noise and vibration impacts.

The Edmonds School District's master plan includes developing a bus base and support services center in the same area. A large fleet of buses deployed from that site could cause higher noise levels for the area.

Some areas, such as in Lynnwood or Mountlake Terrace, may be redeveloped based on current local plans, placing more residential units or other noise-sensitive properties near the freeway or near the light rail project. Lynnwood Link Extension would be designed to avoid or mitigate noise impacts on existing noise-sensitive properties, but developers would need to consider light rail operations and ambient noise levels in the planning and design of future projects.

Because Sound Transit is mitigating all noise and vibration impacts (as defined by exceeding applicable FTA, state, or local criteria) created by the project, the project would not increase cumulative noise or vibration impacts, considering other current or future actions in the project area.

4.7.7 Potential Mitigation Measures

Depending on the combination of segment alternatives selected, if mitigation were not provided, the project would cause light rail noise impacts at 342 to 867 locations, local roadway access to park-and-rides and bus access noise impacts at 25 to 102

locations, and vibration impacts at 8 to 32 locations. However, Sound Transit will mitigate the as detailed in Table 4.7-6, are consistent with Sound Transit's Light Rail Noise Mitigation Policy (Motion No. M2004-08). The FTA manual also defines when mitigation is needed and bases this on the impact's severity, with severe impacts requiring the most consideration. Mitigation requirements for each alternative are summarized in Table 4.7-6; the specific locations and types of mitigation are detailed in the *Noise and Vibration Technical Report*.

When source mitigation measures, noise walls, or sound barriers are infeasible or not entirely effective at reducing noise levels below the FTA impact criteria or applicable requirement, then residential sound insulation would be evaluated and offered at properties where the existing building does not already achieve a sufficient exterior-to-interior reduction of noise levels.

All rail track curves of less than 1,000-foot radius near noise-sensitive land uses would be designed to accommodate a track lubrication system that Sound Transit would install should wheel squeal occur during operation.

Vibration impacts would be mitigated by design measures that reduce the amount of vibration energy transferred from passing trains into the ground. The use of a tire-derived aggregate (shredded tires) in a layer below the track ballast is an effective measure to reduce vibration transfer; other measures, such as ballast mats, a resiliently supported track, high-compliance rail fasteners, or column isolation, are also available and may be appropriate in some locations, such as on structures. Specific vibration-isolation designs to mitigate impacts to below the FTA criteria would be determined during final design.

Additional noise and vibration is generated at rail track cross-overs. Special trackwork, such as a movable-point or spring frog (a device that allows two rails to cross), would be used in place of a conventional frog where the cross-over would otherwise cause a noise or vibration impact.

During final design, all predicted noise and vibration levels and mitigation measures will be reviewed in further detail. If equivalent mitigation can 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. Further noise mitigation will be provided if, after operations commence, noise impacts occur for which mitigation is deemed necessary and appropriate under FTA noise standards.

Table 4.7-6. Summary of Mitigation Measures for Noise Impacts

Alternative	Relocation of Noise Walls Required for Project Construction	Mitigation for Light Rail Noise Impacts after Relocating Noise Walls	Mitigation for Station and Park-and-Ride Access Impacts
Segment A Alternatives			
Preferred Alternative	Approximately 12,250 feet of relocated noise walls along I-5	Approximately 9,700 feet of additional noise walls. Insulation offered to 8 units.	Approximately 530 feet of noise walls at NE 185th Street Station.
A1	Approximately 7,900 feet of relocated noise walls along I-5	Approximately 11,200 feet of additional noise walls.	Approximately 530 feet of noise walls at NE 185th Street Station.
A3	Approximately 2,100 feet of relocated noise walls along I-5	Approximately 17,300 feet of additional noise walls. Insulation offered to 27 units.	Insulation offered to 9 residences at NE 185th Street Station.
A5	Approximately 8,200 feet of relocated noise walls along I-5	Approximately 11,000 feet of additional noise walls. Insulation offered to 8 units.	Approximately 200 feet of noise walls and insulation offered to 10 residences at NE 185th Street Station.
A7	Approximately 2,100 feet of relocated noise walls along I-5	Approximately 17,400 feet of additional noise walls. Insulation offered to 29 units.	Insulation offered to 9 residences at NE 185th Street Station.
A10	Approximately 8,100 feet of relocated noise walls along I-5	Approximately 11,500 feet of additional noise walls. Insulation offered to 3 units.	Approximately 200 feet of noise walls and insulation offered to 10 residences at NE 185th Street Station.
A11	Approximately 3,400 feet of relocated noise wall along I-5	Approximately 17,100 feet of additional noise walls. Insulation offered to 28 units.	Insulation offered to 9 residences at NE 185th Street Station.
Segment B Alternatives			
Preferred Alternative	None	Approximately 16,975 feet of additional noise walls. Insulation offered to 9 units.	Approximately 400 feet of noise walls at Mountlake Terrace Station.
Preferred Alternative – 220th Street Station Option	None	Approximately 16,975 feet of additional noise walls. Insulation offered to 9 units.	Approximately 400 feet of noise walls at Mountlake Terrace Station.
B1	None	Approximately 20,800 feet of additional noise walls.	Approximately 400 feet of noise walls at Mountlake Terrace Station.
B2A	None	Approximately 15,000 feet of additional noise walls. Insulation offered to 3 units.	Approximately 400 feet of noise walls at Mountlake Terrace Station.
B4	None	Approximately 20,000 feet of additional noise walls.	Approximately 400 feet of noise walls at Mountlake Terrace Station.
Segment C Alternatives			
Preferred Alternative	None	Approximately 3,960 feet of additional noise walls.	Insulation offered to 58 residential units. Approximately 1,275 feet of noise walls or insulation offered to an additional 23 residential units to address traffic noise.
C1, either option	None	Approximately 7,200 feet of additional noise walls.	Insulation offered to 51 residential units.
C2, either option	None	Approximately 6,600 feet of additional noise walls.	Insulation offered to 58 residential units.
C3, either option	None	Approximately 1,700 feet of additional noise walls.	Insulation offered to between 12 and 58 residential units.

Segment A Alternatives

In Segment A, most of the at-grade alignments near residential areas would be protected by noise walls that would be relocated from their existing locations along I-5 to outside of the track alignment as part of the project design. Replacement noise walls would be between 6 and 24 feet in height to mitigate the combination of projected I-5 traffic noise levels resulting from the removal of the existing noise walls, changes to ramps and shielding, and light rail noise introduced by the project to below the impact criteria. Sound Transit would incorporate a 4-foot-tall to 8-foot-tall barrier at the edge of the structure closest to the noise-sensitive uses to mitigate most noise impacts from light rail operating on an elevated structure. Mitigation would reduce noise levels at nearby receivers, including areas already below applicable impact criteria.

Sound Transit would provide sound insulation at up to eight residences with the Preferred Alternative, none for Alternative A1, and at up to 38 residences with Alternatives A3, A5, A7, A10, or A11. Sound insulation would be provided where other standard measures that mitigate outdoor noise impacts are not completely effective.

The project would include vibration-reduction measures in several locations to reduce vibration levels to below FTA impact criteria.

Mitigation for impacts from buses and cars operating in the NE 185th Street park-and-rides would include noise barriers along the edge of the facility, sound insulation, or revising the design of the facility to move access driveways and bus loading areas farther from residences.

Segment B Alternatives

In Segment B, the project would include at-grade noise walls to reduce impacts on adjacent receivers for at-grade sections of the alignment. For the Preferred Alternative, the walls would range between 4 and 10 feet above the track height, or from the top of retaining walls built as part of the project. Walls for the other alternatives would range from 4 feet above retaining walls to at least 8 feet above track height. Alternative B1 would have the most walls, including 4-foot to 6-foot walls along both sides of the track in some locations to reduce noise from operation in the median of I-5 to below the FTA impact criteria.

The elevated sections of guideway would require additional mitigation. Sound Transit would incorporate a 4-foot-tall to 6-foot-tall barrier at the edge of the elevated guideway to reduce noise to below the FTA criteria. This would reduce noise levels at nearby properties, including those where levels would already be below the impact criteria. Sound Transit would provide sound insulation to nine residences with the Preferred Alternative and three residences with Alternative B2A.

The project would include vibration-reduction measures in several locations to reduce vibration levels to below FTA impact criteria.

For all alternatives, mitigation measures, such as a noise wall along the eastern edge of the facility, would alleviate noise impacts from buses serving the Mountlake Terrace Station park-and-ride.

Segment C Alternatives

In Segment C, all alternatives would be built on an elevated structure. Sound Transit would incorporate a 4-foot-tall to 6-foot-tall barrier at the edge of the structure to reduce noise caused by the elevated guideway to below FTA criteria.

Sound Transit would mitigate impacts from buses and passenger vehicles operating within the Lynnwood Transit Center Park-and-Ride with sound insulation of up to 58 residences for all alternatives, or through circulation or operational changes, such as revising the design for bus access. Roadway changes to improve access to the Lynnwood Transit Center as part of the Preferred Alternative would cause noise impacts at 23 multi-family residences that would be mitigated with noise walls along 200th Street SW and with sound insulation.

The project would include vibration-reduction measures in several locations to reduce vibration levels to below FTA impact criteria. Sound Transit would include resilient supports and column isolation for Alternatives C1 and C2 to avoid vibration impacts to businesses at 20815 52nd Avenue West in Lynnwood.

Construction

Sound Transit would reduce construction noise and vibration impacts with operational methods and scheduling, equipment choice, and acoustical treatments. In locations where existing noise walls must be relocated, the relocation would be completed as early in the construction process as practical so that the relocated walls would reduce noise from the ongoing construction activities. When required, Sound Transit or its contractor would seek the appropriate noise variance from the local jurisdiction. Construction noise and vibration control mitigation will include the following measures, as necessary, to meet required noise limits and minimize vibration:

- Install construction site noise barrier or noise wall by noise-sensitive receivers where feasible and appropriate.
- Use smart backup alarms during nighttime work that can be automatically adjusted, or lower the alarm level or tone based on the background noise level, or switch off back-up alarms and replace with spotters.
- Use low-noise emission equipment.

- Implement noise-deadening measures for truck loading and operations.
- Monitor and maintain equipment to meet noise limits.
- Use lined or covered storage bins, conveyors, and chutes with sound-deadening material.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Install high-grade engine exhaust silencers and engine-casing sound insulation.
- Prohibit aboveground jackhammering and impact pile driving during nighttime hours.
- Minimize the use of generators or use whisper-quiet generators to power equipment.
- Limit use of public address systems.
- Use movable noise barriers at the source of the construction activity, where appropriate.
- Limit or avoid noisy or high vibration activities during nighttime hours.
- Demolish existing structures near vibration-sensitive receivers with methods that do not cause impact forces against the buildings or near them.
- Minimize use of vibratory soil compactors and vibratory hammers near vibration-sensitive receivers.
- Use oscillatory pile-casing techniques where appropriate.
- Avoid using variable-frequency vibratory hammers in dense residential areas, such as around the NE 130th Street, NE 145th Street, NE 155th Street, and NE 185th Street Stations.
- Avoid conventional vibratory hammers; an alternative to conventional vibratory pile drivers is a resonance-free vibrator or variable eccentric moment vibrator.

4.8 Ecosystem Resources

An ecosystem is defined by the interaction between plants, animals, microorganisms, and the physical environment in which they live. Ecosystems are made up of living organisms, including humans, and the areas they inhabit. This section addresses the ecosystem components—aquatic species and habitat; vegetation, terrestrial wildlife, and wildlife habitat; and wetlands—in the vicinity of the Lynnwood Link Extension alternatives. The *Ecosystem Resources Technical Report* has detailed background information about the methods, affected environment, species, and impacts discussed in this section.

4.8.1 Affected Environment

The study area for ecosystems includes all species and habitat within 200 feet of the project alternatives or features, as well as areas up to 100 feet upstream and 300 feet downstream of any sites where any of the proposed alignments would cross a stream.

Aquatic Species and Habitat

The aquatic resources in the study area are primarily in urban areas, and most of the aquatic habitats have already been changed by development. While conditions vary from stream to stream, the greatest changes are in areas with the most urban development, including roads, freeways, and urban centers. Flows from some of the smaller streams and headwater reaches are channeled through pipes and ditches, thereby changing the natural flow patterns and processes such as groundwater recharge.

Three stream systems drain the study area: Thornton Creek, McAleer Creek, and Scriber Creek (Figures 4.8-1a through 4.8-1c). All three streams drain to Lake Washington. Many species of native and introduced fish, including species listed under the Endangered Species Act (ESA), inhabit Lake Washington and its tributary streams. These waterways also provide essential fish habitat for federally managed species; such habitat is protected under the Magnuson-Stevens Fishery Conservation and Management Act. The streams, stream habitats, and fish species that occur in the study area are described in greater detail in the *Ecosystem Resources Technical Report.*

In addition to Thornton Creek, McAleer Creek, and Scriber Creek, the Lynnwood Link Extension study area includes five tributaries to those streams (Table 4.8-1).

Thornton Creek supports populations of several salmonid fish species, although most are prevented from using stream habitats in the study area because downstream barriers to fish passage are present. The salmonid species most likely to use Thornton Creek stream habitats in the study area are resident cutthroat trout (*Oncorhynchus clarkii*) and rainbow trout (*O. mykiss*). Observers have found steelhead trout (the anadromous, or ocean-going, form of rainbow trout) in Thornton Creek upstream of the study area, but it is not known whether steelhead spawn there. The quality of Thornton Creek's in-stream habitat and riparian habitat within the study area is considered poor, based on channel morphology, sediment regime, existing physical habitat conditions, and degraded riparian habitat conditions.

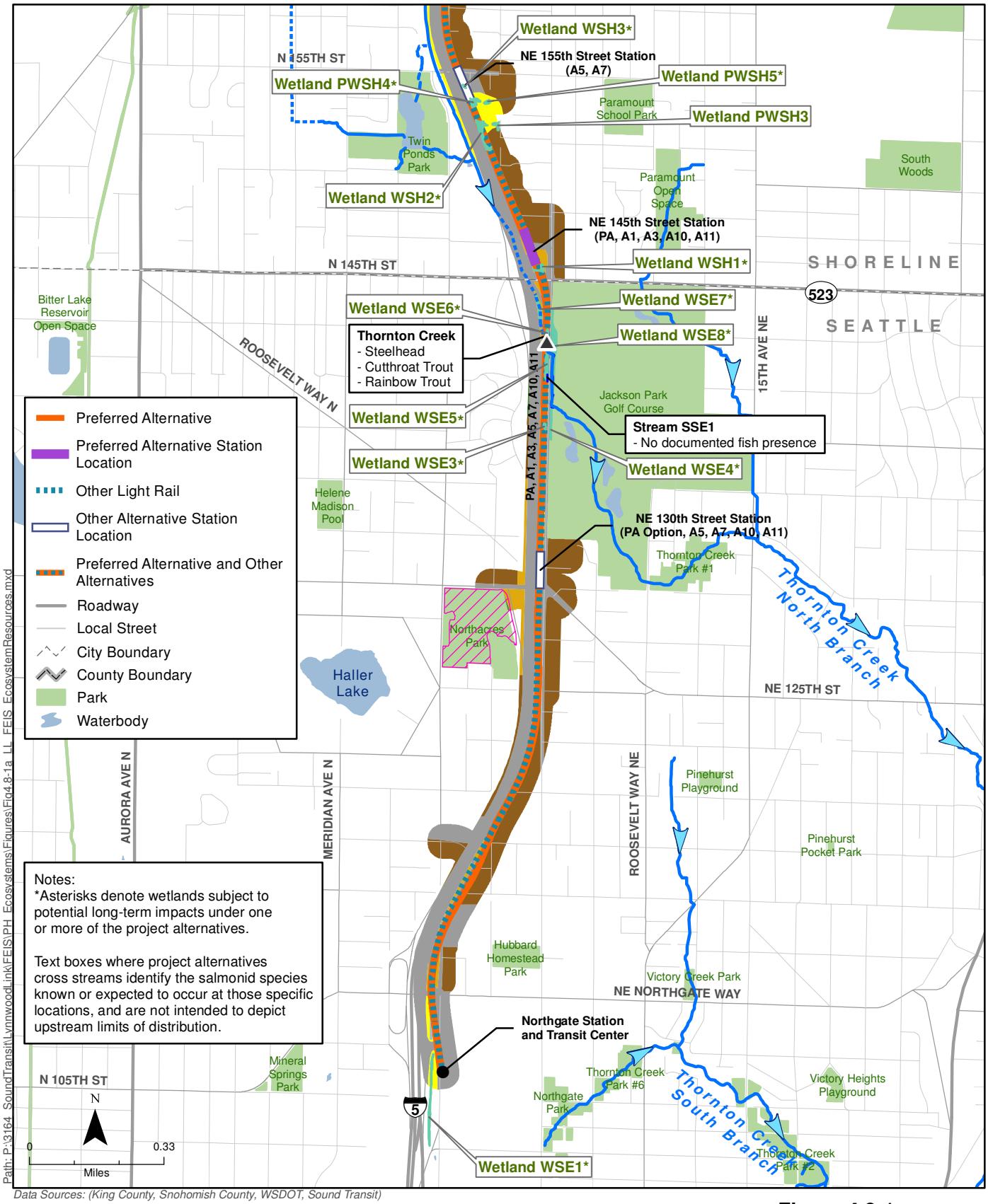


Figure 4.8-1a
Ecosystem Resources

Lynnwood Link Extension

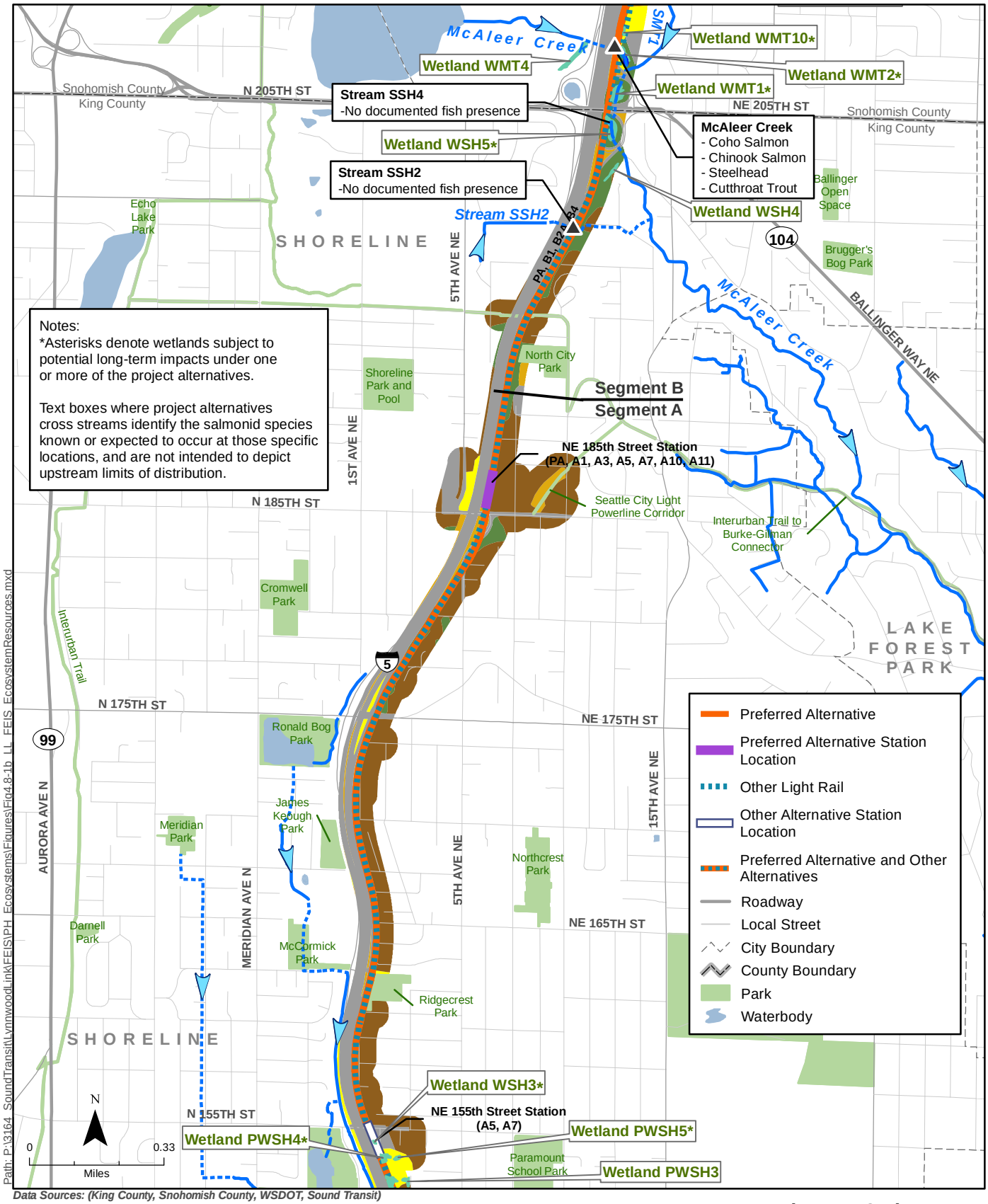


Figure 4.8-1b
Ecosystem Resources

Lynnwood Link Extension

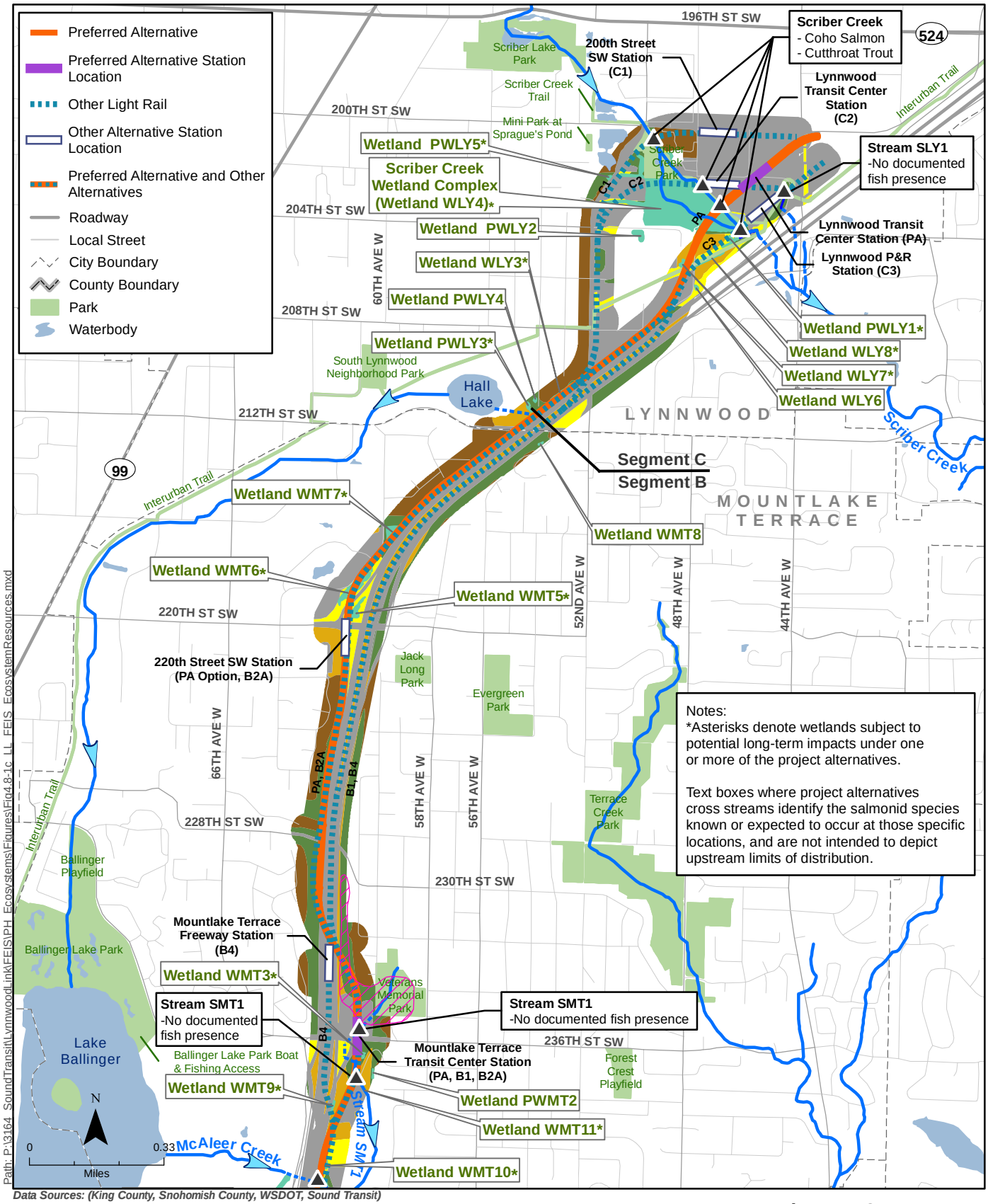


Figure 4.8-1c
Ecosystem Resources

Lynnwood Link Extension

Table 4.8-1. Streams in the Lynnwood Link Extension Study Area

Stream Name [a]	Local Jurisdiction	Local Jurisdiction Stream Classification [b]	Local Jurisdiction Buffer Width (feet) [c]	Fish Species Documented in the Study Area
Thornton Creek, North Branch	Seattle	Type 3	75 [d]	Steelhead Cutthroat Trout Rainbow Trout
Thornton Creek Tributary (SSE1)	Seattle	Type 3	75 [d]	none
McAleer Creek	Shoreline Mountlake Terrace	Type II Class II	115 100	Coho Salmon Chinook Salmon Steelhead Cutthroat Trout
McAleer Creek Tributary (SSH2)	Shoreline	Piped	10	none
McAleer Creek Tributary (SSH4)	Shoreline	Type III	65	none
McAleer Creek Tributary (SMT1)	Mountlake Terrace	Class III / Class V	65 / 0	none
Scriber Creek	Lynnwood	Category I	100	Coho Salmon Cutthroat Trout
Scriber Creek Tributary (SLY1)	Lynnwood	Category III	35	none

[a] Streams other than Thornton Creek, McAleer Creek, and Scriber Creek are identified with alphanumeric codes: SYYn. S = stream; YY = two-letter code for local jurisdiction (SE = Seattle, SH = Shoreline, MT = Mountlake Terrace, LY = Lynnwood); n = sequential identification number.

[b] Identification and classification of streams in this analysis represent conservative estimates, based on available information and the provisions of local critical areas rules (Seattle Municipal Code 25.09.020 (D5), Shoreline Municipal Code 20.80.470, Mountlake Terrace Municipal Code 16.15.080, and Lynnwood Municipal Code 17.10.060). Some of the watercourses identified in this analysis may not actually be defined as streams by the local jurisdictions, or they may be assigned smaller buffers. Actual impacts would be analyzed and mitigated as appropriate through local permitting processes.

[c] Seattle Municipal Code 25.09.200.A.3.d.1; Shoreline Municipal Code 20.80.480; Mountlake Terrace Municipal Code 16.15.090; Lynnwood Municipal Code 17.10.061

[d] Note that the Seattle Municipal Code applies development restrictions and specifies mitigation requirements only within environmentally critical areas or buffers on publicly or privately held parcels. The locations where the proposed alignments would cross Thornton Creek and pass near Stream SSE1 are within the right-of-way for I-5 and are therefore not subject to City of Seattle buffer requirements. For this analysis, the regulatory buffer width is used to identify potential impacts to the riparian buffer for Thornton Creek. Mitigation requirements would be developed through local permitting processes.

McAleer Creek supports salmon and trout as far upstream as Lake Ballinger, and parts of the stream provide spawning and rearing habitat for coho salmon (*O. kisutch*). Observers have seen steelhead and cutthroat trout spawning in McAleer Creek approximately 200 feet downstream of the study area, and Chinook salmon (*O. tshawytscha*) farther downstream. The creek's habitat quality varies by location, and several sections are separated by culverts. Immediately downstream of the study area, the in-stream habitat is rated poor, based on the preponderance of fine sediments and scouring and incision resulting from bank hardening. Riparian (or streamside) habitat quality where the stream has an open channel in the study area is generally good, with forest canopy that provides shade and woody debris for channel complexity.

Three tributaries meet McAleer Creek in the study area. One tributary (Stream SSH2) passes under I-5 south of SR 104 and is entirely within culverts in the study area.

Another tributary (Stream SSH4) emerges from a culvert in the cloverleaf interchange between SR 104 and I-5, then flows approximately 30 feet before joining McAleer Creek. The third tributary (Stream SMT1), which originates in Veterans Memorial Park in Mountlake Terrace, is partly within culverts and joins McAleer Creek near I-5. All of the tributaries flow only intermittently. Based on the presence of human-created barriers to fish passage, neither SSH2 nor SMT1 is known or expected to support fish under current conditions, although the basin sizes, channel widths, and gradients of both streams suggest the potential to support fish. From McAleer Creek, fish can enter the surface-flowing segment of SSH4 in the study area.

In Scriber Creek, coho salmon have been observed upstream of the study area and cutthroat trout use stream habitats as far upstream as Scriber Lake Park. However, a beaver dam about 0.5 mile downstream of the study area impedes access by other salmonid species to reaches of Scriber Creek in the study area. The Washington Department of Fish and Wildlife (WDFW) has classified the dam as a total barrier to fish passage. Spawning habitat quality in Scriber Creek within the study area is generally poor due to limited canopy and vegetative cover, the presence of bank armoring, and the abundance of silt and other fine substrates; however, some side channels may provide suitable rearing habitat. For much of its length in the study area, the stream channel is braided and indistinct as it flows through the large wetland complex south and west of the Lynnwood Transit Center. Based on input provided by Ecology staff who collaborated on field delineations in July 2014, the ordinary high water mark of Scriber Creek through the wetland complex is defined as encompassing the entire breadth of the complex.

An intermittent tributary (Stream SLY1) flows south along the eastern edge of the Lynnwood Transit Center and under I-5 to join Scriber Creek southeast of I-5. For most of its length the tributary is contained within culverts or ditches. Most of its water comes from urban runoff, and the habitat quality is generally poor due to degraded water quality and flows that peak abruptly and fall off rapidly after rain events. Based on the presence of human-created barriers to fish passage, the tributary is not currently known to support fish, but based on its basin size, channel width, and stream gradient, it may have the potential to support fish.

Four aquatic species that have federal or state listing status, or that are candidates for listing, might use habitats in the study area:

- Chinook salmon is listed as threatened under the ESA and is a state candidate species.
- Steelhead trout is listed as threatened under the ESA.
- Bull trout (*Salvelinus confluentus*) is listed as threatened under the ESA and is a state candidate species.
- River lamprey (*Lampetra ayresii*) is a state candidate species.

Of these species, only steelhead trout are known to occur in the study area, but river lampreys are also likely. Based on the lack of suitable habitat and the presence of fish passage barriers downstream of the study area, bull trout are not expected to use any streams in the study area. Although habitat conditions in McAleer Creek are unfavorable for Chinook salmon, and none have been documented in the study area, their presence in the lower reaches of the stream suggests the possibility that Chinook salmon could use McAleer Creek in the study area. Additional information about ESA-listed species in the study area is available in the Biological Assessment prepared for this project (Appendix O).

Vegetation, Terrestrial Wildlife, and Wildlife Habitat

The study area has a mix of urban and more natural vegetation types. Table 4.8-2 identifies the six land cover types in the study area and describes the amount of area covered by each type. The geographic distribution of these cover types is shown in Figures 4.8-1a through 4.8-1c. Most of the study area is dominated by land cover types (Urban Areas, Residential Areas, Maintained Vegetation) where reduced structural complexity and high levels of human activity result in low habitat quality for wildlife. Comparatively natural land cover types (i.e., Forest and Shrub) are found in approximately 20 percent of the study area (Table 4.8-2). More detailed information about vegetation and wildlife resources in the study area is provided in the *Ecosystem Resources Technical Report.*

Much of the study area consists of roadways (including I-5) and commercial, industrial, and residential areas. Such areas provide habitat primarily for species that can coexist with humans and that do not depend on large blocks of relatively undisturbed native vegetation. Most land cover types in the study area offer potential nesting habitat for bird species that are protected under the Migratory Bird Treaty Act. Red-tailed hawks (*Buteo jamaicensis*) and other raptors prey on voles (*Microtus* spp.) that are found in abundance in the grassy vegetation in the I-5 right-of-way. Patches of forest and other native habitat types in the study area are isolated from other areas of similar habitat and generally do not serve as connective corridors to other areas of habitat outside of the study area.

The largest area of native habitat in the study area is the wetland/stream complex located near the Lynnwood Transit Center (also called the Scriber Creek wetland complex). Vegetation and other features in the wetland complex provide habitat for many species of songbirds, mammals, and amphibians. Waterfowl use areas of slow-moving water, and snags throughout the complex show evidence of recent excavation by woodpeckers. The wetland complex is surrounded on all sides by residential and commercial developments, roads, and highways, limiting its value for wildlife species that require large, undisturbed areas and undeveloped travel corridors. Animals that use habitats in

the Scriber Creek wetland complex are likely accustomed to relatively high levels of human activity.

Table 4.8-2. Land Cover Types in the Lynnwood Link Extension Study Area

Land Cover Type	Description	Acres in Study Area
Forest	Areas dominated by evergreen conifers, deciduous broadleaf trees, or a mixture of both, generally greater than 20 feet tall. Canopy cover variable but typically greater than 40 percent. Understories include shrubs, forbs, and/or grasses.	89
Shrub	Areas dominated by native or non-native shrubs. May include trees (particularly red alder) singly or in patches.	59
Maintained Vegetation	Typically, exotic grasses or annuals, such as mown grasses and other low vegetation, most of which are rarely allowed to go to seed. Includes stormwater detention areas.	62
Residential Areas	Houses and yards, including lawns, ornamental plantings, and pruned trees. Tree and shrub canopy cover generally less than 30 percent. Moderate to high levels of human disturbance. Snags, woody debris, and other natural structures are essentially non-existent.	171
Urban Areas	Roadways, parking lots, and other areas dominated by impervious surfaces. Little or no vegetation present.	309
Open Water	Areas of ponding, including natural lakes, streams, and stormwater ponds. All open water in the study area is fresh water.	<1
Total Area		**690**

No terrestrial ESA-listed or state-listed threatened or endangered plant or wildlife species are known or expected to occur in the study area, but several state-listed sensitive species and candidate species may use habitats in the study area. The state lists bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus*) as sensitive species, and the candidate species are Townsend's big-eared bat (*Corynorhinus townsendii*), western toad (*Anaxyrus boreas*), pileated woodpecker (*Dryocopus pileatus*), and Vaux's swift (*Chaetura vauxi*). There are no documented observations of any of these species in the study area, although biologists conducting field reviews observed evidence of pileated woodpecker activity in some wooded areas within and adjacent to the study area.

Wetlands

Sound Transit identified 37 wetlands in the study area (see Figures 4.8-1a through 4.8-1c; individual wetlands are described in the *Ecosystem Resources Technical Report*). On parcels where rights-of-entry were available, wetlands within 100 feet of the footprint of the Preferred Alternative were formally delineated and rated according to local regulations and the *Washington State Wetland Rating System for Western Washington*. Some other wetlands, including those within public rights-of-way near any of the other light rail alternatives, were mapped and rated as well. Wetlands outside of public rights-of-way and more than 100 feet from the footprint of the Preferred Alternative were identified via existing documentation and public vantage points. All the wetlands are in areas where the natural environment has been altered by urban development.

Many are within maintained rights-of-way where they receive stormwater runoff from pipes, ditches, or overland flow, but groundwater, precipitation, and nearby streams also provide a source of water. With one exception, all of the wetlands in the study area have relatively low quality ratings (Category III or IV), indicating moderate to low levels of wetland function and moderate to high levels of disturbance. The exception is a Category II wetland associated with Scriber Creek. This large wetland/stream complex located near the Lynnwood Transit Center provides multiple water quantity, water quality, and habitat functions. Most of the wetlands in the study area are small (less than 0.5 acre), but a few are larger, including the 17-acre wetland associated with Scriber Creek.

4.8.2 Long-Term Impacts

Construction and operation of the Lynnwood Link Extension could have long-term impacts on ecosystem resources. For aquatic species and habitat, such impacts may include permanent loss or degradation of in-stream or riparian habitat, altered hydrology, or water quality degradation. Construction of at-grade or elevated guideways near streams would preclude the development of mature forest habitat in those areas, reducing the potential for the recruitment of large woody debris to nearby streams. Long-term impacts on vegetation, wildlife, and wildlife habitat may include permanent loss or degradation of terrestrial habitat (including habitat connectivity); disturbance due to increased human access, noise, and light; or contributions to the spread of noxious or invasive plant species. Wetlands and buffers in the study area may also experience permanent loss or degradation.

To comply with ESA requirements, FTA initiated consultation with the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) concerning the potential effects of the proposed project on ESA-listed species and critical habitat. Sound Transit prepared a Biological Assessment (see Appendix O) to serve as the basis for the consultation. The Biological Assessment was sent to the U.S. Fish and Wildlife Service and NOAA Fisheries on December 22, 2014. Based on the analysis in that document, including its proposed mitigation measures, FTA determined that construction of the Lynnwood Link Extension may affect, but is not likely to adversely affect, ESA-listed species and critical habitat. The Biological Assessment also included a proposed determination of "no adverse effect" on essential fish habitat protected under the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Fisheries concurred with these determinations on January 27, 2015, and the U.S. Fish and Wildlife Service concurred on January 29, 2015.

Under the Preferred Alternative or any of the other light rail alternatives, construction and operation of guideways, stations, and ancillary features would have direct effects on in-stream habitat only in Scriber Creek and possibly Stream SMT1.

Under any of the light rail alternatives, guideways, stations, and other project features would be elevated at all open stream crossings. Except for the area within the Scriber Creek wetland complex and possibly SMT1, the project would be outside of the ordinary high water mark of all streams (see discussion of the Segment B alternatives later in this section for more about SMT1). Based on the preliminary determination that the ordinary high water mark of Scriber Creek coincides with the outer boundary of the wetland complex, the support columns for the elevated guideway in that area would be within the aquatic habitat of Scriber Creek. Potential construction-related impacts are discussed in Section 4.8.3, below.

No impacts on fish passage are anticipated because no new culverts would be added in any streams and no existing culverts would be extended. Sound Transit would use native vegetation when replanting areas disturbed by construction. At sites where riparian zones are currently dominated by non-native species, the reintroduction of native vegetation could lead to long-term improvements in riparian habitat conditions.

Stormwater from all project-related impervious surfaces would receive appropriate flow control; stormwater from pollutant-generating impervious surfaces would also receive water quality treatment. The light rail alternatives would be designed to meet standards of the applicable jurisdiction and Ecology's Stormwater Management Manual for Western Washington. If a local jurisdiction has more stringent design requirements than those in the Stormwater Management Manual, then Sound Transit would apply the local requirements in the applicable areas. Based on the analysis for water resources (Section 4.9, Water Resources), none of the light rail alternatives would degrade existing water quality conditions. Discharges from stormwater detention facilities could periodically increase water velocities in receiving waters. This could potentially reduce the availability of salmonid prey and displace juvenile fish from cover.

Based on the quality of existing habitat in most portions of the study area[2], the operation of any of the light rail alternatives would not result in long-term adverse effects on the viability of local wildlife populations. Currently, the predominant types of land cover in the project footprint for any of the light rail alternatives are Urban Areas, Residential Areas, and Maintained Vegetation. Little or no vegetation is present in areas classified as Urban. The vegetation that is present in these three types of land cover is highly modified from predevelopment conditions and dominated in many areas by invasive species. In addition, habitat in these areas

[2] Section 4.5 (Visual and Aesthetic Resources) identifies changes in visual quality in some areas due to the loss of dense vegetation cover. Note that these visual impacts would not equate to adverse effects on ecosystem resources because the current habitat value of the affected areas is low. Although changes to low-value habitat may be noticeable to human observers, the impact of such changes on ecosystem functions would be minimal.

occurs along roads and other areas with low value for wildlife. Because the light rail alternatives would be built alongside the I-5 corridor (an existing impediment to migration by terrestrial species), they would not affect areas that serve as connective corridors to other areas of habitat outside of the study area.

Although the potential for adverse effects would be low, operation of any of the light rail alternatives could result in some adverse effects on vegetation and wildlife over the long term. For example, maintenance activities that involve the removal of vegetation or structures that support bird nests (e.g., bridges, overpasses) during the breeding season could destroy nests, eggs, or birds protected under the Migratory Bird Treaty Act. At-grade guideways and other facilities in grassy areas (e.g., along the margins of I-5) would reduce the amount of habitat for voles and other species that are prey for raptors. In addition, disturbance of comparatively natural land cover types in the study area could have some adverse effects, as discussed below.

For this analysis, the amount of Forest cover affected by each light rail alternative is used to indicate the potential for long-term adverse effects on vegetation and wildlife. Construction of project features would have a greater likelihood of reducing the habitat quality of forested areas than other cover types. The removal of trees, snags, and understory vegetation would result in a loss of potential nesting sites, foraging sites, and hiding cover for many species of birds and small mammals. The introduction of cleared areas through patches of contiguous forest cover would fragment the forested habitat. Project construction in some areas classified as Shrub would also diminish the structural and biotic diversity associated with the variety of plant and wildlife species previously present in the cleared areas. The areas where the potential for adverse effects would be greatest are those dominated by native species. These areas generally occur near patches of Forest land cover. For example, most areas dominated by native shrub species in the Scriber Creek wetland complex occur near areas of Forest cover. Alternatives that affect a greater amount of Forest cover would also affect a greater amount of native Shrub cover.

Based on the existing high levels of noise and vehicle traffic on I-5, as well as human activity associated with residential and commercial development in the study area, wildlife that use habitats adjacent to the light rail alternatives are likely accustomed to noise and human activity. The potential is therefore low for any of the light rail alternatives to cause disturbance due to increased human access, noise, and light. Minor localized movements of some species may occur, but would not affect their viability. In addition, operation of the light rail system would not result in any long-term increases in nighttime illumination of fish-bearing waters or cause increases in predation on juvenile salmon, should any be present.

The light rail alternatives would have direct, long-term impacts on wetlands where the project footprint crosses wetlands or buffers. Indirect, long-term impacts might also occur due to construction and operation activities, such as modification of

vegetation, partial shading, water quality degradation, and alteration of wetland hydrology sources.

This impact assessment is based on the information obtained from overlaying the conceptual designs for the light rail alternatives onto ecosystem resource base maps and applying an additional buffer (10 to 12 feet) to account for other features such as noise walls and retaining walls. Not all areas within this analytical buffer would be subject to long-term impacts; some areas would be unaffected under the light rail alternatives or would be subject only to temporary impacts during construction. The acreage values resulting from this analytical approach provide a reasonable indication of the nature and magnitude of potential impacts and reflect differences among alternatives (Table 4.8-3). To provide a conservatively high estimate of impacts, all impacts within these areas are considered to be long term for this analysis.

Although these analytical buffers represent a conservative estimate of the areas where long-term effects may occur, some impacts could take place outside of these areas. For example, some trees in areas adjacent to the analytical buffer may need to be removed to protect light rail safety and reliability. Removal of such hazard trees may accompany construction of any of the light rail alternatives, and hazard tree removal would continue as a maintenance activity during the operational life of project facilities.

Some of the areas identified as long-term impacts occur where the guideway and other features would be elevated, spanning areas of vegetation and other resources. Although construction of elevated structures can minimize the amount of permanent ground disturbance, the amount of water and sunlight available to the vegetation underneath would likely be reduced. Because the elevated guideway structures would be relatively narrow (about 30 feet wide) and more than 15 feet above the ground surface in most places, shading and other impacts on vegetation would likely be minimal. As observed on the Sound Transit Central Link project, herbaceous plants and shrubs are generally able to grow beneath narrow guideways that are at least 15 feet above the ground (Sound Transit 2011d), as long as there is a source of water.

Figures 4.8-1a through 4.8-1c depict the locations of potential long-term impacts of the light rail alternatives on aquatic resources, vegetation, wildlife, and wetlands; Table 4.8-3 summarizes these impacts. Although individual wetlands and other resource areas would be adversely affected by project construction and operation under the light rail alternatives, these effects would be offset through the implementation of compensatory mitigation as required by federal, state, and local regulatory agencies.

Table 4.8-3. Summary of Potential Long-Term Impacts on Aquatic Resources, Vegetation and Wildlife, and Wetlands by Segment Alternative

Segment/Alternative	Aquatic Resources [a, b] (total acres)	Vegetation / Wildlife [c] (total acres)	Wetlands / Wetland Buffer (total acres)	Wetlands Affected [b, d]
Segment A: Seattle to Shoreline				
Preferred Alternative: At-grade/ Elevated with NE 145th and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	2	0.9 / 0.3	WSE1[e], WSE3, WSE4[e], WSE5, WSE6, WSE7[e], WSE8[e], WSH1, WSH2, WSH3, PWSH4
Alternative A1: At-grade/ Elevated with NE 145th and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	2	0.9 / 0.3	
Alternative A3: Mostly Elevated with NE 145th and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	1	0.9 / 0.3	
Alternative A5: At-grade/Elevated with NE 130th, NE 155th, and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	2	0.9 / 0.8	WSE1[e], WSE3, WSE4[e], WSE5, WSE6, WSE7[e], WSE8[e], WSH1[e], WSH2, WSH3, PWSH4, PSWH5[e]
Alternative A7: Mostly Elevated with NE 130th, NE 155th, and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	1	0.9 / 0.8	
Alternative A10: At-grade/Elevated with NE 130th, NE 145th, and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	2	0.9 / 0.3	WSE1[e], WSE3, WSE4[e], WSE5, WSE6, WSE7[e], WSE8[e], WSH1, WSH2, WSH3, PWSH4
Alternative A11: Mostly Elevated with NE 130th, NE 145th, and NE 185th Stations	Thornton Creek (0.5) SSE1 (0.2)	2	0.9 / 0.3	
Segment B: Shoreline to Mountlake Terrace				
Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side	McAleer Creek (0.5) SMT1 (0.5) SSH2 (<0.1) SSH4 (<0.1)	11	0.8 / 1.6	WSH5, WMT1[e], WMT2[e], WMT3[e], WMT5, WMT6, WMT7, WMT10[e], WMT11[e], PWLY3[e]
Preferred Alternative: East Side to Mountlake Terrace Transit Center to West Side with 220th Street Station South Option	McAleer Creek (0.5) SMT1 (0.5) SSH2 (<0.1) SSH4 (<0.1)	11	0.5 / 1.6	WSH5, WMT1[e], WMT2[e], WMT3[e], WMT6, WMT7, WMT10[e], WMT11[e], PWLY3[e]
Alternative B1: East Side to Mountlake Terrace Transit Center to Median	McAleer Creek (0.5) SMT1 (0.5) SSH2 (<0.1) SSH4 (<0.1)	5	<0.1 / 0.9	WSH5, WMT1[e], WMT2[ee], WMT11[e]
Alternative B2A: East Side to Mountlake Terrace Transit Center to West Side with Optional 220th Street SW Station	McAleer Creek (0.5) SMT1 (0.5) SSH2 (<0.1) SSH4 (<0.1)	11	1.6 / 1.3	WSH5, WMT1[e], WMT2[e], WMT3[e], WMT5, WMT6[d], WMT7, WMT10[e], WMT11[e], PWLY3[f]
Alternative B4: East Side to Mountlake Terrace Freeway Station to Median	McAleer Creek (0.7) SSH2 (<0.1) SSH4 (<0.1)	3	0.2 / 0.7	WSH5, WMT1, WMT2, WMT9[e], WMT10

Table 4.8-3. Summary of Potential Long-Term Impacts on Aquatic Resources, Vegetation and Wildlife, and Wetlands by Segment Alternative

Segment/Alternative	Aquatic Resources [a, b] (total acres)	Vegetation / Wildlife [c] (total acres)	Wetlands / Wetland Buffer (total acres)	Wetlands Affected [b, d]
Segment C: Mountlake Terrace to Lynnwood				
Preferred Alternative: Along I-5 to Lynnwood Park-and-Ride Station	Scriber Creek (0.5)[f]	2	0.7 / 1.0	WLY3, WLY4, WLY7
Alternative C1: 52nd Avenue West to 200th Street SW (Option 1—Median)	Scriber Creek (0.2)	1	<0.1 / 0.7	WLY3[e], WLY4, PWLY5[e]
Alternative C1: 52nd Avenue West to 200th Street SW (Option 2—West of I-5)	Scriber Creek (0.2)	1	0.2 / 1.1	WLY3, WLY4, PWLY3[e], PWLY5[e]
Alternative C2: 52nd Avenue West to Lynnwood Transit Center Station (Option 1—Median)	Scriber Creek (0.9)[f] SLY1 (0.1)	<1	0.9 / 0.6	WLY3[e], WLY4
Alternative C2: 52nd Avenue West to Lynnwood Transit Center (Option 2—West of I-5)	Scriber Creek (0.9)[f] SLY1 (0.1)	1	1.1 / 1.1	WLY3, WLY4, PWLY3[e]
Alternative C3: Along I-5 to Lynnwood Park-and-Ride Station (Option 1—Median)	Scriber Creek (0.1)[f] SLY1 (0.1)	1	0.2 / 1.0	WLY4, WLY7[e], WLY8[e], PWLY1
Alternative C3: Along I-5 to Lynnwood Park-and-Ride Station (Option 2—West of I-5)	Scriber Creek (0.1)[f] SLY1 (0.1)	2	0.3 / 1.7	WLY3, WLY4, WLY7[e], WLY8[e], PWLY1, PWLY3[e]

[a] The potential for adverse effects on aquatic resources is indicated by the acres of project footprint within each local jurisdiction's regulatory buffer area for specified streams.

[b] Streams (other than Thornton Creek, McAleer Creek, and Scriber Creek), wetlands, and potential wetlands (i.e., wetlands that were identified via existing documentation but not confirmed through site visits) are identified with alphanumeric codes: SYYn and WYYn. S = stream and W = wetland; YY = two-letter code for local jurisdiction (SE = Seattle, SH = Shoreline, MT = Mountlake Terrace, LY = Lynnwood); n = sequential identification number.

[c] For the reasons identified in the discussion of long-term effects above, the potential for adverse effects on vegetation and wildlife is indicated by the acres of project footprint that overlap with areas classified as Forest land cover.

[d] Impacts to Wetland WMT6 under Alternative B2A could exceed 0.5 acre, potentially triggering additional Clean Water Act permitting requirements, if the impacts cannot be reduced by avoidance measures.

[e] Wetlands that would be affected by buffer impacts only.

[f] The portions of Scriber Creek that would be crossed by the Preferred Alternative and Alternatives C2 and C3 are within the Scriber Creek wetland complex. Based on the preliminary determination that the ordinary high water mark of the stream coincides with the boundary of the wetland complex, potential impacts to aquatic resources in Scriber Creek are calculated as the area of the project footprint overlapping the wetland complex. Stream buffer impacts are described qualitatively in the accompanying text. The *Ecosystem Resources Technical Report* provides additional detail.

No Build Alternative

The No Build Alternative would not have any direct long-term impacts on ecosystem resources. Conversely, implementing the No Build Alternative would not have beneficial effects over the long term. The potential environmental benefits that would not be realized under the No Build Alternative include reduced motor vehicle traffic in the region; possible improvements for past impacts or poorly functioning environmental features along the corridor that have degraded water quality, wetlands,

streams, and regulatory buffers; as well as more concentrated residential and commercial development in planned growth centers. Land development in areas away from such centers could contribute to the degradation or loss of high-value habitat or wetlands in outlying and rural areas. Potential improvements in water quality would not be realized because stormwater would not receive water quality treatment with the No Build Alternative.

Segment A Alternatives

All Segment A alternatives would follow identical routes in the vicinity of Thornton Creek and Stream SSE1 and would, therefore, affect equal amounts of the streams' regulatory buffers (see Table 4.8-3). Based on the condition of the riparian habitat for those watercourses, the potential for adverse effects would be minimal.

The Preferred Alternative would affect 2 acres of Forest cover. The other light rail alternatives would affect similar amounts of Forest cover, ranging between 1 and 2 acres. All affected areas would be immediately adjacent to the I-5 corridor, where existing habitat has been substantially modified from pre-settlement conditions. Therefore, impacts in these areas would not be expected to result in substantial adverse effects on vegetation or wildlife resources in the study area.

All light rail alternatives in Segment A have the potential to affect a total of approximately 0.9 acre of wetland area, distributed among seven wetlands. The regulatory buffers of all these wetlands would also be affected, along with the buffers of four additional wetlands. The total area of wetland buffer impacts under the Preferred Alternative and Alternatives A1, A3, A10, and A11 would be 0.3 acre. Alternatives A5 and A7 would additionally affect the buffer of an additional wetland, with a total wetland buffer impact area of 0.8 acre (Table 4.8-3). Most affected wetland and buffer areas are within the WSDOT right-of-way; they are degraded, vegetated by invasive species, and disconnected from other wetlands by roadways and development.

Segment B Alternatives

Elevated portions of the guideway of the Preferred Alternative would cross a piped portion of the main stem of McAleer Creek immediately east of I-5, passing through the regulatory buffers of surface-flowing segments of that stream at the I-5/SR 104 interchange, and would affect approximately 0.5 acre of regulatory buffer. Alternatives B1 and B2A would cross the main stem of McAleer Creek at the same location as the Preferred Alternative, immediately east of I-5, and would affect approximately equal amounts of the regulatory buffer for that stream and its three tributaries in the study area (Table 4.8-3). Alternative B4 would cross an open segment of McAleer Creek where it exits the culvert under I-5 and would affect more of the stream's buffer than the other alternatives.

The Preferred Alternative and Alternatives B1 and B2A would cross over a segment of Stream SMT1 south of the Mountlake Terrace Transit Center, affecting approximately 0.5 acre of that stream's regulatory buffer. At the elevated crossing of any of these alternatives, it is possible that a portion of one guideway support column could be placed below the ordinary high water mark of that watercourse.

Alternative B4 would not affect Stream SMT1 or any of its buffer areas because the route would enter the I-5 median south of the existing Mountlake Terrace Transit Center. All of the Segment B alternatives, including the Preferred Alternative, would affect less than 0.1 acre of each regulatory buffer for Streams SSH2 and SSH4. The design for the 220th Street Station South Option would not change these impacts on stream buffers.

The Preferred Alternative and Alternative B2A would affect approximately 11 acres of Forest cover, including some in a location that WDFW has identified as a priority habitat area. Alternative B1 would cross the same priority habitat area but would affect a smaller amount of Forest cover overall (5 acres). Alternative B4 would affect only 3 acres of Forest cover because it would enter the I-5 median south of the Mountlake Terrace Freeway Station and avoid the forested habitat to the north. The potential adverse effects of alignments in forested areas under any of these alternatives would include habitat loss and an increased risk of introducing or spreading invasive species. As noted in the general discussion of long-term impacts above, the risk of disturbance to wildlife due to increased human access, noise, and light would be low because the affected areas currently have high noise levels. The design options for the 220th Street SW Station would not affect impacts on Forest cover.

The Preferred Alternative would have the potential to affect 0.8 acre of wetland area, distributed among four wetlands. Implementation of the 220th Street Station South Option under the Preferred Alternative would eliminate the need for reconstructing the off-ramp from I-5 southbound at 220th Street SW, thereby avoiding one wetland and reducing the total wetland impacts to 0.5 acre (Table 4.8-3). The Preferred Alternative (with or without the 220th Street Station South Option) would affect 1.6 acre of wetland buffers. Of all the Segment B alternatives, Alternative B1 would affect wetlands the least, followed by Alternative B4, because both are largely in the freeway median. Alternative B2A would have the most wetland and buffer impacts. The impacts of the Preferred Alternative would be intermediate (Table 4.8-3). Alternative B1 would directly affect one wetland, and Alternatives B2A and B4 would each affect four wetlands.

Under all the alternatives, most impacts would occur along the edges of wetlands and buffers, except for the Preferred Alternative and Alternative B2A, either of which would cross over much of the second-largest wetland in the study area (Wetland WMT6). All of the wetlands that would be affected by the Segment B alternatives

have relatively low quality ratings, based on habitat degradation, the presence of invasive species, and lack of connectivity with wetlands.

Reconstructing the southbound I-5 off-ramp and parking garage near the 220th Street SW Station under Alternative B2A could have impacts on Wetland WMT6 that would exceed 0.5 acre; if this alternative was selected for implementation, permitting requirements under the Clean Water Act would likely require consideration of reasonable avoidance measures to reduce the impacts to less than 0.5 acre.

Segment C Alternatives

Under all of the Segment C alternatives, habitats in Scriber Creek and the associated wetland complex would be spanned by elevated guideways, minimizing the potential for direct adverse effects. The amount of Scriber Creek's regulatory buffer affected by the Preferred Alternative would be approximately 0.5 acre (Table 4.8-3). Among the other light rail alternatives, Alternatives C1 and C3 would have the least impact (ranging from 0.1 to 0.2 acre) because with either their median (Option 1) or west options (Option 2), they would cross small portions along the northern or southern edges of the wetland complex. Alternative C2 (both Options 1 and 2) would have the greatest impact, crossing through the middle of the wetland complex and affecting approximately 0.9 acre of Scriber Creek's regulatory buffer. Impacts to the Scriber Creek wetland complex could adversely affect coho salmon and cutthroat trout that rear and overwinter in wetland habitats adjacent to Scriber Creek.

Under any of the Segment C alternatives, the extent of adverse impacts after final design and at the point of permitting would likely be smaller than is suggested by these acreage estimates. The guideway would be more than 15 feet above the ground surface in this area, and shading and other impacts on vegetation would likely be minimal. Direct impacts would be limited to the areas occupied by support columns for the guideway. Under any of the Segment C alternatives with median and west side options, the amount of stream or stream buffer affected under Option 1 and Option 2 would be the same.

Although all of the Segment C alternatives and options, including the Preferred Alternative, would cross the Scriber Creek wetland complex at different locations, their impacts on Forest and Shrub cover would be similar (Table 4.8-3). The Preferred Alternative and Option 2 of Alternative C3 would affect more Forest cover (2 acres) than the other alternatives and options. Most of the affected area would consist of a strip of Forest along I-5 east of 52nd Avenue West. The current habitat value of this strip is limited by its narrow, linear shape and its location between I-5 and adjacent commercial development.

The Scriber Creek wetland complex and associated buffers would be affected by all the Segment C alternatives (Table 4.8-3). The Preferred Alternative would have the

potential to affect 0.7 acre of wetland area and 1.0 acre of wetland buffer overall; most of the affected area would be associated with smaller wetlands near I-5. Among the light rail alternatives, Alternative C1 would affect the Scriber Creek wetland complex less, crossing a small portion along the northern edge of the wetland complex. Alternative C2 (both Options 1 and 2) would affect it more, crossing through the middle of the wetland complex. Alternative C3 would cross a small portion along the southern edge of the wetland complex, affecting only slightly more area than Alternative C1. Alternative C3 would also affect a nearby wetland. For each of the Segment C alternatives with median and west side options, Option 2 (west of I-5) would have a greater impact on wetlands than Option 1 because Option 2 would affect a small (less than 0.1 acre) portion of a wetland near I-5.

Under any of the light rail alternatives, long-term ground alteration of any wetlands in Segment C would be less than reported in Table 4.8-3 because the alignment would be elevated through all areas where wetlands are present. The elevated guideway would span the smaller wetlands; in the Scriber Creek wetland complex, columns would be constructed in the wetland.

4.8.3 Construction Impacts

Construction impacts would be limited to the period during and immediately following project construction. The construction period would last 6 years (from beginning of construction to beginning of operation). At most locations, ground-disturbing activities would last a year or two. Temporarily disturbed sites would be replanted immediately following construction in each project segment, and vegetation would likely become reestablished within a year or two at most sites.

The conceptual level of design for the footprints of the light rail alternatives include some assumptions and buffers for construction activities and staging areas (some of which are assumed to be located within the project's footprint and are therefore identified as permanent impacts). Although detailed construction limits are not defined at this early phase in the project design, potential construction limits have been estimated near streams, stream buffers, wetlands, and wetland buffers. These consist of areas where temporary impacts could extend beyond the 10- to 12-foot buffer generally defined for the analysis of long-term impacts to account for additional areas that would be needed to construct the project. Additional staging areas could be identified later by the contractor, if needed. In Segment A, the alignment and associated features would be situated on or adjacent to currently developed areas. For this reason, it was assumed for this analysis that no additional construction areas would be required in wetlands, streams, or buffers outside of the analytical buffer that was used to estimate long-term impacts.

For aquatic species and habitat, earthwork and equipment associated with project construction could introduce sediment and contaminants (e.g., fuel or hydraulic

fluids) to streams downstream of the project. Within each project segment, aquatic resources would be at risk during construction based on the total amount of ground-disturbing activity within each basin. Construction work within stream buffers, including work on elevated guideways that pass over streams, would have the highest risk of delivering sediment and pollutants to those streams. The use of artificial lighting for nighttime construction could affect fish because changes in nighttime light conditions may alter migratory behavior or affect predation rates on juvenile salmonids.

Estimated construction impacts on stream buffers are summarized in Table 4.8-4. Under all light rail alternatives, the potential for adverse effects on aquatic species and habitat would be minimized by ensuring that work conditions and activities comply with the required project permits, and by implementing BMPs designed to avoid or minimize the delivery of construction-related sediment and contaminants to streams (see Section 4.8.6, Potential Mitigation Measures).

Table 4.8-4. Summary of Potential Construction Impacts on Aquatic Resources and Wetlands by Segment Alternative

Segment/Alternative	Aquatic Resources[a] (acres)	Wetlands/Wetland Buffers (acres)	Wetlands Affected
Segment A: Seattle to Shoreline			
All alternatives, including the Preferred Alternative	0.0	0.0	NA[b]
Segment B: Shoreline to Mountlake Terrace			
Preferred Alternative	McAleer Creek (0.4) SMT1 (0.2)	0.1 / 0.4	WSH5, WMT1, WMT2, WMT3, WMT6, WMT7, WMT10, WMT11, PWLY3
Preferred Alternative with 220th Street Station South Option	McAleer Creek (0.4) SMT1 (0.2)	0.1 / 0.4	WSH5, WMT1, WMT2, WMT3, WMT5, WMT6, WMT7, WMT10, WMT11, PWLY3
Alternative B1	McAleer Creek (0.4) SMT1 (0.2)	0.0 / 0.1	WMT3, WMT10
Alternative B2A	McAleer Creek (0.4) SMT1 (0.2)	0.0 / 0.1	WMT3, WMT10,
Alternative B4	0.0	0.0 / 0.1	WMT10

Table 4.8-4. Summary of Potential Construction Impacts on Aquatic Resources and Wetlands by Segment Alternative

Segment/Alternative	Aquatic Resources[a] (acres)	Wetlands/Wetland Buffers (acres)	Wetlands Affected
Segment C: Mountlake Terrace to Lynnwood			
Preferred Alternative	Scriber Creek (N/A)	0.3 / 0.2	WLY3, WLY4, WLY7
Alternative C1 (with Option 1)	Scriber Creek (0.1)	0.0 / <0.1	WLY4
Alternative C1 (with Option 2)	Scriber Creek (0.1)	0.0 / <0.1	WLY4
Alternative C2 (with Option 1)	Scriber Creek (N/A) SLY1 (<0.1)	0.0 / 0.2	WLY4
Alternative C2 (with Option 2)	Scriber Creek (N/A) SLY1 (<0.1)	<0.1 / 0.3	WLY3, WLY4
Alternative C3 (with Option 1)	Scriber Creek (N/A) SLY1 (<0.1)	0.0 / <0.1	WLY4
Alternative C3 (with Option 2)	Scriber Creek (N/A) SLY1 (<0.1)	<0.1 / 0.1	WLY3, WLY4

[a] The potential for construction-related effects on aquatic resources is indicated by the estimated construction area within each local jurisdiction's regulatory buffer area for specified streams. The *Ecosystem Resources Technical Report* provides additional detail (see Appendix D of the technical report).

[b] Because the proposed alignment in Segment A would be located within or adjacent to currently developed areas, it is anticipated that any of the light rail alternatives could be constructed without disturbing areas outside the analytical buffer that was used to estimate long-term impacts.

To minimize the potential for impacts on ecosystem resources in Scriber Creek and the associated wetland complex for the Preferred Alternative (as well as Alternatives C2 and C3), temporary work trestles would be used for equipment access during construction of the elevated guideway across the Scriber Creek wetland complex. The trestles would be supported by steel piles and would remain in position only as long as needed for the completion of project construction. Any in-water work for trestle construction (including pile driving and pile removal) would be conducted in accordance with the terms of the Hydraulic Project Approval (HPA) and other applicable permits obtained for the project. Such permits typically place restrictions on the time of year when work can be conducted below the ordinary high water mark of any streams. These permits also typically include numerous provisions aimed at avoiding or minimizing the potential for adverse effects on fish and aquatic habitat (discussed in Section 4.8.6, Potential Mitigation Measures).

For vegetation and wildlife, Sound Transit assumes that the temporary construction impacts on habitat for each alternative would be proportionate to the amount estimated for long-term impacts. In other words, alternatives with greater amounts of long-term impacts would likewise be expected to have greater amounts of temporary impacts. Vegetation and wildlife habitat would be temporarily affected by clearing for the project's permanent facilities as well as for access roads and equipment storage areas. Wildlife species near the project corridor could be affected by noise, vibration, dust, dirt, light, and the clearing and grubbing of the landscape along the alignment. As with the long-term impacts described in Section 4.8.2, there would be a low risk of disturbance to wildlife from human access, noise, and light during construction

because the affected areas currently have high noise levels and low habitat value. Construction activities involving the removal of vegetation or structures that support bird nests (e.g., bridges, overpasses) during the breeding season could destroy nests, eggs, or birds protected under the Migratory Bird Treaty Act.

Wetlands could incur temporary loss, or wetlands and buffers could be degraded by construction-related activities, such as vegetation clearing and temporary site grading and filling for site access. Estimated construction impacts on wetlands and wetland buffers are summarized in Table 4.8-4.

Temporary construction impacts to wetlands and their functions would be minimized by the installation, monitoring, and maintenance of appropriate BMPs for the duration of construction. Wetland functions could be affected by soil compaction, accidental spills of hazardous substances, noise and human-caused disturbance, potential increase of sediment input, and introduction of invasive species.

4.8.4 Indirect Impacts

Under any of the light rail alternatives, several factors would limit the potential for development near stations to adversely affect ecosystem resources. All proposed stations would be located in areas that are already densely developed. Any new development in these areas would be subject to review under local critical areas ordinances. This review would trigger the implementation of mitigation measures and practices aimed at avoiding or minimizing the potential for adverse effects on wetlands, aquatic species and habitat, and other natural resources such as fish and wildlife habitat conservation areas.

Indirect impacts also include potential interference with possible future habitat restoration projects. For example, the presence of guideways, stations, or other facilities near streams could affect the potential replacement of existing fish passage barriers by limiting options for locations and types of fish-passable crossing structures. In most locations, the potential for construction of the light rail alternatives to interfere with possible future fish habitat restoration projects would be minimal because project features would be designed and located to avoid streams. As noted in Section 4.8.2, Long-Term Impacts, no new culverts would be added in streams with documented or potential fish habitat and no existing culverts in such streams would be extended. Moreover, construction and operation of any of the light rail alternatives would not interfere with any anticipated culvert replacement projects.

One stream in the study area (SMT1) that is currently categorized as non-fish-bearing is upstream of a culvert identified as a fish passage barrier in the I-5 right-of-way. The reach of SMT1 crossed by the light rail alternatives is approximately 2,000 feet upstream of the barrier culvert. The alternatives that cross SMT1 (the Preferred Alternative and Alternatives B1 and B2A) would be elevated at this location. If the barrier culvert is removed and fish access to SMT1 is restored in the future, and if

fish habitat improvement projects are subsequently planned for the stream reach crossed by the elevated guideway, it is possible that a guideway support column at this location could complicate the design of such habitat restoration projects. Such interference is unlikely to occur, however, because the stream channel at this location is poorly defined and the local topography offers ample opportunities for the creation of a channel that would avoid support columns or other structures.

4.8.5 Cumulative Impacts

Past actions and development have greatly changed the landscape in the study area and surrounding vicinity. Present and reasonably foreseeable future actions, including other transportation or infrastructure projects and other planned or pending land use actions or developments in the project vicinity, could contribute to cumulative impacts on ecosystem resources in the study area. Not all reasonably foreseeable actions have the potential to result in adverse effects on the environment. For example, WSDOT and WDFW formed a cooperative program in 1991 to inventory and assess fish passage barriers on WSDOT facilities statewide. Culvert replacement and retrofitting projects through that program may improve fish access to streams in the study area. Sound Transit would coordinate its light rail facility design with WSDOT to avoid conflicts with these projects.

Several proposed site development projects could have some effect on ecosystem resources in the study area. These include a site in Mountlake Terrace, south of 236th Street SW and the Mountlake Terrace Transit Center, which is envisioned by the City of Mountlake Terrace to accommodate higher-density development. The Edmonds School District master plan includes developing a bus base and administration center north of I-5 and east of 52nd Avenue West in Lynnwood. Construction of this facility could affect ecosystem resources such as the Scriber Creek wetland complex. Sound Transit is considering an OMSF alternative in the same area, although the Preferred Alternative is a Bellevue site. The Lynnwood site alternative would largely be built on previously developed parcels but a portion would extend into the Scriber Creek wetland complex, with about 2 acres of potential direct impacts to wetlands and slightly under 2 acres of wetland buffer impacts. The impacts of one or potentially both of these projects in Lynnwood could be lessened through final design, but their combined impacts would result in loss or degradation of vegetation, wildlife habitat, streams, wetlands, and associated buffer areas in the complex. These impacts would be both short-term (e.g., temporary disturbance during construction) and long term (e.g., conversion of vegetated areas to impervious surface).

These projects and future projects generally would have limited potential for adversely affecting aquatic species, aquatic habitat, vegetation, wildlife, or wetlands in the study area. Any projects or land use actions would be subject to regulatory

review and/or permitting under federal, state, and local regulations. These review and permitting processes would trigger the implementation of measures to avoid or minimize impacts on ecosystem resources. Such processes would also provide compensatory mitigation for any unavoidable impacts on streams, stream buffers, wetlands, or wetland buffers. If combined with the effects of the Lynnwood Link Extension, there would be higher cumulative effects on ecosystem resources than if the impacts of each project were considered on its own. However, if avoidance and mitigation measures such as those described below are applied for all projects, the effects would be minimal. Coordination among the project proponents could also help to reduce impacts.

4.8.6 Potential Mitigation Measures

Sound Transit's policy on ecosystem mitigation is to avoid impacts on environmentally sensitive resources as much as possible, and to provide adequate mitigation for unavoidable impacts to ensure no net loss of ecosystem function and acreage as a result of agency projects. Mitigation for ecosystem impacts is based on a hierarchy of avoiding, minimizing, and compensating for unavoidable adverse impacts. The design of the Lynnwood Link Extension already incorporates avoidance and minimization techniques, although further avoidance and minimization measures would continue to be pursued as the project enters final design and permitting stages.

Under any of the light rail alternatives, Sound Transit would comply with standard BMPs and applicable federal, state, and local mitigation requirements during design, construction, and post-construction activities. A summary of BMPs that would be applied to avoid and minimize impacts on ecosystem resources follows. Additional details are provided in the *Ecosystem Resources Technical Report*.

Construction Best Management Practices

Sound Transit's construction contractor would implement construction BMPs that would apply to all work in or around sensitive areas. The construction contractor would work within construction limits marked with fencing and signage to prevent unintended impacts on riparian vegetation, wetlands, woodlands, and other sensitive sites outside of the construction limits.

The construction contractor would be required to develop, implement, and monitor a temporary erosion and sediment control (TESC) plan to address potential erosion for the duration of construction. Temporary work trestles or other measures that minimize impacts would be used in extremely sensitive areas, such as the Scriber Creek wetland complex.

BMPs would be employed for fish and aquatic habitat protection. All work below the ordinary high water mark would comply with the terms and conditions set forth in the

HPA issued by WDFW for the project. Seasonal restrictions (i.e., work windows) would apply to work conducted below the ordinary high water mark. To reduce the risk of adverse effects on migrating salmonids, Sound Transit would require construction contractors to direct lighting away from fish-bearing waters and to place hoods or shields on lights, as needed, to minimize the amount of backlight or dispersed light cast toward the water's surface. Any affected streambeds and stream banks would be restored and replanted with native vegetation after in-water work.

For water quality protection, the project would obtain and adhere to a construction stormwater general permit under the National Pollutant Discharge Elimination System (NPDES) permit program to reduce or eliminate stormwater pollution and other impacts on surface waters. A construction stormwater pollution prevention plan (SWPPP), approved by Ecology, would also be implemented before the start of construction. The plan would include BMPs to (1) prevent erosion; (2) prevent sedimentation; and (3) identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The requirements of the plan and the BMPs to be employed are described in Section 4.9.3 (Construction Impacts – Water Resources).

Measures would be implemented before and during project construction to avoid or minimize effects on vegetation and wildlife resources. Examples of these measures are minimizing vegetation clearing, restoring temporarily affected areas, preparing and implementing a revegetation plan, and implementing construction methods to avoid impacts on migratory birds. In accordance with the Migratory Bird Treaty Act, Sound Transit would consult with the U.S. Fish and Wildlife Service on measures to avoid impacts on migratory birds. Measures likely to be required may include pre-construction surveys for migratory birds and/or restrictions on vegetation clearing during the breeding season for migratory birds. Sound Transit would also implement appropriate measures to minimize the risk of introduction and spread of noxious and invasive species, including restoring temporarily disturbed areas as soon as practical following construction in each project segment. To minimize use of herbicides and fertilizers, restoration of disturbed areas would include the use of mulching, ground cover, and other planting strategies that discourage growth of undesirable species.

Design and Operation Best Management Practices

Sound Transit would also implement design and operation BMPs for permanent stormwater runoff treatment and flow control. These would include natural or engineered dispersion BMPs; biofiltration BMPs such as vegetated filter strips, biofiltration swales, or ecology embankments; wet-pool BMPs; and infiltration BMPs. The project would route drainage to maintain existing stream basin contributing areas. In addition, Sound Transit would coordinate with WSDOT, local

jurisdictions, and resource agencies conducting restoration projects in the area to minimize the potential for light rail facilities to interfere with future restoration projects. Except where hazard trees pose an immediate threat to light rail safety or reliability, vegetation maintenance and hazard tree removal would be conducted outside of the breeding season for migratory birds.

Compensatory Mitigation

To the extent that impacts cannot be avoided or adequately minimized through BMPs, Sound Transit would implement additional measures to reduce adverse effects, as well as provide compensatory mitigation measures where adverse effects are unavoidable. Sound Transit has committed to achieving no net loss of ecosystem function and acreage on a project-wide basis. This includes a commitment to no net loss of wetland functions and wetland areas. Long-term impacts on wetlands and wetland buffers would be mitigated through the use of available approved mitigation banks, the King County in-lieu fee program, or project-specific mitigation developed by Sound Transit. Sound Transit would implement compensatory mitigation in accordance with applicable federal, state, and local requirements and guidelines.

Mitigation for unavoidable impacts on streams, stream buffers, and wildlife habitat would comply with local critical areas ordinances. In general, those ordinances state that mitigation should prevent the net loss of ecological function; the means of achieving that goal are determined through individual permitting processes. Sound Transit's actions to mitigate for impacts on wetlands and wetland buffers (e.g., planting native trees and shrubs near wetland areas) would help offset the loss of some habitat for wildlife and contribute to improved ecological function of nearby streams and stream buffers. Tree planting required for compliance with WSDOT's and local jurisdictions' tree protection rules would also help mitigate impacts on streams, stream buffers, and wildlife habitat. Lastly, planting of trees and shrubs to mitigate for visual impacts (including in replacement lands for affected WSDOT beautification areas along I-5, as described in Section 4.5, Visual and Aesthetic Resources) would also provide ecological benefits.

Potential sites currently under consideration for project-specific mitigation for impacts on wetlands and wetland buffers are described below.

North Seattle Community College Campus

Various opportunities may be present on the North Seattle Community College Campus for wetland restoration and enhancement, although other projects proposed in the vicinity may reduce the area available.

Jackson Park Golf Course/5th Avenue NE

Potential wetland and riparian mitigation could be constructed along the east side of the 5th Avenue NE right-of-way and the Jackson Park Golf Course, particularly along North Branch Thornton Creek.

NE 145th Street Vicinity

Two potentially available parcels near Paramount Park in Shoreline may provide opportunities for wetland protection and restoration.

NE 155th Street Station Vicinity

Wetland creation may be possible south of the NE 155th Street Station (proposed under Alternatives A5 and A7) near the locations of Wetlands PWSH4 and PWSH5.

Ballinger Lake Golf Course

The City of Mountlake Terrace will be transitioning the Ballinger Lake Golf Course to a passive park/open space, which could create wetland restoration opportunities.

Scriber Creek Wetland Complex (Wetland WLY4)

Wetland and stream mitigation opportunities are present in the Scriber Creek vicinity near the Lynnwood Transit Center. These parcels are under both public and private ownership, including parcels that could be acquired by Sound Transit because they intersect with areas needed for the light rail right-of-way. A private parcel on Cedar Valley Road, along the western edge of the wetland complex, could also provide an opportunity for mitigation. These mitigation opportunities may include wetland creation, restoration, or enhancement.

4.9 Water Resources

This section discusses how the project would potentially affect water resources. The discussion covers surface water quality, stormwater runoff volumes, drainage systems, shorelines, floodplains, and construction stormwater management.

4.9.1 Affected Environment

The study area for the water resources analysis comprises the stream basins that would be crossed by the project, as shown on Figure 4.9-1.

Natural Water Bodies

The surface water in the study area discharges to one of three urban stream basins: Thornton Creek, Lake Ballinger/McAleer Creek, and Swamp Creek–all of which are located in Water Resource Inventory Area (WRIA) 8 (Lake Washington/Cedar/ Sammamish Watershed). In general, the lakes and streams in the study area have been affected by the surrounding urban environment, and all of the streams have

reaches that are channelized or have been piped. The following subsections describe each water body and also identify those listed in Ecology's Water Quality Assessment (the Clean Water Act Section 303(d) list). The 303(d) list designates waters that have beneficial uses–such as drinking, recreation, aquatic habitat, and industrial use, and those that are impaired by pollution.

Thornton Creek Basin

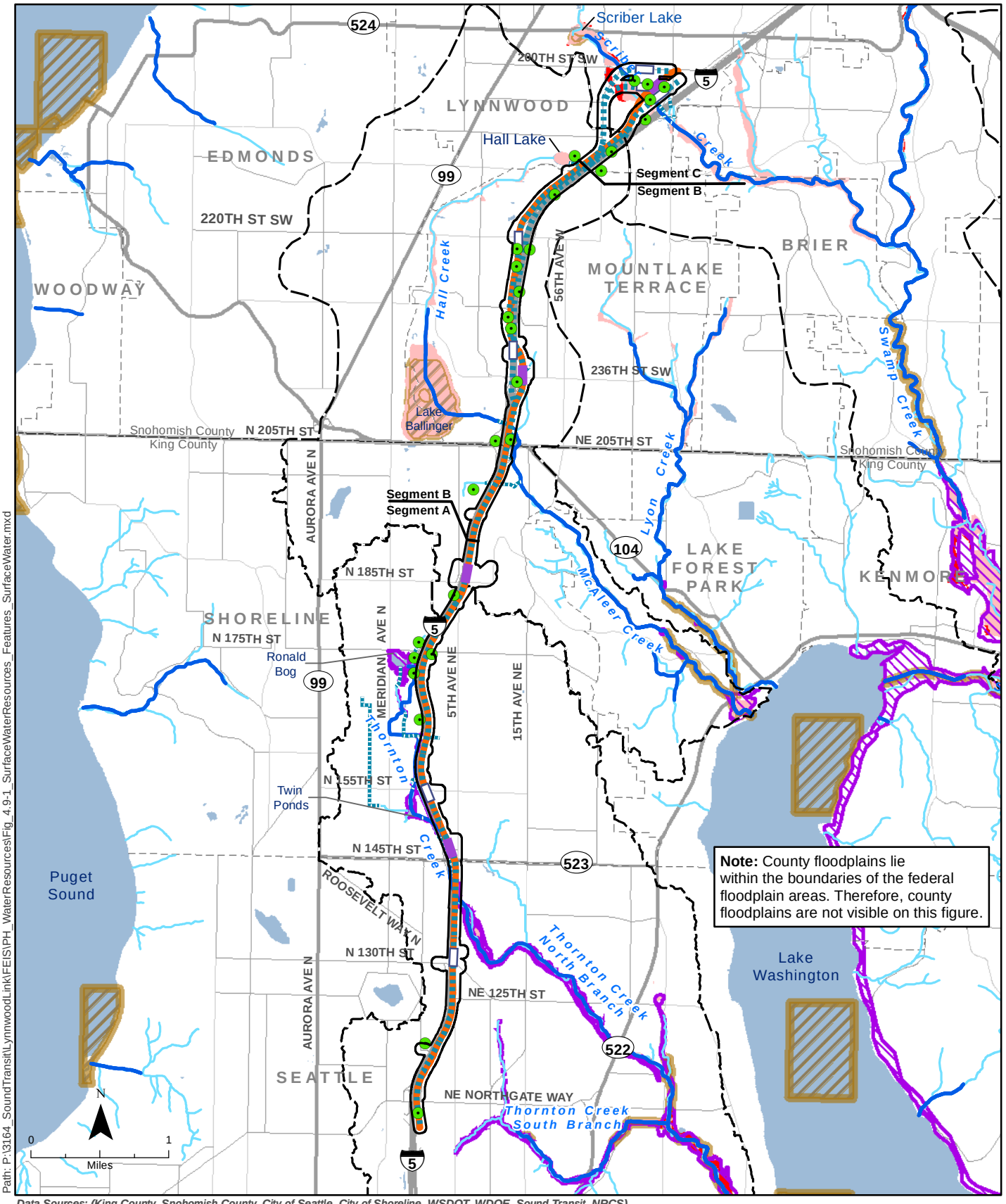
Most of Segment A would be located in the Thornton Creek Basin, from the southern starting point at Northgate to the northern boundary of the stream basin at approximately NE 185th Street (see Figure 4.9-1). In the study area, the Thornton Creek Basin contains the following water bodies:

- Thornton Creek: The southern part of the study area is near the Thornton Creek South Branch, also known as Maple Leaf Creek. The study area also crosses the Thornton Creek North Branch just south of NE 145th Street, and remains near the North Branch up to about North 176th Street. Thornton Creek collects stormwater from large sections of Shoreline and north Seattle, where the majority of the land is impervious. The creek has several sections in culverts and is on Ecology's 303(d) list of impaired water bodies for non-compliance with temperature, dissolved oxygen, and fecal coliform bacteria standards. However, there is strong public interest in returning the creek to a more natural state; some sections have been restored already, including segments around Northgate Mall.
- Twin Ponds: These created ponds, which together comprise about 4 acres, are located near NE 155th Street in Shoreline to the west of the project. They are not on Ecology's 303(d) list of impaired water bodies.
- Ronald Bog: Ronald Bog is a 7.7-acre pond/wetland complex near NE 175th Street in Shoreline. It is not on Ecology's 303(d) list of impaired water bodies.

Lake Ballinger/McAleer Creek Basin

In the study area, the Lake Ballinger/McAleer Creek Basin contains the following water bodies:

- McAleer Creek: This creek system begins at Hall Lake in Lynnwood, flows south through Hall Creek to Lake Ballinger by way of Edmonds and Mountlake Terrace, and becomes the McAleer Creek West Tributary through Shoreline to Lake Washington. The creek is fish-bearing and has multiple piped segments. The City of Lynnwood has documented flooding problems near Hall Creek and Lake Ballinger. Part of the creek near Lake Washington is on Ecology's 303(d) list of impaired water bodies for non-compliance with dissolved oxygen and fecal coliform bacteria standards.



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Data Sources: (King County, Snohomish County, City of Seattle, City of Shoreline, WSDOT, WDOE, Sound Transit, NRCS)

- Study Area
- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Stream Basin
- Ecology 303(d) Listed Waterbody
- Waterbody
- Fish Presence
- Open Stream
- Piped Stream
- Existing Stormwater Facility

Floodplain

- 100 Year (Federal)
- 500 Year (Federal)
- City floodplain

Figure 4.9-1
Water Resources
Affected Environment
Surface Water

Lynnwood Link Extension

- Lake Ballinger: Lake Ballinger is a relatively shallow 104-acre lake near the southern border of Edmonds and Mountlake Terrace. Lake Ballinger's water levels are controlled by an outlet weir, although flooding of homes surrounding Lake Ballinger is a continuing problem during large storm events. Drainage downstream in McAleer Creek is constrained by a 60-inch pipe that is too small to accommodate flows and results in continued flooding problems in the creek during large storms. While the lake is fish-bearing and supports other wildlife, it is on Ecology's 303(d) list for non-compliance with dioxin, dieldrin (a pesticide), and polychlorinated biphenyl (PCB) standards.

Swamp Creek Basin

Within the Swamp Creek Basin, only Scriber Creek is in the study area. Scriber Creek begins above Scriber Lake in Lynnwood and flows downstream to a large wetland near the Lynnwood Transit Center, goes under I-5 in a pipe, and then flows through forested wetland to Swamp Creek. Scriber Creek is not on Ecology's 303(d) list of impaired water bodies.

Stormwater Infrastructure

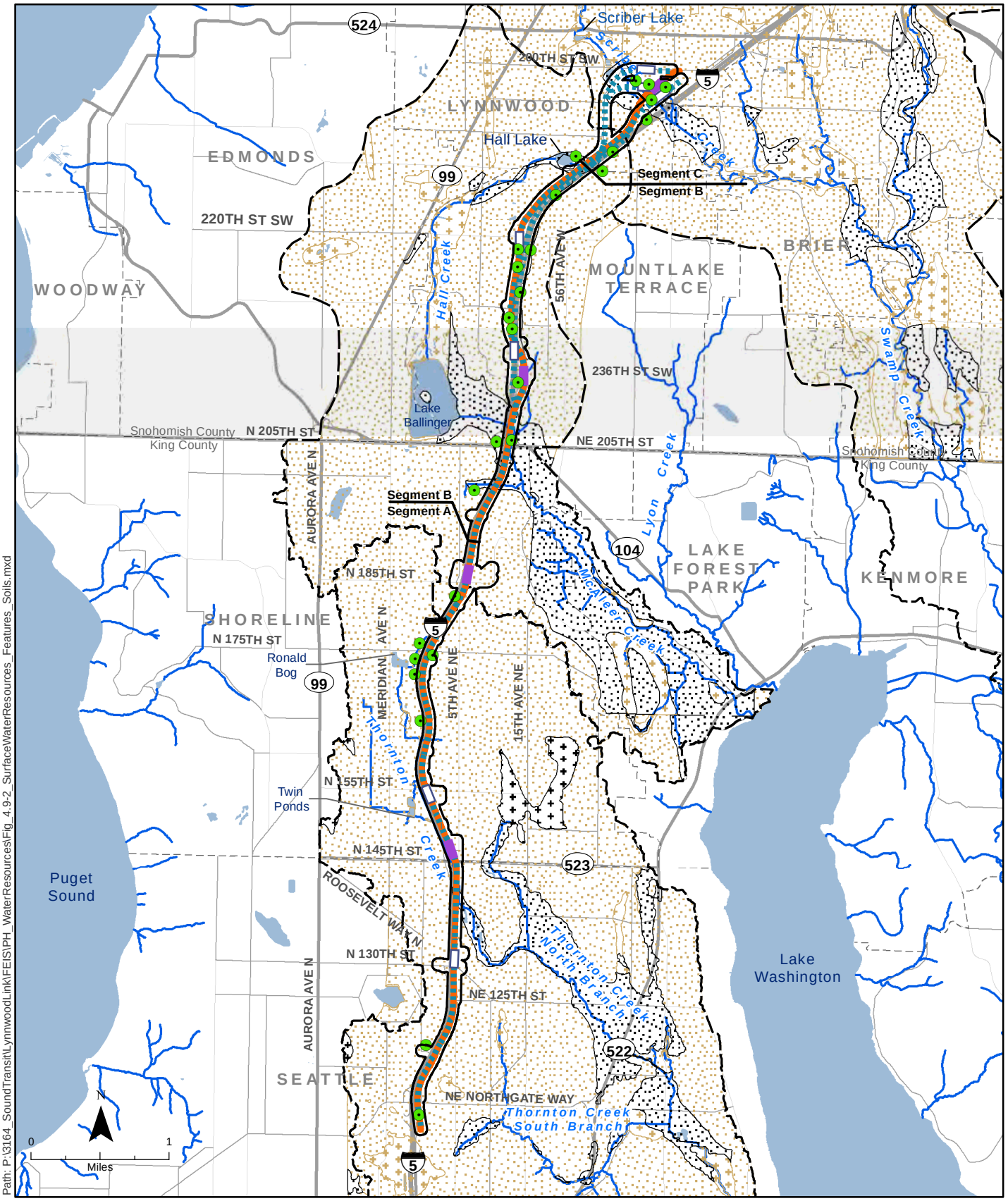
In the study area, most of the surface stormwater is collected by piped municipal systems. The largest system is in the I-5 right-of-way and features pipes and roadside ditches, media filter drains, stormwater ponds, and vaults. The locations of existing water quality and flow control facilities (WSDOT and municipal) in the proposed project vicinity are presented in Figure 4.9-1. A detailed list of the existing facilities is provided in Appendix I-4.9, Water Resources.

Land Use

Next to the proposed project is a mixture of urban residential, commercial, and vegetated areas. The impervious (hard) surfaces along the study area are a fairly even mix of pollution-generating roadway and parking areas, with non-pollution-generating surfaces that typically include roofs and sidewalks. Sound Transit reviewed the existing land cover within 100 feet of the proposed light rail routes to establish existing conditions and estimate potential changes in runoff flow volumes and pollutant loads with the project.

Infiltration

Figure 4.9-2 shows the hydrologic soil groups in the study area. The most common group is Type C, which is predominantly till-type soil that has a low infiltration and a high runoff potential. Type C soils are generally not compatible with stormwater management facilities that require surface water to infiltrate, which includes many low impact development (LID) approaches. Other soil groups in the study area are



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Data Sources: (King County, Snohomish County, City of Seattle, City of Shoreline, WSDOT, WDOE, Sound Transit, NRCS)

- Study Area
- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Stream Basin
- Waterbody
- Stream
- Existing Stormwater Facility

Hydrologic Soil Group

- A: High Infiltration
- B: Moderate Infiltration
- C: Low Infiltration
- D: Minimal to No Infiltration

Figure 4.9-2
Water Resources
Affected Environment
Soils

Lynnwood Link Extension

Types A and B, which have high to moderate infiltration potential, respectively, and are generally compatible with many types of LID stormwater facilities. There are also areas of Type D soils, which are typically saturated areas that do not allow percolation of additional surface water. Details regarding soil types and locations within each hydrologic soil group are presented in Appendix I-4.9.

Shorelines

Ecology has delegated authority to regulate designated shorelines in the study area to the Cities of Seattle, Shoreline, Mountlake Terrace, and Lynnwood. Lake Ballinger is the only water body in the study area with a state-designated shoreline, but it is not a shoreline of statewide significance. Around the shoreline of Lake Ballinger and its associated wetlands, the City of Mountlake Terrace requires prior approval and permits for larger development.

Floodplains

Federal floodplains, county flood hazard areas, and city flood hazard areas within the study area are shown on Figure 4.9-1. Thornton Creek, McAleer Creek, and Scriber Creek have floodplains that extend beyond their banks in the vicinity of the proposed project. In addition to requiring the flood storage and conveyance capacity of the flood zones to be maintained, local governments in the study area generally prohibit certain types of construction and activities in their flood zones, require preservation of wetlands or other natural flood storage features, and require flood-proofing for construction. Flood zone designation details for each study area jurisdiction and applicable floodplain regulations are presented in Appendix I-4.9.

4.9.2 Long-Term Impacts

This subsection identifies potential long-term impacts from the project alternatives.

No Build Alternative

Under the No Build Alternative, light rail would not be extended to Lynnwood and the associated changes to the landscape within the study area would be avoided. As a result, there would be no direct impacts from the project.

Impacts Common to the Light Rail Alternatives

The light rail alternatives are all similar in structural components, operational activities, and general alignment locations at the stream basin level. Therefore, each light rail alternative poses similar types of potential impacts to water resources, but in some cases in varying degrees.

Through continued project design and development in compliance with stormwater management regulations, Sound Transit would prevent or minimize potential impacts

to water resources. Examples of measures to prevent or minimize impacts include minimizing impervious footprints, avoiding the placement of project elements in or near water resources where possible, and installing appropriate water quality treatment and flow control facilities. Sound Transit's *Link Design Criteria Manual* (Sound Transit 2012b) requires stormwater facilities for its projects to conform to the requirements of local jurisdictions.

Chapter 30 of Sound Transit's *Link Design Criteria Manual* emphasizes sustainability measures, including LID as a preferred stormwater management method, if appropriate and feasible. Also, the 2012 Ecology *Stormwater Management Manual for Western Washington* requires LID approaches to stormwater management to the extent feasible. Stormwater management facilities would be designed using sustainable, LID approaches where practical. Some site conditions, however, may necessitate other approaches. Additional water resource regulations applicable to the project area and potential stormwater management approaches that could be implemented by the project are discussed in Appendix I-4.9.

Surface Water

The potential impacts to surface water from the project are summarized in Tables 4.9-1 and 4.9-2 for each project segment. To evaluate these impacts, Sound Transit considered:

- Increases in impervious surfaces: Impervious surfaces increase runoff volumes that can escalate flooding and flow frequencies, which in turn can contribute to stream erosion and aquatic habitat degradation. In addition, impervious areas subject to vehicular traffic and other pollution-generating activities accumulate contaminants that are transported to water bodies by stormwater runoff. This can include parking areas, although garages would have less pollution-generating areas than surface lots.
- BMPs: The design of the alternatives already features stormwater management facilities. Other BMPs and LID strategies will be considered in addition to these water quality and flow control facilities.
- Use of at-grade versus elevated structures: At-grade areas would be slightly wider than the elevated guideway structures and result in more impervious surfaces, pose more risk of direct conflict with municipal stormwater management facilities, and require more alteration of surface grade areas and flow paths.
- Stream crossings: Sound Transit's design is elevated for all stream crossings, which minimizes impacts to stream channels; columns or other structures in and around stream buffers can still pose a risk to buffer quality.
- Use of the I-5 median: The project would require less vegetation removal if the guideway were placed in the I-5 median rather than adjacent to the highway.

Given Sound Transit's commitment to design the project to meet the stormwater management requirements of each jurisdiction and to comply with applicable permit requirements, the light rail alternatives are not expected to adversely affect surface waters.

Impervious Surfaces

The Preferred Alternative and other light rail alternatives would add both pollution-generating and non-pollution-generating impervious surfaces in the vicinity of the light rail alternatives. Pollution-generating impervious surfaces are subject to motor vehicle use and include parking areas, bus holding areas, and project-associated roads or road realignments. Non-pollution-generating impervious surfaces are not subject to motor vehicle use and include the light rail tracks, guideways, and stations. Table 4.9-2 summarizes the range of impervious surface changes that would result from the Preferred Alternative and other alternatives in Segments A, B, and C compared to existing conditions. A discussion of the impervious surface calculation is presented in Appendix I-4.9, including a table and map depicting estimated changes for individual alternatives.

Table 4.9-1. Surface Water: Comparison of Alternatives

Segment/ Alternative	Impervious Increase [a]	BMPs Featured in Design	At-Grade Portions	Stream Crossings	Additional Considerations
Segment A: Seattle to Shoreline					
Preferred Alternative	About 30 acres	Detention Ponds, Detention Vaults, Guideway Dispersion, Bioretention, and Infiltration Facilities	Highest amount of at-grade portions, NE 130th Street Station at-grade	Elevated over Thornton Creek crossing south of NE 145th Street	Smallest NE 145th Street Station footprint Options: ▪ NE 130th Street Station (would not change the amount of impervious increase) ▪ Shoreline Stadium Garage (would not change amount of impervious increase)
Alternative A1	About 30 acres	Same as Preferred Alternative	Medium amount of at-grade portions	Same as Preferred Alternative	Includes reconstruction of NE 117th Street bridge; largest NE 145th Street Station footprint
Alternative A3	About 27 acres	Same as Preferred Alternative	Lowest amount of at-grade portions	Same as Preferred Alternative	Smallest NE 145th Street Station footprint
Alternative A5	About 30 acres	Same as Preferred Alternative	Medium amount of at-grade portions, NE 130th Street Station at-grade	Same as Preferred Alternative	Includes new parking lot at NE 155th Street Station

Table 4.9-1. Surface Water: Comparison of Alternatives

Segment/ Alternative	Impervious Increase [a]	BMPs Featured in Design	At-Grade Portions	Stream Crossings	Additional Considerations
Alternative A7	About 27 acres	Same as Preferred Alternative	Lowest amount of at-grade portions	Same as Preferred Alternative	Includes new parking lots at NE 130th and NE 155th Street stations
Alternative A10	About 30 acres	Same as Preferred Alternative	Medium amount of at-grade portions, NE 130th Street Station at-grade	Same as Preferred Alternative	Includes reconstruction of NE 117th Street bridge; largest NE 145th Street Station footprint
Alternative A11	About 27 acres	Same as Preferred Alternative	Lowest amount of at-grade portions	Same as Preferred Alternative	Includes new parking lot at NE 130th Street Station; smallest NE 145th Street Station footprint
Segment B: Shoreline to Mountlake Terrace					
Preferred Alternative	About 17 acres	Infiltration Ponds, Other Infiltration Facilities, Detention Ponds, and Detention Vaults	Lowest amount of at-grade portions	Elevated over McAleer Creek crossings at NE 205th Street/SR 104 and near 237th Street SW	None of the alignment would be within existing I-5 median Option: ▪ 220th Street SW Station South with 200-car surface parking lot (amount of impervious increase with option would be similar to Alternative B2A)
Alternative B1	About 10 acres	Same as Preferred Alternative	Highest amount of at-grade portions	Same as Preferred Alternative	Makes some use of I-5 median alignment Option: ▪ Parking garage on existing surface lot with 280 additional spaces (would not change amount of impervious increase)
Alternative B2A	About 20 acres	Same as Preferred Alternative	Medium amount of at-grade portions	Same as Preferred Alternative	None of the alignment would be within existing I-5 median; includes new parking lot at 220th Street SW Station
Alternative B4	About 10 acres	Same as Preferred Alternative	Highest amount of at-grade portions	Similar to Preferred Alternative, but avoids crossing near 237th Street SW	Makes the most use of I-5 median alignment, including Mountlake Terrace Freeway Station

Table 4.9-1. Surface Water: Comparison of Alternatives

Segment/ Alternative	Impervious Increase [a]	BMPs Featured in Design	At-Grade Portions	Stream Crossings	Additional Considerations
Segment C: Mountlake Terrace to Lynnwood					
Preferred Alternative	About 4 acres	Detention Vault and Guideway Dispersion	All elevated	Moderate crossing footprint over Scriber Creek and associated buffers	Lynnwood Transit Center Station would not add any new impervious surface and would potentially remove existing impervious surface
Alternative C1	About 4 acres	If connected to a west side alignment: Same as Preferred Alternative If connected to a median alignment: Infiltration Trenches, Detention Vaults, and Guideway Dispersion	All elevated	Smallest crossing footprint over Scriber Creek and associated buffers	200th Street SW Station would be located on mostly existing impervious surface; Alignment Option 2 would add more new impervious surface than Alignment Option 1[b]
Alternative C2	About 4 acres	Same as Alternative C1	All elevated	Largest crossing footprint over Scriber Creek and associated buffers	Lynnwood Transit Center Station would be located on mostly existing impervious surface; Alignment Option 2[b] would add more new impervious surface than Alignment Option 1
Alternative C3	About 4 acres	Same as Alternative C1	All elevated	Moderate crossing footprint over Scriber Creek and associated buffers	Lynnwood Park-and-Ride Station would potentially remove existing impervious surface; Alignment Option 2 would add more new impervious surface than Alignment Option 1 Station Options: 1. Existing transit center remains 2. Existing transit center relocated (would add more pollution-generating impervious surface than Station Option 1)

[a] Calculation of impervious area increase included the areas of the alternatives only and did not include options. Detailed calculations are provided in Appendix I-4.9.

[b] Alignment Option 1 refers to the alignment from the I-5 media; Alignment Option 2 refers to the alignment from the west side of I-5.

Table 4.9-2. Estimated Changes in Impervious Surfaces

Project Segment	Total Existing Impervious (acres)			Total Impervious After Project (acres)		
	PGIS[a]	NPGIS[b]	Total	PGIS[a]	NPGIS[b]	Total
Segment A Alternatives	79	11	90	79 to 83	38	117 to 121
Preferred Alternative	79	11	90	83	38	121
Segment B Alternatives	64	5	69	60 to 64	20 to 24	80 to 87
Preferred Alternative	64	5	69	64	23	86
Segment C Alternatives	56	11	67	53 to 54	16 to 17	69 to 71
Preferred Alternative	56	11	67	54	17	71

[a] PGIS (pollution-generating impervious surface) includes parking, bus areas, and roads.

[b] NPGIS (non-pollution-generating impervious surface) includes light rail tracks, guideways, and stations.

Total pollution-generating impervious surface area would be similar to existing conditions because most of the proposed road segments and parking lots would be located in areas with similar existing uses. Runoff from some areas of existing pollution-generating impervious surfaces currently receive water quality treatment while some do not. All of the light rail alternatives would include treatment of runoff from pollution-generating impervious surfaces, as summarized in Table 4.9-1. Non-pollution-generating impervious surfaces would increase compared to existing conditions, mostly as a result of the new guideway covering existing grassy right-of-way areas as shown in Table 4.9-2. The increase would not affect groundwater recharge; groundwater is discussed in Section 4.11, Geology and Soils.

Shorelines

The proposed project design would not alter any areas within regulated shorelines; therefore, no impacts are expected.

Floodplains

The Preferred Alternative and all other light rail alternatives would use elevated guideways to cross water bodies, and columns would be located outside the stream channel floodway or floodplain when it is possible to span these areas. At the Thornton Creek and McAleer Creek crossings, the preliminary engineering for the Preferred Alternative guideway spans the narrow floodplains and floodways without columns being placed within their boundaries; therefore, minor impacts or no impacts are expected. Similar designs would be anticipated for the other alternatives to minimize impacts.

In Segment C, the Scriber Creek floodplain is so wide that the project would likely have to place elevated guideway columns within the floodplain boundaries. Also, the guideway segments in this area would be wider to accommodate the station at the Lynnwood Transit Center and would be supported by pairs of columns rather than a single column in the center. The floodplain width to be crossed by the Preferred Alternative is approximately 380 feet, which would likely place 3 or 4 pairs of columns within the floodplain. Alternative C1 would cross the least amount of floodplain; this

alternative would cross two separate branches of the Scriber Creek floodplain that are 125 feet wide and 60 feet wide, respectively, and would probably place at least one pair of columns within the 125-foot-wide floodplain segment. Alternative C2 would cross the floodplain almost at its widest location of approximately 925 feet, requiring placement of 7 to 9 pairs of columns within the floodplain. Similar to the Preferred Alternative, Alternative C3 would cross a moderate width of approximately 350 feet of floodplain, which would place 2 or 3 pairs of columns within the floodplain. Placement of columns within the Scriber Creek floodplain would require a Development Permit from the City of Lynnwood, and the project would need to create additional flood storage to fully compensate for storage removed. No adverse impacts are expected.

4.9.3 Construction Impacts

The light rail alternatives would have similar potential construction-related impacts to water resources because construction equipment and techniques would be similar. Construction of alternatives with more at-grade portions (see Table 4.9-1) would have more disturbed ground area, with more areas requiring BMPs to protect sensitive areas. 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 local 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 by water or wind off site to stormwater drains or streams where it increases turbidity in the water. Construction vehicle tires can carry soil onto roadways, where the soil could be carried into ditches or streams during storms.
- Concrete work and paving: The pH in surface water can increase to levels harmful to fish and wildlife if runoff comes in contact with process water or slurry from concrete work or curing concrete.
- Stream Crossings: Over-water work and construction in stream buffers can degrade water quality through pollutant spills, sediment transport, or wind deposition of stockpiled materials.
- Construction machinery: Equipment leaks or spills can affect water quality in nearby water resources. Hydrocarbons and other hazardous materials associated with construction machinery can increase turbidity or affect other water quality parameters, such as pH levels or the amount of available oxygen in the water.

Regulatory agencies responsible for water quality typically require construction projects to implement various BMPs, depending on site-specific and project-specific circumstances. Common measures are listed below. Sound Transit would implement the BMPs required by its permits or as necessary to meet regulatory requirements.

These permits and regulatory procedures include the NPDES Construction Stormwater General Permit process, the WDFW Hydraulic Project Approval, applicable elements of the ESA consultation, and applicable guidance manuals. Sound Transit would develop and implement a construction SWPPP to serve as the overall construction stormwater mitigation plan. This plan would be submitted to Ecology and required to be implemented for the duration of construction as part of the NPDES Construction Stormwater General Permit compliance. The construction SWPPP would include the following elements (see further details in Appendix I-4.9):

- Temporary Erosion and Sediment Control
- Spill Prevention, Control, and Countermeasures
- Concrete Containment and Disposal
- Dewatering Management
- Fugitive Dust Control

The BMPs commonly applied in the permits and regulations that apply to the project include:

- Phasing the work to minimize the amount of disturbed area at any one time
- Minimizing the need for haul roads that use fill material in sensitive areas (e.g., stream crossings or wetlands) by instead building temporary bridges or platforms with small piles (i.e., pin piles)
- Marking and fencing of construction limits
- Minimizing the amount of cleared area at a construction site
- Stabilizing construction entrances and haul roads using quarry spalls (crushed basalt)
- Washing truck tires at construction entrances
- Constructing silt fences downslope from exposed soil
- Protecting catch basins from sediment
- Containing and controlling concrete and hazardous materials on site
- Installing temporary ditches to route runoff around or through construction sites, with periodic straw bales or rock check dams to slow and settle runoff
- Providing temporary plastic or mulch to cover soil stockpiles and exposed soil
- Using straw wattles to reduce the length of unbroken slopes and minimize runoff concentration
- Using temporary erosion control blankets or mulch on exposed steep slopes to minimize erosion before vegetation is established
- Constructing temporary sedimentation ponds 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
- Implementing stream protection measures, as necessary, including diverting stream flow around the construction area and limiting the construction period to the required "work window," a period of the year identified in the HPA when fish would be minimally affected

Through compliance with applicable construction permits and the BMPs the permits would incorporate, none of the light rail alternatives is likely to adversely affect water resources during construction.

4.9.4 Indirect Impacts

Population in Washington is expected to increase in the future, with increased vehicular traffic and likely development pressure on many parts of the state. The proposed project could be expected to shift some future vehicular traffic to light rail and reduce vehicle-related stormwater pollutants. The project could also attract development in the urban areas designated for higher growth, which could protect undeveloped areas in other portions of the watershed from development. Therefore, the proposed project could indirectly offset some adverse impacts on water resources caused by population increases. The project would also support increased redevelopment in station areas, where allowed by local plans. While most of these areas are already urbanized, redevelopments would comply with current standards for water quality protection, which would be beneficial.

4.9.5 Cumulative Impacts

Historically, development in the Puget Sound watershed led to discharges of municipal sewage, stormwater runoff, and industrial wastes into local area surface waters. Logging and land clearing resulted in sedimentation in streams, lakes, and marine water bodies. Pesticides and fertilizers used on landscaped areas and contaminated runoff from impervious surfaces made their way into surface water via stormwater runoff. These past and ongoing actions have degraded water quality in many of the water bodies in the study area. Current regulations primarily target point discharge sources; however, new development or redevelopment is required to bring many existing non-point-source pollution-generating surfaces up to current standards for flow control and water quality treatment in more populated areas of the Puget Sound watershed. Therefore, small improvements in water quality are expected to occur over time, with or without the light rail project.

If other projects were constructed within the vicinity of the proposed project and within the same timeframe, the cumulative risk of construction-related impacts on water resources would increase.

In some locations, other large projects could be developed during a similar timeframe and in the vicinity of the light rail alternatives. If Sound Transit's OMSF were located at the Lynnwood site, there is the potential for increased impervious surfaces, fill impacts within the Scriber Creek floodplain, and the loss of adjacent wetland or riparian buffer. However, much of the area that potentially would be occupied by the maintenance facility is already developed, and a redevelopment to current stormwater management standards could help improve existing problems with water quality management.

Additional areas that could be developed by other projects include the master-planned Edmonds School District support services center, which would include administrative facilities and a school bus base in Lynnwood on a district-owned site that overlaps with a portion of Sound Transit's maintenance facility alternative in Lynnwood. The school district site is partly developed already, but the development could increase pollution-generating impervious surface in the Scriber Creek Basin. The school district project would prevent or minimize impacts to water resources by meeting the current stormwater management standards required by construction permits; therefore, no cumulative impacts are expected.

4.9.6 Potential Mitigation Measures

The project would be designed to comply with all federal, state, and local regulations, which would prevent or minimize potential impacts to water resources through project planning, design, and the application of required BMPs (see Section 4.9.3 and Appendix I-4.9). Measures to prevent or minimize long-term impacts include LID approaches, where applicable, and stormwater flow control and water quality treatment as identified in Table 4.9-1. Sound Transit will comply with the NPDES permit program, and will implement measures defined for the project through its construction SWPPP. With these impacts controlled, as described in Sections 4.9.2 and 4.9.3, no operational or construction-related adverse impacts on water resources are expected and no mitigation is required.

The project design would include avoidance and minimization measures to prevent cumulative impacts to water resources by other projects constructed within the vicinity of the Lynnwood Link Extension and within the same timeframe. These measures would adhere to applicable regulatory standards, the Ecology NPDES Construction General Permit, and the WDFW Hydraulic Project Approval.

4.10 Energy

This section discusses the project's use of energy for construction and operation, and the potential for indirect and cumulative changes in energy used for regional transportation. Energy use is often expressed in terms of a standard measure known as the British thermal unit (Btu). At the regional scale, the units are counted in the millions to trillions (mBtu or tBtu, respectively).

4.10.1 Affected Environment

With an annual consumption of 2,195 tBtu, Washington consumes more energy than it produces. Of the 2,195 tBtu consumed in 2012 in the state, roughly 48 percent came from fossil fuels (43 tBtu from coal, 272 tBtu from natural gas, and 743 tBtu from petroleum). Renewable energy was the second highest energy source consumed, at approximately 47 percent (1,039 tBtu), and nuclear energy was third at 4 percent (98 tBtu) (EIA 2014a).

In 2012, transportation was the highest end-use energy consumption sector in the state at roughly 30 percent (619.8 tBtu), followed by industrial at 28 percent (582.1 tBtu), residential at 23 percent (479.6 tBtu), and commercial at 18 percent (375.1 tBtu) (EIA 2014a).

The study area for energy is the four-county Central Puget Sound urbanized area (King, Snohomish, Pierce, and Kitsap counties) regional transportation network. According to the PSRC travel demand model, which provided the base transportation data used in this analysis, most regional miles traveled are in passenger cars and light trucks. Public transit accounts for less than 1 percent of the regional miles traveled. Compared to the No Build Alternative, potential transit improvements would reduce motor vehicle use within the study area, as well as increase travel on Sound Transit's light rail network, this analysis evaluates existing energy consumption of these transportation modes. The proposed project would also affect public transportation provided by other agencies because the Lynnwood Link Extension could reduce the need for other transit routes that would otherwise be operating under congested conditions; therefore, energy consumption from other public transportation agencies is included in this analysis. Energy consumption per mile for transit vehicles is listed in Table 4.10-1 along with the estimated 2011 energy consumption based on vehicle miles traveled.

Table 4.10-1. Existing (2011) Daily Vehicle Energy Consumption in the Study Area

Travel Mode	Btu per Vehicle Mile[a]	2011 Daily Vehicle Miles Traveled	2011 Daily Energy Consumption (mBtu)
Bus[b]	37,718	254,100	9,584
Commuter Rail	92,474	960	89
Light Rail	64,585	4,430	286
Total Transit Energy Consumption	—	*259,490*	*9,959*
On-Road Vehicles (including automobiles, light trucks, medium trucks, and heavy trucks)	—	79,442,960	532,429

[a] Transportation Energy Data Book, Edition 32, Table 2.12 (2013)

[b] Bus vehicle miles traveled include King County Metro, Pierce Transit, Everett Transit, Community Transit and Sound Transit buses.

Energy consumption for passenger vehicles was developed using EPA's MOVES model version 2010b (released in June 2012). For this analysis, PSRC provided regionally specific MOVES input files, and national defaults were used when regionally specific inputs were not available. Vehicle miles traveled by mode and associated energy consumption are listed in Table 4.10-1. Total transit and passenger vehicle energy consumption for 2011 is shown in Table 4.10-2. As indicated in this table, passenger vehicles and trucks consume the most transportation energy within the study area.

Table 4.10-2. Total 2011 Energy Consumption in the Study Area

Travel Mode	2011 Daily Energy Consumption (mBtu)	Percentage of Total Daily Energy Consumption
Transit Energy Consumption	*9,959*	1.8%
On-Road Vehicles (including automobiles, light trucks, medium trucks, and heavy trucks)	532,429	98.2%
Total	***542,388***	

4.10.2 Long-Term Impacts

The proposed project's long-term impacts would change energy consumption for transportation along roadways, and change energy use by the public transit system. The analysis applies to all alternatives because their operation and ridership characteristics are similar. Table 4.10-3 shows the estimated 2035 energy consumption for the No Build Alternative and for the Preferred Alternative by vehicle type.

Table 4.10-3. 2035 Energy Consumption by Travel Mode (mBtu)

Travel Mode	No Build Alternative in 2035[a]		Light Rail Preferred Alternative in 2035[a]		Daily Energy Consumption Change from No Build Alternative in 2035[a] (percent)
	Daily Vehicle Miles Traveled	Daily Energy Consumption (mBtu)	Daily Vehicle Miles Traveled	Daily Energy Consumption (mBtu)	
On-Road Vehicles (including automobiles, light trucks, medium trucks, and heavy trucks)	100,592,498	591,488	100,307,852	588,820	-0.5%
Bus	243,000	9,165	240,400	9,067	-1.0%
Heavy Rail	1,470	980	1,470	980	0.0%
Light Rail	13,600	878	17,900	1,156	31.7%
Weekday Daily Total	***100,850,568***	***602,511***	***100,567,622***	***600,023***	***-0.4%***

[a] The energy calculations do not assume the most recent and likely future updates to EPA's fuel economy and emission standards. Other state and federal legislation also could reduce future energy consumption rates. Thus, actual 2035 energy consumption could be lower.

No Build Alternative

The transportation energy forecasts for the No Build Alternative account for other planned transportation projects as well as the increased travel demand based on future land use, population, and employment. These forecasts also consider predicted changes in vehicle fuel consumption as future vehicles become more efficient; however, the current models do not yet assume the most recent or likely future updates to EPA's fuel economy and emission standards. Still, while overall miles traveled would increase by nearly 27 percent by 2035, energy consumption for transportation would increase by less than half that, or 11 percent.

Light Rail Alternatives

The travel forecasts combined the Preferred Alternative from each project segment (A, B, and C) to provide a representative prediction of regional travel for the project, even if other alternative combinations by segment were used. Although the individual light rail alternatives would have some differences in ridership, the changes in roadway operating conditions and travel by mode at the regional level would be statistically similar to the Preferred Alternative. All the light rail alternatives are expected to primarily shift commuters from automobiles and light trucks to light rail as well as from bus transit to light rail. These shifts in travel mode are expected to occur throughout all periods of the weekday, with the most dramatic shifts occurring in the morning and evening peak periods, which is consistent with the typical work commute times. Energy consumption would decrease by about half of 1 percent as a result of the mode shift as well as the higher operating speeds on roadways, which improve fuel economies for all vehicle classifications.

Sound Transit published a *Sustainability Plan* in 2011 that builds on the 2007 Sustainability Initiative. It commits Sound Transit to integrate efficient operating practices at existing and new facilities, using energy-saving equipment to reduce energy demand, and maximizing intermodal transit connections to reduce automobile VMT. Many of these practices have been incorporated into the initial Central Link light rail segment that began operating in 2009. The *Sustainability Plan* identifies a long-term energy target in which all fleets would deploy fuel-efficient, clean, and cost-effective vehicles to optimize the use of proven technologies. It also identifies initiatives to develop and implement an energy management strategy and to continue to develop and implement fuel reduction strategies for Sounder commuter rail, ST Express buses, and the non-revenue fleet. Sound Transit's design standards for light rail also require designers to maximize the energy efficiency of transit facilities, buildings, and systems. Implementing the *Sustainability Plan* and Sound Transit's design standards could further reduce energy consumption during Lynnwood Link Extension construction and operations.

4.10.3 Construction Impacts

Using the Preferred Alternative as representative of all alternatives, Sound Transit estimated the construction-related energy consumption of the project. The estimate uses a method developed by the California Department of Transportation (Caltrans). The Caltrans method applies energy consumption rates to the various construction activities and quantities identified by the design team for developing construction cost estimates. These estimates are summarized in Table 4.10-4.

The estimate for the Preferred Alternative construction-related energy consumption is 5,171,499 mBtu, the sum of the total construction energy consumed by segment as shown in Table 4.10-4.

During final design, Sound Transit would identify and implement sustainability measures consistent with its Sustainability Program, which includes a variety of energy-saving protocols and practices.

Energy used during construction and in the manufacture of construction materials would be irretrievable. However, the proposed project would not adversely affect the continued availability of energy because the scale of the project is negligible when compared to energy production in Washington.

Table 4.10-4. Light Rail Preferred Alternative Construction Energy Consumption (mBtu) by Segment

Description	Segment A	Segment B	Segment C	Total
Length (Miles):	4.5	3.0	1.0	8.5
Number of Stations:	2	1	1	4
Guideway and Track Elements (mBtu)	1,415,200	1,291,011	521,722	3,227,933
Stations, Stops, Terminals (mBtu)	440,006	193,612	553,962	1,187,580
Sitework and Special Conditions (mBtu)	253,891	74,361	23,933	352,185
Systems (mBtu)	209,071	138,174	56,556	403,801
Total Construction Energy (mBtu)	**2,318,168**	**1,697,158**	**1,156,173**	**5,171,499**

Note: Estimates are based on preliminary construction cost estimates developed by the project team in July 2014; they do not include change order contingency; right-of-way, land, and existing improvements; vehicles; professional services; unallocated contingency; or high-estimate factor (15 percent).

4.10.4 Indirect and Cumulative Impacts

There are no long-term indirect impacts associated with this project because energy consumption used in operating the light rail extension would be a direct impact. Cumulative impacts of the proposed project are accounted for in the regional scope of the travel demand model used for this energy consumption analysis. Operating light rail would result in less energy usage than the No Build Alternative; therefore, this project would not contribute to the cumulative impacts of increased energy consumption in the region. The cumulative energy impacts of additional projects, such as the OMSF or the Edmonds School District support services center, would be negligible on the regional scale.

4.10.5 Potential Mitigation Measures

No mitigation measures would be needed for the Lynnwood Link Extension long-term or construction impacts. The light rail alternatives would consume less energy compared with the No Build Alternative because of the shift in travel mode to light rail, which would also reduce traffic congestion. Mitigation measures proposed for transportation and air quality impacts (see Section 3.6 in Chapter 3, Transportation Impacts and Mitigation, and Section 4.6, Air Quality and Greenhouse Gases) would also result in reduced energy consumption during construction.

4.11 Geology and Soils

This section describes the existing geological conditions that could affect or be affected by the Lynnwood Link Extension, including topography, regional geology, groundwater, seismicity, and geologic hazards.

4.11.1 Affected Environment

This section discusses the geology and soils in a study area extending 100 feet from the light rail alternatives. Sound Transit also researched the geologic units and soil characteristics in the larger project area by reviewing existing geologic maps and surveys, including geotechnical reports for previous projects in and near the project area. These sources included logs of over 700 borings and test pits completed in or near the study area since 1962, and logs of almost 100 borings completed for preliminary design of this project.

Topography, Regional Geology, Groundwater, and Seismicity

The project would be located within the central Puget Lowland, a north-south trending trough bordered by the Cascade Mountains to the east and the Olympic Mountains to the west. The existing topography and regional geology have been largely shaped by glacial activity.

The regional geology generally includes a thick sequence of glacially consolidated soils overlying bedrock, which is generally 300 feet to 1,600 feet below the ground surface in the project area. Under the weight of the glaciers, the underlying soils became consolidated and are generally very hard or compact. More recent soils have been deposited over the glacially consolidated soils by lake and river actions.

Figure I-4.11-2 in Appendix I-4.11, Geology and Soils, shows the surficial geology of the project area, and Table I-4.11-1 in the same appendix describes the geologic units and their engineering properties.

Where pervious soils are present at the ground surface, rainfall and snowmelt infiltrate to sustain typical shallow water table or perched groundwater conditions. In upland areas of the project where glacial till is present at or near the surface, the upper portion of the till and/or the thin veneer of overlying sediments can develop perched groundwater conditions because the underlying till has low permeability and water percolates into the till only at very slow rates. Such groundwater occurrences are commonly seasonal, developing through the wet winter months and diminishing or drying out completely during the dry summer months.

Groundwater that percolates into the glacial till moves downward slowly to eventually recharge an aquifer, which is usable as a water resource. However, none of the aquifers present along the project alignment are used for municipal or private water supply.

In some portions of the study area, groundwater is present throughout the year within confined and unconfined aquifers in permeable soils. Groundwater levels are usually tied to adjacent stream conditions, with levels increasing during the wet winter months and lowering as they feed the streams during drier weather

conditions. Near Thornton Creek, borings have encountered groundwater under moderate artesian pressure.

The Puget Sound region has experienced numerous earthquakes in the past and will experience earthquakes in the future. This region is located at the convergent continental boundary known as the Cascadia Subduction Zone. Three major types of earthquakes occur in this zone, which contribute to the overall earthquake hazard.

Shallow crustal earthquakes involve movement within the crust of the North American Plate. This movement tends to occur along faults such as the Seattle Fault (9 miles south of the project area) and the South Whidbey Island Fault (3 miles north of the project area); the Seattle Fault last ruptured 1,100 years ago and the South Whidbey Island Fault last ruptured 3,000 years ago. Intraplate earthquakes occur within the subducting Juan de Fuca Plate at depths of 20 to 40 miles. Relatively recent intraplate earthquakes include the Olympia 1949, Seattle 1965, and Nisqually 2001 events. Even larger earthquakes involve movement along all or a portion of the Cascadia Subduction Zone and represent the largest anticipated earthquakes for the region; the most recent occurred just over 300 years ago in 1700.

Geologic Hazards

Washington State's GMA (RCW Chapter 36.70A) requires all cities and counties to identify critical areas within their jurisdictions and to formulate development regulations for their protection. The GMA defines critical areas, including geologically hazardous areas, as areas that are susceptible to erosion, sliding, earthquake, or other geological events and are therefore not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns.

The Lynnwood Link Extension would pass through four cities and two counties, all of which have defined geologically hazardous areas in their respective codes (see Figure I-4.11-1 in Appendix I-4.11, which shows geologic hazardous areas). These geologic hazards include the following:

- Erosion hazard areas (generally encompassing the entire project area), with surficial soils that are prone to erosion if left exposed.
- Steep slope hazard areas, with grades between 15 and 40 percent, that might move during wet weather or seismic events.
- Landslide hazard areas where past slides have occurred, where the soil types under steep slopes make them unstable, or any areas where the slope is steeper than 40 percent. There are no known past landslides in the project area.
- Seismic hazard areas subject to earthquake-induced ground shaking or fault displacement. Shown in Figure I-4.11-1 in Appendix I-4.11, these areas have saturated loose granular soils that can liquefy and become unstable during an

earthquake (referred to as liquefaction). The project area is located outside known fault zones; therefore, the risk of fault displacement is low.

- Settlement hazard areas, with soft or loose soils that could experience significant settlement under the weight of new fill or structures.

Sole-Source Aquifers

The project would not be located within an EPA-designated sole-source aquifer area (EPA defines a sole-source aquifer as the primary source for drinking water in a given area). The nearest is Cross Valley Sole-Source Aquifer, which is located at least 3 miles east of the I-5 corridor.

Critical Aquifer Recharge and Wellhead Protection Areas

Aquifer recharge areas restrict developments that could affect sources for groundwater used for potable water supplies. Wellhead protection areas designated by local jurisdictions also help control activities involving potential sources of pollutants. The project would not be located within the boundaries of a King County or Snohomish County critical aquifer recharge or wellhead protection area.

Site Geology

The topography along the entire project corridor was substantially modified during construction of I-5 with engineered cuts and fills to create the existing freeway corridor. The light rail alternative routes within Segments A and B have similar geological conditions, but in Segment C the geological characteristics may vary slightly among the alternative routes. Most of the project area is underlain by glacial till and advance outwash. These soils are considered favorable for support of light rail, with good bearing support and little settlement, but several areas also include soils that would be subject to liquefaction. These areas include:

- Near Thornton Creek (south of NE 145th Street in Segment A)
- North and south of the King-Snohomish county line (in Segment B)
- Near Hall Lake (in Segments B and C)
- Near Scriber Creek (Lynnwood Transit Center in Segment C)

4.11.2 Long-Term Impacts

During preliminary design, Sound Transit conducted geotechnical borings and detailed soil analyses to inform and refine potential design and construction approaches to avoid potential impacts and geological risks during light rail operations. This section summarizes potential long-term operational impacts from the Lynnwood Link Extension and the No Build Alternative.

No Build Alternative

Under the No Build Alternative, the Lynnwood Link Extension would not be constructed. While there may be other localized projects, there are no major projects in the project corridor that would change existing geological and soils conditions.

Impacts Common to All Light Rail Alternatives

The discussion below considers long-term impacts that the proposed project could cause, as well as geological conditions that could affect the project. Sound Transit anticipates that the overall impacts would be similar among the alternatives.

Elevated guideway structures and light rail stations would both likely have shallow foundations (approximately 6 feet to 10 feet deep) or drilled shaft foundations (approximately 40 feet to 60 feet deep).

Retaining structures would be required in many areas along the routes of the alternatives. Some could require permanent soil anchors that extend beyond the limits of the study area onto adjacent properties, which would require permanent easements and could affect the future use of neighboring properties. Retaining structures can affect or be affected by local groundwater movement and seepage. Their design would provide appropriate means of drainage or waterproofing.

Parking structures would likely be supported on shallow foundations (approximately 6 feet to 10 feet deep) or drilled foundations (approximately 30 feet to 50 feet deep); ground improvement may also be used, likely in combination with shallow foundations. Surface lots would be supported at-grade.

Surface water runoff from impervious areas such as parking structures and station buildings would be managed with stormwater facilities described in Section 4.9, Water Resources. These would include infiltration facilities that discharge most or all of the collected stormwater to the ground (after appropriate treatment). Municipalities in Western Washington are required to maximize the use of LID techniques for new projects because they recharge aquifers, improve the base flow to streams, and reduce the risk of flooding, erosion, and surface water contamination.

Overall, the risk of adverse impacts on light rail facilities is low because the design would address potential impacts that could be caused by the geological conditions and/or soils in the project right-of-way. The potential impacts on the light rail facilities would be similar among the alternatives, with slight variances arising from the available space for construction; proximity of existing structures; loads from adjacent slopes; soil type; and steep slope, settlement, and seismic hazards (particularly liquefaction).

Insufficient Stability of Earth Slopes and Retaining Structures

Insufficient stability of earth slopes and retaining structures could endanger light rail facilities, light rail passengers, and neighboring properties. Earth slopes could include

existing slopes, slopes that are steepened, and slopes for embankment fills. These would generally be areas identified as steep slope and landslide hazard areas. The risk of insufficient slope stability would be greater when a large seismic event occurs.

The overall risk from unstable slopes and retaining structures is low because Sound Transit has evaluated these risks during project design and would increase the stability of the slope and retaining structures to acceptable levels. If slopes intersect perched groundwater or the water table, the project would collect and drain seepage to prevent erosion and loss of soils by piping or sloughing that could otherwise compromise long-term slope stability.

Settlement of New Earth Fills

New earth fills would be used in some areas to support light rail structures, but the fills would typically include retaining structures to limit the extent of the fill. The fills would cause increased loads on the soil and could result in settlement of soft soils, which could damage light rail structures as well as existing improvements.

Most of the new earth fills would be located in areas underlain by glacially consolidated soils, which are not expected to experience significant settlement. The light rail alternatives would use elevated structures to cross over most areas underlain by soft soils (wetland deposits, younger alluvium, and recessional outwash), which would reduce the risk of settlement in these areas.

The overall risk of settlement along the project corridor is low. Project design would incorporate measures to improve the soils in locations with the potential for settlement, or would allow tolerances for anticipated settlement.

Seismic Ground Shaking

The elevated light rail and retaining structures would be designed to withstand the effects of seismic ground shaking, thereby minimizing the risks to rail facilities and users. Sound Transit light rail design standards are based on the occurrence of a rare and large seismic event; therefore, the risk of damage from seismic ground shaking would be low.

4.11.3 Construction Impacts

The construction impacts of the Lynnwood Link Extension would be similar for all light rail alternatives because construction equipment and techniques would be similar. Construction activities could cause various geology- and soils-related impacts on a short-term basis. If not properly managed, the short-term construction impacts could become long-term problems.

Erosion

Construction activities could expose soils to rainfall and potential erosion through vegetation and tree removal, excavation and grading, and stockpiling of soils. The risk of erosion is a function of the soil type, slope inclination, presence of perched or shallow

groundwater, area of soil exposed, and rainfall intensity. Erosion hazards would be reduced using BMPs described in Section 4.9, Water Resources.

Slope Instability and Excavations

Construction would include removal of vegetation, excavation of temporary and permanent cut slopes, placement of earth embankment fills, and construction of retaining structures. These activities could affect the stability of slopes, particularly in steep slope and landslide hazard areas.

Slopes and retaining structures would be evaluated and designed for adequate stability using appropriate techniques, such as limiting slope inclination, limiting surcharge loading, or adding slope reinforcement such as soil nails. Shallow or perched groundwater intersected by cut slopes or other excavations would require drainage to control seepage and prevent it from contributing to slope instability.

Existing soils excavated during construction that cannot be used as structural fill would be disposed of. This would result in additional truck traffic, dust, and other construction-related impacts.

Table 4.11-1 shows the estimated total cut-and-fill earthwork quantities for the Preferred Alternative and the other light rail alternatives.

Table 4.11-1. Estimated Earthwork Quantities (in cubic yards)

Alternative(s)	Cut[a]	Fill[a]
Preferred Alternative A[b]	227,000	180,000
A1, A5, A10	214,000	67,000
A3, A5, A11	83,000	32,000
Preferred Alternative B	56,000	66,000
B1	98,000	23,000
B2A	123,000	33,000
B4	92,000	54,000
Preferred Alternative C	28,000	0
C1	11,000	0
C2	10,000	0
C3	9,000	0

[a] Includes calculations of the areas with cuts or fills needed for elevated or at-grade structures, with a 50 percent addition for station earthwork and a contingency amount reflecting the early stage of design information available.
[b] The Preferred Alternative's fill estimates also include retained fill structures transitioning to elevated structures based on updated design information.

Seismic Ground Shaking

Seismic ground shaking could occur during light rail construction, and the impacts would be similar to those previously discussed. If a large earthquake occurred during construction, the major risk would be damage to facilities under construction. The risk of seismic ground shaking is low due to the low probability of an earthquake occurring during the construction window.

Settlement from Construction Earth Loads

Construction earth loads would result from temporary stockpiling and the placement of new earth for embankments. The risk of settlement from construction earth loads is low. During the design process, Sound Transit would identify areas where soft soils could settle and avoid these areas or take other measures to protect against settlement damage.

Dewatering

Sound Transit does not anticipate dewatering for construction. Drilled shaft foundations are the primary project element that would extend below the groundwater table. Shafts would be completed without dewatering, and may even require the addition of water during installation ("water heading") to prevent heaving conditions at depth.

If dewatering is required, the design process would consider the potential effects of dewatering-induced settlement on nearby structures. Sound Transit would reduce settlement by using localized dewatering, reinjecting groundwater, using sheet piles for groundwater cutoff, or underpinning nearby structures.

4.11.4 Indirect Impacts

Although other developments could occur in the station areas, any new development would be built to meet current design standards and permit requirements. Permanent soil anchors could be used for major structures, which could restrict excavations for new developments within the anchor zone. However, such restrictions would be limited and alternative design remedies could be used.

4.11.5 Cumulative Impacts

A few proposed projects in the project area could alter geological or soil conditions, including Sound Transit's OMSF alternative in Lynnwood and the Edmonds School District's support services center. Both of these projects would require earthwork and other construction-related activities, but these would not add to the Lynnwood Link Extension's impacts.

4.11.6 Potential Mitigation Measures

With appropriate use of engineering design standards and BMPs as described above in Section 4.11.3, Sound Transit does not expect adverse geological and soils impacts.

4.12 Hazardous Materials

This section discusses the potential for the Lynnwood Link Extension alternatives to encounter existing hazardous materials that could pose risks to human health and/or the environment or could create control or cleanup requirements for the project. It also discusses the potential for the project to introduce new sources of hazardous materials contamination.

Hazardous materials can be classified in a number of different categories based on laws and regulations that define their characteristics and use. These categories include hazardous waste, dangerous waste, hazardous substances, and toxic substances.

4.12.1 Affected Environment

The hazardous materials study area extends 1/8 (0.125) mile around the light rail alternatives (project footprint). Contaminated sites within this area are considered the most likely to affect the project. Because of the nature of hazardous materials, pollutants could migrate toward the project from nearby sites, typically through groundwater migration. To address this potential risk, Sound Transit considered the physical setting, including geologic, surface water, and hydrologic conditions, and collected regulatory database information about sites with known contamination or potential contamination, as well as relevant historical conditions, within 0.25 mile of the project footprint; this area is shown as the Search Area in Figure 4.12-1. This was a conservative approach to ensure that all hazardous materials sites that could potentially affect the study area were captured in the database review.

Physical Setting

The project corridor is located within the Central Puget Lowland ecoregion, where the existing topography and regional geology have been largely shaped by glacial activity. The terrain in the study area features valleys and hills varying by up to 300 feet in elevation. The region is mostly underlain by Vashon Till, and surface soils in the study area generally consist of a mixture of sands, silts, and gravels of varying thicknesses and occurrences.

Depth to groundwater in the study area can vary considerably. However, monitoring well information and local municipal information indicate that, in general, depth to groundwater ranges from less than 10 feet below ground to approximately 30 feet below ground. Groundwater flow direction is also variable and highly influenced by streams and other surface water features. In general, groundwater flow is relatively flat, with a slight gradient to the west toward Puget Sound in much of the study area.

As noted in Section 4.9, Water Resources, the study area lies entirely within the Lake Washington/Cedar/Sammamish Watershed (WRIA 8), which has the greatest urban development and population density of any watershed in Washington.

Contamination issues are of particular concern in sensitive areas, such as wetlands, floodplains, rivers, and creeks.

Hazardous Materials Sites

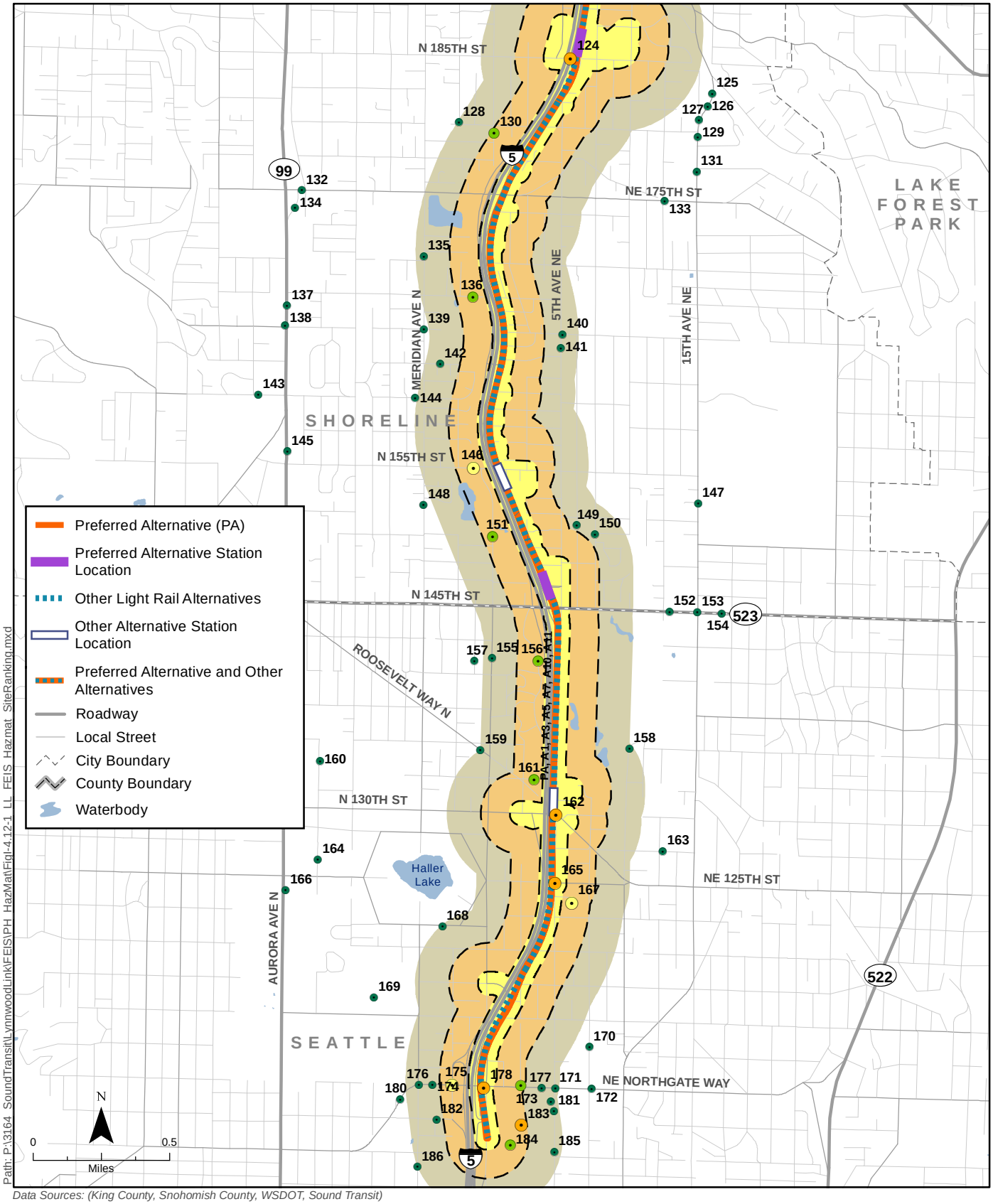
Sound Transit identified approximately 200 properties with previous records of contamination within or near the study area. While much of the study area is residential, with few sites of past contamination, there are areas where businesses or other entities have used hazardous materials, or where spills or leaks have occurred. These are mostly along arterials and in areas with commercial, manufacturing, or industrial uses. Sound Transit considered the potential of each site to act as a contaminant source affecting the project footprint and ranked them based on:

- Location of the site (relative to the project footprint)
- Type and number of environmental database listings
- Occurrence of a known release of a hazardous substance(s) or petroleum product
- Status of cleanup—active, inactive, or unknown; all sites are considered active unless identified as having no further action or inactive status

Sites were ranked on a scale of 0 to 5 (lower priority concern to higher priority concern) as follows:

0 – Identified site is more than 1/8 mile from the project footprint.
1 – Identified site is 1/8 mile or less outside the project footprint and has had no confirmed or suspected release.
2 – Identified site is within the project footprint and is not known to have had a confirmed or suspected release.
3 – Identified site is 1/8 mile or less outside the project footprint and has had a confirmed release.
4 – Identified site is within the project footprint and has had a confirmed or suspected release; however, no further action is required or pending.
5 – Identified site is within the project footprint, has had a confirmed or suspected release, and cleanup activities at the site are active.

Figures 4.12-1a and 4.12-1b show the location and ranking of the hazardous materials sites identified in the study area. Figure I-4.12-1 in Appendix I-4.12, Hazardous Materials, shows the highest ranked sites (4 and 5) and their proximity to the alignment and potential acquisition parcels. A higher ranking indicates sites of higher concern because of the type and extent of their contamination and location relative to the alternatives. In Appendix I-4.12, Table I-4.12-1 lists all sites found in environmental databases and their environmental database number (EDR ID); Table I-4.12-2 shows the distance of each site from the project footprint and its corresponding rank; Table I-4.12-3 lists the higher priority hazardous materials sites (sites listed as a 4 or 5). Information on all higher priority sites identified within, or adjacent to, the Preferred Alternative was obtained (where available) to confirm conditions and current status of sites (EDR 2012a, 2012b). These sites are discussed in greater detail in Section 4.12.3, Construction Impacts.



Hazardous Materials Site and Ranking

0 1 2 3 4 5

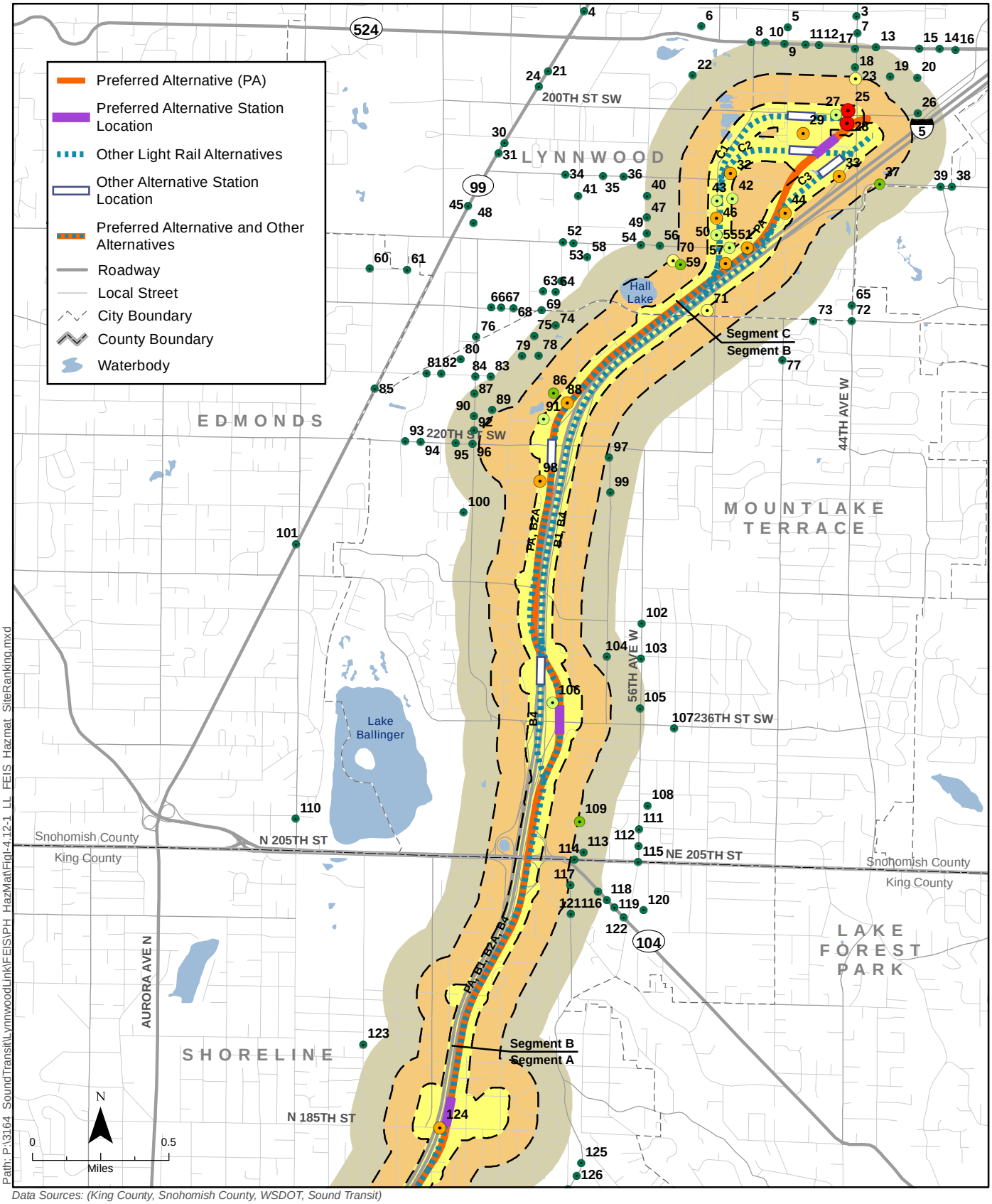
43 (EDR ID)*

Project Footprint
1/8-Mile Study Area
1/4-Mile Search Area

**Note:*
EDR ID is assigned from the Environmental Data Resources (EDR) regulatory database review.

Figure 4.12-1a
Ranking of Hazardous Materials Sites
Segment A

Lynnwood Link Extension



Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

Hazardous Materials Site and Ranking

0 1 2 3 4 5

43 (EDR ID)*

Project Footprint
1/8-Mile Study Area
1/4-Mile Search Area

**Note:*
EDR ID is assigned from the Environmental Data Resources (EDR) regulatory database review.

Figure 4.12-1b
Ranking of Hazardous Materials Sites
Segments B and C

Lynnwood Link Extension

4.12.2 Long-Term Impacts

This analysis of the project's long-term direct impacts considered long-term operation and maintenance activities. An operating transit facility could cause long-term impacts if there were an accidental release of hazardous materials, such as a fuel spill. Because light rail trains operate on electricity and not fuel, major spills are unlikely; however, minor hazardous material releases could result during maintenance activities on the tracks or at the stations and park-and-ride facilities where buses and automobiles operate. Sound Transit has an established hazardous materials handling plan and program for responding to emergencies within its system, including a spill response. There is generally a low potential for impacts from ongoing system operations under all the light rail alternatives.

If Sound Transit purchases a contaminated property for project use, the agency might need to conduct cleanup activities (see Figure I-4.12-1 in Appendix I-4.12). Although this could affect project costs, it would also be an environmental benefit. Most of these cleanups would occur during light rail construction and are discussed under Section 4.12.3, Construction Impacts. A site with complex hazardous materials concerns can require remediation actions in the long term, such as deed restrictions that would affect further site uses, or additional monitoring or maintenance. However, an environmental restoration plan that specifies the regulatory process, cleanup actions, and associated costs and schedule would be implemented for longer-term remediation actions.

No Build Alternative

The No Build Alternative would not acquire potentially contaminated sites. Ongoing bus transit operations under the No Build Alternative would involve hazardous materials, but systems are in place to manage potential releases through spills or accidents.

Segments A and B: Seattle to Mountlake Terrace

There are no high priority hazardous materials sites located on parcels identified for acquisition within Segments A and B. However, there is the potential to encounter contamination from known or unknown hazardous materials sites in the study area.

Segment C: Mountlake Terrace to Lynnwood

Under each of the Segment C alternatives, Sound Transit would acquire all or parts of parcels that contain hazardous materials sites. Seven sites of high concern were identified within the alternatives; four of these sites are located within the Preferred Alternative. While most of these sites have already been remediated, residual contamination could remain, requiring additional cleanup.

The Preferred Alternative and Alternative C1 would affect a service station site (Chevron 94953) that poses a higher level of concern than sites the other light rail alternatives would encounter. While contamination at most of the sites would be addressed before and during project construction, as discussed in more detail under Section 4.12.3, Construction Impacts, the Chevron site could require ongoing active remediation, monitoring, or other protective measures or restrictions. Each site would be handled consistent with applicable regulations and approvals.

4.12.3 Construction Impacts

During construction, direct impacts could result from the presence of hazardous materials on a site or the use of hazardous materials. Table I-4.12-1 in Appendix I-4.12 lists the environmental databases in which the identified hazardous materials sites were recorded. Soils, sediments, surface water, stormwater, and groundwater can be adversely affected by existing contamination or the release of hazardous substances during construction activities. Construction impacts could occur when contaminated soil, groundwater, underground storage tanks (USTs), and/or leaking underground storage tanks (LUSTs) that contain hazardous materials are encountered during construction activities. Hazardous materials could be encountered during excavation, grading, dewatering, drilling, and demolition activities. Construction or demolition can create or expose contaminated materials, such as treated timbers; contaminated soil, sediment, and groundwater; transformers; abandoned waste; and lead or asbestos-containing materials in demolished structures. Both elevated and at-grade construction could encounter hazardous materials during in-ground work; however, the potential for the elevated options is less due to less in-ground work required.

Fuels and other hazardous materials such as lubricants are also used during construction. Spills of any size could cause harm to the environment if not contained. Hazardous materials could affect worker safety and public health during construction, although the handling of contaminated materials is regulated at the state and federal levels. Workers could be exposed through skin contact and inhalation of contaminated vapors or particulates, such as during excavation work, demolition, or the use of materials containing hazardous substances.

Contaminants encountered or released during construction can migrate into the environment through various pathways. Shallow soil contamination can migrate downward into subsurface soils and/or groundwater through "drag-down" from excavation, utility relocation, drilling, stormwater infiltration, or dewatering.

Segment A: Seattle to Shoreline

Four hazardous materials sites of concern were identified near all of the light rail alternative alignments in Segment A. However, these sites (Table 4.12-1) are not located on parcels that might be acquired by Sound Transit, and are not likely to affect the Segment A light rail alternatives. An additional site was also found near the Preferred Alternative, due to a partial acquisition of a tax lot that extends well beyond the project area (Northgate Mall; EDR #183).

Table 4.12-1. Higher Priority Hazardous Materials Sites Adjacent to Segment A Alternatives

EDR ID Number	Owner Name	Address	Rank	Potentially Affected Alternatives						
				Preferred Alternative	A1	A3	A5	A7	A10	A11
Segment A										
183	Northgate Mall	555 Northgate Mall	4	●	●	●	●	●	●	●
178	WSDOT I-5/Northgate	1st Avenue NE and NE 110th Street	4	●	●	●	●	●	●	●
165	Puget Sound Energy	5th Avenue NE and NE 125th Street	4	●	●	●	●	●	●	●
162	Unknown	5th Avenue NE and NE 130th Street	4	●	●	●	●	●	●	●
124	WSDOT	Interstate 5 and NE 185th Street	4	●	●	●	●	●	●	●

Segment B: Shoreline to Mountlake Terrace

Sound Transit identified two hazardous materials sites of concern near, but not on, parcels that might be acquired by Sound Transit. Therefore, they are not likely to affect any of the Segment B light rail alternatives.

Table 4.12-2. Higher Priority Hazardous Materials Sites Near Segment B Alternatives

EDR ID Number	Owner Name	Address	Rank	Potentially Affected Alternatives			
				Preferred Alternative	B1	B2A	B4
Segment B							
98	Snohomish County PUD	6200 222nd Street SW	4	N/A	N/A	●	N/A
88	Snohomish County PUD	21604 60th Avenue West	4	●	N/A	●	N/A

N/A = not applicable; PUD = Public Utility District

Segment C: Mountlake Terrace to Lynnwood

Sound Transit identified nine hazardous materials sites (from industrial, manufacturing, public utility, transportation, and service station sites) in Segment C that have generated past releases of contaminants to soil and groundwater. Four are located on parcels that Sound Transit would acquire for the Preferred Alternative, and two are adjacent to it (Table 4.12-3).

Table 4.12-3. Higher Priority Hazardous Materials Sites In and Adjacent to Segment C

EDR ID Number	Owner Name	Address	Rank	Potentially Affected Alternatives			
				Preferred Alternative	C1	C2	C3
Segment C (potential acquisitions in Segment C)							
57	Budget Tank Removal	20825 52nd Avenue West	4	●	●	●	●
51	Sheldons Custom Cab LTD	20626 50th Avenue West	4	●	N/A	N/A	N/A
46	Connelly Skis Inc.	20621 52nd Avenue West	4	N/A	●	●	N/A
44	C Martin Trucking	20610/20631 48th Avenue West	4	●	N/A	N/A	●
32	RIMPAC Steel Inc.	20311 52nd Avenue West	4	N/A	●	●	N/A
29	Community Transit	20100 48th Avenue West	4	N/A	●	●	N/A
28	Chevron 94953	20010 44th Avenue West	5	●	●	N/A	N/A
Segment C (sites adjacent to Segment C)							
51	Sheldons Custom Cab LTD	20626 50th Avenue West	4	N/A	●	●	●
33	Lynnwood Sewer Lift Station 10	4599 204th Street	4	●	●	●	●
25	Shell Station 120839	19930 44th Avenue West	5	●	●	●	●

N/A = not applicable

The elevated profile of the Segment C alternatives would lessen (but not eliminate) the need for excavation in contaminated soils.

The Chevron 94953 (Site ID# 28; 44th Avenue West and 200th Street SW) service station site is of concern because it is an ongoing cleanup site that would be acquired by Sound Transit for the Preferred Alternative as well as for Alternative C1.

The site includes benzene and gasoline contamination confirmed in groundwater and soil in 1990. Groundwater monitoring has been conducted since that time. In 2007, 2008, and 2009, Ecology concluded that the site required further actions. In September 2009, a 1,000-gallon used oil UST and three fuel dispenser islands were decommissioned, and a new 8,000-gallon diesel UST was installed. Petroleum and benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in soil samples collected from the central dispenser island excavation. Approximately 734 tons of contaminated soil were excavated and removed from the site. There was reportedly evidence of affected soil remaining near the central and northeastern dispensers (Conestoga-Rovers & Associates 2009).

The site is still active, and regulatory action continues. Potential on-property sources of contamination include the current and former USTs located in the central and southern portions of the site; fuel dispenser islands and conveyance piping, located in the central and southern portions of the site; and the former waste oil and heating oil USTs located in the central portion of the site. Construction activities are expected to encounter existing contamination in the soil and groundwater. Thus, acquisition of the property and/or construction activities associated with the Preferred Alternative would likely require remedial actions or monitoring, regulatory interactions, and/or liability negotiations and protections with the site owner.

4.12.4 Indirect and Secondary Impacts

Construction of the Lynnwood Link Extension could result in redevelopment of existing structures and/or paved areas, as opposed to development of natural areas. Existing contamination is more likely to be encountered or potentially released during redevelopment activities in older urban areas. Redevelopment of older structures in the study area may result in the cleanup of hazardous materials sites, which would be an indirect benefit of the project.

4.12.5 Cumulative Impacts

The trend in managing hazardous materials impacts is toward cleanup. Federal and environmental regulations have resulted in the identification and cleanup of past hazardous materials sites, and in fewer hazardous materials spills and releases. Because encountered hazardous materials must be cleaned up or remediated during project development, future development projects, with or without the Lynnwood Link Extension, would accelerate the cleanup of existing contaminated sites in the study area.

If the Lynnwood site (near the Lynnwood Transit Center) were selected for the proposed OMSF, that project could acquire properties associated with inventoried hazardous materials sites. Operation of this facility would involve storage and handling of some hazardous materials associated with vehicle maintenance. Sound Transit would handle these materials in accordance with applicable state and federal regulations, and the facility would not be a source of additional cumulative effects related to hazardous materials. The Edmonds School District's proposed support center and bus facility near 52nd Avenue West would also have storage and handling of hazardous materials, but no additional cumulative impacts are expected if they are handled consistent with applicable rules.

4.12.6 Potential Mitigation Measures

Sound Transit would adhere to applicable regulations regarding hazardous materials handling and spill response during construction and long-term operation of the Lynnwood Link Extension; as a result, the project would not have an adverse effect

on the environment, but could have a net beneficial impact. When encountered, contaminated sites would be cleaned up or contained, in compliance with regulations, to the extent that would allow for project construction.

Ideally, Sound Transit would minimize potential long-term impacts from contaminated sites by avoiding contaminated sites or portions of such sites. However, the project area has other physical, environmental, or topographic constraints in many locations. To avoid impacts from potential contaminated sites in the project area, Sound Transit would perform environmental due diligence for properties along the project corridor before property acquisition, and attempt to avoid contaminated sites, where feasible.

Typical environmental due diligence includes the completion of environmental site assessments, which become more detailed if past contamination is identified. Phase I environmental site assessments help identify liability issues associated with acquiring or building on a facility or property. Sound Transit would perform a Phase I site assessment on properties to be acquired or properties that have substantial associated construction activities. A Phase II environmental site assessment might be necessary for property acquisition or for construction purposes if the Phase I site assessment identifies potential contamination. The Phase II site assessment can include the collection of samples of soil, groundwater, and/or building materials. The substances most frequently tested for are petroleum hydrocarbons, metals, pesticides, solvents, asbestos, and/or lead-based paint.

These assessments could establish the condition of acquisition properties and help to determine plans for cleanup and construction management, as needed. Ecology would be notified if unknown contamination is encountered during an assessment. Some previously contaminated properties might require longer-term covenants, restrictions, or other remedial activities, which would be approved by Ecology.

To address potential impacts on environmental resources from construction activities, Sound Transit would implement applicable BMPs. These would include requiring contractors to prepare and implement hazardous materials management plans, construction stormwater pollution prevention plans, health and safety plans, spill control and prevention plans, contaminated media management plans, and lead and asbestos abatement programs, as necessary. These plans would establish the procedures for managing hazardous materials in accordance with state and federal regulations. To the extent practicable, Sound Transit would limit construction activities that might encounter contaminated groundwater or contaminated soil. With these standard practices and measures in place, no adverse impacts are anticipated.

4.13 Electromagnetic Fields

Electric and magnetic fields, known as electromagnetic fields (EMFs), are produced wherever electricity is used. EMFs surround all electrical equipment, appliances, and facilities, including the electrical power lines and electrical devices as proposed in the Lynnwood Link Extension. Although there are no regulatory requirements or exposure limits for EMFs, these fields can result in electromagnetic interference, which can cause disruptions and possibly malfunctions in sensitive equipment. In addition, in certain situations, EMFs can affect human health.

4.13.1 Affected Environment

The study area for identifying potential EMF effects on sensitive equipment and facilities is 200 feet from the proposed project alignment. This area covers all locations where potential EMFs from the light rail facilities and operating light rail vehicles would be more than the ambient EMFs from other common sources, such as automobiles, appliances, or street power lines.

Sources of Electromagnetic Fields

Electric charges and currents create electric and magnetic force fields. The greater the charge or current, the stronger the electric field at a given distance from it. The strength of both electric and magnetic fields decreases rapidly with distance from the source. The many existing electrical power lines and electrical devices in the project corridor create a complex pattern of EMFs in the project area.

Light Rail and Electromagnetic Fields

The power transmission lines that would provide power to the traction power substations along the proposed light rail alternative routes would produce EMFs. EMFs would also be produced by the overhead catenary wires that provide power to the light rail train, and by the individual train cars, especially when they are moving. The electricity needed to operate the cars flows from the overhead catenary wires to the traction motors and other electronic equipment. The amount of electricity flowing would vary depending on whether the train is accelerating, running at steady speed, decelerating, or is stationary. EMFs would be created whenever the train is operating, and the electrical current would be highest when the train is accelerating. The strength of the magnetic field generated by light rail operations diminishes sharply relative to the distance from the tracks.

Potentially Affected Receptors

Based on Sound Transit's projections for EMFs that could temporarily interfere with the operation of sensitive electronics and electrical equipment near the right-of-way,

the project design team reviewed all nearby land uses and facilities that might be sensitive to EMFs. Hospitals or clinics that use sensitive electronic equipment would be typical facilities of concern, as would some broadcast facilities. Most of the properties near the light rail alternative alignments serve residential, open space, or transportation uses. The nearest medical facilities to the Lynnwood Link Extension are more than 1,000 feet away—more than 10 times the distance within which effects would be experienced. No other specialized technical or broadcast uses exist in the project area.

Some types of specialized sound systems can also be affected by EMFs; however, this is unusual.

EMFs also can affect humans. Certain EMF combinations can cause shock and burn injuries through direct contact with energized components, or they can interfere with the operation of electrical and magnetic devices, including heart pacemakers.

4.13.2 Long-Term Impacts

No Build Alternative

The No Build Alternative would not introduce any new sources of EMFs into the project area.

Light Rail Alternatives

There are no potentially sensitive hospital-, clinic- or broadcast-related electronic or electrical receptors located closer than 1,000 feet to the Preferred Alternative or any of the other light rail alternative alignments. The project's system designers have reviewed existing aerial utilities along the alignments to establish the necessary safeguards between light rail electrical systems and other systems. No impacts are anticipated. Receptors external to the light rail system (e.g., the public, nearby residences, institutions, and places of employment) would experience EMFs primarily from the overhead catenary system and the traction power substations. Cables emerging from the substations would carry direct current power, creating EMFs primarily in the static (0 to 3 Hz) frequency range.

Based on Sound Transit's existing operations and on data available from similar light rail systems, the Lynnwood Link Extension alternatives are unlikely to generate EMFs that would pose health concerns.

There are no federal regulations that limit exposure to electric or magnetic fields; however, EMFs at locations of human exposure within and adjacent to the light rail alignment would be considerably below exposure guidelines established by the American Conference of Governmental Industrial Hygienists, including the more

recent guidelines established by the International Commission on Non-Ionizing Radiation Protection, which address known biological effects of EMFs.

4.13.3 Construction Impacts

Sound Transit anticipates no impacts from EMFs during project construction because construction equipment generates negligible amounts of EMFs.

4.13.4 Indirect and Cumulative Impacts

Increases in population and employment along the project corridor could increase the demand for electrical power and could also increase the number of sources and the cumulative intensity of EMFs. The proposed site for the OMSF would increase EMF levels if the facility is sited in Lynnwood near the Segment C alternatives, but the combined levels from that facility and other potential projects would not materially affect people or equipment.

4.13.5 Potential Mitigation Measures

Under all light rail alternatives, EMF impacts from the Lynnwood Link Extension are not anticipated. No mitigation is proposed.

4.14 Public Services, Safety and Security

This section discusses the Lynnwood Link Extension's potential impacts on public services, including fire and emergency medical services (including hospitals), police, solid waste and recycling, schools, and postal services. It also discusses public safety and security issues in the project corridor communities and in the light rail operating environment and facilities.

4.14.1 Affected Environment

The following subsections summarize the primary public services in the project area. Section 4.4, Social Impacts, Community Facilities, and Neighborhoods, has a map showing major facilities (Figure 4.4-4).

Emergency Services and Law Enforcement

Fire and emergency medical services are provided in Seattle by the Seattle Fire Department; in Shoreline by the Shoreline Fire Department, which is a member of King County Medic One; in Mountlake Terrace by Snohomish County Fire District 1; and in Lynnwood by the Lynnwood Fire Department. Table 4.14-1 indicates the response times in 2013 for emergency services by jurisdiction.

Table 4.14-1. Fire and Emergency Response Times by Jurisdiction in 2013

Jurisdiction	Advanced Life Support	Basic Life Support	Fire, Rescue, and Hazardous Materials Response
Seattle	3.74 minutes	3.74 minutes	4.45 minutes
Shoreline	7.19 minutes	5.36 minutes	6.42 minutes (first engine) Full: 10.52 minutes EMS: 6.42 minutes
Mountlake Terrace (Snohomish County Fire District 1)	5:34 minutes	5:47 minutes	Fire: 5:52 minutes
Lynnwood	5.50 minutes	4.31 minutes	7.50 minutes

The Seattle Police Department precinct covering the project area is the north precinct/station at 10049 College Way North in Seattle. The Shoreline Police Department, which operates through a contract with the King County Sheriff's Office, has one police station at 1206 North 185th Street in Shoreline. The Mountlake Terrace Police Department station is located at 5906 232nd Street SW in Mountlake Terrace, in a facility shared by Mountlake Terrace Fire Station 19. The Lynnwood Police Department station is located at 19321 44th Avenue West in Lynnwood.

Table 4.14-2 shows the 2013 crime rates for the jurisdictions in which the Lynnwood Link Extension would travel. Thefts of motor vehicles and thefts from motor vehicles are included in the property crimes total. Table 4.14-3 shows the police response times.

Table 4.14-2. Crime Rates by Jurisdiction in 2013

Jurisdiction	Population[3]	Crimes per 1,000 Residents	Crimes Against Persons per 1,000 Residents	Property Crimes (Total)
Seattle	626,600	56.0	5.9	31,422
Shoreline	53,670	32.9	1.4	1,725
Mountlake Terrace	20,160	28.6	1.7	574
Lynnwood	35,960	70.4	3.0	2,452

Table 4.14-3. Police Response Times by Jurisdiction in 2013

Jurisdiction	Highest Priority[a]	Medium Priority[a]	Lower Priority[a]
Seattle	6.9 minutes	9.2 minutes	Not applicable
Shoreline	3.42 minutes	6.48 minutes	9.51 minutes
Mountlake Terrace (2011)	Standard is 8 minutes; met 90 percent of the time.		
Lynnwood (2011)	4.63 minutes	5.22 minutes	Not applicable

[a] Jurisdictions use different names for these categories.

[3] All population figures are from Washington State Office of Financial Management.

Solid Waste and Recycling Services

In Seattle, the Seattle Solid Waste Utility, a division of Seattle Public Utilities, currently contracts with Waste Management, CleanScapes, SeaDruNar, and Allied. In Shoreline, curbside, multifamily, business garbage, and recycling pick-up is provided by CleanScapes. In Mountlake Terrace, residential and business waste and recycling pick-up is provided by Waste Management NW. In Lynnwood, the City does not provide garbage service and curbside pick-up. Residents and businesses may use private contractors or transport their own waste to transfer stations.

Schools

Twenty-three public and private schools are within 0.50 mile of the light rail alternatives (see Figures 4.4-2a, 4.4-2b, and 4.4-2c in Section 4.4, Social Impacts, Community Facilities, and Neighborhoods). Altogether, the schools serve approximately 28,000 students, almost two-thirds of whom (about 18,000) are enrolled in North Seattle Community College.

4.14.2 Long-Term Impacts

No Build Alternative

With continued population and employment growth and related increases in development, traffic, and other activities, there would be higher demands on all public services and safety and security with the No Build Alternative, including emergency services. Increased traffic congestion could affect emergency service response times.

Light Rail Alternatives

All alternatives have generally similar types of impacts on public services and safety and security. This subsection summarizes the impacts for all segments and alternatives jointly, and then briefly discusses the differences in impacts by alternative starting with the Preferred Alternative and then discussing how other alternatives differ.

Fire and Emergency Medical Services

All alternatives would run trains on an exclusive right-of-way. Because the right-of-way is not crossed by roads, sidewalks, or paths of any kind, accidental intrusions by people or vehicles onto the right-of-way are very unlikely, resulting in a very low potential for crashes.

Light rail trains would not cross surface streets at-grade; therefore, light rail operations at street crossings would not directly affect emergency and incident response routes or times. However, increased congestion at station areas and park-and-ride lots could affect response times. Chapter 3, Transportation Impacts and Mitigation, identifies locations where traffic congestion and delays would occur with

the light rail alternatives, and the associated mitigations; of these, Shoreline Fire Station No. 65 is discussed below.

All of the jurisdictions along the project corridor currently operate Emergency Vehicle Preemption (EVP) programs that give emergency vehicles priority. Sound Transit would work with the jurisdictions to anticipate the EVP programming needs around stations and to ensure that emergency response times would not be affected.

Service providers would need special training to respond to emergencies at light rail elevated guideway sections and stations. In general, it is slower and more difficult to access elevated sections in an emergency compared to at-grade sections, although at-grade locations may have access restrictions, such as where at-grade facilities are within WSDOT's right-of-way and immediately adjacent to active freeway lanes or shoulders. Several of the alternatives are within the freeway median (such as Alternative B1 or B4) or where the guideway crosses above traffic lanes (all alternatives in Segment B, and some options in Segment C). However, Sound Transit's design standards and operating procedures for light rail directly address emergency access needs for all types of facilities and alignments featured in the light rail alternatives.

Access plans for getting to the stations and guideway from I-5 will be developed in consultation with WSDOT, FHWA, and the affected agencies, and will include regular ongoing coordination with the service providers. No existing I-5 median emergency and law enforcement vehicle turnarounds will be removed.

In Segment A, Alternatives A5 and A7 would have unique impacts because they would place a station and park-and-ride lot adjacent to Shoreline Fire Department Station No. 65 that would alter traffic levels and construct new driveways and intersections adjacent to that fire station. The increase in traffic at the park-and-ride lot could slightly increase response times.

Access to fire hydrants, fire lanes, and access points within or adjacent to the project boundaries will be maintained where possible; where it is not possible, access will be redesigned in concert with the appropriate agencies and jurisdictions.

Project design will be in accordance with Link light rail design standards and in coordination with local jurisdictions and the Link Fire, Life, and Safety Committee. Sound Transit design standards require specific facilities and locations to allow emergency access throughout the light rail line and for evacuating passengers if needed. These standards include design requirements for lighting, unobstructed views, pedestrian safety, elevators and escalators, public plazas, patron information centers, public telephones, call-for-aid stations, emergency management panels, security cameras, vandalism deterrents, public address systems, radio communications, and alarms. They also include principles and guidelines designed to ensure safety and security throughout the light rail system.

Operationally, a Lynnwood Link Extension emergency response and safety and security plan will be developed and implemented and include training and equipment, as well as procedures for light rail construction and operation.

Law Enforcement

All alternatives would require police and security staff to monitor stations, parking facilities, and other areas to protect people and property. Sound Transit operates its own security force within its facilities.

Studies by Sound Transit, the City of Seattle, and others have consistently found that crime at transit facilities, such as stations, generally reflects the conditions in the surrounding neighborhoods. Quality-of-life crimes (for example, vandalism, drunkenness, and panhandling) and property crimes account for more than 90 percent of transit facility crimes. Violent crimes account for most of the remaining crimes. Crimes are more likely to occur at a station than on a light rail car. In addition, stations with park-and-ride lots have more potential for crime than stations without parking. Different types of station access (stairs, escalators, or elevators) do not appear to influence criminal activity, but their design and location can be a factor if they provide places where criminals can act without being observed by others.

The project's final designs will incorporate Crime Prevention Through Environmental Design principles. These principles, in association with other security features of the light rail system and the presence of security personnel, would deter criminal activity and generally make light rail stations and parking facilities safer and more secure.

As with fire and emergency services, because light rail trains would not cross surface streets at-grade, light rail operations at street crossings would not directly affect police response routes or times. However, increased congestion at station areas and park-and-ride lots could affect response times. Chapter 3, Transportation Impacts and Mitigation, identifies locations where traffic congestion and delays are predicted to occur with the light rail alternatives, and provides associated mitigation.

As with fire and medical emergencies, police access to the light rail trains would require additional planning for alternatives with an elevated guideway and stations, and for stations not easily accessible from the existing road network. This would occur with segments of the Preferred Alternative and all other alternatives.

Since events in 2001, terrorism has received heightened awareness, and federal legislation has given FTA a safety oversight role for transit systems. Many measures that address non-terrorism security and safety issues also address terrorism concerns. Sound Transit will continue to work with FTA, law enforcement agencies, the U.S. Department of Homeland Security, and emergency service

providers to develop strategies to prevent and respond to terrorist activities that could affect the proposed project.

Solid Waste

The Preferred Alternative and all other alternatives would not acquire or otherwise affect any property currently occupied by recycling, composting, and solid waste facilities or operating bases. Travel times or collection routes for these facilities would not be notably affected by the project.

Other Public Facilities

Neither the Preferred Alternative nor any other alternatives would acquire any property currently in active use as a school, post office, postal facility, or hospital. The project would acquire a portion or all of a parking lot at NE 185th and 5th Avenue NE on Shoreline School District property now in use as a conference and recreation center. In addition, the project would occupy a portion of Edmonds School District vacant properties; this would occur in Segment B with the 220th Street Station South Option in the Preferred Alternative, and in Segment C with all alternatives, but the property affected could still be developed. Section 4.1, Acquisitions, Displacements, and Relocations, identifies areas where the Preferred Alternative or other alternatives could affect parcels owned by the public school districts. No alternatives would notably affect the travel times or routes for school buses.

Current postal services or routes would not be notably affected by the project, and the project would not affect access to hospitals.

Lakeside School is close to the proposed NE 145th Street Station with the Preferred Alternative and Alternatives A1, A3, A10, and A11. It serves a widely dispersed student body, some of whom might arrive by light rail. Currently, students using public transit and walking to the school have routes with safety concerns, including incomplete sidewalk links. The light rail project would not introduce any new safety concerns, and it would upgrade street crossings and the intersection immediately adjacent to the station. Any other safety-related improvements (sidewalks and protected crossings) constructed to serve pedestrians accessing the new light rail station could also serve Lakeside students for parts of their routes to and from the station. While there are other schools near the proposed light rail alignment along I-5, no other schools are as close to a station alternative as Lakeside; see Figures 4.4-2a, 4.4-2b, and 4.4-2c in Section 4.4, Social Impacts, Community Facilities, and Neighborhoods.

4.14.3 Construction Impacts

Sound Transit would work with contractors, utility providers, Cities, WSDOT, and FHWA to minimize disruption to the transportation network; however, some disruption would still occur. Traffic rerouting, lane closures, and construction traffic

may affect emergency response times and the travel times or routes for public service vehicles during construction periods, especially at stations or construction sites. This could also require emergency responders to alter their response routes or it could increase their response times. The reconstruction or closure of I-5 overcrossings could require detours or increase delays.

Alternative A1 would rebuild the NE 117th Street overpass, which would affect access to Northgate Elementary School. The Preferred Alternative and Alternatives A1, A5, and A10 would rebuild the NE 130th Street overcrossing and northbound off-ramp. Alternative A1 would rebuild the NE 185th Street overcrossing. All Segment A alternatives would construct an elevated structure over NE 155th Street, which could cause temporary lane closures or delays at NE 155th Street, where a fire station is located and where the Shoreline Fire Department's only ladder truck is based. Any closures or delays would be temporary and of short duration as a single event, although these closures and delays may occur over several months. Still, this could affect response times and require detours, alternative routes, or other modified operations during the most active period of construction at the affected location.

The above impacts are limited to Segment A because the other light rail segments do not include major rebuilds of streets and bridges. Chapter 3, Transportation Impacts and Mitigation, identifies the locations where construction traffic changes are anticipated, and also describes the construction traffic mitigation measures that would be implemented to reduce impacts. Construction haul routes would primarily be on arterials and at freeway ramps and would not affect public service facilities, except at Shoreline's Fire Station No. 65, where plans would be developed to maintain emergency access and response times.

In Segments B and C, the Preferred Alternative could result in construction-related impacts to Edmonds School District property, such as the relocation of school buses that could use the Edmonds School District property in Segment C for parking during project construction.

4.14.4 Indirect and Cumulative Impacts

As described above for the No Build Alternative and light rail alternatives, the continued growth in population, employment, and general urban activity in the project area through 2040 would increase demand on public services, including emergency and public safety services. As described in Section 4.2, Land Use, and Section 4.3, Economics, population and employment growth consistent with regional and local comprehensive plans, the Lynnwood Link Extension, and other potential projects in the area, such as the proposed OMSF (if sited in Lynnwood) and the Edmonds School District master planned services center development, would cumulatively increase the level of development and public activity in station areas and increase the demand for public services within the project area. However, the

project's contribution to the potential increase in demand for public services would be minor, and the project's indirect and cumulative effects would not hinder service providers in delivering services.

4.14.5 Potential Mitigation Measures

Sound Transit would coordinate with the Shoreline Fire Department during final design to avoid construction impacts to Station No. 65, and to define measures to minimize impacts on response times and operations.

During final design and construction, Sound Transit would coordinate with the Edmonds School District to minimize property impacts on its properties in Segments B and C.

During construction, Sound Transit would provide regular updates to schools, emergency service providers, local agencies, and postal services. The agency would also assist public school officials in providing advance and ongoing notices to students and parents about construction activity near schools.

No other mitigation would be needed, given the project commitments to:

- Provide mitigation measures as identified in Chapter 3, Transportation Impacts and Mitigation, for long-term and construction impacts on traffic.
- Design the project in accordance with Link light rail's design standards that fully address emergency, safety, and security.
- Operate the light rail in accordance with Link light rail's existing approaches to ensure safety and security throughout the system.
- Develop emergency response and safety and security plans and programs in cooperation with WSDOT, FHWA, local jurisdictions, and affected agencies, including working with local emergency response providers to ensure they have the necessary equipment to access the guideway at all points along the route.

4.15 Utilities

This section analyzes the short-term construction and long-term operations impacts of the Lynnwood Link Extension on utility providers and systems that currently serve, or are planned to serve, the project area.

4.15.1 Affected Environment

The study area for this analysis extends 100 feet from the alternative alignments and stations. Utility providers within the project area include municipal agencies, public utility districts, and private companies. In addition to public or municipal utility providers, such as the cities with water or sewer utilities, there are electrical power, natural gas, water, sanitary sewer, stormwater, and telecommunications service

providers in the study area. The individual utilities are identified below in Section 4.15.2, Long-Term Impacts.

Sound Transit asked all the utility providers in the project area about any planned improvements that might affect or be affected by the light rail alternatives. Five of the future projects identified by providers in the project area are considered major utility projects (12-inch-diameter pipelines or larger for water, sewer, and stormwater). These five projects are the City of Shoreline's fish barrier removals west of I-5 near mile post 174.9, City of Mountlake Terrace's 24-inch-diameter stormwater line and 12-inch-diameter water line, Alderwood Water & Wastewater District's 20-inch-diameter water line, and Snohomish County PUD's electric power substation. Although the Snohomish County PUD's planned substation was initially identified as potentially within the Lynnwood Link Extension footprint, Sound Transit subsequently adjusted the design for the project to avoid this potential conflict.

4.15.2 Long-Term Impacts

No Build Alternative

Under the No Build Alternative, light rail would not be extended to Lynnwood. Without the light rail extension, direct impacts on utilities would be avoided.

All Light Rail Alternatives

All light rail alternatives in Segments A, B, and C would need to relocate existing utilities in order to avoid conflicts with utility infrastructure and operations. The potential for conflicts occurs wherever the alternative alignments and associated features would cross an existing utility such as electric lines, water mains, stormwater or sewer lines, natural gas lines, or telecommunications (cable and fiber optic) networks. Also, conflicts would occur where utilities are located parallel and in proximity to the alternatives. Table 4.15-1 shows the affected utilities by segment, and Table 4.15-2 shows the number of affected utilities. Appendix I-4.15, Utilities, has further details on the areas where potential major utility conflicts might occur. Through project design, conflicts would be addressed by avoiding the conflict or by relocating the utility; no long-term impacts are expected.

After the conflicting utilities are relocated, the project would not cause major disruptions in service to utility customers during light rail operations or maintenance along the guideway. In some cases, manholes, pipes, vaults, and other maintenance access points might also need to be permanently relocated to ensure that maintenance activities could be conducted without interrupting either light rail or utility service.

Sound Transit would work closely with WSDOT or utility providers during the design process to provide required access to facilities and any relocated manholes, vaults, utility mains, fire hydrants, and/or other features. Nearly all water, sewer, and

stormwater lines within the project footprint are 12 inches or more in diameter and all are considered major utilities. These major utility lines are either buried or hung from bridges. Consequently, except for the elevated guideway columns, there would be direct conflicts only where these utilities cross below at-grade sections of the light rail alignment. Major utility crossings have been flagged as potential conflicts, as shown in Table 4.15-1. During final design, additional coordination with the utility providers would confirm and resolve potential conflicts.

Table 4.15-1. Potential Conflicts with Existing Utilities in the Study Area

Jurisdiction and Segment	Utility	Provider	Number of Conflicts
Seattle	Gas	Puget Sound Energy	5
	Electricity	Seattle City Light	16
Segment A	Water	Seattle Public Utilities	1
	Wastewater	Seattle Public Utilities	1
	Stormwater	Seattle Public Utilities	2
	Cable	Comcast	2
	Communications	CenturyLink, Verizon, WSDOT, AT&T, Clearwire, T-Mobile	5
Shoreline	Gas	Puget Sound Energy	2
	Electricity	Seattle City Light, PSE	13
Segments A and B	Water	Seattle Public Utilities	2
	Wastewater	Ronald Wastewater District	3
	Stormwater	City of Shoreline	9
	Cable	Comcast	2
	Communications	CenturyLink, WSDOT	5
Mountlake Terrace	Electricity	Snohomish County PUD	4
	Wastewater	City of Mountlake Terrace	3
	Stormwater	City of Mountlake Terrace	4
Segment B	Cable	Comcast, Black Rock Cable	1
	Communications	CenturyLink, WSDOT	3
Lynnwood	Electricity	Snohomish County PUD	5
	Water	City of Lynnwood	1
Segments B and C	Communications	Frontier Communications	2

Abbreviations: PSE = Puget Sound Energy; PUD = Public Utility District, WSDOT = Washington State Department of Transportation's Illumination and Intelligent Transportation Systems

Table 4.15-2. Utility Conflict Summary: Crossings and Parallel Relocations

Segment/Alternative	Total Crossings	Linear Feet of Parallel Utilities
Segment A		
Preferred Alternative[a]	65	6,595
Alternative A1	30	3,000
Alternative A3	28	550
Alternative A5	29	2,850
Alternative A7	25	550
Alternative A10	28	2,850
Alternative A11	27	550
Segment B		
Preferred Alternative	25	1,695
Alternative B1	16	9,900
Alternative B2A	21	1,150
Alternative B4	23	9,900
Segment C		
Preferred Alternative	6	50
Alternative C1	12	2,400
Alternative C2	6	700
Alternative C3	11	0

[a] The Preferred Alternative utility information reflects additional design information needed to identify minor as well as major utilities and their relocation or avoidance requirements.

The light rail system would draw power from the regional electrical power grid. The alternatives would operate electric trains with up to four cars from existing 26-kilovolt (kV) and 12-kV primary electric distribution facilities. Sound Transit would locate traction power substations approximately every 1.5 miles along the project corridor to provide power to the overhead catenary system that powers the light rail vehicles. These substations would be powered by primary electric distribution lines connecting to the nearest existing power source, either overhead or underground. In some cases, the existing local network may be upgraded or new power lines constructed to transmit power to light rail substations. However, the power demands of the light rail system would not affect the ability of electrical utilities to meet the overall demand in their service areas.

Some utilities within or adjacent to the light rail facility footprint could be susceptible to stray currents. Without corrosion control measures, a portion of the electrical current flowing through the light rail trains could stray along conducting utility lines in the ground. These existing utilities will be carefully evaluated during design for possible effects from stray currents. Sound Transit will also coordinate the implementation of control measures with potentially affected utility providers.

These control measures could include the following:

- 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 to control stray current where appropriate

Most of the telecommunications, cable, and fiber optic facilities in the alternatives' footprint are identified as potential conflicts, and almost all are within the I-5 right-of-way or other public rights-of-way. Most private utilities within public rights-of-way are franchise holders (the utility has an agreement with the city government or WSDOT to use the public right-of-way) who must relocate their utilities at the City's or WSDOT's request, at their own expense. Sound Transit would work with the affected utilities on relocation, consistent with Sound Transit's design criteria, policies, and applicable laws and permits, including city codes and charter provisions.

To resolve conflicts with overhead power lines, some power poles would need to be relocated and/or raised. Typically, when an electric power transmission line is raised, it affects several power poles because power line elevation changes need to be spread out. For example, changes in height for a 115-kV transmission line may affect power poles, transmission line heights, and the supporting poles from 350 to 450 feet on either side of where the elevation changes are needed. There are approximately eight 115-kV transmission line crossings over the length of the Preferred Alternative, with seven additional power line crossings of lesser voltage. There will also be a need to relocate local primary distribution power lines that conflict with the guideway and stations, as well as the related reconstruction of surface streets. For the overhead primary power distribution lines crossing over the project and I-5, the overhead lines may need to be placed underground, instead of being raised, if the reach of the utility maintenance vehicles is too short.

Preferred Alternative

Table 4.15-3 lists overhead electrical line crossings for the Preferred Alternative. The largest change in an existing transmission line is expected in Lynnwood at 48th Avenue West. This is where the crossing of light rail with a transmission line along the Interurban Trail would relocate a portion of the transmission line and poles about 1,300 feet to the west and another portion about 900 feet to the east.

Table 4.15-3. Major Overhead Power Line Conflicts

Location	Type of Crossing	Utility	Proposed Action	Typical Runout[a]	
				West	East
NE 123rd Street/I-5	115-kV Transmission	SCL	Raise Pole	None	Yes
NE 155th Street/I-5	Distribution	SCL	Relocate and Raise Pole	Yes	Yes
NE 165th Street/I-5	115-kV Transmission/Distribution	SCL	Raise Pole	None	None
NE 167th Street/I-5	Distribution	SCL	No Action Required	None	None
NE 170th Street/I-5	Distribution	SCL	Raise Pole	None	None
NE 180th Street/I-5	Transmission/Distribution	SCL	Relocate and Raise Pole	None	Yes
NE 189th Street/I-5	Distribution	SCL	Raise Pole	None	Yes
NE 195th Street/I-5	115-kV Transmission	SCL	Raise Pole	None	None
NW 201st Street/I-5	115-kV Transmission	SCL	Raise Pole	Yes	Yes
NE 205th Street/Ballinger Way NE and I-5	115-kV Transmission/Distribution	SCL/PUD/PSE	Raise Pole	Yes	Yes
58th Avenue West/I-5	Distribution	PUD	Raise Pole	Yes	None
212th Street SW/I-5	115-kV Transmission/Distribution	PUD	Relocate and Raise Pole	None	None
52nd Avenue West/ I-5	115-kV Transmission/Distribution	PUD	Raise Pole	Yes	Yes
Interurban Trail/48th Avenue West	115-kV Transmission/Distribution	PUD	Relocate and Raise Pole	Yes	Yes
200th Street SW/44th Avenue West	Distribution	PUD	Underground	None	None

[a] Typical Runout: Horizontal distance and additional raised power poles required to allow elevated power lines to converge with existing adjacent non-elevated power lines.

SCL = Seattle City Light; PUD = Public Utility District; PSE = Puget Sound Energy

Segment A: Seattle to Shoreline

The Preferred Alternative's most common utility conflicts would involve overhead and underground power (27 conflicts). Others would be a 16-inch high-pressure gas main and two gas district regulators near NE 130th Street; a 24-inch water main at NE 185th Street; a 30-inch water main at NE 115th Street; and up to eight sewer systems (3,010 linear feet of parallel sewer lines). Ridgecrest Park would be affected by 250 linear feet of sewer replacement that is parallel and adjacent to Segment A on the west side of the park. The impacts would temporarily affect the existing landscaping berm and transitional areas (see Section 4.17, Parks and Recreational Resources, for more information about Ridgecrest Park).

Neither the NE 130th Street Station Option nor the NE 185th Street stadium parking garage option would alter the number of affected utilities.

Segment B: Shoreline to Mountlake Terrace

The Preferred Alternative has approximately 25 utility conflicts, including nine electric power conflicts. There are also sewer conflicts at and near the Mountlake Terrace Transit Center. There are seven telecommunications conflicts and two water conflicts; 1,695 linear feet of parallel utilities are in conflict. The major electric conflicts involve raising transmission lines at I-5 and NE 195th Street, raising transmission lines at I-5 and NE 201st Street, raising transmission lines at I-5 and NE 205th Street, raising distribution lines at I-5 and 58th Avenue West, and raising transmission lines at I-5 and 212th Street SW after first relocating a power pole that is in the path of the Preferred Alternative.

The Preferred Alternative's 220th Street Station Option would create three additional minor conflicts: telecommunication lines and cables for WSDOT's Illumination and Intelligent Transportation Systems.

Segment C: Mountlake Terrace to Lynnwood

The Preferred Alternative has six potential power line conflicts in Segment C along with 50 linear feet of parallel utility conflicts; power transmission poles and lines adjacent to the Interurban Trail would need to be raised. However, there would be no permanent effect on these utilities.

Other Light Rail Alternatives

The following discussion and Table I-4.15-1 in Appendix I-4.15, Utilities, indicate the relative differences among the alternatives by segment.

Segment A: Seattle to Shoreline

The other Segment A alternatives would have 25 to 30 potential utility conflicts; many of these involve overhead power lines. There are also potential gas line conflicts in Segment A with all the light rail alternatives. Other utilities of concern include a 30-inch-diameter Seattle Public Utilities water line crossing at North 115th Street and a 24-inch-diameter Shoreline Water District water line crossing at NE 185th Street. These crossings would be of heightened concern because of their large supply capacity and the large number of customers who would be affected if service were disrupted. The other conflicts would be with storm drains and communication lines.

The linear feet of parallel utilities vary by alternative in Segment A, depending on whether it is at-grade or elevated (conflicts with parallel utilities would be not only where they are along the alignment but also where they would be encountered at a similar grade or could restrict access). For example, there are 550 feet of parallel utilities within the footprints of the mostly elevated alternatives (A3, A7, and A11), but the mostly at-grade alternatives (A1, A5, and A10) would have approximately 3,000 linear feet of parallel utility conflicts.

Segment B: Shoreline to Mountlake Terrace

There are 16 to 23 potential utility conflicts in Segment B. Many of these conflicts would involve power lines, but there are also four potential gas line conflicts for all Segment B alternatives. Other conflicts would include water lines, one sewer line, storm drains, and communication lines.

The linear feet of parallel utilities vary considerably among the Segment B alternatives. The footprint of Alternative B2A would include only 1,350 linear feet of parallel utilities, but Alternative B4 would have more than eight times that amount.

Segment C: Mountlake Terrace to Lynnwood

Segment C utility conflicts would be from Snohomish County PUD power lines. Alternative C1 would have the greatest number of potential power line conflicts, both in terms of the number of crossings and in length of parallel construction conflicts. Alternative C2 would have approximately half as many potential power line conflicts as the two other Segment C alternatives. Alternative C3 would have nearly as many potential conflicts as Alternative C1, but no potential parallel conflicts. Alternative C3 would require relocating two large transmission poles and raising the Snohomish County PUD transmission lines, but they would remain within the PUD right-of-way, and the new poles would be outside the areas currently occupied by the Interurban Trail.

4.15.3 Construction Impacts

Construction impacts would occur when utilities are located along the project footprint (parallel impacts) or where utilities would intersect the light rail alignment. Impacts would be avoided or minimized by permanently or temporarily relocating the affected utilities during construction, by adjusting the light rail alignment during final design, or by protecting utilities from construction damage, in accordance with Sound Transit's *Link Design Criteria Manual* (Sound Transit 2013).

Underground utilities may need to be relocated because of impeded maintenance access, inadequate vertical clearance between the utility and the rail line (especially in cut sections), or structural impacts to the utility (both in cut sections and at-grade sections).

For elevated light rail guideways, impacts on underground utilities should be minimal, provided that the support columns could be located to provide adequate horizontal clearance between the utility and the support column. However, conflicts between elevated light rail guideways and overhead utilities could occur where elevated guideways either run directly underneath the utility lines or cross them. Also, utility lines may need to be raised to accommodate large construction equipment. These conflicts would be resolved by raising the lines over the overhead light rail catenary system at the utility's required minimum distance, in compliance

with the National Electrical Safety Code. Work plans would be submitted to the utility providers prior to construction. Sound Transit will replace existing utilities in-kind if Sound Transit funds the relocation.

Potential Service Disruptions

For the Preferred Alternative and other at-grade alternatives, high pressure gas mains on 5th Avenue NE just south of NE 130th Street would be relocated. Puget Sound Energy indicated that this relocation, which would temporarily reduce gas transmission capacity, should only occur during the summer when demand is lowest. Two Puget Sound Energy regulators at the southwest corner of 5th Avenue NE and NE 130th Street would also likely need to be relocated, as would a 6-inch intermediate pressure gas main on the NE 130th Street bridge, and a 6-inch intermediate pressure gas main along 5th Avenue NE, just north of NE 185th Street. Brief interruptions in service to customers would occur while service switches to temporary connections.

For all alternatives, brief water service outages would be required as water mains are switched over from existing systems to new or temporary facilities. The service outages would generally be a few hours to half a day. Customers would be given advanced warning of the shutdown well in advance of the shutdown. Affected areas would be limited to the immediate vicinity of the work.

At the bridge crossing at NE 185th Street, an existing 24-inch water main would be modified to accommodate changes to the bridge. The configuration of the valves in the vicinity of this work would not allow the work to be fully isolated from the adjacent systems. As a result, customers between 1st Avenue NE and I-5 and north of NE 185th Street would experience outages while the system is switched to a temporary line, and again when the system is switched back to the new permanent facilities.

Power and telecommunications (cable, telephone, fiber optic) service to customers in the vicinity of the project would be interrupted briefly as lines are adjusted to accommodate the light rail infrastructure. Final design and coordination of the construction would be completed by the respective utility source providers, and they would be responsible for maintaining service and notifying customers. In general, service outages would be brief and isolated to the immediate vicinity of the work sites.

4.15.4 Indirect and Cumulative Impacts

The availability of light rail service could encourage development of property near the project footprint, which in turn would increase the demand for utility services in this area. However, any development near the project footprint would be no more intense than what is allowed in the adopted land use plans of the local governments. Concurrent construction projects near the project could result in more utility relocations, which could increase the number of short-term service disruptions.

Potential concurrent projects are OMSF (Lynnwood site alternative) and the Edmonds School District master planned services center. See Section 4.2, Land Use, for more details on the indirect and cumulative impacts related to land use development.

4.15.5 Potential Mitigation Measures

All alternatives include design standards and BMPs to minimize impacts. These measures include coordination with utility providers and the public to minimize impacts on utilities during light rail construction and operation. If simultaneous projects in the vicinity of the Lynnwood Link Extension would have impacts on utilities, Sound Transit would coordinate with those projects to minimize additional service disruptions. Sound Transit would conduct potholing and preconstruction surveys to identify utility locations, including outreach to inform customers of potential service disruptions. Sound Transit would continue to work with utility providers to minimize any potential service interruptions.

In some cases, establishing temporary utility lines might be necessary during construction to ensure continuous service or to minimize service disruptions. In addition, Sound Transit and its contractors will follow safety protocols, especially when working near gas lines and power facilities, to protect the safety of construction workers.

With the implementation of design standards and BMPs, Sound Transit does not anticipate any adverse impacts on utilities during light rail operation; therefore, no additional mitigation is proposed.

4.16 Cultural, Archaeological, and Historic Resources

This section identifies and describes the historic properties in the vicinity of the Lynnwood Link Extension alternatives. Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to identify historic properties and to consider the potential project impacts on those historic properties. Regulations in 36 CFR 800 outline the process for complying with Section 106 requirements. Historic properties are defined in 36 CFR 800.16(l)(1) 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.

Historic properties are identified and evaluated in consultation with the State Historic Preservation Officer (SHPO) at the Washington State Department of Archaeology and Historic Preservation (DAHP); tribes with jurisdiction or interest; local jurisdictions (Cities of Seattle, Shoreline, Mountlake Terrace, and Lynnwood); and other consulting parties.

To be eligible for National Register of Historic Places (NRHP) listing, a historic resource must meet standards of integrity and at least one of the following criteria (36 CFR 60.4):

a) Is associated with an important event or series of events that have made a significant contribution to the broad patterns of American history; or

b) Is associated with an important individual who was significant in our past; or

c) Embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master or possesses high artistic values; or represents a significant and distinguishable entity whose components lack individual distinction.

d) Has yielded, or may be likely to yield, information important in history or prehistory.

Regulations in 36 CFR 800 outline the process for satisfying the Section 106 requirements. The process includes the following steps: (1) initiate consultation with regulatory agencies, tribes with jurisdiction or interest, local governments, and other interested parties; (2) define the Area of Potential Effects (APE); (3) identify, record, and evaluate resources for potential NRHP eligibility; (4) identify project effects; and (5) consult with affected parties to resolve adverse effects, if any, on historic properties.

A law known as Section 4(f) of the Department of Transportation Act provides further protection for historic properties that could be affected by a transportation project with FTA involvement; see Section 4.18, Section 4(f) and 6(f) Evaluation, for further details.

There are also state and local regulations that require consideration of cultural resources. SEPA and its implementing rules contained in WAC 197-11 require the identification of historic, archaeological, and cultural resources listed in national, state, or local registers, and the identification of measures to reduce or control effects on these resources. For listing in the Washington Heritage Register (RCW 27.34.200 and WAC 25-12), a property must typically be at least 50 years old, have a high-to-medium level of integrity, and have documented historic significance at the local, state, or federal level. Nine areas of significance are taken into consideration.

RCW 27.44 (Indian Graves and Records) protects Indian burials, while RCW 27.53 (Archaeological Sites and Resources) protects archaeological sites. RCW 76.09 (Confidentiality of Information) provides for the confidentiality of information on archaeological sites.

The Governor's Executive Order 05.05 addresses the need for state agencies to consult with Indian tribes in acquiring or developing land for capital improvements.

This analysis follows guidance provided by DAHP's *Washington State Standards for Cultural Resources Reporting*.

Three of the jurisdictions within the APE—Seattle, Shoreline, and Lynnwood—have a local preservation program with a board or commission that maintains a register of significant historic properties. The City of Shoreline's ordinance incorporates the King County preservation ordinance. The City of Mountlake Terrace has not adopted a preservation ordinance. The criteria for listing in local registers are generally similar to, but broader than, the NRHP criteria cited above.

The *Cultural, Archaeological, and Historic Resources Technical Report* provides detailed information on the historic, archaeological, and cultural resources discussed in this section. It also provides additional information about federal, state, and local regulations for protecting the resources.

4.16.1 Affected Environment

The APE for the Lynnwood Link Extension encompasses any historic, archaeological, and cultural property that could be directly or indirectly affected by construction or operation of the project. It includes all areas within 200 feet of the center of the light rail guideway, including at-grade or elevated profile sections, and within 200 feet of any station, parking structure, staging area, or other project facility. The vertical APE for archaeological resources includes all areas of ground disturbance associated with project construction. However, at this stage in the project, details regarding the depth of construction may vary by alternative and will continue to be developed as the project progresses through design.

Archaeological Resources

Archaeologists conducted a field survey in 2012, targeting locations within the APE that had some potential for having intact archaeological deposits. The project's Archaeological Work Plan (Appendix A of the *Cultural, Archaeological, and Historic Resources Technical Report*) describes the survey methods and the approach Sound Transit used to determine survey locations. The technical report also discusses the survey findings.

In recent decades, roadway construction and residential or other urban development have disturbed much of the study area; as a result, the overall APE has a low to moderate probability for intact archaeological remains.

Two historic-period archaeological sites (the Seattle–Everett Interurban Trail Segment site, 45SN531, and the Scriber Creek Park site, 45SN609) were identified during the archaeological investigation, but neither site retains integrity nor is considered historically or prehistorically significant. In consultation with the SHPO and affected tribes, FTA has determined these sites are not eligible for listing in the NRHP; the

SHPO concurred with these determinations on December 4, 2012. These sites are described in the *Cultural, Archaeological, and Historic Resources Technical Report*.

Traditional Cultural Properties

FTA and Sound Transit have consulted with the Muckleshoot Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Suquamish Tribe, Tulalip Tribes of Washington, and Yakama Nation.[4] None of these parties has identified any potential for a traditional cultural property within the APE.

Historic Buildings and Structures

To identify potential historic properties within the APE, Sound Transit conducted a historic resources field survey. Every property within the APE that was built in or before 1970 was surveyed at an intensive level. While the standard NRHP age threshold is 50 years, Sound Transit used 1970 as the threshold year based on a conservative estimate of 2020 as the start of construction. Over 650 properties were surveyed.

Sound Transit also reviewed properties that are less than 50 years old but meet the age criteria for a local jurisdiction's preservation program. The agency coordinated with the Cities that have historic resource programs (Seattle, Shoreline, and Lynnwood) to identify any properties that were potentially eligible for their historic registers.

As a result of the historic resources field survey, FTA and Sound Transit determined that five historic resources within the APE retain a high level of integrity and meet NRHP eligibility criteria under Criterion C.[5] The SHPO concurred with these determinations on December 4, 2012.

In October 2013, after the publication of the Draft EIS, one of the NRHP-eligible resources, Melody Hill Elementary School, was demolished by its owner, Edmonds School District No. 15.

The remaining four NRHP-eligible buildings are located within Segment A, and are described in the following paragraphs. Table 4.16-1 lists these historic properties and Figure 4.16-1 displays them.

[4] Consistent with federal guidance, FTA and Sound Transit have also consulted with the potentially interested (although not federally recognized) Duwamish and Snohomish tribes.

[5] The NRHP-eligible resources are also considered Section 4(f) resources. Please see Section 4.18, Section 4(f) and 6(f) Evaluation, of this Final EIS for details on the project's 4(f) analysis.

Table 4.16-1. NRHP-eligible Resources within the Area of Potential Effects

Address	Description	Construction Date	Historic Status Eligibility
11200 1st Avenue NE, Seattle	Northgate Plaza Apartments	1950–51	Eligible NRHP Criterion C
11725 1st Avenue NE, Seattle	Northgate Elementary School	1956	Eligible NRHP Criterion C
13130 5th Avenue NE, Seattle	Parsonage	1928	Eligible NRHP Criterion C
132 NE 155th Street, Shoreline	Log House	1920	Eligible NRHP Criterion C

Northgate Plaza Apartments is a garden apartment complex with 207 units in 34 buildings. It was designed in 1950–51 by John Graham, Jr., the architect of nearby Northgate Mall, to help address the critical need for housing after World War II.

Northgate Elementary School (11725 1st Avenue NE, Seattle) was built in 1956 to accommodate post-World War II population growth in north Seattle. It was designed by Paul Thiry, one of Seattle's notable Modernist architects.

A residence at 13130 5th Avenue NE, Seattle, currently used as a parsonage by the North Seattle Church of the Nazarene, is a very good example of the Georgian Revival style, exhibiting an Italian Renaissance influence and an extensive use of terra cotta ornamentation.

The log house (132 NE 155th Street, Shoreline) is one of the oldest houses in the vicinity and is an example of a style that is very unusual in north King County.

In addition to being NRHP eligible, these properties are also eligible for listing in the Washington Heritage Register and for landmark designation in the cities of Seattle and Shoreline.

The historic resources survey identified one additional property that appears likely to meet the Seattle landmark designation standards: the Seattle Latvian Evangelical Lutheran Church (11710 3rd Avenue NE, Seattle). The property, built in 1971, does not yet meet the age criteria for the NRHP but does meet Seattle's 25-year threshold for landmarks. Only the Seattle Landmarks Preservation Board has the authority to determine if a property is eligible for designation. No other properties in the survey appear likely to meet local landmark criteria.

Only one previously identified historic resource is within the APE: a house at 727 NE 189th Street, Shoreline, which was identified in King County's Historic Resources Survey of Shoreline as meeting King County's and Shoreline's criteria for landmark designation. In consultation with the SHPO, this house has been determined to lack sufficient integrity to be eligible for NRHP listing.

Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_LandUse\LL_FEIS_Lynnwood_HistoricListings.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Roadway
- Local Street
- City Boundary
- County Boundary
- Park
- Waterbody
- Area of Potential Effect

Figure 4.16-1
National Register Eligible Properties within the APE

Lynnwood Link Extension

During consultation, the City of Lynnwood noted two buildings that have been altered and lack integrity, but have some historical importance to the City. The Cedar Valley Grange played an important role in the history of Lynnwood, serving as a community fixture. The City also noted that Hall's Lake is important to local history as the location of one of the area's first sawmills and an early church camp. The City also noted the Interurban Trail, which has been built on the former Interurban line right-of-way. The importance of the Interurban rail service is discussed in the *Cultural, Archaeological, and Historic Resources Technical Report*, but no visible evidence of the rail line remains.

4.16.2 Determination of No Adverse Effect

Under Section 106 regulations, 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 NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include, but are not limited to, the following:

- Demolition or alteration of the property
- Alteration of the property's setting
- Introduction of visual, audible, or atmospheric elements that are out of character with the setting of the historic property
- Physical encroachment upon an archaeological site

An agency may make a finding of no adverse effect, in consultation with the SHPO, when the undertaking is modified or conditions are imposed to avoid adverse effects.

FTA and Sound Transit have determined that this project would have no adverse effects on historic properties. The SHPO concurred with this determination in a letter dated November 13, 2014. The SHPO's letter is attached to the *Cultural, Archaeological, and Historic Resources Technical Report*. The factors considered in determining the lack of effects to identified historic properties are described below.

No NRHP-eligible archaeological resources or traditional cultural properties have been identified; however, it is possible one or more archaeological sites exist beneath the ground surface in areas where project excavation would take place. Through the NEPA review and the Section 106 process, FTA and Sound Transit will continue to consult with the SHPO, tribes, and other interested parties to minimize impacts to a potential site, if found.

Long-Term Impacts

Long-term impacts are those that would occur or continue to occur while the proposed project is in operation. The impact would constitute an adverse effect if it, as described above, alters any of the characteristics that qualify the property for inclusion in the NRHP or local landmarks ordinances.

None of the light rail alternatives would adversely affect any of the NRHP-eligible historic properties within the APE, or have a long-term effect on any other potential landmark properties in Seattle, Shoreline or Lynnwood.

No Build Alternative

The No Build Alternative would have no long-term effects on historic properties.

Light Rail Alternatives

Segment A: Seattle to Shoreline

No alternative would affect historic properties during operation of the transportation facility. All of the historic properties are far enough from the transportation facility to preclude adverse vicinity impacts, such as noise, vibration, or visual effects. The new guideway would not alter or diminish the buildings' integrity of setting because the guideway would be constructed adjacent to I-5. I-5 has already altered the setting of nearby historic properties. Introduction of a new rail alignment next to I-5 would not further alter or diminish the integrity of those historic properties. None of the alternatives would alter or diminish the historic properties' remaining aspects of integrity: location, design, workmanship, feeling, or association.

The **Northgate Plaza Apartments** are located across the street from all the potential Segment A alternatives. This would cause a minor alteration of the apartments' integrity of setting, but because the new guideway is across the street, adjacent to I-5, the effect would not be adverse. There would be no other long-term alteration of the apartments' integrity of location, design, materials, workmanship, feeling, or association.

Northgate Elementary School is located west of I-5 and adjacent to the NE 117th Street overpass, which would be rebuilt under Alternative A1. This would not affect the historic property because the overpass would be replaced rather than newly located to the site. There would be no other long-term alteration to the building's integrity of location, design, setting, materials, workmanship, feeling, or association. All other Segment A alternatives are east of I-5 and would not affect this resource.

The **Parsonage** would be across I-5 from all alternatives. Alternatives A5, A7, A10, A11, and the Preferred Alternative with station option would include a station at NE 130th Street. This would cause a minor alteration to the Parsonage's integrity of setting and feeling, but because the new guideway and station are adjacent to I-5, these effects would not be adverse. No other aspect of integrity (location, design, materials, workmanship, or association) would be altered as a result of the station operation.

The **Log House** is located across the street from the proposed parking facility that would be constructed under Alternatives A5 and A7. All of the Segment A

alternatives would include a guideway west of the Log House. This would cause a minor alteration to the building's integrity of setting and feeling, but because the new guideway is adjacent to I-5 and the parking facility is across NE 155th Street and adjacent to the fire station, these effects would not be adverse. This project would not alter any other aspect of integrity (location, design, materials, workmanship, or association).

The project could affect the property owned by the **Seattle Latvian Evangelical Lutheran Church**, which is not NRHP eligible, but may meet Seattle Landmarks eligibility criteria. The Preferred Alternative and Alternatives A1, A5, and A10 would displace the residence (used as a caretaker's house) on the property, which has been determined to not be NRHP eligible, but the church buildings would be unaffected.

If the Seattle Landmarks Preservation Board were to designate the property as a Seattle Landmark, Sound Transit would seek a Certificate of Approval from the Board to undertake the necessary work on the site and would comply with the Board's requirements.

Segment B: Shoreline to Mountlake Terrace

None of the Segment B alternatives would affect historic properties because there are no historic properties within this segment of the APE.

The house at **727 NE 189th Street** is not NRHP eligible but is on the City of Shoreline's Historic Property Inventory; this property would also not be negatively affected by the project. It is located about 125 feet east of the guideway, which would run along the east side of I-5. The introduction of the new transportation facility would not alter or diminish the building's integrity of setting because the guideway would be constructed adjacent to I-5. I-5 has already altered and diminished the setting of nearby historic resources. Introduction of a new rail alignment adjacent to I-5 would not further alter or diminish the historic resource's remaining aspects of integrity: location, design, workmanship, feeling, or association.

Segment C: Mountlake Terrace to Lynnwood

None of the Segment C alternatives would affect historic properties because there are no historic properties within this segment of the APE. None of the Segment C alternatives would affect landmarks or locally significant resources in Lynnwood. All of the alternatives would be along the freeway as the edge of the Halls Lake property. Alternatives C1 and C2 would be elevated across the street from the Cedar Valley Grange and would not affect it.

Construction Impacts

Construction impacts such as noise, vibration, dust, or reduced access would be temporary and occur only during project construction. While they may temporarily disturb occupants, they would only be an adverse effect if they diminished the

qualities that make the property eligible for NRHP listing or local landmarks ordinances.

In order to reduce construction-related effects, Sound Transit will implement standard BMPs throughout the project construction period. Construction noise and vibration impacts are discussed in Section 4.7, Noise and Vibration.

Although Sound Transit has not identified significant archaeological resources in the project area and the corridor overall has a moderate-to-low probability for containing intact archaeological resources, construction activities involving excavation could encounter an unanticipated archaeological site. If the site is determined to be significant, an adverse effect could occur.

No Build Alternative

The No Build Alternative would have no construction-related effects on historic properties.

Light Rail Alternatives

Segment A: Seattle to Shoreline

The **Northgate Plaza Apartments** are located across the street from the potential alignment. All of the Segment A alternatives, including the Preferred Alternative, would involve guideway construction between the Northgate Plaza Apartments and I-5, which would have temporary minor effects, including noise, changed visual quality, and reduced access. These effects may temporarily alter the setting, but they would not permanently diminish any of the aspects of integrity (location, design, workmanship, materials, setting, feeling, and association); therefore, these effects are not considered adverse.

Northgate Elementary School would experience temporary, minor proximity effects from Alternative A1 during the rebuilding of the NE 117th Street overpass. These effects may include noise and visual intrusions. The setting may potentially be temporarily altered, but not diminished. No other Segment A alternative, including the Preferred Alternative, would affect this resource.

The **Parsonage** would experience temporary, minor proximity effects from the alternatives (Preferred Alternative with options, A5, A7, A10, and A11) during construction of the NE 130th Street Station. Construction impacts, such as noise, vibration, reduced access, or visual intrusions, could temporarily alter the integrity of setting and feeling of this historic resource. However, setting and feeling would not be permanently diminished, and these effects are not considered adverse. No other aspect of integrity (location, design, materials, workmanship, or association) would be altered.

The **Log House** would experience temporary, minor proximity effects from Alternatives A5 and A7 during construction of a parking facility across the street. Construction impacts, such as noise, vibration, reduced access, or visual intrusions, could temporarily alter the setting of this historic resource. However, setting and feeling would not be permanently diminished, and these effects are not considered adverse. No other aspect of integrity would be altered. No other Segment A alternative, including the Preferred Alternative, would affect this resource.

The **Seattle Latvian Evangelical Lutheran Church**, which is not NRHP eligible, but may meet Seattle Landmarks eligibility criteria, could have short-term restricted access during construction for all alternatives. Other construction impacts, such as construction traffic, visual changes and intrusions, noise and vibration, could also be nearby, but would not permanently alter the church structure.

Segment B: Shoreline to Mountlake Terrace

None of the Segment B alternatives, including the Preferred Alternative, would affect historic properties during construction because no historic properties are located within or adjacent to the proposed construction area.

Segment C: Mountlake Terrace to Lynnwood

No historic properties are located within or adjacent to the proposed construction area. None of the Segment C alternatives, including the Preferred Alternative, would affect landmarks or locally significant resources in Lynnwood. The properties of local significance (Hall's Lake and the Cedar Valley Grange) would have light rail nearby but would not be directly affected.

4.16.3 Indirect Impacts

Indirect impacts would be limited because there are so few historic properties in the project corridor.

4.16.4 Cumulative Impacts

Cumulative impacts would be limited because few historic properties exist in the project corridor; moreover, there are few pending projects involving construction or other developments that could affect historic resources in areas where the light rail project could also have effects.

4.16.5 Potential Mitigation Measures

Section 106 of the NHPA directs FTA, in consultation with the SHPO and other consulting parties, to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties. Where adverse effects cannot be avoided, they will be resolved through

mitigation measures in a Memorandum of Agreement (MOA). Because there would be no adverse effects on NRHP-eligible historic properties, no MOA is anticipated for the Lynnwood Link Extension.

To minimize the risk of damage to currently unknown archaeological resources, Sound Transit would develop an Inadvertent Discovery Plan prior to ground-disturbing construction activities. FTA and Sound Transit would coordinate with the SHPO and tribes to review the plan. In addition, archaeologists would conduct training for contractors to help them identify potential archaeological remains during construction; the training would also cover protocols to implement if something is discovered.

If potentially significant archaeological materials or sites (or evidence thereof) are discovered during construction, activities would be halted around the find. All reasonable measures would be taken to avoid or minimize harm to the property until such time as FTA and Sound Transit, in consultation with the SHPO and the tribes, determine that appropriate measures have been taken to ensure that the project is in compliance with Section 106 of the NHPA.

The Inadvertent Discovery Plan also would describe the procedures that Sound Transit and FTA would follow if any human remains are discovered during project construction.

4.17 Parks and Recreational Resources

The parks and recreational resources considered in this section consist of designated public parks, designated open spaces, trails, and other publicly owned and publicly accessible lands that support recreational activities.

4.17.1 Affected Environment

The study area covers parks and recreational resources within 200 feet of potential light rail track alignments and 0.25 mile of potential station locations. Figures 4.17-1a and 4.17-1b map the parks and recreational resources in the study area. Table 4.17-1 summarizes the size, recreational use, location, and access for the resources.

In addition to the effects discussed in this section, impacts on parks and recreational resources are also evaluated under two federal statutes: Section 4(f) of the U.S. Department of Transportation Act of 1966, and Section 6(f) of the 1965 Land and Water Conservation Fund Act. These statutes require specific analysis of recreational resources, including avoidance or mitigation for certain direct impacts on some properties with parks and recreational uses. This analysis is provided in Section 4.18, Section 4(f) and Section 6(f) Evaluation.

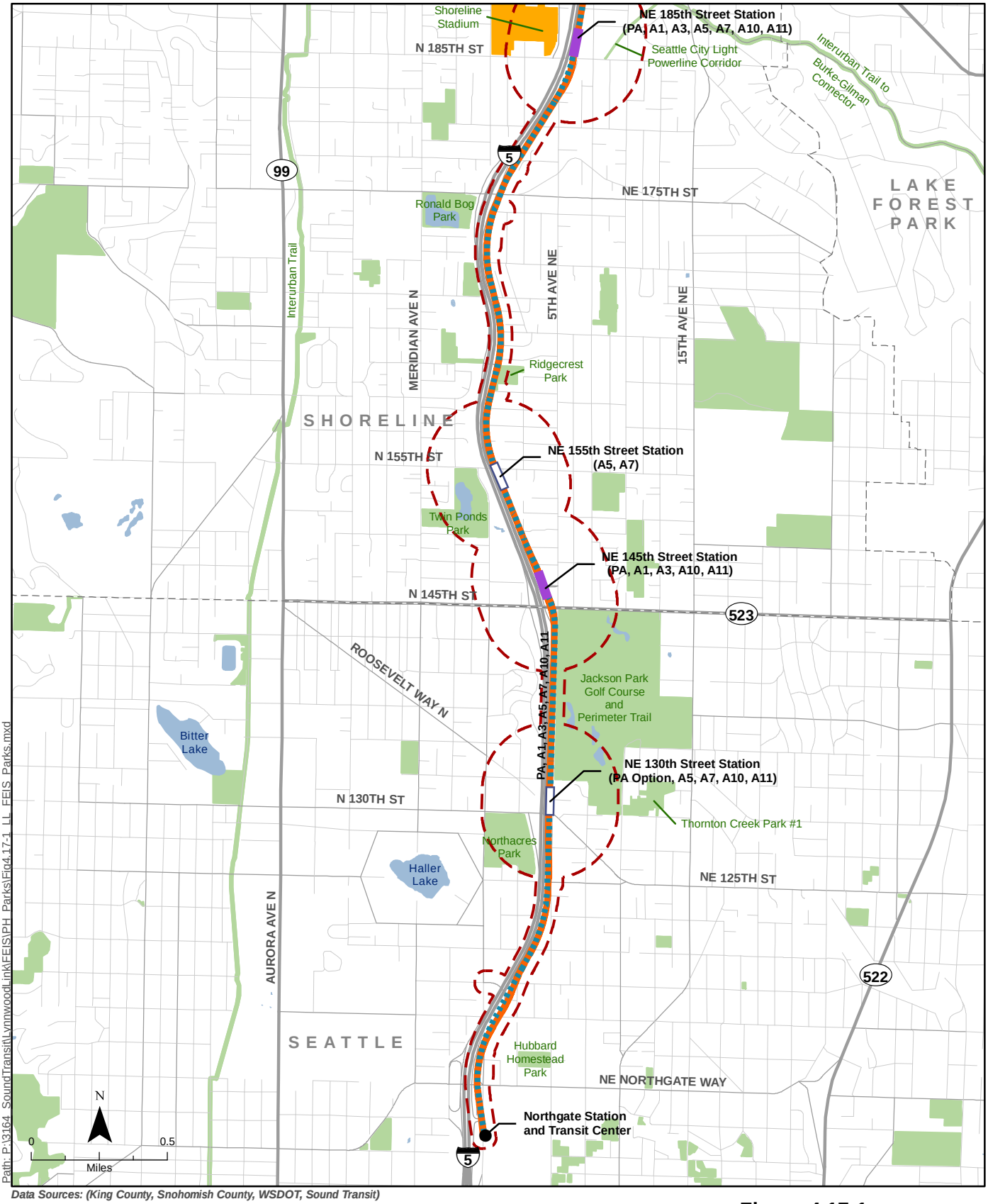
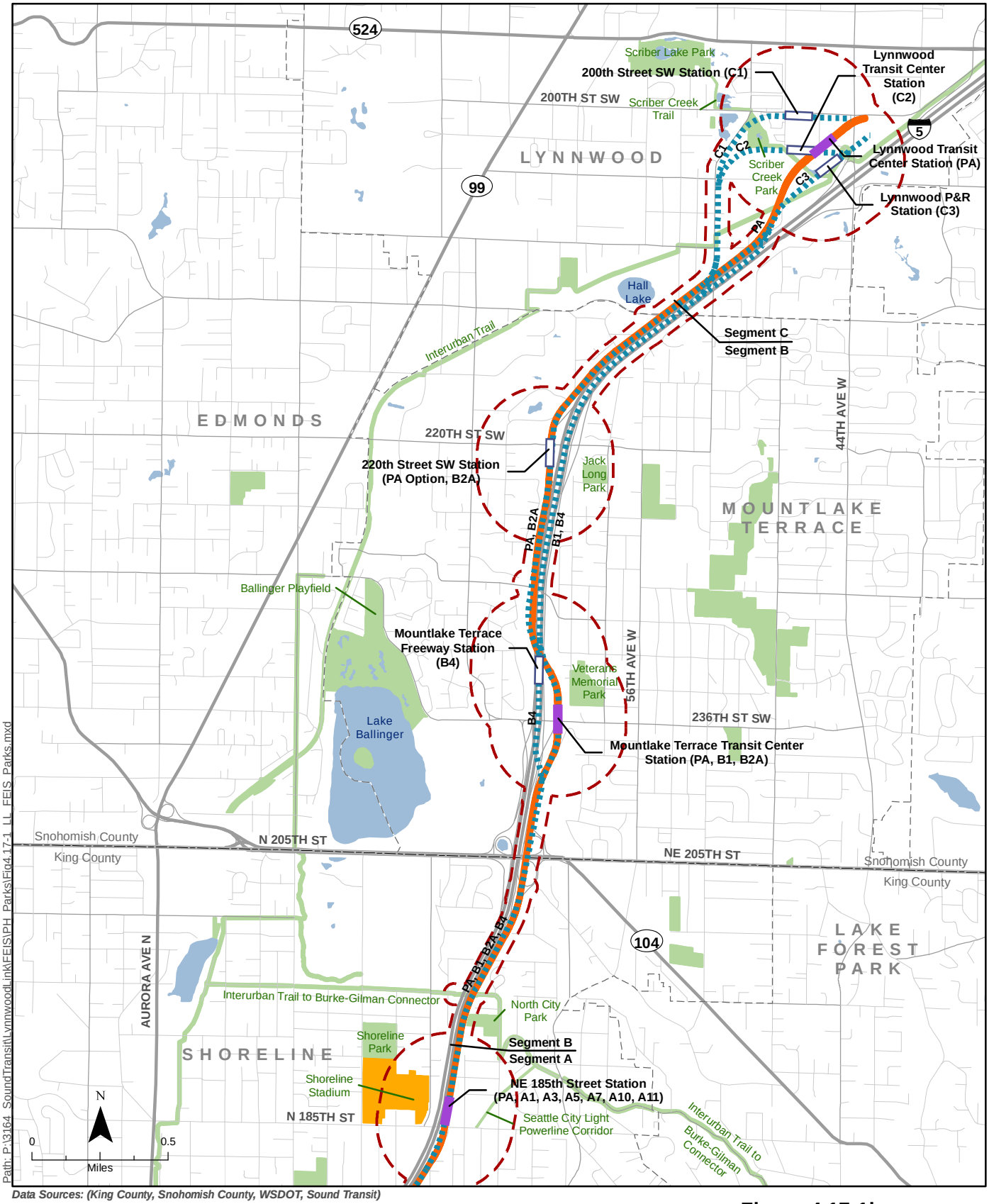


Figure 4.17-1a
Park and Recreational Facilities in the Study Area

Lynnwood Link Extension



Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Study Area
- Public Recreation Facility
- Park
- Trail
- Waterbody

Figure 4.17-1b
Park and Recreational Facilities in the Study Area

Lynnwood Link Extension

Table 4.17-1. Parks and Recreational Resources in the Study Area

Park Facility	Size (acres)	Recreational Uses	Location of Recreational Uses Within Facility	Access Locations	Recreational or Open Space Values
Segment A					
Jackson Park Golf Course City of Seattle	160.38	Golf, walking trail	Throughout; trail facility along boundary.	NE 135th Street	Golf, scenic setting, mature conifers.
Thornton Creek Park #1 City of Seattle	7.8	None	Not applicable (N/A)	N/A	Scenic natural setting.
Northacres Park City of Seattle	20.67	Baseball, softball, soccer, nature trails, off-leash dog area, children's playground.	Throughout	1st Avenue NE	Active recreational facilities, off-leash dog area, large mature forest.
Twin Ponds Park City of Shoreline	21.96	Soccer, tennis, nature viewing, trails, playground.	Throughout; developed recreation located at the east side of park.	1st Avenue NE	Ponds and wildlife viewing access.
Ridgecrest Park City of Shoreline	3.82	Baseball diamond, handball, open grass.	Baseball diamond is nearest the proposed light rail route; handball is located on the east side of the park.	NE 161st Street	None
Seattle City Light Power Line Corridor	2.21	Open space.	Throughout	NE 185th Street, NE 188th Street	None
Shoreline Park and Stadium City of Shoreline	39.62	Football/soccer/track and field stadium, tennis, indoor swimming pool, grass fields, field turf soccer fields, forested trails.	The stadium is located nearest the potential light rail development; other uses are farther to the west.	Primary from 1st Avenue NE, secondary access from NE 185th Street	One of the few venues for large-scale track and field meets in the region; stadium seating for football, track, and soccer events.
Segment B					
Interurban Trail to Burke-Gilman Trail Connector City of Shoreline	(planned)	Planned signed bicycle and trail route connecting Interurban and Burke-Gilman trails.	Follows NE 195th Street to the Burke-Gilman Trail at NE 170th Street in Lake Forest Park; uses existing bridge crossing over I-5.	Part of street system	Urban street
North City Park City of Shoreline	3.96	Forest trails; adjacent school property is open to the public for soccer and playground use.	The forested section of North City Park extends east from the I-5 right-of-way.	10th Avenue NE	Mature Pacific Northwest forest.
Veterans Memorial Park City of Mountlake Terrace	10	Forested walking trails, gazebo, picnicking.	Throughout	232nd Street SW and 58th Avenue West	Mature Pacific Northwest forest; Veterans Memorial installation.
Jack Long Park City of Mountlake Terrace	3	Nature trails, picnicking, horseshoes.	Throughout	58th Avenue West	Mature conifers.

Table 4.17-1. Parks and Recreational Resources in the Study Area

Park Facility	Size (acres)	Recreational Uses	Location of Recreational Uses Within Facility	Access Locations	Recreational or Open Space Values
Segment C					
Interurban Trail City of Lynnwood	N/A	Walking, running, bicycling, skating.	Entire facility	Several street crossings; existing park-and-ride	Long-distance recreational trail.
Scriber Creek Trail City of Lynnwood	N/A	Walking, running, nature viewing.	Throughout	Scriber Creek Park and Lynnwood Park-and-Ride	Nature viewing.
Scriber Creek Park City of Lynnwood	4.59	Nature park with parking, picnicking area, short loop nature trail in the north section of the park and Scriber Creek Trail section to the south.	Picnicking and short loop trail in the northernmost section of the park; wetland trail to the south.	Cedar Valley Road, additional pedestrian access from 48th Avenue West	Mature conifers, natural character, wetland boardwalk, and trail.

Segment A

Jackson Park Golf Course, Seattle

Jackson Park Golf Course is a 27-hole golf course owned by the City of Seattle and managed by a private company. This golf course, which opened in 1930, is characterized by mature conifers and rolling topography. A public walking trail is located near the boundary of the course. In some locations the trail is a soft-surface walking path; in other locations it is a sidewalk.

Thornton Creek Park #1, Seattle

The undeveloped Thornton Creek Park #1 open space consists of riparian forest along the banks of Thornton Creek. There are a few unofficial trails in this park, but otherwise the open space does not accommodate recreational use.

Northacres Park, Seattle

Northacres Park is a large open space that provides baseball, softball, and soccer fields for active recreation, as well as nature trails, play areas, an off-leash dog area, and undeveloped open space for more passive recreation. The children's play area includes a wading pool.

Twin Ponds Park, Shoreline

Twin Ponds Park includes an artificial turf soccer field, children's playground, tennis court, nature trails, and a viewing deck for its namesake ponds.

Ridgecrest Park, Shoreline

Ridgecrest Park features a baseball diamond and a concrete handball court, as well as a grassy outfield/open space area. It has a small parking lot in the southwest corner. Although this park is located just east of I-5, a berm planted with mature cottonwood trees buffers the park from the freeway.

Shoreline Park and Stadium, Shoreline

This recreational complex includes Shoreline Park, Shoreline Stadium, and the Shoreline Pool. Shoreline Park includes tennis courts and two artificial turf soccer fields as well as a small forested area with walking paths. Recreational facilities on a portion of the site owned by the Shoreline School District include an undeveloped grass field and the Shoreline Stadium. The grass field is used for track and field events and informal recreation. The Shoreline Stadium includes an artificial turf football/soccer field as well as track and field facilities. It has a covered grandstand, and hosts large regional high school sports competitions, including an annual invitational track meet as well as football games, track meets, and soccer games. The recreational facilities associated with the Shoreline Stadium are open for public use.

Seattle City Light Power Line Corridor

Between North 185th Street and North 188th Street, Seattle City Light maintains a power line corridor as a grassy open space. A few informal trails cross the corridor. This corridor has no developed facilities, and the prominent overhead power lines reduce the aesthetic quality of the open space.

Segment B

Interurban Trail to Burke-Gilman Trail Connector, Shoreline

This planned route will connect the Interurban Trail and the Burke-Gilman Trail along North/NE 195th Street and NE 170th Street in Lake Forest Park. The route includes the existing pedestrian bridge over I-5 at NE 195th Street. According to the City of Shoreline, this route is primarily a transportation facility that can support recreational activities; impacts on the connector as a transportation facility are discussed in Chapter 3, Transportation Impacts and Mitigation.

North City Park, Shoreline

This small park includes a patch of remnant conifer forest with nature trails. The park is adjacent to a school play area and provides public access to this area, including a grass soccer field and children's play structures. The school's play area is adjacent to I-5 on the east side of the freeway and is buffered from the freeway by a wide stand of mature mixed forest.

Veterans Memorial Park, Mountlake Terrace

Veterans Memorial Park, located just northeast of the Mountlake Terrace Town Center, is a forested park offering nature trails, a gazebo, picnicking, and a children's play area. It also includes a flagpole and plaque as a memorial to veterans.

Jack Long Park, Mountlake Terrace

This small park east of I-5 is located adjacent to the Mountlake Terrace water towers. Its most significant feature is a patch of mature conifers. Recreational facilities include a nature walk trail, picnic tables, a small climbing rock, and horseshoe pits.

Segment C

Interurban Trail, Lynnwood

The Interurban Trail is a regional, multipurpose trail that spans several local jurisdictions. The segment of the trail in the study area is managed by the City of Lynnwood and includes segments on Snohomish County PUD right-of-way, as well as a side-path adjacent to city streets. North of the Lynnwood Park-and-Ride the trail continues adjacent to the I-5 right-of-way.

Scriber Creek Park, Lynnwood

This small park includes a parking area, picnic tables, a grassy area for passive recreation, and a short trail through mature conifers. It includes an open-water pond that is part of a larger wetland extending southward beyond the park property. A trail on the south end of the park (Scriber Creek Trail, described in the following paragraph) provides recreational access to the wetland within the park and expansive views over the larger wetland outside the park. This park was developed with bond funding from Snohomish County, which came with restrictions on how land could be converted to other uses.

Scriber Creek Trail, Lynnwood

Scriber Creek Trail connects Scriber Lake Park with Scriber Creek Park and the Interurban Trail. It enters Scriber Creek Park from Cedar Valley Road, extends southward to the park's boundary at a large wetland, then turns eastward to the edge of the Lynnwood Park-and-Ride and follows the boundary of the park-and-ride southeast, eventually connecting with the Interurban Trail.

4.17.2 Long-Term Impacts

Long-term impacts typically include permanent changes to a resource, such as when a project converts land from a park or recreational resource to another use. Indirect long-term impacts (discussed in Section 4.17.4) include changes to the area surrounding the park or recreational resource that would affect recreational opportunities or the recreational experience. 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 years.

Table 4.17-2 summarizes the long-term impacts that would affect parks and recreational resources in Segment A, where the highest number of resources would be encountered. The impacts in all three segments are described below.

No Build Alternative

The No Build Alternative would not affect parks and recreational resources.

Segment A Alternatives

Jackson Park Golf Course

Near the Jackson Park Golf Course, the Preferred Alternative transitions to an elevated guideway, with an above-grade station north of NE 145th Street and a multi-story parking garage. Portions of the guideway, the station, and the parking structure would be visible from some playing areas of the golf course and from parts of the walking trail along the boundary of the course. The light rail facilities would be most visible from the section of trail along 5th Avenue NE. The visibility of the guideway and station would not affect public use of the golf course or trail but would change some of the views.

For the other alternatives, portions of the guideway would also be visible from within the park, with the mostly elevated alternatives being more visible (A3, A7, and A11). Alternatives A1 and A10 would have similar visual impacts as the Preferred Alternative. For more discussion of this impact on views, see Section 4.5, Visual and Aesthetic Resources. Visual simulations from selected viewpoints within Jackson Park are provided in Appendix G, Visual Simulations and Illustrations (Viewpoint 10).

Thornton Creek Park #1

The project would have no long-term impacts on Thornton Creek Park #1.

Northacres Park

The project would have no long-term impacts on Northacres Park.

Twin Ponds Park

The project would have no long-term impacts on Twin Ponds Park.

Table 4.17-2. Long-Term Impacts, Segment A

Park Facility	Preferred Alternative	Alternative A1	Alternative A3	Alternative A5	Alternative A7	Alternative A10	Alternative A11
Jackson Park Golf Course	No property impacts, but areas with vegetation removal and an elevated NE 145th Street Station would be visible from parts of the golf course and walking trail.	Same as the Preferred Alternative.	Similar to the Preferred Alternative, but elevated guideway more visible.	Visual impacts from vegetation removal only.	Visual impacts from guideway only.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Thornton Creek Park #1	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.
Northacres Park	No anticipated impacts for the NE 145th Street Station Option. The NE 130th Street Station Option would provide improved access to the park; however, restrictions on parking would be needed to discourage use of the parking lot by transit patrons.	No anticipated impacts.	No anticipated impacts.	NE 130th Street light rail station would provide improved access to the park. Restrictions on parking would be needed to discourage use of the parking lot by transit patrons.	Same as Alternative A5.	Same as Alternative A5.	Same as Alternative A5.
Twin Ponds Park	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	NE 155th Street light rail station would provide improved access to the park. Possible unintended use of parking lot may occur as informal parking for light rail patrons. Restrictions on parking would be needed to discourage use of parking lot for transit patrons.	Same as Alternative A5.	No anticipated impacts.	No anticipated impacts.
Ridgecrest Park	The light rail facility would occupy approximately 0.30 acre at the western edge of the park, removing a berm and trees that provide a buffer to I-5. Sound Transit would provide replacement parkland to the south.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table 4.17-2. Long-Term Impacts, Segment A

Park Facility	Preferred Alternative	Alternative A1	Alternative A3	Alternative A5	Alternative A7	Alternative A10	Alternative A11
Shoreline Park and Stadium	The NE 185th Street Station would relocate a local street, affecting 0.18 acre of the Shoreline Stadium property (part of the existing surface parking lot, and the edge of the track and field facility). An option would locate the garage in the existing parking area.	Relocated local road would require use of 0.18 acre of the parking lot and stadium field for Shoreline Stadium. Impacts would include reduced parking spaces.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.	No anticipated impacts.
Seattle City Light Power Line Corridor	Potential minor additional use of informal trail to access light rail station.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Portion of the open space replaced with parking for light rail station.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Ridgecrest Park

The Preferred Alternative would occupy a portion of the park's western edge for the light rail right-of-way. It requires realigning 1st Avenue NE, which offers an opportunity to create replacement parkland to the south to offset the park impact. The total park impact area would be approximately 0.30 acre. This area is adjacent to parking on the south side of the park and to the baseball diamond on the north side. The light rail facility would partially replace a berm and row of mature cottonwoods that currently buffer the park from I-5. A portion of the berm and existing trees may be retained at the northern edge of the park, depending on the final design of the light rail facility.

Figure 4.17-2 shows the area that would be affected within the park. The light rail guideway would be in a retained cut through this area, although the tracks would be close to existing grade. The anticipated impacts would not reduce parking or affect use of the baseball diamond, handball court, or grassy play area. The Preferred Alternative would have a berm, landscaping, or other barriers between the light rail facility and the park to replace the noise reduction and visual screening functions of the affected berm (see Viewpoints 21 and 22 in Appendix G). Also, to replace the property impacted by the light rail facility, property to the south of the existing park would be added to the park, and typical park features such as parking and landscaping would be developed; see Figure 4.17-2 for the proposed mitigation area.

The other Segment A alternatives would have similar impacts as the Preferred Alternative; similar replacement land and other mitigation have been included in those alternatives.

Shoreline Park and Stadium

The Preferred Alternative station at NE 185th Street would realign 5th Avenue NE, requiring retaining walls along the edge of Shoreline Stadium's parking lot and into part of a spur to the running track. About 10 of the 73 parking spaces in the existing parking lot would be affected. These changes within the stadium property would not permanently interfere with sporting activities at the facility or with the stadium's operations. The total impact area, including both parking and field impacts, would be approximately 0.18 acre, and is shown in Figure 4.17-3.

An option to the Preferred Alternative is to locate a five-story parking structure on the stadium's existing surface parking area (Figure 4.17-4). The parking garage would replace the surface spaces of the existing lot. During non-peak transit periods (after evening peak travel and on weekends), additional spaces would be available for stadium users. The parking garage could be seen from the stands and active sports areas, but would not affect user experience or function of the facility.

Path: P:\3164 SoundTransit\LynnwoodLink\FEIS\PH Parks\Fig4.17-2 LL FEIS Park Detail Ridgecrest.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit, Bing Aerial)

All Light Rail Alternatives
Area of Affected Park and Recreation Facility
Area of Impact
Relocated 1st Avenue NE and Replacement Park Land

Figure 4.17-2
Ridgecrest Park Impacts

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Data Sources: (King County, Snohomish County, WSDOT, Sound Transit, Bing Aerial)

Preferred Alternative
Area of Affected Park and Recreation Facility
Area of Impact

Figure 4.17-3
Shoreline Stadium Potential Impacts With Preferred Alternative and Alternative A1

Lynnwood Link Extension

Path: P:\3164 SoundTransit\LynnwoodLink\FEIS\PH Parks\Fig4.17-4 LL FEIS Park Detail Stadium.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit, Bing Aerial)

Area of Affected Park and Recreation Facility

Area of Impact for the Preferred Alternative Option

Figure 4.17-4
Shoreline Stadium Potential Impacts With Preferred Alternative Option

Alternative A1 would have similar impacts to the Preferred Alternative because it would realign 5th Avenue NE to accommodate the parking garage on the west side of I-5. The other Segment A alternatives would place both the parking and the station on the east side of I-5, which would not have any impacts on the stadium.

Seattle City Light Power Line Corridor

Alternative A5 would convert part of the corridor's open space to use as parking areas for the NE 185th Street Station. No other Segment A alternatives would affect this power line corridor.

Segment B Alternatives

Interurban Trail to Burke-Gilman Trail Connector

All alternatives would rebuild the WSDOT bridge that crosses I-5 at NE 195th Street, which is a link in the trail system. The replacement bridge would continue to connect the trails.

North City Park

All alternatives would narrow the forested buffer between North City Park and I-5, but the light rail facility would not be visible from the park. No direct impacts to park property are anticipated.

Veterans Memorial Park

The Preferred Alternative would have no long-term impacts on Veterans Memorial Park. Alternative B1 has an option for a parking garage on what is now surface parking, in an area that borders the park, but does not physically alter the park or trail.

Jack Long Park

The project would have no long-term impacts on Jack Long Park.

Segment C Alternatives

Interurban Trail

All alternatives cross over the Interurban Trail. In all cases, the light rail facility would be elevated over the trail and would not interfere with its use or maintenance. Figure 4.17-5 shows where each alternative crosses the Interurban Trail and the Scriber Creek Trail.

The Preferred Alternative would cross over the Interurban Trail as it passes through an open field and wetland area south of Scriber Creek (see Viewpoint 48 in Appendix G). Several power line poles alongside the trail would be relocated. The light rail guideway would be prominent from the trail, but would not affect the use of the trail for recreation or commuting purposes. Because the trail is already in a visually complex urban setting, the light rail crossing overhead would have a minor impact on the trail character.

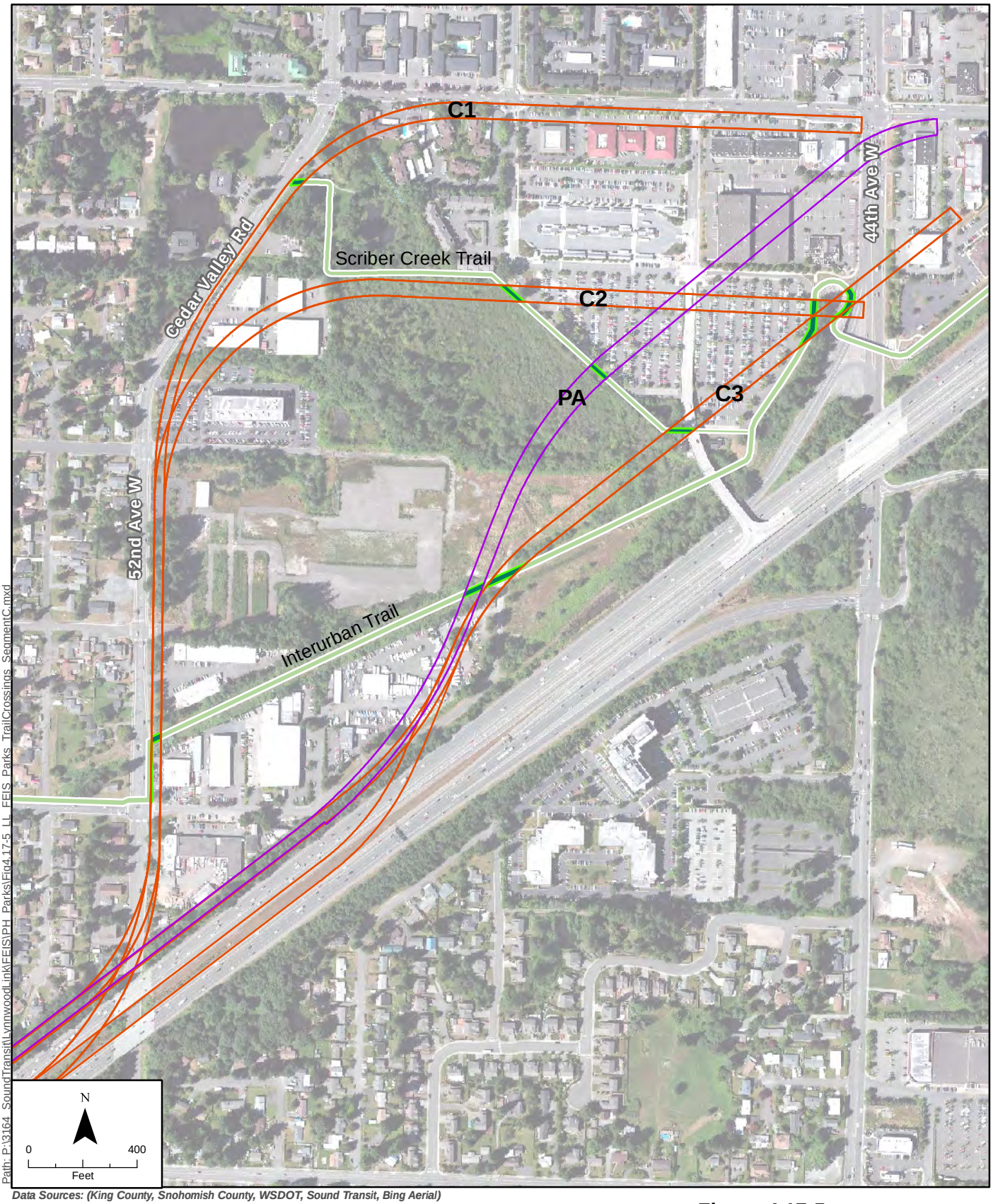


Figure 4.17-5
Segment C Trail Overcrossings

Alternative Footprint
Preferred Alternative
Potential Trail Overcrossing
Trail

Under Alternatives C1 and C2, the guideway would cross over the trail just east of 52nd Avenue West. The elevated tracks would also be located directly east of the trail for approximately half a block extending north from 208th Street SW. The light rail facility would be prominent for trail users; however, the trail is already in a visually complex urban setting in this location and the light rail facility would have a negligible impact on its use and enjoyment.

Under Alternative C2, the tail tracks would extend above the trail near 202nd Street SW as the trail slopes upward to the 44th Avenue West overcrossing.

Under Alternative C3, the elevated guideway would be similar to the Preferred Alternative but cross the trail about 50 feet to the south (see Viewpoint 43 in Appendix G). After crossing the trail, it would then travel northeast, roughly parallel to the trail for about 400 feet, until it crosses the trail again at the ramp leading to the 44th Avenue West overcrossing. An existing set of power line poles alongside the trail would be relocated. The light rail guideway would alter the quality of the views from the trail, but would not affect the use of the trail for recreation or commuting purposes.

Scriber Creek Park

The Preferred Alternative would cross to the Lynnwood Transit Center about 1,000 feet southeast of Scriber Creek Park. Elevated tracks would be visible in the distance, but would be partly screened by vegetation and would be difficult to distinguish from I-5 and the existing HOV direct access ramps, which characterize the more distant views.

Under Alternative C1, an elevated portion of the light rail route would pass above the Scriber Creek Park's entrance road and parking lot. Support columns would be located within the park property, and would directly affect approximately 0.42 acre of the park. The elevated guideway would be a prominent feature of the parking area, crossing directly overhead and changing the experience of the parking lot, which is currently buffered from the surrounding street and neighborhoods by established vegetation. The light rail facility would be visible from the short nature trail and picnic areas in the park but would not be as prominent as it would be from the parking area, and would not restrict recreational activities inside the park. While mitigation or other design measures could reduce impacts, Alternative C1 would still modify the character of the park by introducing larger-scale transportation infrastructure within the park. Public comments on the Draft EIS consistently described the natural setting of the park as a key part of its character. Figure 4.17-6 shows the area within the park anticipated to be used for the project right-of-way. Also, see Viewpoints 43 and 44 in Appendix G.

Path: P:\3164_SoundTransit\LynnwoodLink\FEIS\PH_Parks\Fig4.17-5_LL_FEIS_Park_Detail_SriberCreek.mxd

Data Sources: (King County, Snohomish County, WSDOT, Sound Transit, Bing Aerial)

Potentially Affected Park and Recreation Facility
Potential Impact
Potentially Impacted Taxlot

Figure 4.17-6
Scriber Creek Potential Impacts

Under Alternative C2, an elevated guideway would pass over a wetland area adjacent to and south of the park and be visible from the segment of Scriber Creek Trail located in this area of the park, as shown in Figure 4.17-4 and Viewpoints 41 and 42 in Appendix G. Although the park would not experience direct property impacts, the light rail would be a prominent part of the view from the trail and would change the experience of this area of the park, which is focused on the natural wetland area. Enjoyment of some activities in the park, including wildlife watching and enjoyment of the natural environment of the adjacent wetland, could be diminished by the proximity of the elevated structure.

The project includes noise walls to mitigate noise impacts at nearby residences, which would also minimize noise increases in the park. Support columns, the elevated guideway, and the presence of passing trains would change the natural character of the wetland view from the park. Without mitigation, Alternative C2 would reduce the natural character of the park setting and user experience.

Alternative C3 would be about 1,100 feet southeast of the park. While the elevated light rail guideway would be visible from a park trail at the southeast edge of the park, it would be a distant view, similar to that of the Preferred Alternative.

Scriber Creek Trail

Each Segment C alternative includes an overcrossing of the Scriber Creek Trail, and effects would be similar to those described above for the Interurban Trail. The overcrossing would change the visual character of the trail in that location but not affect trail use.

With the Preferred Alternative, the elevated light rail guideway would cross over the Scriber Creek Trail on the southwest side of the park-and-ride. Views of the wetlands associated with Scriber Creek would not be obstructed.

Under Alternative C1, the light rail would cross the trail inside Scriber Creek Park where the trail is adjacent to the park's parking area, near 52nd Avenue West.

Under Alternative C2, the light rail would cross the trail as it follows the edge of the Lynnwood Park-and-Ride near 48th Avenue West. The elevated guideway would be adjacent to the trail for approximately 500 feet, including the portion of the trail on the southern boundary of Scriber Creek Park and its extension to 48th Avenue West. This section of the trail is alongside the Scriber Creek wetland.

Under Alternative C3, the location and character of the overcrossing would be farther south, closer to the HOV ramp to I-5, but its effects would be similar to that of the Preferred Alternative.

4.17.3 Construction Impacts

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 small portions of the parks closest to the light rail facilities being constructed. Visual and noise impacts would be temporary and would not inhibit park use. The parks and recreational facilities with direct physical impacts from one or more of the alternatives (Ridgecrest Park, Shoreline Park and Stadium, and Scriber Creek Park) could have areas that are temporarily affected to allow construction access, staging, utility relocation, or other construction activities.

All alternatives would require temporary trail closures and detours. In Segment A, the Preferred Alternative and other alternatives would close a bridge that is related to the planned Interurban Trail to Burke-Gilman Trail connector, because WSDOT's existing pedestrian bridge crossing I-5 at NE 195th Street would be rebuilt. A detour to either NE 185th Street or NE 205th Street/Ballinger Way NE would be available during construction.

All alternatives would cross the Interurban Trail near the Lynnwood Transit Center. Work above or adjacent to the trail would involve short-term delays or longer, but temporary closures and detours would occur depending on the work involved.

The Preferred Alternative and Alternatives C2 and C3 would temporarily close a segment of the Scriber Creek Trail adjacent to the park-and-ride during construction, but detours would maintain connections to Scriber Creek Park and the Interurban Trail.

Tables 4.17-3 through 4.17-5 summarize the construction impacts for all light rail alternatives by segment.

4.17.4 Indirect and Secondary Impacts

The Lynnwood Link Extension could improve access to parks and recreational facilities. The facilities may experience increased congestion and unplanned parking, requiring cities in the affected areas to restrict parking to park and recreational users.

In Segment A, the Shoreline Park and Shoreline Stadium could be affected by unauthorized transit patron parking as well as increased roadway congestion under all alternatives. Although there are no current plans for redevelopment of the complex, which is school district property, the light rail station could increase the potential for redevelopment.

Table 4.17-3. Potential Construction Impacts, Segment A

Park Facility	Preferred Alternative	Alternative A1	Alternative A3	Alternative A5	Alternative A7	Alternative A10	Alternative A11
Jackson Park Golf Course	Noise and minor visual impacts from construction of facility along 5th Avenue NE, and from construction of NE 145th Street Station.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Ridgecrest Park	Light rail facility and a relocated underground sewer line would be located on western part of the park, replacing existing buffer; park would have noise and visual impacts during construction.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Shoreline Park and Stadium	Noise and visual impacts during construction. Parking restrictions to stadium. Short-term closures of parts of the track and field areas. An option with a parking garage would temporarily close the parking area, but alternative parking locations would be available.	Same as the Preferred Alternative.	No impacts.	No impacts.	No impacts.	No impacts.	No impacts.
Interurban Trail to Burke-Gilman Trail Connector (planned)	Temporary closure for replacement of NE 195th Street pedestrian bridge.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table 4.17-4. Potential Construction Impacts, Segment B

Park Facility	Preferred Alternative	Alternative B1	Alternative B2A	Alternative B4
North City Park	Noise and screened views of construction activities.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Veterans Memorial Park	Alteration of transit center sidewalks connecting to a park trail, but the park would remain accessible.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	No impacts.

Table 4.17-5. Potential Construction Impacts, Segment C

Park Facility	Preferred Alternative	Alternative C1	Alternative C2	Alternative C3
Interurban Trail	Short-term closures with detours during construction.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Scriber Creek Park	Minor visual impacts on the wetland boardwalk area of the park.	Short-term partial closure of the park during construction. Visual and noise impacts.	Noise and visual impacts during construction activities.	Same as the Preferred Alternative.
Scriber Creek Trail	Detour around temporary closure of the section of the trail on sidewalks connecting Scriber Creek Park and the Interurban Trail.	Detour during a short-term closure of trail entrance to Scriber Creek Park.	Short-term closure during construction of elevated guideway.	Same as the Preferred Alternative.

At Northacres Park, light rail alternatives that include a light rail station at NE 130th Street (Alternatives A5, A7, A10, and A11) would have potential indirect effects on the park. The light rail station would improve access to the park, which could increase use of park facilities. The park may also be used as a pedestrian or bicycle route for neighborhood residents using the light rail facility. Its parking area could also be used for parking by light rail users, reducing the capacity for park users.

For Twin Ponds Park, the light rail alternatives that include a light rail station at NE 155th Street (Alternatives A5 and A7) would have effects similar to those described above for Northacres Park.

In Segment B, Veterans Memorial Park could benefit from higher levels of use due to increased development in the areas targeted by the City of Mountlake Terrace for transit-oriented development. Apart from the Lynnwood Link Extension, an improved pedestrian connection could be developed by others between the Mountlake Terrace Town Center and the station. This could increase the number of users in the park. The Veterans Memorial Park trail also could experience increased use from commuters accessing the station area. This effect would occur with all Segment B alternatives.

In Segment C, Scriber Creek Park and Scriber Creek Trail could have increased use due to high levels of development in the station area. Several properties adjacent to the park and trail could be developed to higher levels. The Interurban Trail also could experience increased use from commuters accessing the station area.

4.17.5 Cumulative Impacts

The proposed OMSF, if sited in Lynnwood, would be adjacent to the southwest corner of Scriber Creek Park and the Scriber Creek Trail. While the light rail facility would not occupy park property, it would be adjacent to a corner of Scriber Creek Park and would require lead track guideways over the Interurban Trail to connect to the light rail alternatives. Part of the parcels that currently buffer the park and trails could also be developed. The light rail facility could be visible from some locations in the park but would be clearly visible from portions of the Interurban Trail. The Edmonds School District has a master plan for a support services building and bus storage facility on its property. The Lynnwood site alternative for the OMSF would overlap with the Edmonds School District property. Either project or potentially both projects would cumulatively increase the view impacts experienced by trail users, but overall impacts would remain minor.

No major additional changes to parks or recreational resources by other projects or actions are anticipated. The No Build Alternative and the light rail alternatives assume continued population and employment growth through 2040, which would likely increase the use of parks and recreational facilities throughout the project area.

4.17.6 Potential Mitigation Measures

For all of the affected resources, Sound Transit would work closely with the owning or managing jurisdictions to design and implement measures and construction plans that minimize potential long-term and construction effects. Many of the mitigation measures identified in this 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 resources and their users. Similarly, where park property would be needed for the proposed project, Sound Transit would work with the agency that has jurisdiction to provide compensation, consistent with the procedures outlined in Section 4.1, Acquisitions, Displacements, and Relocations. Potential mitigation measures for the affected resources include:

- **Northacres Park** (Preferred Alternative 130th Street Station Option; Alternatives A5, A7, A10, and A11). Signage would limit potential parking impacts due to unauthorized parking by transit patrons.
- **Twin Ponds Park** (Alternatives A5 and A7). Signage would limit potential parking impacts due to unauthorized parking by transit patrons.
- **Ridgecrest Park** (all alternatives). Sound Transit would coordinate with the City of Shoreline to provide landscaping and restoration of the affected area, and place a barrier between the light rail facility and the park to function like the existing berm in buffering I-5 noise and views of I-5. The project would also design and rebuild 1st Avenue NE from NE 159th Street to NE 161st Street in coordination with the City, and transfer replacement property at the south end of the park, or other property as agreed to with the City, consistent with the requirements of Forward Thrust. The replacement land would be developed to a level comparable to the displaced park area, and the design process would include outreach in the adjacent neighborhood to inform roadway and park design, in coordination with the City.
- **Shoreline Park and Stadium** (Preferred Alternative and Alternative A1). Sound Transit would restore affected areas after construction, and would coordinate access improvements and construction activities with the Shoreline School District.

  For the Preferred Alternative NE 185th Street Station Option, Sound Transit would also enter into an agreement with the School District to develop the garage and establish a shared-use agreement for using the garage for stadium events or casual recreation.
- **Trails**. For all temporary trail closures or reroutes associated with construction, Sound Transit would coordinate with appropriate local jurisdictions to develop detours, and to provide public information and

detour routes with signage during construction to allow for continued connections.

- **Scriber Creek Park**. For Alternative C1, Sound Transit would need to address Section 4(f) requirements that have not yet been satisfied (see Section 4.18, Section 4(f) and Section 6(f) Evaluation). Sound Transit would coordinate with the City of Lynnwood and Snohomish County to develop landscaping and site improvements to offset the impact of guideway encroachments; options could also include expanding the park or improving trail connections. Any necessary property acquisition would be coordinated with both the City and the County, in accordance with original agreements funding the park. For Alternative C2, Sound Transit would either provide landscaping and trail improvements to reduce the visual impacts and related changes to the park's setting or it would implement other mitigation as agreed to with the City of Lynnwood.

For mitigation for construction impacts that do not involve physical changes to a park or recreational facility, Sound Transit would coordinate with appropriate jurisdictions and facility operators to minimize impacts. Mitigation for construction period impacts would include outreach to the public 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.

4.18 Section 4(f) and Section 6(f) Evaluation

This section addresses a federal law known as Section 4(f), which protects parks, recreation areas, historic and cultural resources, and wildlife and waterfowl refuges, and another law known as Section 6(f), which restricts the conversion of lands previously purchased with money from the Land and Water Conservation Fund (LWCF).

4.18.1 Section 4(f)

The U.S. Department of Transportation Act of 1966, Section 4(f), generally prohibits U.S. Department of Transportation (USDOT) agencies (including the FTA) from approving projects that would use land from:

> …a significant publicly-owned park, recreation area or wildlife and waterfowl refuge or any significant historic site, unless there is no feasible and prudent alternative to the use of land from the property and the action includes all possible planning to minimize harm to the property resulting from the use.

A *use* is generally defined as a transportation activity that permanently or temporarily acquires land from a Section 4(f) property, or that substantially impairs the important activities, features, or attributes that qualify the property as a Section 4(f) resource.

Section 4(f) applies to significant 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. The USDOT regulations for Section 4(f) define historic properties as those listed in or eligible for the NRHP.

The Section 4(f) study area for this project is based on the APE used for cultural, archaeological, and historic resources (see Section 4.16, Cultural, Archaeological, and Historic Resources) and the parks and recreational resources analysis (see Section 4.17, Parks and Recreational Resources). This evaluation also takes into account the areas of effect and analyses from other environmental investigations, including acquisitions, displacements, and relocations; transportation; land use; noise and vibration; and visual and aesthetic resources.

4.18.2 "Uses" of Section 4(f) Resources

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 any portion of the resource (typically during construction), and it substantially impairs the resources. A temporary occupancy can avoid being a Section 4(f) "use" if:

- The project would occupy the property less than the time needed for the construction of the project, and there will be no change in ownership;
- There are minimal changes to the Section 4(f) resource;
- There are no permanent adverse physical changes or interference with protected activities, features, or attributes of the resource;
- The land is restored to the same or better condition; and
- The federal, state, or local officials with jurisdiction over the resource and the authority over the land agree in writing that the use is not adverse.

Constructive, or indirect, use can occur when the project is near the Section 4(f) resource and has effects that substantially impair the protected activities, features, or attributes of a property. For example, a park property that is primarily a scenic viewpoint could have a constructive use if a transportation project blocks its views.

Conditions for Approval of a Use for a Section 4(f) Property

The FTA can approve a transportation use of a Section 4(f) property only if:

- The use of the property meets the requirements for a regulatory exception established under Section 4(f). For instance, a temporary occupancy can be allowed if it meets the requirements described above.

or:

- The use will have a *de minimis* impact on the property.

or:

- There is no feasible and prudent *avoidance* alternative to using the property; and
- The program or project includes all possible planning to minimize harm to the property resulting from the use.

De minimis impacts cannot "adversely affect the activities, features, and attributes" of a Section 4(f) resource. A *de minimis* impact finding can take into account any mitigation or enhancement measures that would be implemented, including design measures to avoid or reduce impacts. Before FTA can make this finding, it must send a written notice to notify the official with jurisdiction over the resource, and there must be an opportunity for public notice and comment (the Draft EIS comment period served this purpose for the Lynnwood Link Extension).

For public parks or recreation properties, a *de minimis* impact finding requires written concurrence from the agency with jurisdiction over the property, such as a city or county parks department. For historic and archaeological sites, a *de minimis* impact is allowed if FTA has determined "no adverse effect" in compliance with Section 106 of the NHPA (see Section 4.16). Prior to making a *de minimis* finding, FTA must send a written notice to the SHPO. If the SHPO concurs or does not object, FTA may proceed with a *de minimis* finding.

When FTA has made a *de minimis* determination, the project is not required to analyze avoidance alternatives for that Section 4(f) property.

Avoidance Alternatives and Least Harm Analysis

When a project's Section 4(f) impact would be greater than *de minimis*, FTA must consider whether there are feasible and prudent alternatives that would avoid the impact. As defined in the Section 4(f) regulation, an alternative is feasible if it can be built as a matter of sound engineering judgment. An alternative is prudent if:

- It meets the project purpose and need and does not compromise the project to a degree that makes it unreasonable to proceed in light of its stated purpose and need; and
- It does not cause extraordinary operational or safety problems; and

- It causes no other unique problems or severe economic or environmental impacts; and
- It would not cause extraordinary community disruption; and
- It does not have construction costs of an extraordinary magnitude; and
- There are no other factors that collectively have adverse impacts that present unique problems or reach extraordinary magnitudes.

If FTA finds that an alternative is not feasible and prudent, that alternative is removed from consideration as a way to avoid a Section 4(f) use. If there are no prudent and feasible alternatives that can avoid all Section 4(f) resources, then FTA must determine which alternative results in the least overall harm, after considering the following factors:

i. The ability to mitigate adverse impacts to each Section 4(f) property (including mitigation measures that result in benefits to the property);
ii. The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features of the Section 4(f) property;
iii. The relative significance of each Section 4(f) property;
iv. The views of the official(s) with jurisdiction over each Section 4(f) property;
v. The degree to which each alternative meets the purpose and need for the project;
vi. After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
vii. Substantial differences in costs among the alternatives.

4.18.3 Section 6(f) Resources

The LWCF Act provides funds for acquiring or developing parks and recreation areas. Section 6(f) of the LWCF prohibits conversion of LWCF properties to a non-recreational purpose, without the approval of the U.S. Department of the Interior's National Park Service.

Sound Transit reviewed the records of grants under the LWCF, which are maintained by the Washington State Recreation and Conservation Office. There are two properties in the study area developed with LWCF funds: Twin Ponds Park in Shoreline and Jack Long Park in Mountlake Terrace. Neither property would be directly converted to a non-recreational use; the potential for indirect impacts (such as the possibility of transit users using the parks for unauthorized parking) is discussed in Section 4.18.5.

4.18.4 Section 4(f) Resources

Sound Transit's Section 4(f) analysis considered potential impacts on significant publicly owned parks, recreation areas, and NRHP-eligible historic properties in a

study area that extended 200 feet from any potential project feature. Sound Transit also reviewed existing public agency records and plans, performed field inspections, and coordinated with the agencies that own or have jurisdiction over the resources. The Section 4(f) analysis reflects Sound Transit's and FTA's research and coordination for Section 106 of the NHPA, as described in Section 4.16, and the parks and recreational analysis discussed in Section 4.17. These efforts helped Sound Transit and FTA identify the important features, qualities, and characteristics of potential Section 4(f) resources.

Sound Transit did not find any public wildlife and waterfowl refuges in the study area. Historic properties and parks and recreation properties were the only Section 4(f) resources found within the study area. The parks, recreation, or NRHP-eligible historic resources within the study area that qualify as Section 4(f) resources are shown on Figures 4.18-1a and 4.18-1b.

Historic Resources

Sound Transit conducted a historic resources field survey considering every property within 200 feet of any of the alternatives. The survey documented every property built on or before 1970, although the standard age threshold for NRHP eligibility is 50 years. Over 600 properties were surveyed. Four historic resources have been determined eligible for listing in the NRHP.

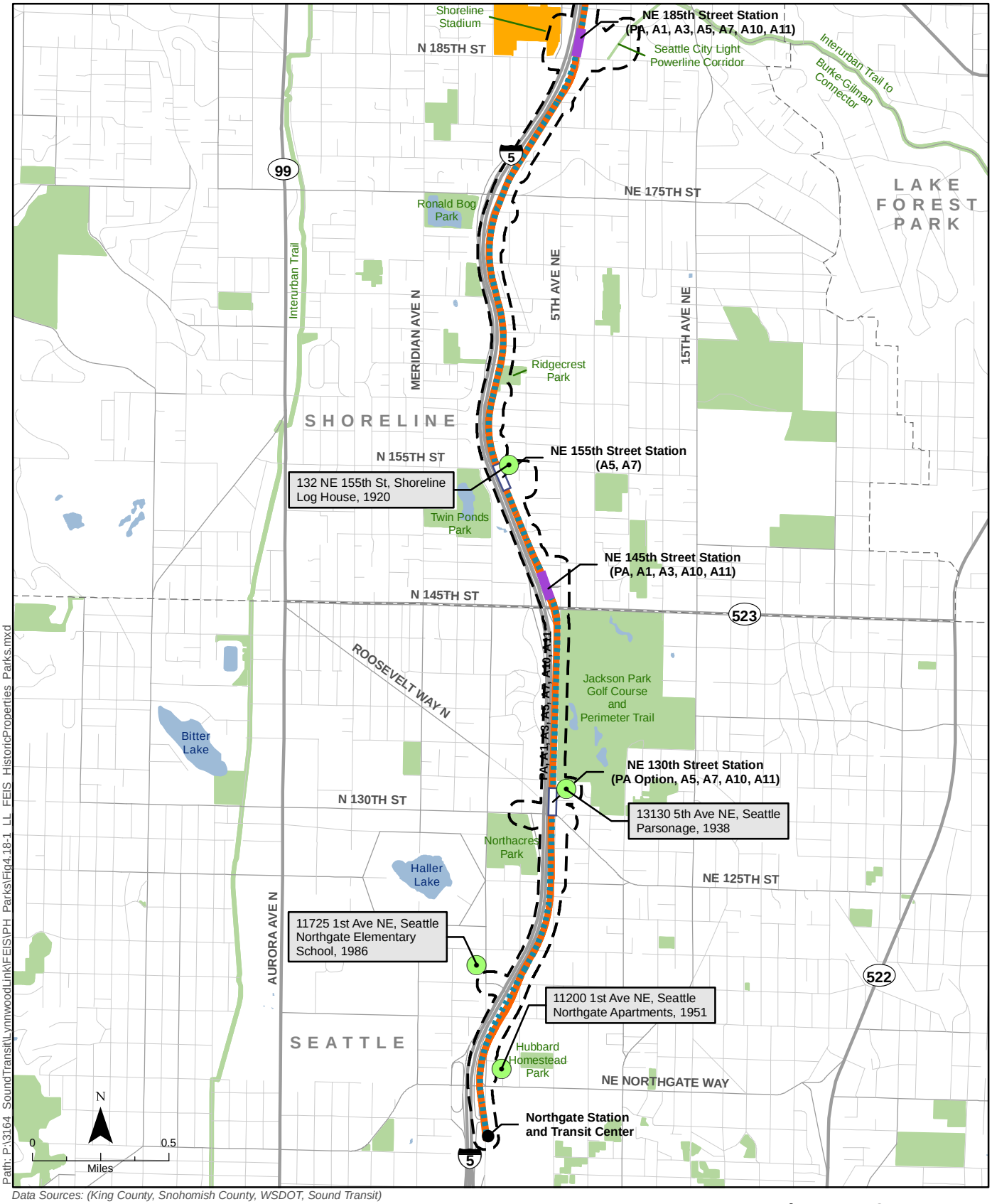
Table 4.18-1 lists the historic resources in the study area.

Table 4.18-1. Historic Properties

Address	Description	Construction Date	Historic Status	Section 4(f) Resource?
11200 1st Avenue NE, Seattle (Segment A)	Northgate Plaza Apartments	1951	Eligible NRHP Criterion C	Yes
11725 1st Avenue NE, Seattle (Segment A)	Northgate Elementary School	1956	Eligible NRHP Criterion C	Yes
132 NE 155th Street, Shoreline (Segment A)	Log House	1920	Eligible NRHP Criterion C	Yes
13130 5th Avenue NE, Seattle (Segment A)	Parsonage	c. 1920	Eligible NRHP Criterion C	Yes

Field surveys, records reviews, and contacts with tribes in the study area and the SHPO revealed no significant archaeological resources or traditional cultural properties in the study area.

For more detail on individual historic resources in the study area and the project's Section 106 research and consultation efforts, see Section 4.16 and the *Cultural, Archaeological, and Historic Resources Technical Report.*

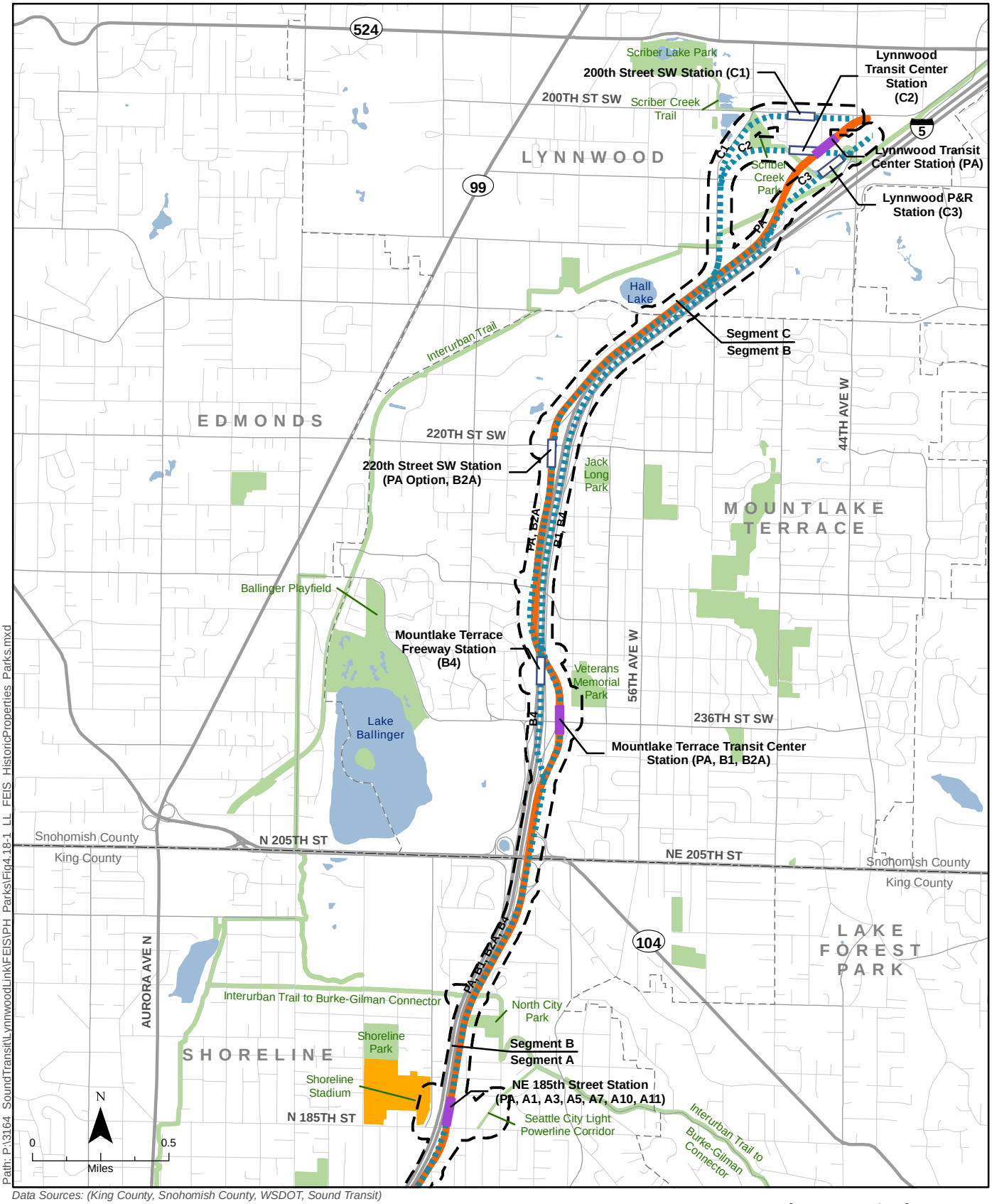


Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Trail
- Study Area
- Historic Property Within Study Area
- Public Recreation Facility
- Park

Figure 4.18-1a
Section 4(f) Resources in Segment A Study Area

Lynnwood Link Extension



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Data Sources: (King County, Snohomish County, WSDOT, Sound Transit)

- Preferred Alternative (PA)
- Preferred Alternative Station Location
- Other Light Rail Alternatives
- Other Alternative Station Location
- Preferred Alternative and Other Alternatives
- Trail
- Study Area
- Historic Property Within Study Area
- Public Recreation Facility
- Park

Figure 4.18-1b
Section 4(f) Resources in Segments B and C Study Area

Lynnwood Link Extension

Parks and Recreational Resources

Table 4.18-2 lists parks and recreational resources in the study area, and identifies the resources qualifying as Section 4(f) or Section 6(f) properties. Section 4.17 has more detail about these resources.

Table 4.18-2. Parks and Recreational Properties Reviewed for Section 4(f) and Section 6(f) Eligibility

Park Facility and Owner or Jurisdiction	Size	Recreational Uses	Section 4(f) Resource?	Section 6(f) Resource?
Segment A: Seattle to Shoreline				
Jackson Park Golf Course, City of Seattle	161 acres	Golf, walking trail	Yes	No
Northacres Park, City of Seattle	21 acres	Baseball, softball, soccer, nature trails, off-leash dog area, children's playground	Yes	No
Twin Ponds Park, City of Shoreline	22 acres	Soccer, tennis, nature viewing, trails, playground	Yes	Yes
Ridgecrest Park, City of Shoreline	3.8 acres	Baseball diamond, handball, open grass	Yes	No
Shoreline Stadium, Shoreline Public Schools	40 acres	Football/soccer/track and field stadium with adjacent parking area	Yes	No
Segment B: Shoreline to Mountlake Terrace				
Interurban Connector Trail, City of Shoreline	(planned)	Planned signed bicycle and trail route connecting Interurban and Burke-Gilman trails, crossing I-5	No. Planned trail on city streets and WSDOT-owned facilities is considered a transportation facility.	No.
North City Park, City of Shoreline	4 acres	Forest trails, plus adjacent school has open public playgrounds and fields	Yes	No
Veterans Memorial Park, City of Mountlake Terrace	10 acres	Forested walking trails, gazebo, and picnicking	Yes	No
Jack Long Park, City of Mountlake Terrace	3 acres	Nature trails, picnicking, horseshoes	Yes	Yes
Segment C: Mountlake Terrace to Lynnwood				
Interurban Trail, Snohomish County PUD, City of Lynnwood	15 miles	Walking, running, bicycling, skating	Yes	No
Scriber Creek Trail, City of Lynnwood	1.5 miles	Walking, running, nature viewing	Yes	No
Scriber Creek Park, City of Lynnwood	4.7 acres	Nature park with parking, picnicking area, short loop nature trail in the north section of the park and Scriber Creek Trail section to the south	Yes	No

4.18.5 Potential Impacts on Section 4(f) and Section 6(f) Resources

Sound Transit reviewed all locations where Section 4(f) or Section 6(f) properties could be affected by light rail alternatives. Table 4.18-3 summarizes the potential impacts. Unaffected properties in the study area are not listed. For Section 6(f) resources, Sound Transit's analysis concluded there would be no potential for a direct or indirect conversion of any part of Twin Ponds Park or Jack Long Park, satisfying Section 6(f) requirements.

The Draft EIS included a preliminary Section 4(f) evaluation, as well as a listing of potential *de minimis* findings FTA was considering. The public review period for the Draft EIS also served as a public notice and comment opportunity for *de minimis* findings for the alternatives studied in the Draft EIS.

For this Section 4(f) evaluation, Sound Transit and FTA have coordinated with the Cities of Seattle, Shoreline, Mountlake Terrace, and Lynnwood, as well as with the Snohomish County PUD and the Shoreline School District, which are the resource owners or managing jurisdictions for parks and recreational facilities in the project area. Through the Section 106 process, Sound Transit and FTA have also consulted with the SHPO and tribes on cultural and historic resources.

The Section 4(f) evaluation identifies potential uses of Section 4(f) resources, along with mitigation and avoidance measures. The evaluation considers public comments on the Draft EIS, and reflects Sound Transit and FTA coordination with the agencies with jurisdiction as they developed measures to minimize and mitigate impacts. The impacts include acquisition and conversion of properties to a transportation use, as well as proximity impacts that could affect the property (which federal regulations refer to as a "constructive use"). Where FTA has found no Section 4(f) use, it means there are no impacts that would adversely affect the features, attributes, or activities qualifying the properties as Section 4(f) resources.

Table 4.18-3. Section 4(f) Impacts

Section 4(f) Resource	Alternatives	Section 4(f) Use Determination
PARK AND RECREATION PROPERTIES		
Jackson Park Golf Course	Preferred Alternative and all other Segment A alternatives	No Section 4(f) use.
Ridgecrest Park, City of Shoreline	Preferred Alternative and all other Segment A alternatives	*De minimis.* Light rail facility would be located on the west edge of the park, removing a berm and trees that provide an existing visual buffer. The park would experience property and visual impacts but current park functions and activities would not be substantially changed. In addition to restoring areas affected by construction, including providing a barrier to replace an existing berm, Sound Transit would

Table 4.18-3. Section 4(f) Impacts

Section 4(f) Resource	Alternatives	Section 4(f) Use Determination
		provide replacement property to the south of the park to compensate for parkland converted to transportation use, with features and design details to be developed during final design with the City of Shoreline. Shoreline has signed a letter of concurrence.
Northacres Park, City of Seattle	Preferred Alternative with NE 130th Street Option; Alternatives A5, A7, A10, and A11	No Section 4(f) use. Unauthorized parking by transit users would be prohibited.
Twin Ponds Park, City of Shoreline	Alternatives A5, A7, and A11	No Section 4(f) use. Unauthorized parking by transit users would be prohibited.
Shoreline Stadium, Shoreline School District	Preferred Alternative, Alternative A1	*De minimis*. With the Preferred Alternative and Alternative A1, the garage between 5th Avenue NE and I-5 would require a minor right-of-way acquisition for a roadway realignment and new retaining wall, affecting part of the larger parcel containing the stadium, and affecting several parking spaces for the stadium. Sound Transit would restore affected areas and make facility improvements defined in coordination with the Shoreline School District during final design. The District has signed a letter of concurrence.
	Preferred Alternative with Shoreline Stadium Parking Garage Option	Potential *de minimis* only if Shoreline School District concurs. With this option for a shared-use garage on the stadium parking lot, Sound Transit would build a garage on District property, with spaces to be available for stadium users, and replacement parking supplied off site during construction. Sound Transit would provide landscaping, access improvements, restoration of other affected areas, and coordinated planning with the District during final design and construction. FTA has determined that the impact would qualify as *de minimis* if the District concurs. However, the Shoreline School District has not yet concurred, and the option could not be selected for further development without future written agreement by the District.
North City Park, City of Shoreline	Preferred Alternative and all other Segment B alternatives	No Section 4(f) use.
Veterans Memorial Park, Mountlake Terrace	Segment B Preferred Alternative, B1 and B2A	No Section 4(f) use. Alternative B1 has an option for a parking garage on the existing surface lot adjacent to the park. There are no direct impacts to the park, and potential indirect impacts would not cause a constructive use of park property.

Table 4.18-3. Section 4(f) Impacts

Section 4(f) Resource	Alternatives	Section 4(f) Use Determination
Jack Long Park, City of Mountlake Terrace	Alternatives B1 and B4	No Section 4(f) use.
Interurban Trail, Snohomish County PUD, City of Lynnwood	Preferred Alternative	No Section 4(f) use. No direct or constructive long-term 4(f) uses. Temporary construction closures meet the criteria for temporary occupancy. The City of Lynnwood has agreed in writing that the project meets Section 4(f) exceptions for temporary occupancy during construction. Detour routes to be provided during short-term construction closures.
	All other Segment C alternatives	No Section 4(f) use, presuming written agreement with the City of Lynnwood. (Sound Transit requested written agreement specifically for the Preferred Alternative.)
Scriber Creek Park, City of Lynnwood	Preferred Alternative	No Section 4(f) use.
	Alternative C1	Section 4(f) use. The alternative would occupy part of the park with columns and would remove trees and vegetation.
	Alternative C2	No Section 4(f) use. There is no direct use, and mitigation would reduce visual and setting impacts to levels that would not impair the park's essential functions, attributes, and activities.
	Alternative C3	No Section 4(f) use.
Scriber Creek Trail, City of Lynnwood	Preferred Alternative	No Section 4(f) use. The City of Lynnwood has agreed in writing that the project meets Section 4(f) exceptions for temporary occupancy during construction. Detour routes would be provided during short-term construction closures.
	Alternatives C2 and C3	No Section 4(f) use, presuming written agreement with the City of Lynnwood. (Sound Transit requested written agreement specifically for the Preferred Alternative.)
HISTORIC PROPERTIES		
Northgate Plaza Apartments	All Segment A alternatives	No Section 4(f) use.
Log House	Alternatives A5 and A7	No Section 4(f) use.
Northgate Elementary School	Alternatives A1, A5, and A10	No Section 4(f) use.
Parsonage	All Segment A alternatives	No Section 4(f) use.

Segment A

Northgate Plaza Apartments (Historic)

All Segment A Alternatives, including the Preferred Alternative, would place the light rail guideway between the Northgate Plaza Apartments and I-5, which would alter some views to and from the apartments. No alternative would physically alter the building or the property or adversely affect the property's historic qualities. While the guideway would be visible adjacent to I-5, it would not impair the building's historic qualities, and would not rise to the level of a constructive use.

Log House (Historic)

Alternatives A5 and A7 include a NE 155th Street Station several properties away, and a park-and-ride structure would be across an arterial from the historic log house. There would be no physical impacts, and the development of nearby areas for light rail would not substantially impair its historic characteristics, which do not depend on its setting.

Northgate Elementary School (Historic)

While the Preferred Alternative would have no effect, several at-grade/elevated alternatives (A1, A5, and A10) would reconstruct the NE 117th Street bridge over I-5, which is adjacent to the Northgate Elementary School. The reconstruction of the bridge would not alter the historic characteristics of the school building. There would be no Section 4(f) use of the property by any alternative.

Parsonage (Historic)

None of the alternatives would require any land from the parsonage building. Alternatives A1, A5, and A10 would have no effects on the parsonage, and the elevated alternatives (A3, A7, and A11) would install noise walls along the guideway to avoid noise impacts. None of the alternatives would alter the historic characteristics of the parsonage, and there would be no Section 4(f) use.

Jackson Park Golf Course

None of the light rail alternatives would acquire any part of the Jackson Park Golf Course property, and no other impacts would rise to the level of a Section 4(f) use. All alternatives would be visible from the golf course, and the elevated alternatives (A3, A5, A7, and A11) would have visual impacts, as noted in Section 4.5, Visual and Aesthetic Resources. The change in views would not impair the ongoing recreational activities, features, and attributes of the golf course.

Ridgecrest Park

All alternatives would acquire about 0.30 acre of Ridgecrest Park property along its west side, adjacent to a parking area and a baseball diamond. They would cut into a berm and remove mature cottonwoods that buffer the park from I-5, and they would

also alter the parking area and southern entrance during construction. Viewpoints 19 and 20 in Appendix G, Visual Simulations and Illustrations, show a visual simulation of this potential change to the park.

The affected area is at the edge of the park and does not alter the recreational activities or features of the park. This is an active-use, recreational park that is not considered noise-sensitive, and it would not have noise impacts under FTA criteria even if it were a noise-sensitive property. For the Preferred Alternative, Sound Transit would replace the acquired park property with additional property to the south of the park, which it would develop for the City as parkland in conjunction with a 1st Avenue NE realignment. Design details and features for the replacement park property would be consistent with features of property acquired for the project, and defined in coordination with the City and public outreach to adjacent neighborhoods during final design. Other measures to restore and enhance park features include re-landscaping affected areas, and placing a wall or barrier along the guideway's eastern side to provide a safety and visual buffer between the park and the light rail facility and I-5. The barrier, which could also be combined with residential noise walls required for the project, would also help shield the park from I-5 noise. The City of Shoreline concurs with the *de minimis* finding (see Appendix D, Section 4(f)/Section 6(f) Correspondence).

Shoreline Stadium

The Preferred Alternative and Alternative A1 would acquire about 0.18 acre of a parcel encompassing the stadium, a parking area, and adjacent facilities. It would be needed for a realignment of 5th Avenue NE (see Figure 4.18-1) to accommodate a parking garage on the west side of I-5 for a station at NE 185th Street. All the other Segment A alternatives place both the parking and the station on the east side of I-5, avoiding the Section 4(f) use. Also, an option for the Preferred Alternative would develop a shared use garage on the existing surface parking area south of the stadium.

For the Preferred Alternative and Alternative A1, the acquisition of land needed for the roadway realignment and a retaining wall would affect the edge of a parking lot serving the stadium and also a corner of the area adjacent to the track. Several parking spaces could be displaced, and some buffering landscape elements would be removed. An edge of a spur to the track also would be affected. In consultation with the Shoreline School District, Sound Transit has developed measures to offset these impacts, which include providing compensation for the acquired property, replacing parking spaces or redesigning the parking lot to replace lost parking, and coordinating final design and construction with the District to minimize effects on track and field activities or operations.

Considering the limited amount of land involved, as well as Sound Transit's mitigation measures and other commitments, FTA has determined the Preferred Alternative and Alternative A1 would have a *de minimis* impact. The Shoreline School District has concurred (see Appendix D).

For the optional garage on the stadium's surface parking lot, there would be no change to the stadium itself or the track and field facility. The new park-and-ride garage would be available to stadium users, subject to the terms of an agreement that Sound Transit and the School District would develop in exchange for the right to place the park-and-ride garage on District property. Sound Transit would develop design and construction details for the garage in coordination with the District. During construction of the garage, the current surface parking lot with about 72 spaces would be temporarily closed, but the stadium would remain open. For major events at the stadium during the construction period, Sound Transit would provide replacement parking or work with the District to direct users to existing spaces within the Conference Center complex. Given the lack of impacts to the stadium facility itself, and with the commitments to maintain access and adequate parking supply during construction, FTA has preliminarily determined the impact would qualify as *de minimis* if the District concurs, but for the option to be advanced, the District must agree in writing.

Northacres Park

Alternatives A5, A7, A10, and A11 would develop a NE 130th Street Station that would modify a street adjacent to Northacres Park. There would be no Section 4(f) use. Any potential for unauthorized use of the park's parking facilities would be managed by parking restrictions.

Twin Ponds Park

Alternatives A5, A7, and A11 would develop a NE 155th Street Station on the other side of the freeway. Any potential for unauthorized use of the park's parking facilities would be managed by parking restrictions. There would be no impacts on Twin Ponds Park and no Section 4(f) use.

Segment B

North City Park

All alternatives would remove part of a forested area on WSDOT land adjacent to North City Park, but no parkland would be acquired. Trees on the park property would not be disturbed and a visual buffer between the park and I-5 would be maintained. There would be no Section 4(f) use.

Veterans Memorial Park

Under the Preferred Alternative and Alternatives B1 and B2A, Sound Transit would develop a light rail station west of Veterans Memorial Park and within the current Mountlake Terrace Transit Center. The existing parking and traffic circulation at the transit center, immediately adjacent to the park, would be reconfigured. Alternative B1 has an option for a garage on the existing surface lot. No property within the park would be required by any of the alternatives. Construction activities would temporarily increase noise levels and visually alter areas adjacent to the park's western boundaries, but would not impair the important features and attributes of the park. Construction could also temporarily alter the transit center sidewalks connecting to a trail in the park, but the public would have several other ways to access the park. There would be no Section 4(f) use.

Jack Long Park

Alternatives B1 and B4 would be in the median of I-5, and the park is east of the freeway. The Preferred Alternative and Alternative B2A are to the west of I-5. There would be no effects and no Section 4(f) use.

Segment C

Interurban Trail

In Segment C, an elevated guideway would pass directly over short sections of the Interurban Trail for all alternatives (Viewpoint 43 in Appendix G). This would change the visual setting for part of the trail, but would not directly affect the essential activities, features, and attributes of the regional trail. Although the elevated guideway would be visually prominent to trail users, the trail is already in a variable urban setting with nearby roads, industrial properties, the freeway and its ramps, and other large infrastructure. The elevated guideway would require air rights; however, no piers or other appurtenances would be located on Section 4(f) property. Aerial structures passing over a Section 4(f) property are not considered a direct use.

The location of the light rail facility near the trail raises the possibility of indirect impacts, which are discussed below, but these impacts are not substantial enough to cause a constructive use of the property. Short-term closures of the trail would be necessary during construction, and would need to meet the criteria for temporary occupancy. The temporary occupancy analysis for the alternatives is also described below.

For the Preferred Alternative, the elevated guideway would cross over the Interurban Trail in an area where the trail has an open field and wetland area on one side and large industrial properties (including the Edmonds School District property) on the other. The alternative would then continue across Scriber Creek and the wetland area to a station on the southeast corner of the Lynnwood Transit Center. Existing

power poles beside the trail would be relocated and the transmission lines would be raised to provide clearance for the elevated light rail line. The light rail facility near a part of the trail would not substantially impair the trail's character, given other transportation facility crossings along the trail, and the light rail facility would not alter or impair trail activities.

During construction of the Preferred Alternative, the trail would need to be closed for the short term. Sound Transit would coordinate with the City of Lynnwood to develop a detour and provide signage and notices to users. There would be no physical change to the trail facility, which would be reopened in the same condition; ownership of the underlying property would remain the same; and replacement landscaping would be provided where vegetated areas might need to be cleared for construction. With these measures in place, the short-term construction impacts of the Preferred Alternative would qualify for a Section 4(f) exception for temporary occupancy, and no Section 4(f) use would occur. The City of Lynnwood has provided written concurrence for a temporary occupancy finding for the Preferred Alternative (see Appendix D).

For Alternatives C1 and C2, the light rail guideway would cross above the Interurban Trail at 52nd Avenue West. Some vegetation where the trail currently crosses the street would be removed, and the elevated guideway would pass overhead. The guideway would create shading and alter views at the existing arterial crossing, but this would not affect the trail's active recreational and trail travel activities.

Under Alternative C3, the elevated guideway would cross over the Interurban Trail, with similar effects as the Preferred Alternative. Tail tracks would also cross over the trail near 44th Avenue West. The presence of light rail facilities near sections of the trail would not be a notable change in the trail's character, and would not impair its activities.

As with the Preferred Alternative, the other alternatives would qualify for a temporary occupancy exception by providing detours and restoring the trail to the same or better condition; therefore, activities during construction would not involve a Section 4(f) use.

FTA did not request concurrence on temporary occupancy from the City of Lynnwood for the other alternatives. Written concurrence to a temporary occupancy determination would be required prior to the selection of alternatives other than the Preferred Alternative.

Scriber Creek Park

Preferred Alternative. The Preferred Alternative does not involve a Section 4(f) use of Scriber Creek Park because it does not physically alter the park or otherwise affect the protected activities, attributes, or features that qualify the park as a Section 4(f) resource. The Preferred Alternative would be about 1,000 feet from the

southern edge of the park, and any views of the guideway would be distant and intermittent. Construction work (such as cranes) may be noticeable from some areas of the park, but public activities in the park could continue without impairment.

Alternative C1. Under Alternative C1, an elevated guideway would pass above the entrance road and parking lot to Scriber Creek Park before curving to cross over a corner of the park and a portion of the creek. An elevated guideway would cross over 0.42 acre of the park, but a portion of the park property would be acquired for the structures that support the guideway (see Figure 4.17-4 in Section 4.17 for a diagram, and Viewpoints 38 and 39 in Appendix G). In addition to vegetation clearing that would include removing mature trees, the elevated guideway would affect views, light, and shade for part of the park. These impacts are described in more detail in Section 4.17.

Construction activities would also require a short-term closure of a portion of Scriber Creek Park. This would include all or part of the parking area and potentially the main entrance, but the trail entrance or an alternative entrance would be maintained to allow the park to remain open for normal public use.

The City of Lynnwood and Sound Transit have discussed mitigation measures to reduce and offset long-term and short-term impacts that Alternative C1 would have on the park. The measures include providing additional landscaping after construction, restoring affected natural areas to minimize impacts on the park's natural setting, and implementing potential enhancements such as trail improvements. However, following public comments on the Draft EIS, the City of Lynnwood has stated that the impacts would be adverse, and the City does not agree to a *de minimis* finding. Therefore, FTA has determined that a Section 4(f) use would occur with Alternative C1, and other prudent and feasible alternatives to avoid the use must be considered. Unless Alternative C1 were either modified to avoid the park property or to reduce impacts to a *de minimis* level (any occupation of the park requires agreement by the City of Lynnwood), FTA cannot approve a project featuring this alternative. The other Segment C alternatives would be feasible and prudent avoidance alternatives available to the Sound Transit Board.

Alternative C2. Under Alternative C2, no parkland would be acquired. The elevated guideway would pass over a non-park area adjacent to and south of Scriber Creek Park near the park's nature trail, which also forms part of the Scriber Creek Trail (see Appendix G, Viewpoints 41 and 42, for visual simulations). Section 4.17 describes the impacts on the park in more detail; impacts would include visual impacts and construction-related visual, noise, and dust impacts to park users.

The City of Lynnwood and Sound Transit have considered mitigation measures to help offset these impacts. Restoring cleared areas with natural plantings would maintain and enhance the park's natural setting. Landscaping and other improvements to other areas of the park would minimize impacts to park users. Other mitigation options include creating additional trail, park, or wetland natural improvements on other nearby properties that would be acquired for the light rail project. Alternative C2 would also require wetland mitigation, which would present additional opportunities to restore the wetlands in conjunction with measures to restore and enhance the park's natural setting. With such mitigation measures in place to help maintain the natural characteristics of the park and its boardwalk, FTA anticipates no constructive use of the park, as defined for Section 4(f).

No other impacts would impair the park to the level rising to a constructive use. A high level of ambient noise already exists at the park due to the nearby freeway, roadways, and adjacent light industrial properties. The light rail guideway would have noise barriers along the guideway to avoid noise impacts to nearby residences, which would also minimize the change in noise levels within the park.

Alternative C3. Under Alternative C3, Scriber Creek Park would not have any direct property or vegetation impacts. The light rail facility may be visible from parts of the wetland boardwalk, but only from a distance, and the intermittent views of the guideway would not impair the park's setting or any other important features, activities, or attributes. Construction work may be noticeable from the park, but public activities in the park could continue without impairment. There would be no Section 4(f) use.

Scriber Creek Trail

All alternatives would cross over part of the Scriber Creek Trail, but no trail property would be permanently acquired.

With all four alternatives, the trail would continue to maintain its essential function of connecting parks to a regional trail, and there would be no permanent direct or constructive use of the trail. Sound Transit would coordinate with the City of Lynnwood to provide a detour during a temporary closure of the trail for construction. The trail would be reopened in the same or better condition than today and replacement landscaping would also be provided. With these measures in place, the short-term construction impacts qualify for a temporary occupancy

exception, and there would be no Section 4(f) use of the trail with any of the alternatives. The City of Lynnwood has agreed in writing to this exception for the Preferred Alternative (see Appendix D).

For the other alternatives, Sound Transit would apply the same measures as the Preferred Alternative, written concurrence with a temporary occupancy exception would still be needed before any other alternative would be implemented.

4.18.6 Conclusions and Section 4(f) Findings

Section 4(f) regulations do not allow FTA to approve an alternative with a Section 4(f) use if there are prudent and feasible avoidance alternatives, unless there is a *de minimis* finding.

Preferred Alternative

The Preferred Alternative would acquire a portion of Ridgecrest Park adjacent to the freeway. Given the minor impacts to the park and Sound Transit's mitigation commitments, and the results of coordination with the City of Shoreline, FTA has determined the impacts would be *de minimis*. The City of Shoreline has signed a letter of concurrence.

The Preferred Alternative, with the mitigation commitments Sound Transit has identified, would have *de minimis* impacts to Shoreline Stadium. The Shoreline School District has concurred in writing with the *de minimis* finding. An option for the Preferred Alternative to place a parking garage on an existing surface lot is also anticipated to have *de minimis* impacts, with the mitigation measures and related commitments to maintain adequate parking supply for stadium activities during construction. The Shoreline School District has not yet agreed to a *de minimis* finding. The option could not be selected for further development without written agreement by the District.

The Preferred Alternative would cross over the Interurban Trail and the Scriber Creek Trail. The project would require air rights only, would not convert land from the trails, and would not substantially impair important activities, features, or attributes of the trails. During construction, Sound Transit would provide signage, detour routes, and construction mitigation measures to address the impacts of a trail closure during construction. These commitments and the written concurrence from the City of Lynnwood meet the requirements for Section 4(f) temporary occupancy exceptions for the trails; neither trail would have a Section 4(f) use.

Appendix D provides the letters of concurrence by the City of Shoreline and the Shoreline School District on the *de minimis* findings, as well as the letter of agreement signed by the City of Lynnwood regarding the temporary occupancy exceptions for the project.

Other Light Rail Alternatives

All of the Segment A alternatives would require a portion of Ridgecrest Park adjacent to the freeway. Given the minor impacts to the park and Sound Transit's mitigation commitments described for the Preferred Alternative, they would also have *de minimis* impacts. For the Shoreline Stadium, Alternative A1 would have the same *de minimis* impacts as the Preferred Alternative.

Alternative C1 involves a Section 4(f) use of Scriber Creek Park. It could not be implemented as part of the project unless it were redesigned to avoid the use of the park or mitigate any park impact to *de minimis* levels. The Preferred Alternative and Alternatives C2 and C3 all avoid the park and any other Section 4(f) uses. These alternatives would be reasonable and feasible avoidance alternatives to the Section 4(f) use of Scriber Creek Park.

In Segment C, Alternatives C1, C2, and C3 cross over the Interurban Trail and the Scriber Creek Trail. As with the Preferred Alternative, they would require air rights only, and would not convert land from the trails, or permanently impair the important activities, characteristics, or features of the trail. For construction, Sound Transit would provide signage, detours, and related construction mitigation measures to address the impacts of a trail closure during construction. These commitments meet the requirements for Section 4(f) temporary occupancy exceptions, but written concurrence from the City of Lynnwood would be needed.