Appendix F4.11

Geologic Unit Summaries, Hazard Areas, and Boring Locations

Appendix F4.11

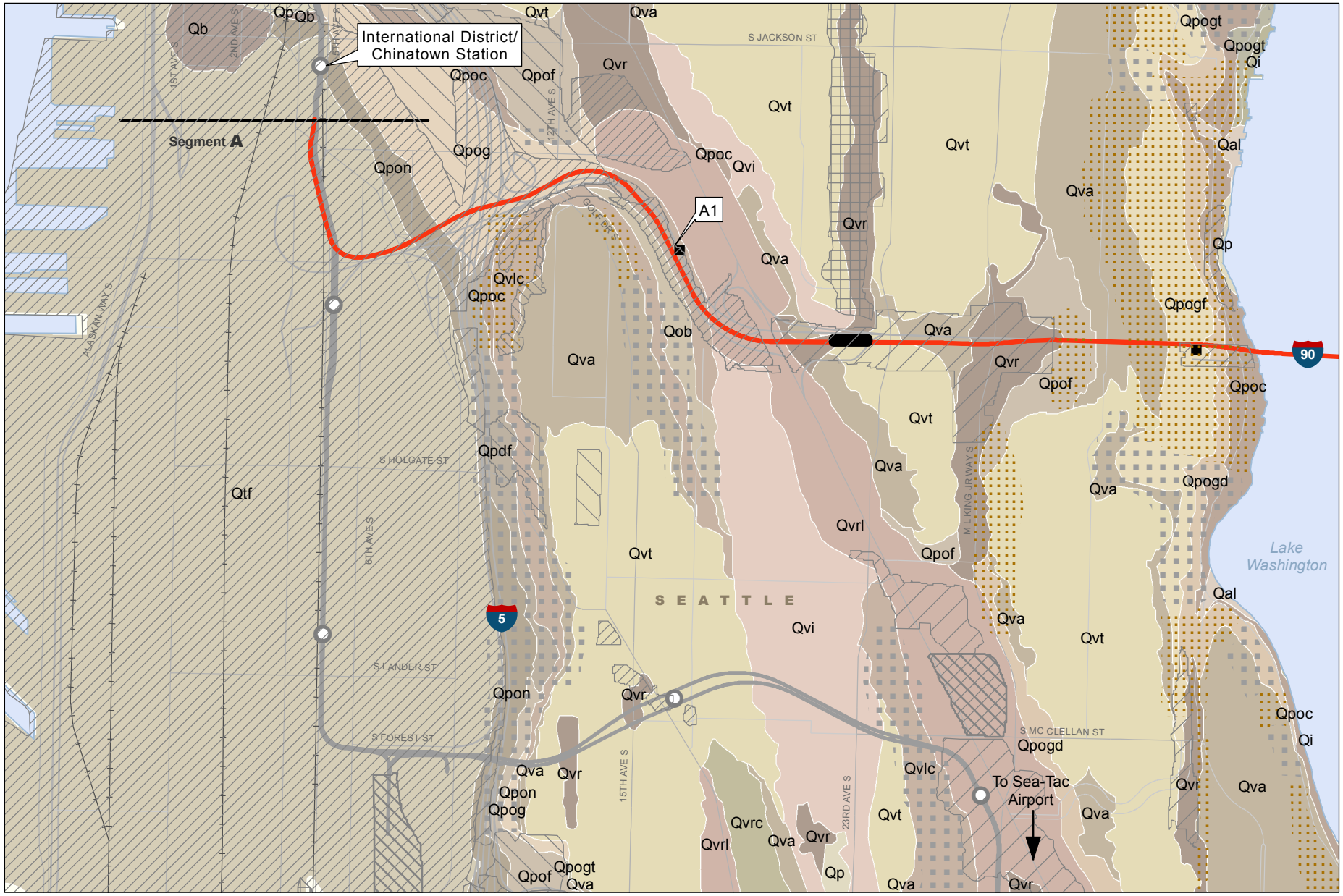
Geologic Unit Summaries, Hazard Areas, and Boring Locations

TABLE F4.11-1
Summary of Geologic Units and their Engineering Properties

Geologic Unit (Map Symbol)	Description	General Constructability	Density and/or Hardness	Strength	Permeability	Liquefaction Potential [a]
Modified land (m) [b] or  or 	Fill and/or graded natural deposits that obscure or alter the original deposit	Varying, depending on whether nonengineered or engineered; poor foundation support and potentially poor cut stability if nonengineered, depending on composition and density and/or hardness of material; excellent foundation support and cut stability if engineered	Very soft to stiff or very loose to dense	Potentially low	Variable	Potentially high
Mass wastage (Qmw) or 	Colluvium, soil, landslide debris, and organic matter; common below springs where peaty deposits are also present; mapped on steep slopes; deposits, both mapped and unmapped, include abundant landslides up to 500 feet long	Poor foundation support, poor cut stability	Loose to dense and soft to stiff; variable degree of consolidation, depending on material in colluvium and its coherency	Potentially low	Variable	Potentially high
Landslide (Qls) 	Blocks of surficial deposits transported downslope en masse by gravity; numerous unmapped areas of both landslide and related mass-wastage deposits occur along slopes; landslide terrain, often including benches that slope back into the hillside and have wetlands and peat deposits	Poor foundation support, poor cut stability, potential for additional slide movement	Very loose to very dense or soft to hard; variable degree of consolidation, depending on material coherency	Potentially low	Variable	Potentially high
Wetland deposits (Qw)	Organic-rich sediment, peat, and fine-grained alluvium, poorly drained and intermittently wet; not all deposits mapped	Poor foundation support, poor cut stability, high occurrence of groundwater, wet-weather sensitive, poor soils for reuse as engineered fill due to wet conditions and a high fines and organic content	Very soft to medium stiff or very loose to medium dense	Potentially low	Variable	Potentially high
Tideflat deposits (Qtf)	Silt, sand, organic sediment, and detritus, with some shells, historically exposed in broad coastal benches at low tide and now covered with fill	Poor foundation support, poor cut stability, high occurrence of groundwater, wet-weather sensitive, poor soils to reuse as engineered fill due to wet conditions and generally a high fines content	Very loose to dense or very soft to stiff	Potentially low	Variable	Potentially high

TABLE F4.11-1 CONTINUED
Summary of Geologic Units and their Engineering Properties

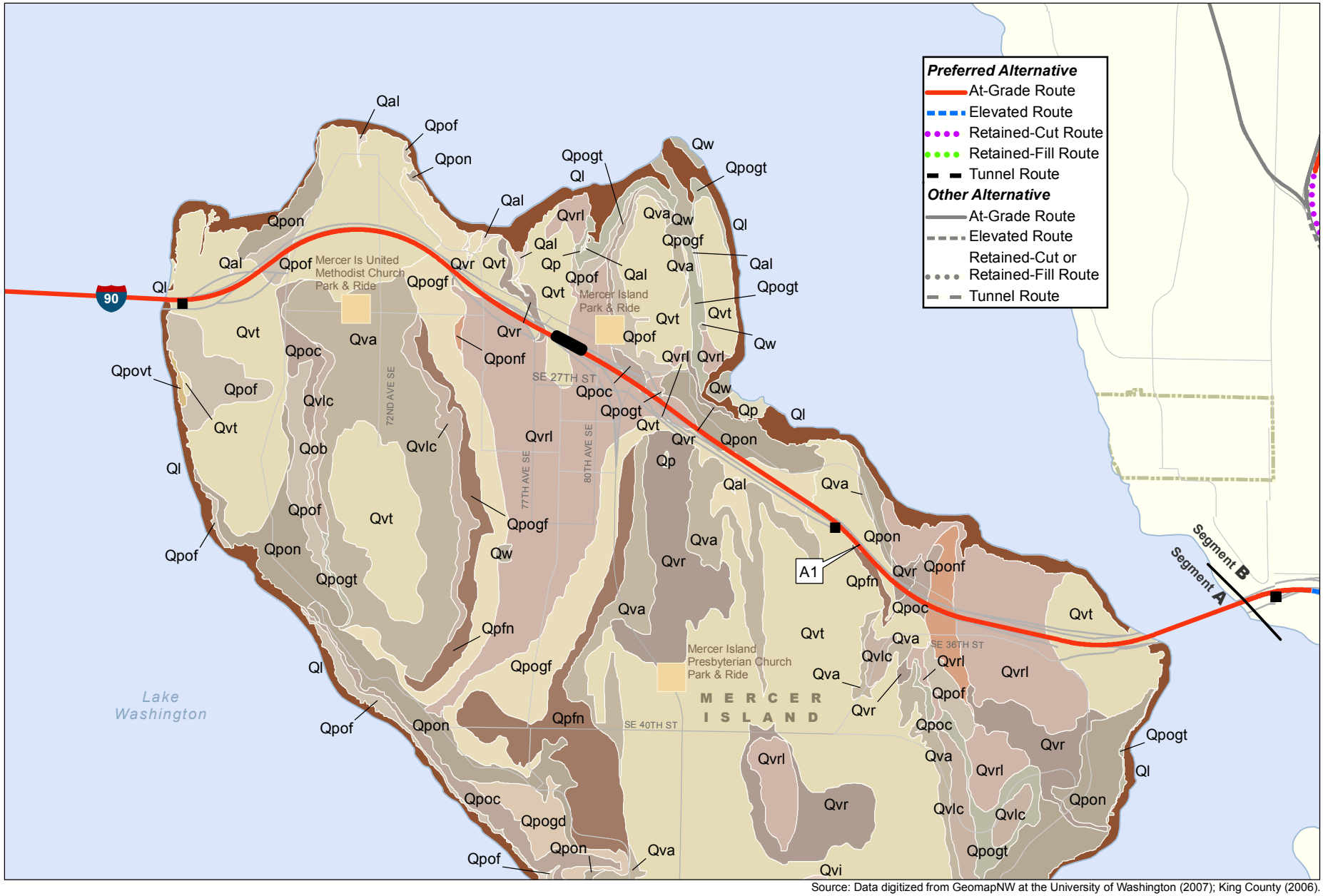
Geologic Unit (Map Symbol)	Description	General Constructability	Density and/or Hardness	Strength	Permeability	Liquefaction Potential [a]
Younger alluvium (Qyal)	Silt, sand, gravel, and cobbles deposited by streams and running water; locally contains soft peat lenses	Poor to good foundation support, depending on composition, density and/or hardness, and construction type; some soils might be wet-weather sensitive; some soils might be suitable for reuse as engineered fill, depending on amount of fines content; poor where peat materials occur	Loose to dense or soft to stiff	Low to medium	Variable	Potentially high
Lake deposits (Ql)	Silt and clay with local sand layers, peat, and other organic sediments deposited into Lake Washington; most mapped areas are lake-bottom sediments exposed when Lake Washington was lowered in 1916; at many locations, the lake deposits are thin and overlie a dense substrate; commonly capped by fill to improve building sites	Poor foundation support; poor cut stability; high groundwater occurrence; wet-weather sensitive; poor soils for reuse as engineered fill due to wet conditions and a high fines content	Very soft to medium stiff or very loose to medium dense	Potentially low	Low	Potentially high
Vashon recessional outwash deposits (Qvr)	Layered sand and gravel, deposited in outwash channels of melting glaciers during the ice retreat; also includes deposits that accumulated in or adjacent to recessional lakes; deposits less than about 3 feet thick not shown on map	Good foundation support and cut stability when undisturbed; potential groundwater occurrence; soils suitable for reuse as engineered fill	Loose to dense	Low to medium	Medium	Potentially high
Vashon recessional lacustrine deposits (Qvrl)	Thinly layered silt and clay with local sand layers, peat, and other organic sediments, deposited in slow-flowing water and temporary lakes	Poor to good foundation support and cut stability, depending on composition, density and/or hardness, and construction type; wet-weather sensitive; poor soils for reuse as engineered fill due to high fines content	Very soft to stiff	Medium	Low	Low to medium
Vashon till (Qvt)	Compact mixture of silt, sand, and gravel, glacially transported and deposited under ice; contains layers of sand and gravel; cobbles are common; upper 3 feet of till generally weathered and only medium dense to dense	Excellent foundation support and stable cuts when undisturbed; low groundwater occurrence; wet-weather sensitive; soils suitable for reuse as engineered fill depending on moisture content	Dense to very dense; sand commonly less dense	High	Low	Low
Vashon advance outwash (Qva)	Sand and gravel deposited by streams from advancing ice sheet; silt lenses locally present in upper part and common in lower part	Excellent foundation support and stable cuts when undisturbed, unless below the water table or exposed to water; potentially high groundwater occurrence; soils suitable for reuse as engineered fill	Dense to very dense	High[c]	High	Low



Source: Data digitized from GeomapNW at the University of Washington (2007); Sound Transit (2007) and King County (2006).

- At-Grade Route
- Elevated Route
- Retained-Cut Route
- Tunnel Route
- Mass Wastage Deposit
- Landslide Deposits
- Modified Land
- Artificial Fill
- Landfill Debris
- Filled River Channels
- Graded Land
- Regraded Land
- Traction Power Substation
- Proposed Station
- Central Link Alignment and Station

Exhibit F4.11-1
Surficial Geology
Segment A, Seattle
East Link Project



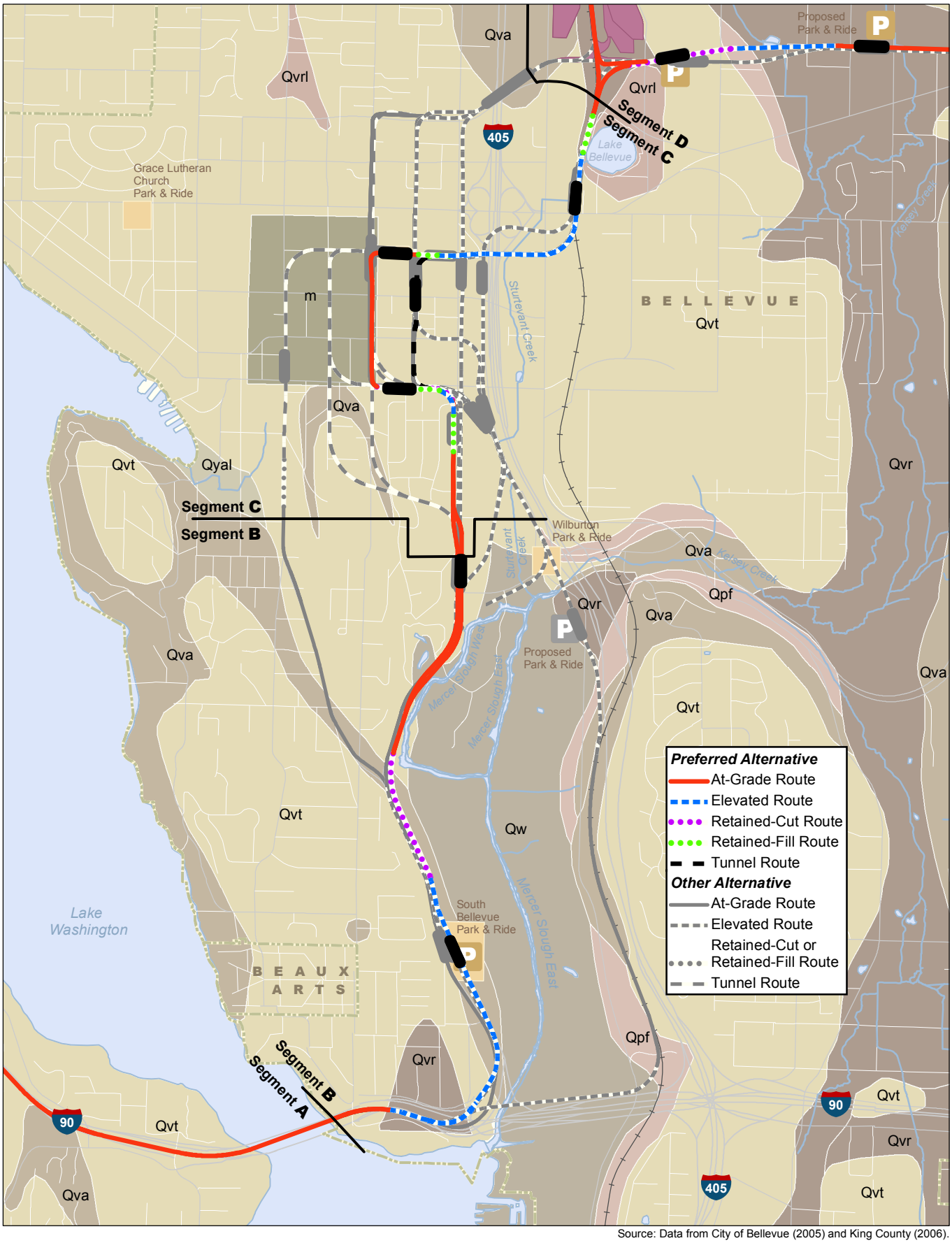
Source: Data digitized from GeomapNW at the University of Washington (2007); King County (2006).

- Traction Power Substation
- Proposed Station
- City Limits

N

0 0.25 Miles

Exhibit F4.11-2
Surficial Geology
Segment A - Mercer Island
East Link Project



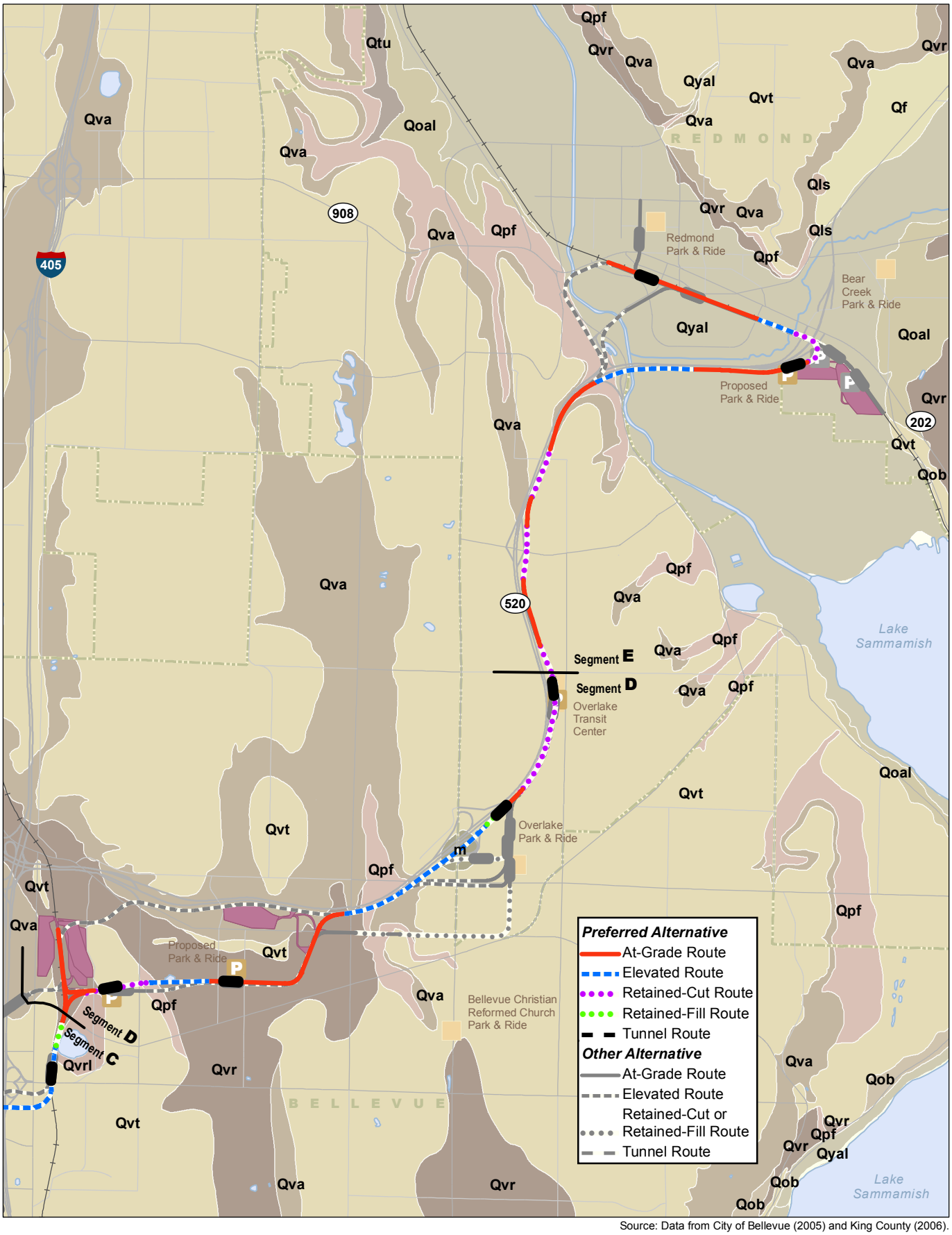
Source: Data from City of Bellevue (2005) and King County (2006).

Proposed Station
City Limits
Railroad

N

0 0.25 Miles

Exhibit F4.11-3
Surficial Geology
Segment B/C
East Link Project



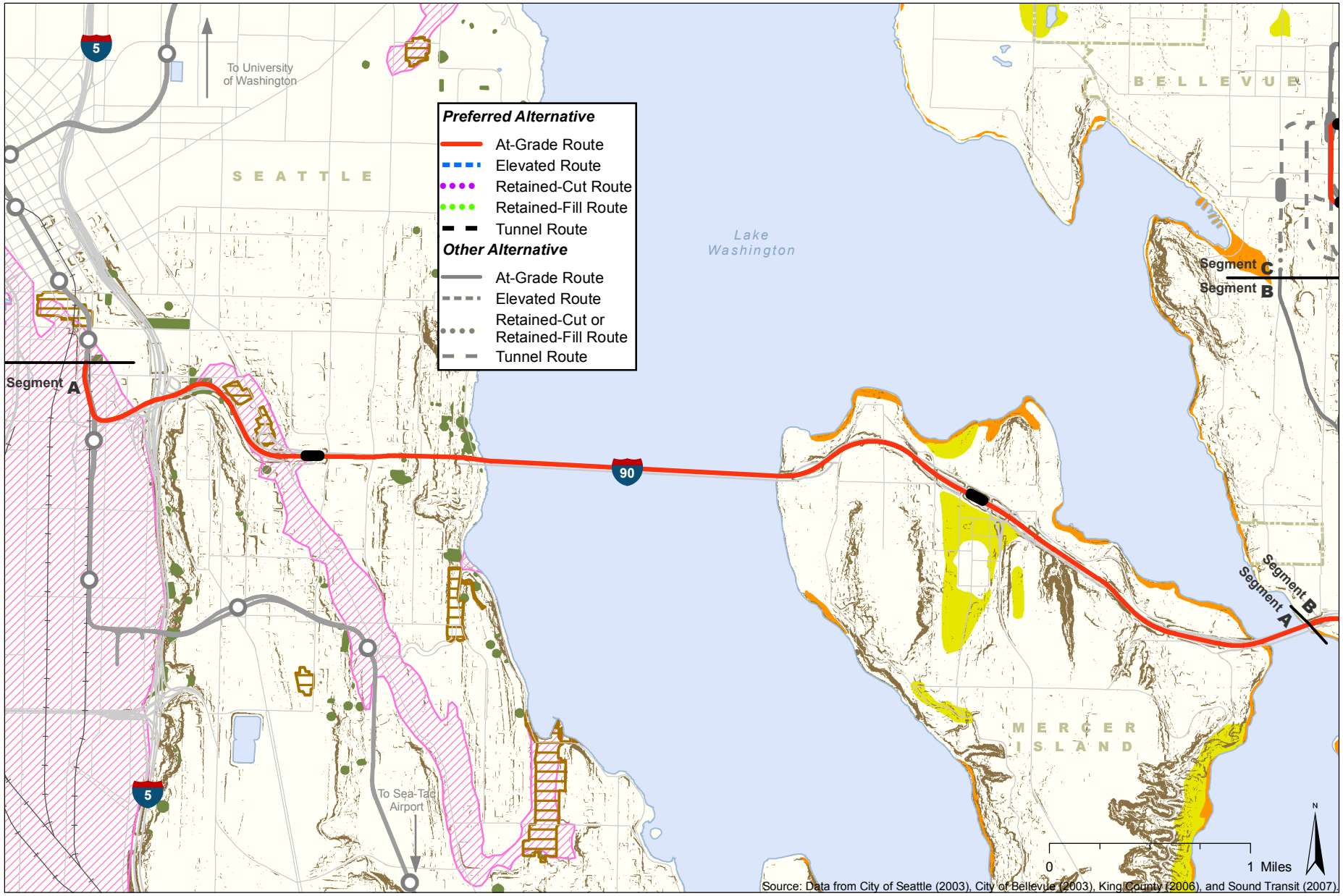
Source: Data from City of Bellevue (2005) and King County (2006).

Proposed Station
Maintenance Facility
City Limits

N

0 0.5 Miles

Exhibit F4.11-4
Suficial Geology
Segment D/E
East Link Project



Low to Moderate Liquefaction Hazard (Bellevue & Mercer Island)

Moderate to High Liquefaction Hazard (Bellevue & Mercer Island)

Peat (Bellevue & Mercer Island)

Liquefaction Hazard Area (City of Seattle)

Landslide Hazard Area (City of Seattle)

Steep Slope Greater than 40% (City of Seattle & King County)

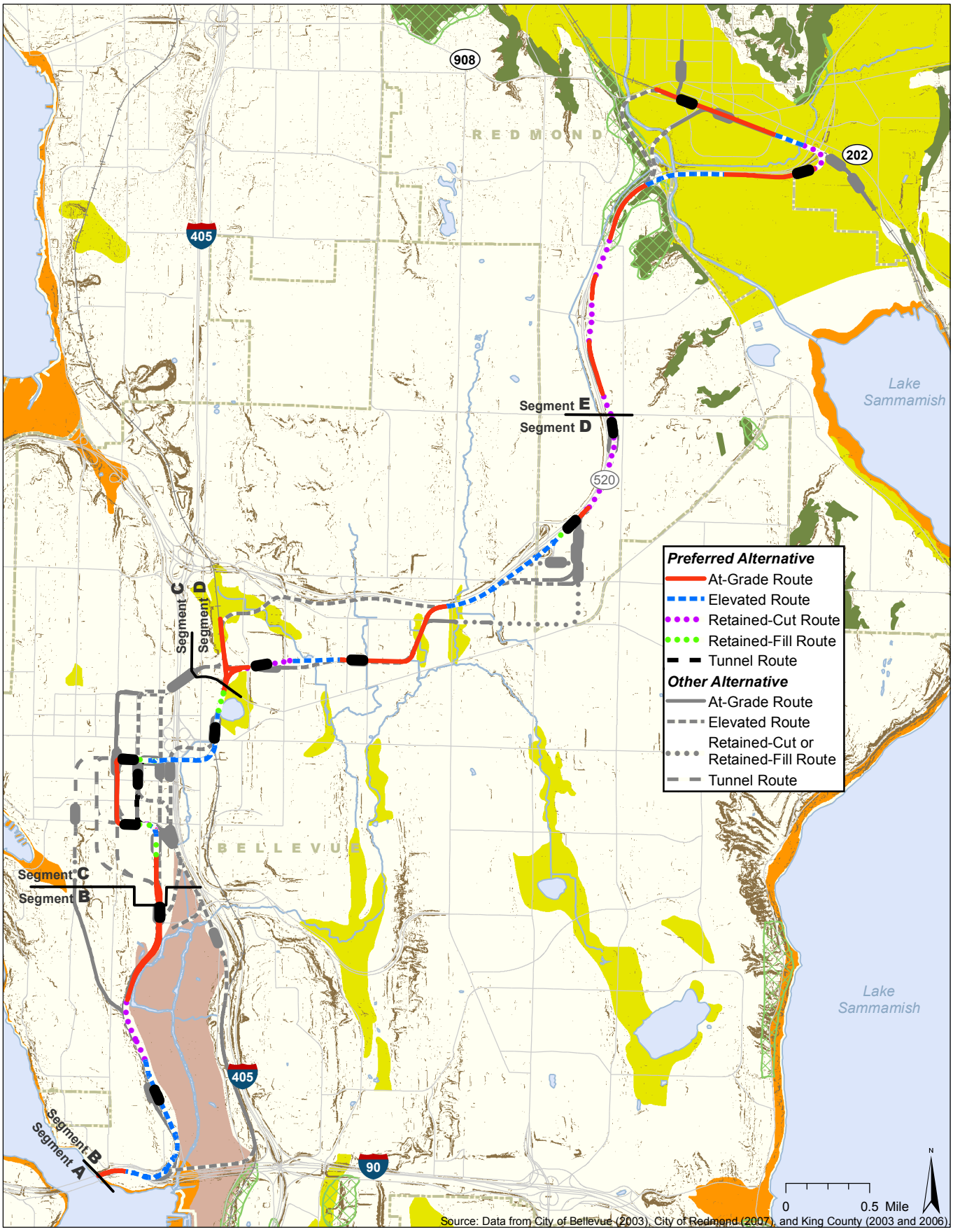
Peat Settlement Prone Area (City of Seattle)

Proposed Station

Central Link Alignment and Station

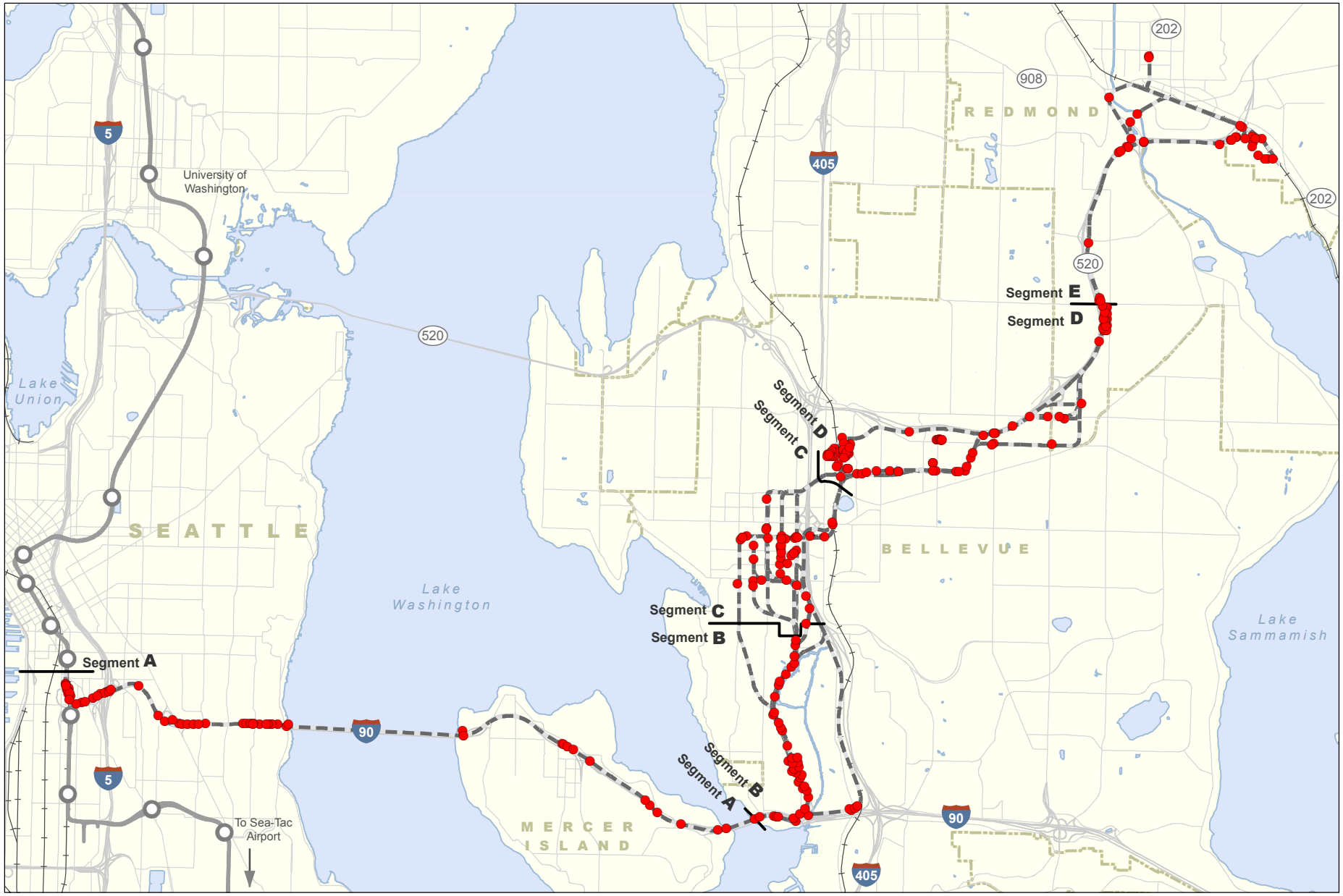
City Limits

Exhibit F4.11-5
Geologic Hazard Areas
Segment A
East Link Project



Low to Moderate Liquefaction Hazard
Moderate to High Liquefaction Hazard
Peat
Landslide Hazard Area (City of Redmond)
Landslide Hazard Area (King County)
Steep Slope Greater than 40% (City of Bellevue & King County)
Proposed Station
City Limits

Exhibit F4.11-6
Geologic Hazard Areas
Segment B/C/D/E
East Link Project



Source: Data from GeoMapNW at the University of Washington (2007), Sound Transit (2007), and King County (2006).

Existing Soil Boring Within the Alternative and Maintenance Facility Right-of-Way

East Link Proposed Alternative

Central Link Alignment and Station

N

0 1 Mile

Exhibit F4.11-7
Existing Soil Borings Segments A,B,C,D, and E
East Link Project