Record of Decision

ATTACHMENT E

Summary of Required Mitigation Measures

For the Initial Segment of the
Central Link Light Rail Transit Project

May 2002

Introduction

This attachment provides a summary of the mitigation commitments made by the Federal Transit Administration (FTA) and Sound Transit for the Initial Segment[1] of the planned Central Link Light Rail Project. This summary is provided in the Amended Record of Decision (Amended ROD) to facilitate the monitoring of the implementation of the mitigation measures and to give a sense of the nature of the mitigation actions and associated impacts. However, this summary does not supersede or negate any of the commitments for environmental mitigation established in the Central Link Final EIS (November 1999), the Tukwila Freeway Route Final Supplemental EIS (October 2001), the Initial Segment Environmental Assessment (February 2002), and the Section 106 Programmatic Agreement (December 1999) as amended. These documents, together with their associated published Drafts, constitute the FTA environmental record for the project.

The mitigation measures identified for the Initial Segment in the FTA environmental record for the project shall and must be implemented by Sound Transit if the project proceeds with FTA financial assistance. These mitigation measures are now incorporated into the definition of the project, and Sound Transit shall implement them, provide funding for their implementation, or ensure that other agencies fund and implement them (although this would not alleviate Sound Transit's overall responsibility for implementation). Sound Transit is prohibited from withdrawing or substantially changing any of the mitigation measures identified in the environmental record for the project without express written approval by FTA. In addition, any change to the project that may involve new or changed environmental or community impacts not yet considered in the existing environmental record must be reviewed in accordance with FTA environmental procedures (23 CFR Part 771) and approved by FTA.

Mitigation measures associated with the operation of the project are described first in Section 1 of this Attachment. Mitigation measures associated with the construction of the project are described second in Section 2. The program for monitoring the implementation of the mitigation measures is described at the end in Section 3.

1 Operational / Long-Term Mitigation

1.1 TRANSPORTATION

1.1.1 Common to all segments

Mitigation Features of the Project

To improve non-motorized access, Sound Transit will work with local public transportation agencies, communities and local governments to place and design transit facilities that fit with local community plans. These facilities will include improvements within one-half mile of each station for safe, easy pedestrian and bicycle access, consistent with existing Sound Transit policy recommendations. New sidewalks will be provided on or immediately adjacent to light rail station property. At a minimum, existing sidewalk widths will be maintained and any improvements will be sufficiently wide to accommodate pedestrian volumes from light rail and will be designed to conform to City standards. New

[1] The mitigation measures provided herein apply to the Initial Segment of the planned Central Link LRT System that is the subject of the ROD of April 2002 and runs from the Convention Place Station (CPS) to S. 154th Street. The unqualified term, "project," used in this Attachment refers to this Initial Segment. Whenever the longer Central Link Light Rail Project that includes more than the Initial Segment is the subject, the name of that larger Central Link LRT Project will be fully spelled out so that there is no ambiguity.

sidewalks will be constructed for the area within ½ mile of stations with respect to bicycles at all new stations/facilities, Sound Transit will:

- Design facilities at new stations to provide ample space for maneuvering bicycles in and through stations and on to vehicles.
- Provide a mix of storage lockers and racks.
- Provide storage areas open to circulation, on direct paths from access points, but not impeding pedestrian and vehicular traffic flows.
- Designate areas, where possible, for storage expansion to accommodate bicycle ridership increases.

In addition to the non-motorized facility improvements at stations, the following location-specific trail facility improvements are included in the project design:

- Development of a Class I trail facility adjacent to the E-3 Busway and light rail alignment in the North Duwamish area.
- Development of Chief Sealth Trail crossings of MLK Jr. Way S. and Henderson Street in the vicinity of Henderson Station.
- Development of a bicycle facility through the Rainier Valley parallel to the light rail corridor.
- Improved signage for an existing on-street bicycle route through the Rainier Valley.

Hide-and-ride parking impacts and mitigation refer to the potential for some light rail users to use unrestricted on-street parking in neighborhoods to access light rail stations. Hide-and-ride parking impacts will be mitigated through a number of locally appropriate measures including new or expanded residential parking zones (RPZs), hourly and day of week parking restrictions, parking meters, monitoring of use, enforcement and public education campaigns. RPZs are generally applicable on residential streets with greater than 75 percent parking utilization, while parking restriction signs and meters are more applicable in commercial business areas.

The potential for hide-and-ride and the best ways to mitigate the impact are unique to each individual station area. Sound Transit will conduct additional parking surveys of on-street unrestricted parking supply within 1/4-mile to 2,000 ft radius of most proposed station locations approximately six months or less prior to light rail system opening. All stations will be surveyed on two consecutive weekdays. The average of these two days will be used for the before/after parking survey comparison. Table 1.1-1 summarizes parking survey parameters by station.

Approximately six months after light rail system opening, Sound Transit will repeat the surveys described above for all locations and times. In cases where on-street parking utilization is greater than 90 percent, the surveys after system opening will focus on whether utilization is increasing in areas greater than 1/4-mile from that station. Parking surveys will be collected on two consecutive weekdays similar to the surveys conducted before the light rail system opens. The results of all surveys will be used to identify mitigation measures.

Mitigation measures will be identified on a case-by-case basis for all locations where parking surveys show that 50 percent or more of unutilized parking spaces prior to light rail implementation are utilized after light rail begins operation. For example, if a block face shows a parking utilization rate of 60 percent before light rail implementation and a utilization of 80 percent or greater after light rail implementation, Sound Transit will identify potential mitigation measures.

This increase threshold will be used for each block face to assess whether mitigation should be considered. For locations exceeding the parking utilization threshold, Sound Transit and the local jurisdiction will together determine the appropriate mitigation for each block face, if any.

For locations where the mitigation is accepted and approved by City staff and local community or neighborhood groups, Sound Transit will provide funding for direct start-up costs of mitigation proportional to the increase in parking related to the light rail project. In the case of residential parking zones, Sound Transit expects the affected city to recoup on-going monitoring, enforcement, education, and other operating costs from parking fines and permit fees.

The light rail system will include the following design features to enhance safety and minimize any risk or exposure to traffic accidents along at-grade routes where the track-way runs within a roadway:

- Signs and pavement markings to advise vehicle drivers not to encroach on to the trackway area;
- Lighting along the at-grade route;
- Lighting all corners of signalized intersections (auto and pedestrian signals) along the at-grade route;
- Clear delineation between the adjacent street and trackway that will be visual and tactile;
- Operating trains at speeds within the speed limit of the adjacent street on at-grade segments;
- Safe pedestrian crossing locations;
- Operating a high-intensity light on the train during all operating times;
- An active traffic control system that may consist of gates, signals, and audio warning devices to notify pedestrians and motorists of an oncoming train; and
- An intensive public information program to create awareness and discuss possible safety features.

Table 1.1-1. Summary of Project Parking Survey Parameters

Station	Time of Day	Survey Radius[3]
Royal Brougham[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
S. Lander[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Beacon Hill[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
McClellan[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Edmunds[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Graham[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Othello[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Henderson[2]	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
Boeing Access Road	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)
North SeaTac (S. 154th)	9:30 A.M. - 3:30 P.M.	0.25 mi. (1,320 ft)

Note: Station list may change with the Sound Transit Board decision in November 1999.

1 Surveys at these stations will be conducted for either the early morning or midday time period, but not both.

2 Early morning surveys will be conducted at these stations if the midday utilization is greater than 90%.

3 Survey radii will be 0.25 miles except in locations where parking utilization prior to Link implementation is 90% or greater.

1.1.2 Segment B -- Partial (Convention Place Station to Westlake Station)

Mitigation Features of the Project

There are no mitigation features of the project for this part of Segment B beyond those previously identified as common to all segments.

1.1.3 Segment C (Westlake Station to S. McClellan Street)

Mitigation Features of the Project

Many of the physical improvements in the downtown put into place during retrofit of the downtown transit tunnel will remain in place after construction completion and the start of operations of the Link light rail. After Link light rail operation begins, the "Monitor and Maintain" committee (established prior to the start of construction and includes members from Sound Transit, the City of Seattle, and King County and may be expanded to include participation by other transit agencies) will review the various transit surface mitigation measures that were put in place during construction to determine which improvements continue to benefit downtown operations. The committee shall then make recommendations to the appropriate local governing body as to which mitigation measures may be removed. It is acknowledged that the committee may not have jurisdiction over the implementation or removal of these traffic mitigation measures.

A new traffic signal will be placed at the Lander Street/Beacon Avenue S. intersection near the Beacon Hill Station, if the City of Seattle deems it warranted and required. This new signal will provide a protected pedestrian crossing to the station and allow buses to safely cross as well.

Sound Transit is working with King County Metro to mitigate for the possible loss of parking at Ryerson Base if the base is expanded. Options include providing temporary parking using WSDOT right-of-way with long-term parking being accommodated in new structured parking at Central Base or a new parking lot.

1.1.4 Segment D (S. McClellan Street to Boeing Access Road)

Mitigation Features of the Project

The recommended light rail signal priority system for the project in Segment D is a progression-based system on MLK Jr. Way S. This system relies on the predictability of light rail vehicle arrivals, eliminating the need for light rail vehicles to fully preempt traffic signals. This type of system minimizes or eliminates impacts to eastbound/westbound movements and northbound/southbound left-turn movements compared to a light rail signal preemption system. All existing and new signalized intersections will require timing and phasing revisions. Most of the LOS impacts at intersections from at-grade light rail system are eliminated with the progression-based signal system. However, there are six intersections where improvements have been included in the project design to improve LOS to better than No-build conditions and fully mitigate project impacts. These locations include:

- S. Columbian Way - add eastbound left-turn lane
- S. Graham Street - add eastbound right-turn lane
- S. Myrtle Street - add eastbound and westbound left-turn lanes
- S. Othello Street - add eastbound and westbound left-turn lanes and restripe the eastbound curb lane to an exclusive right-turn lane
- Renton Avenue S. - add westbound left-turn lane
- S. Cloverdale Street - add eastbound right-turn lane

All signalized intersections will require timing and phasing revisions. To mitigate impacts of eliminating left-turn access at unsignalized locations, additional signals with northbound and/or southbound left-turn lanes will be included at the following intersections:

- S. Dakota Street
- S. Edmunds Street
- S. Dawson Street
- S. Holly Street

Passenger vehicles will be allowed to make U-turns at these locations. Protected pedestrian crosswalks across MLK Jr. Way S. will also be provided. The following intersections will also be signalized; however, left-turn lanes will not be provided on MLK Jr. Way S. at these locations:

- S. Hanford Street
- S. Brandon Street/35th Avenue S.

A new traffic signal will also be added at the Rainier Avenue S./S. Forest Street intersection to improve vehicular and pedestrian access to the McClellan station if the currently proposed bus service integration plan is implemented by King County. If the plan is modified, the need for this signal will be re-evaluated. A new traffic signal and truck u-turn is also added at Merton Way S. to facilitate better truck circulation.

For additional crossing opportunities for pedestrians, pedestrian-only signals will be included on MLK Jr. Way S. with the project at the following intersections:

- S. Andover Street
- S. Genessee Street (realigned street)
- S. Hudson Street
- S. Raymond Street
- S. Morgan Street

- S. Willow Street
- S. Holden Street
- S. Elmgrove Street
- S. Thistle Street
- S. Trenton Street

These added pedestrian-only signals, in addition to the signalized intersections, will minimize the walking distance required to reach a protected crossing of MLK Jr. Way S. They will also enhance pedestrian safety by providing additional protected pedestrian crossing opportunities of MLK Jr. Way S.

Final design of the at-grade sections will include evaluation and implementation where determined to be appropriate of safety measures such as a visual element in the center of the tracks (42-inch high decorative fence, bollards and chain, or other similar feature) to discourage crossing the tracks except at legal crosswalks. Another measure to be evaluated is an area for pedestrians to stand between or on one or both sides of the rail tracks at legal crossing locations.

The project also includes a 6-ft sidewalk with 4.5-ft planting strip on MLK Jr. Way S. throughout the corridor. At station locations, the sidewalk width will be increased to 10 feet.

Additional Mitigation Commitments

Business/property owners will be directly compensated by Sound Transit when a portion of their property is acquired by Sound Transit. If a portion of the area purchased was used for parking, Sound Transit will work with the property owner on a case-by-case basis to replace lost parking.

1.1.5 Segment E (Tukwila)

Mitigation Features of the Project

Improve signal-timing adjustments at the Boeing Access Road/MLK Jr. Way S/Ryan Way intersection to mitigate traffic from the Boeing Access Road Station. Channelization and traffic signal modifications will occur at Boeing Access Road/I-5 southbound ramps intersection to add the new south leg accessing the Boeing Access Road Station and park-and-ride lot.

For the S. 154th Station, located at the intersection of International Boulevard (SR 99) and S. 154th Street, crossing opportunities will be limited to the intersections. Additional sidewalks on S. 154th Street will be provided on the south side from International Boulevard to 40th Avenue S. and along the north side from International Boulevard to the park-and-ride driveway entrance. It is anticipated that sidewalks along International Boulevard adjacent to the station will be provided by the City of SeaTac as part of their improvements along International Boulevard (scheduled for 2003) and/or as part of WSDOT widening of the SR 99/SR518 interchange.

With the Initial Segment, a shuttle bus operation will be included at the S. 154th Station to meet each train and provide a direct connection to the airport.

Additional Mitigation Commitments

A westbound right-turn lane will be added on S 154th Street at its intersection with International Boulevard.

A traffic signal will be provided at the driveway entrance to the S 154th Station park-and-ride if required by signal warrants in the Manual on Uniform Traffic Control Devices.

Driveway access impacts due to column placement for the elevated structure will be mitigated by driveway relocation or consolidation. Columns will be placed to minimize access impacts.

Sound Transit will mitigate clear zone impacts and potential future widening within freeway right-of-way by placing the light rail as far from highways as practical. (22-feet from the fog line of the road at a minimum) and providing appropriate safety barriers between the light rail and highways as agreed with WSDOT. Clear zone and safety barriers on local streets will be coordinated with local jurisdictions.

Business/property owners will be directly compensated when a portion of their property is acquired by Sound Transit. If a portion of the area purchased was used for parking, Sound Transit will work with each property owner on a case-by-case basis to replace or compensate for lost parking.

Link park-and-ride facilities within the City of Tukwila are not intended to replace paid parking for airport passengers, and special enforcement policies will be developed in conjunction with the City of Tukwila and Port of Seattle to allow park-and-ride facilities at the S. 154th Station to remain available for transit users. Enforcement policies to be considered and implemented where determined to be appropriate include time restrictions or permit requirements for park-and-ride users.

1.1.6 Maintenance Base Site M1-D (Rainier Brewery/Roadway Express)

Mitigation Features of the Selected Maintenance Base Site

The maintenance base site selected to be built is located at the former site of the Rainier Brewery between S. Forest Street, south of S. Hinds Street, Airport Way S., and Seventh Avenue S. The site (M1-D) requires the vacation of S. Hanford, S. Horton, and S. Hinds streets between Seventh Avenue S. and Airport Way S. All truck access to businesses located west of the maintenance base will be from Sixth Avenue.

Local Access

If the maintenance base vacates portions of public streets, creating a dead-end street, turn-arounds will be constructed where required to accommodate large trucks and fire apparatus.

1.2 LAND USE AND ECONOMICS

1.2.1 Common to all Segments

Mitigation Features of the Project

At each station area Sound Transit shall work with the local jurisdictions, as possible, during the Station Area Planning process to actively involve local businesses, neighborhood organizations, and local residents to plan for development of land uses that effectively serve and support the unique characteristics and needs of each station area.

Sound Transit shall to the extent not inconsistent with federal requirements, follow its adopted Guiding Principles for Employment and Contracting.

1.2.2 Segment D. (S. McClellan Street to Boeing Access Road)

The Final EIS recognizes that the light rail project may have adverse impacts on certain businesses located within the Rainier Valley and along Segment D. Sound Transit shall, therefore, implement a community reinvestment program funded at a level of $50 Million ("Community Reinvestment Fund"). This Community Reinvestment Fund shall be used and available to assist the community and the qualified local businesses, neighborhood organizations and community institutions within this area to mitigate and offset adverse economic impacts that they may suffer due to the Link light rail and its construction. The specific operational elements and program requirements of the Community

Reinvestment Fund shall be later established by Sound Transit in consultation with the City of Seattle and community business representatives. (This Community Reinvestment Fund, although a project requirement under this Amended ROD, is not considered part of the Link Light Rail Project funding and will not contain either United States Department of Transportation funds or Project local matching funds.)

1.3 ACQUISITIONS, DISPLACEMENTS AND RELOCATIONS

1.3.1 Common to all Segments

Mitigation Features of the Project

Sound Transit will contact all property owners whose property will be directly affected to answer questions and provide additional information about relocation assistance services, payments, and reimbursement eligibility. Sound Transit's relocation assistance advisory services will include, but not be limited to, measures, facilities, or services that may be necessary or appropriate to determine the relocation needs and preferences of each household, business, and nonprofit organization to be displaced. Sound Transit will provide current information on the availability, purchase prices, and rental costs of comparable replacement dwellings.

Sound Transit shall work closely and proactively with families and businesses to help them plan ahead for relocation, assist them to find new homes or sites, and help solve problems as they may occur. Interpreters will be used to assist those who do not feel comfortable speaking English to ensure understanding of their choices and options. While the ultimate choice of relocation site will be up to the affected family or business, Sound Transit will help with detailed investigation of possible locations. Every reasonable attempt will be made to assist those who wish to remain in their neighborhood in finding a new location close to their current site.

Sound Transit will compensate affected property owners according to the provisions specified in Sound Transit's adopted Real Estate Property Acquisition and Relocation Policy, Procedures, and Guidelines. These provisions are largely based on the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and Uniform Relocation Act Amendments of 1987 and on the State of Washington's relocation and property acquisition regulations (468-100 WAC). These benefits vary depending on the level of impact, available options, and other factors.

Property owners whose entire or partial property is acquired by Sound Transit will receive just compensation for their land and improvements. Just compensation is an amount paid to a property owner for property acquired for public purposes which is not less than the market value of the property acquired, including damages or benefits to the remaining property. Compensation will include any measurable loss in value to the remaining property as a result of a partial acquisition.

Sound Transit will pay for all normal expenses of sale, including escrow fees, title insurance, pre-payment penalties, mortgage release fees, recording fees, and all typical costs incurred incident to conveying title. The sale, however, will be exempt from real estate excise tax and no real estate commissions are involved. All funds remaining at the end of sale closing will be released to the seller.

Other benefits and compensation may include payment of residential moving expenses and replacement housing payments, nonresidential moving expenses, and reestablishment expenses. Sound Transit's Business Acquisition and Relocation Handbook and Residential Acquisition and Relocation Handbook outlines compensation and acquisition procedures in detail.

1.4 NEIGHBORHOODS

Specific mitigation for impacts to neighborhood quality of life, social interaction, safety and security, and social equity are described in detail in other sections of this mitigation plan (transportation, land use, displacements, visual resources, air quality, and noise).

1.5 VISUAL RESOURCES

1.5.1 Segment D (S. McClellan Street to Boeing Access Road)

Mitigation Features of the Project

The elevated portion of guideway south of S. McClellan Station (options B and C) will cross S. Winthrop Street, part of the Olmsted-planned Cheasty Boulevard system. The project will include landscaping, tree plantings and other streetscape improvements of Cheasty Boulevard along S. Winthrop Street that will enhance its visual quality.

The project will require the removal of mature street trees and specimen trees along the east frontage of the Rainier Vista housing development, a public landscape with high design quality that constitutes an important community visual resource. The associated visual impacts will be partially mitigated by replacement of the trees with new trees.

Streetscape improvements along MLK Jr. Way S. and S. Edmunds and S. Henderson streets will include new trees and new or repaired curb, gutter and sidewalks that will improve the visual quality of the area. To prevent possible land dereliction associated with the creation of remainder parcels difficult to redevelop, the project will replant such parcels with grass or simple landscaping after project construction, and pursue their redevelopment for land uses (including public open space) that are feasible and consistent with neighborhood plans.

1.5.2 Segment E (Tukwila)

Mitigation Features of the Project

The presence of the elevated trackway running along the hill on the south side of Boeing Access Road and removal of naturalized vegetation will have a low visual impact on an area which has potential traditional cultural value to local Indian Tribes. Restoration of affected areas with native plant species originally found on the site will reduce this impact.

Vegetative screening of the elevated guideway along the north side of SR 518 directly adjacent to residential properties west of 42nd Avenue S. and apartments along S. 154th Street will be provided, primarily consisting of coniferous trees, and where there no interference with the safe operations and maintenance of the light rail trains and guideway.

1.6 AIR QUALITY

No significant impacts have been identified during operation and no mitigation is necessary.

1.7 NOISE AND VIBRATION

1.7.1 Common to All Segments

The following sections describe the mitigation measures that will be used throughout the project. Utilizing the recommended noise and vibration mitigation measures, light rail and traffic noise impacts and light rail vibration impacts could be attenuated. During final design, project modifications could

eliminate some of the currently projected noise and vibration impacts. These modifications will be reviewed prior to finalizing mitigation needs.

Mitigation Features of the Project

There are several operational measures that can be taken to assure that noise and vibration levels related to light rail operation remain at the levels projected in the analysis. Table 1.7-1 provides a list of measures that Sound Transit will perform on a regular basis and the benefit that each of the measures will provide. In addition to the measures listed, Sound Transit will continue to research methods of maintaining low project-related noise and vibration levels during normal system operation. Purchasing quiet light rail vehicles is an important step in minimizing noise impacts. Sound Transit will use low-noise, current state-of-the-art vehicles.

Approaches to controlling wheel squeal will include one or more of the following:

- Use lubrication and friction modification. Apply lubrication on the flange side of the rail and friction modifiers on the running surface of the rail.
- Optimize rail and wheel profiles. It is often possible to reduce levels of wheel squeal through modifications to the rail and wheel profiles.
- Minimize contact with restraining rails.

Table 1.7-1
Summary of Link Light Rail System-Wide Operational Mitigation Measures

Operational Measure	System Benefit
Rail Grinding and Replacement	As rails wear, both noise levels from light rail by-passes and vibration levels can increase. By grinding down or replacing worn rail noise and vibration levels will remain at the projected levels. Rail grinding or replacement is normally performed every three to five years
Wheel Truing and Replacement	Wheel truing is a method of grinding down flat spots (commonly called "wheel flats") on the light rail's wheels. Flat spots occur primarily because of hard braking. When flat spots occur they can cause increases in both the noise and vibration levels produced by the light rail vehicles.
Vehicle Maintenance	Vehicle maintenance includes performing scheduled and general maintenance on items such as air conditioning units, bearings, wheel skirts, and other mechanical units on the light rail vehicles. Keeping the mechanical system on the light rail vehicles in top condition will also help to maintain the projected levels of noise and vibration.
Operator Training	Operators will be trained to maintain light rail travel speeds at those speeds given in the operation plan that was used for the analysis and to avoid "hard-braking" whenever possible. As stated, "hard-braking" can cause wheel flats and may also damage track. Furthermore, by training operators to identify potential wheel flats and other mechanical problems with the trains, proper maintenance can be performed in a more timely manner.

Additional Mitigation Commitments

1.7.1.1 Noise mitigation measures

Following is a summary of the types of noise mitigation measures that are recommended. Some combination of these recommendations will be used to eliminate all identified light rail and traffic noise impacts:

- Install sound walls. Sound walls are considered the most effective noise control measure, and are widely used to control traffic noise. In order to be effective, the walls must block the direct view of the noise source and must be solid with minimal openings. Sound walls will be used to mitigate any light rail noise impacts when the alignment is elevated on a structure. For the at-grade segments, a combination of sound walls and sound insulation (described below) can eliminate all noise impacts.
- Provide sound insulation. Insulating affected structures can reduce noise levels inside those structures, thereby eliminating any interior noise impact. This technique does not, however reduce exterior noise levels and is normally used for structures that have little or no outdoor use at the facility.

Sound walls were evaluated as the primary type of mitigation for light rail noise impacts in areas where the light rail alignment was elevated. The installation of four-foot sound walls on elevated trackway will eliminate all noise impacts for elevated sections. Six to eight foot sound walls adjacent to at-grade trackway, when not located in a roadway, or near receivers locations were also evaluated as mitigation measures. Sound walls for noise mitigation will occur in a few locations adjacent to receivers and will be constructed at the property owners' discretion. No sound walls are proposed adjacent to in-street trackway. Sound walls will be designed so the noise level at the affected structure will meet the appropriate criteria, either FTA, FHWA, or in some cases both criteria. All decisions to use at-grade sound walls will be coordinated with the affected property owner.

For those areas where sound walls are not a feasible and reasonable form of noise mitigation, building insulation will be used to mitigate remaining light rail noise impacts in accordance with FTA and

FHWA regulations. The sound insulation will use the Housing and Urban Development (HUD) interior 45 dBA Ldn as the reference value for noise reduction for light rail noise impacts, and the WSDOT 51 dBA peak hour Leq criteria for traffic noise impacts. For those locations where both light rail and traffic noise impacts are identified, the interior levels will be required to meet whichever criteria required the greatest level of noise reduction.

Finally, new development and redevelopment along the alignment can incorporate sound considerations into site planning and building design. The planned redevelopment of two large public housing projects in Segment D - Rainier Vista and Holly Park - provide opportunities to design these facilities to reduce noise impacts and enhance community character and access. Redevelopment options include creating a buffer zone between the road and new residences, incorporating a sound barrier or constructing new homes so that interior noise levels meet HUD criteria. This process will mitigate project noise impacts at both of these developments. Sound Transit will work with local jurisdictions and communities during the final design phase to further evaluate and develop appropriate mitigation.

1.7.1.2 Vibration mitigation measures

All of the projected vibration impacts will be mitigated using one of the mitigation measures described below. The actual form of mitigation will be selected during final design.

- Ballast mat on top of a concrete pad in ballast and tie track;
- High resilience direct fixation fasteners;
- Resiliently supported ties;
- Spring-loaded switch frogs or ballast mats for areas where impacts may be caused by cross-overs and switches; and
- Alternating stiffness fasteners.

1.7.2 Segment B – Partial (Convention Place Station to Westlake Station)

No significant impacts have been identified during operation and no mitigation is necessary.

1.7.3 Segment D (S. McClellan Street to Boeing Access Road)

Additional Mitigation Commitments

The project is projected to have 52 moderate light rail noise impacts. The potential noise impacts will be primarily at front-line residences bordering MLK Jr. Way S. There will also be the potential for 231 traffic-related noise impacts. All of the 52 receptors with potential light rail noise impacts have traffic noise impacts because the roadway will be moved to accommodate the light rail. Most of the front-line receivers along MLK Jr. Way S. currently have existing noise levels that meet or exceed the traffic noise abatement criteria.

No potential vibration impacts are projected along MLK Jr. Way S.

1.7.3.1 Noise Mitigation

Noise mitigation analysis in this segment was performed using a combination of building sound insulation and sound walls. Where proposed, sound walls will be located adjacent to the affected property. Noise impacts in this segment are divided into five separate sections for the purpose of performing the mitigation analysis. The five sections are as follows:

- McClellan Street Station to S. Alaska Street;
- S. Alaska Street (including Edmunds Station) to S. Graham Street;
- S. Graham Street to S. Kenyon Street (includes Holly Park);

- S. Kenyon Street to S. Henderson Street; and
- S. Henderson Street (including Henderson Station) to Boeing Access Road.

McClellan Station to S. Alaska Street (including Edmunds Station): There is one light rail and 40 traffic noise impacts projected in this section of Segment D. Twenty will use building sound insulation, although four of the impacts may be mitigated with sound walls or building insulation. The remaining 16 impacts are in the Rainier Vista residential housing complex which is planned for redevelopment. Mitigation of the remaining 16 impacts at Rainier Vista will be performed during the redevelopment by 2006. If the redevelopment is not completed prior to implementation of the light rail project, the noise-impacted units will be mitigated using building sound insulation.

S. Alaska Street to S. Graham Street (including Graham Station): This section of Segment D has 90 projected traffic noise impacts, 29 of which also have noise impacts related to light rail operations. Fifteen of the impacts will be mitigated using sound walls or building insulation. All other impacts will be mitigated using some form of building sound insulation. The walls will have a combined length of just over 850 ft and have a height of approximately 6 ft

S. Graham Street to S. Kenyon Street (includes all of Holly Park): There are 42 projected traffic noise impacts, with 18 of these impacts also having noise impacts due to light rail operations. All except six of the impacts will be mitigated using some form of building sound insulation. The remaining six impacts are located in Holly Park and will be mitigated as part of the planned redevelopment of this area by 2003. If the redevelopment does not occur prior to light rail implementation, the six units will be mitigated using building sound insulation.

S. Kenyon Street to S. Henderson Street: This section is projected to have 50 traffic noise impacts, with seven of these impacts also having noise impacts due to light rail operations. Building sound insulation or three sound walls totaling approximately 1,220 ft will be used to mitigate both the traffic noise and light rail noise impacts at 13 of these receivers. All other impacts will have some form of building sound insulation applied as mitigation.

S. Henderson Street (including Henderson Station) to Boeing Access Road: There are 25 traffic noise and 13 light rail noise impacts projected in this section of Segment D. All noise impacts in this section of Segment D can be mitigated. Thirteen of the impacts that both have light rail and traffic noise impacts will be mitigated with a sound wall or building insulation. All other impacts will be mitigated using building sound insulation.

1.7.4 Segment E (Tukwila)

Additional Mitigation Commitments

Thirty nine potential light rail-related noise impacts were projected in this segment and none are considered severe under FTA guidelines. There are also 8 projected vibration impacts in the segment.

1.7.4.1 Noise Mitigation

Noise mitigation will consist of sound walls, as previously described (see section 1.7.1, above), along elevated or retained/cut at-grade sections of the alignment. The installation of four-foot sound walls on elevated trackway will mitigate all noise impacts. The height and location of sound walls along retained/cut at-grade sections will be determined during final design.

1.7.4.2 Vibration Mitigation

All of the projected 8 vibration impacts will be mitigated using methods described in Section 1.7.1. The actual method will be determined during final design.

1.8 ECOSYSTEMS

Increased impervious surfaces will result in increased stormwater runoff and decreases in water quality. This impact can be mitigated with detention and treatment of stormwater runoff from new impervious surfaces, as discussed in the Water Resources of the Final EIS.

1.8.1 Segment B – Partial (Convention Place Station to Westlake Station)

No significant impacts have been identified during operation and no mitigation is necessary.

1.8.2 Segment C (Westlake Station to S. McClellan Street)

Additional Mitigation Commitments

The project will result in the loss of approximately 10,150 square feet of deciduous forest within city of Seattle designated greenbelts. Tree removal within a city greenbelt will require replacement planting. Portions of the greenbelts disturbed by construction will be required to be replanted at a ratio of 100 trees per acre and 1,600 shrubs per acre. A three-year maintenance plan is also required to provide survival of the plantings.

1.8.3 Segment D (S. McClellan Street to Boeing Access Road)

Additional Mitigation Commitments

The project will fill approximately 5,000 square feet of wetland (AR-3) and remove approximately 1,500 square feet of wetland buffer. The compensation/restoration ratio for these wetland impacts is 2:1, therefore approximately 10,000 square feet of wetland mitigation is required. Also, the compensation/restoration ratio for wetland buffer impacts is 1:1, therefore 1,500 square feet of buffer mitigation is required. Mitigation could be accomplished either on or offsite. Wetland AR-3 is located on Seattle City Light powerline right-of-way and private property. On-site opportunities to conduct wetland creation or restoration at this site may be limited by the requirements of Seattle City Light. The wetland currently consists primarily of mowed wetland grasses. With permission from Seattle City Light, this wetland could be enhanced by removing invasive shrubs and grasses and replanting the site with native wetland species. Potential for wetland restoration exists on privately owned land adjacent to wetland AR-3. Fill material could be removed to connect wetland AR-3 with another wetland located outside of the project limits. Dense blackberry thickets could be removed and replaced with native wetland tree species. Blackberries in the buffer area could also be removed and planted with native upland species to meet the buffer mitigation requirements. Offsite mitigation will also be pursued in the event that on-site opportunities are not preferred. The final mitigation will be developed in conjunction with the permitting agencies.

Several mature trees will be removed at the edges of deciduous forest patches. To minimize this impact, saved trees will be clearly marked and disturbed sites will be landscaped with native trees and shrubs.

1.8.4 Segment E (Tukwila)

Additional Mitigation Commitments

The Tukwila Freeway Route results in filling up to approximately 2.2 acres of wetland (AR-7, AR-8, AR-49, AR-50), and will remove up to approximately 4.6 acres of wetland buffer. The compensation/restoration ratio for these wetland impacts is 1.5:1, therefore approximately 3.3 acres of wetland mitigation is required. Also, the compensation/restoration ratio for wetland buffer impacts is 1:1, therefore approximately 4.6 acres of buffer mitigation is required. Mitigation could be accomplished on-

and/or off-site, although off-site mitigation will be located within the City of Tukwila where practical.. On-site mitigation options include:

1. Minimizing the footprint of the new construction through design modification, as practical, will minimize the total wetland impact.

2. Restoring and enhancing AR-7 to provide a portion of the wetland mitigation requirement. Wetland AR-7 is situated on three parcels of land that are owned by Burlington Northern Santa Fe railroad, Union Pacific railroad and WSDOT. Excavate fill material adjacent to AR-7 to create additional wetland area. Remove garbage (e.g. building structure, appliances, tires, bed frame) throughout the wetland and replace exotic invasive species with native wetland species to enhance wetland functions.

Off-site mitigation may be necessary to achieve the 3.3-acre required mitigation ratios. Off-site mitigation could occur in conjunction with fisheries habitat restoration. Off-site, mitigation could be accomplished at a different location within the Duwamish River drainage basin. Locations will be selected in coordination with permitting agencies and/or the Watershed Restoration Group.

Mitigation for impacts on threatened and candidate fish species associated with bridging the Duwamish River could be achieved by planting riparian trees on the river banks in the vicinity of the project area or by making in-stream habitat improvements such as anchoring large woody debris within the channel. Mitigation measures for the Duwamish River Bridge construction will include, but are not limited to the following: (1) Limiting in water construction to in-water work periods; (2) Spill control such as silt curtains and oil booms; (3) Sediment and erosion control, BMPs; (4) Maintain specific construction access points; (5) Limit clearing; and (6) Revegetate at least 500 ft of nearby banks of the Duwamish River with new trees and riparian shrubbery (assuming displacement of two 50-ft-wide swaths of existing bank vegetation and a 5:1 replacement ratio). The success of riparian vegetation will be monitored by Sound Transit for a period of no less than 5 years after installation. Specific monitoring locations will be identified in the future in collaboration with the permitting agencies. Mitigation for placement of Southgate Creek into a culvert will be achieved by stream channel habitat improvements downstream of this area according to applicable regulations. Relocating the Southgate Creek stream channel outside the alignment corridor will have less of an impact than placing it in a culvert, engineering considerations require that culverting be retained as an option. Relocation of the drainage ditch which conveys the northern unnamed tributary of Gilliam Creek (AR 50) will provide opportunity to mitigate fisheries impact through the improvement of stream quality. These improvements may include introducing sinuosity to this tributary, increasing complexity of habitat, and reduction in water temperature through associated riparian plantings. Additional off-site mitigation could be achieved, as needed, in the headwaters to Gilliam Creek located on the south side of SR 518. Mitigation for fisheries impacts will be provided according to applicable regulations.

Tree removal at Wetlands AR-48, AR-49, and AR-50 could be mitigated through on-site wetland enhancement. While trees could not be replanted at these locations, clearing could be limited and planting plans could be prepared to revegetate areas disturbed by construction and also remove exotic species and replace them with native shrubs and herb species. This type of mitigation may be difficult to accomplish at AR-49 and AR-50 due to the confined nature of the wetlands at these locations. Wetland AR-48 is located in a less confined area. If property can be purchased or an easement can be obtained at AR-48, mitigation for impacts on this wetland and AR-49, which is also in the Southgate Creek drainage basin, could be accomplished at this site. Wetland mitigation will be provided according to applicable regulations.

1.9 WATER RESOURCES

1.9.1 Common to all Segments

Stormwater control techniques can mitigate the effects of long- and short-term hydrologic changes. State and local regulations establish standards for detention, retention, and other methods of stormwater control. In general, post-development runoff rates are required to match existing discharge rates which can range from the 2-year up to the 100-yr design storm event, dependent upon the point of discharge. Mitigation is usually accomplished by reducing or attenuating peak runoff rates from a developed site, by either detention (store and release to surface waters) or retention (store and infiltrate or evapotranspirate runoff).

Water quality impacts are generally regulated by federal and state guidelines, usually through standards for receiving water quality and limitations on the generation and release of pollutants. Washington State's Department of Ecology (Ecology) has established regulations to protect water quality from point and non-point source pollution. A National Pollution Discharge Elimination System (NPDES) permit will be obtained for construction and operation of this project. If a general permit is obtained, specific discharge treatments, monitoring, and reporting requirements applicable to individual project sites will be included for park-and-ride and maintenance facilities and stations.

Source controls will be used on developed sites to prevent pollutants from entering stormwater. Source control Best Management Practices (BMPs) are intended to mitigate pollutants generated through normal operation and use of buildings, roadways, park-and-rides, and other urban facilities. Specific source control strategies have been developed for individual contaminants of concern and/or polluting activities. They include the following:

- Preserve natural vegetation
- Establish buffer zones
- Contain wash water or discharge to sewer system
- Maintain permanent seeding or planting on exposed soil
- Maintain spill and fume control at paint facilities
- Maintain oil/water separators

Non-point source pollutants are removed from stormwater when suspended sediments are deposited or trapped when plants uptake dissolved materials in stormwater. Non-point source pollutants are removed in conjunction with suspended solids, which can be accomplished by using wet ponds, constructed wetlands, or wet vaults. Nutrient pollutants (including phosphorus, nitrogen, and organics) and metals can also be removed through filtration and biological uptake facilities, such as constructed wetlands and biofiltration swales.

Additional mitigation or treatment will be used on a site-by-site basis to remove pollutants if appropriate. In general, estimates of pollutant loading and treatment system removal efficiencies indicate that mitigation could reduce the concentrations of pollutants (total suspended solids, chemical oxygen demand, metals, and nutrients) expected in runoff, relative to existing levels, on a long-term basis. Their effectiveness at specific sites will be determined using water quality models.

Additional stormwater detention and treatment is not necessary in Segments A, B, and C because new impervious surfaces in these areas are served by storm drains with adequate capacity.

1.9.2 Segment D (S. McClellan Street to Boeing Access Road)

Mitigation Features of the Project

Stormwater facilities such as detention ponds or vaults will be constructed if needed at the Henderson Street bus layover area to mitigate potential hydrologic impacts. The capacity required to meet City of Seattle regulations at this location is approximately 3,300, and will require approximately 3,600 ft2 of treatment.

Widening MLK Jr. Way S. between the tunnel portal and S. Norfolk Street will create new impervious surfaces. Runoff from this area generally drains to the City of Seattle's storm drainage system, except for areas between S. Hanford Street and S. Columbian Way, which drains to a combined sewer and between S. Trenton Street and Barton Avenue S, where it then drains to a CSO. A new storm water collection system will be constructed on MLK Jr. Way S. This collection system will convey storm runoff from the project area to the existing storm drain system (except at S. Henderson Street). Stormwater runoff along MLK Jr. Way S. will be separated from the existing CSO for approximately 4,000 ft between Hanford Street and Columbian Way, which will reduce CSO events and reduce existing impacts to receiving waters. The City of Seattle has indicated that the existing storm drainage conveyance system at the south end of MLK Jr. Way has inadequate capacity. The City hired a consultant to complete an analysis of the basin and preliminary findings.

The light rail project will require rebuilding MLK Jr. Way S. to include installation of a new storm drainage collection system. This system will be sized to accommodate the design flows established in the hydraulic study.

Construction of the light rail along MLK Jr. Way S. south of Beacon Avenue will result in a negligible increase in impervious surface area because most of the area adjacent to the existing roadway is either asphalt parking/shoulder or compacted gravel. At the time that the City hydraulic report is completed, Sound Transit will establish the level of its participation in the recommended program of storm drainage improvements, including detention and water quality facilities in the basin.

1.9.3 Segment E (Tukwila)

Mitigation Features of the Project

Stormwater detention facilities will be constructed to detain runoff from non-pollutant generating segments of track and detention and treatment facilities will be provided at the park-and-ride facilities to mitigate impacts of the increased polluting impervious surface, according to the King County Surface Water Design Manual Level 2 requirements. Detention facilities will be located within existing freeway right-of-way or property already required for acquisition. The detention facilities will be designed according to the King County Stormwater Manual (1998) King County Level 2 standards and will be used for the preliminary volume estimates at the Boeing Access Road facility because it will discharge to a wetland. According to Tukwila's Sensitive Areas Ordinance, stormwater discharge to this wetland will be allowed after a site review. The Boeing Access Road park-and-ride will add approximately 155,000 square feet of impervious surface area. Stormwater detention will be provided for the additional impervious area created by the project.

Water quality treatment such as oil/water separators and/or bioswales will also be provided at the Boeing Access Road park-and-ride facilities to remove conventional pollutants associated with automobile use. Bioswales were designed for each of these sites based on preliminary drawings. Bioswale calculations will be made using the method recommended in the King County Surface Water Design Manual (1998). Bioswales are assumed for water quality treatment because they will require the most surface area, and represent a worst-case scenario for feasibility evaluation.

Compared to existing conditions the park-and-ride facility at S. 154th Street will decrease total impervious surface area and runoff by adding landscaping to an area that currently has none. This site will also decrease total pollutant generating impervious surface. A bioswale or other treatment Best Management Practices (BMPs) will be constructed at this site to treat runoff in accordance with the King County Stormwater Design Manual.

None of the impervious surface generated by segments of track will be subject to vehicular use; therefore, runoff from these areas will not be a measurable source of pollutants. Detention will be provided for those sections of track that create new impervious surface area. The specific locations of detention facilities will be determined during final design but will be located in freeway right-of-way or property already acquired for the project.

Compared to existing conditions the park-and-ride facility at S. 154th Street will decrease total impervious surface area and runoff by adding landscaping to an area that currently has none. However, this site will increase total pollutant generating impervious surface and a bioswale (approximately 6,000 ft2) or other treatment Best Management Practices (BMPs) will be constructed at this site to treat runoff in accordance with the King County Stormwater Design Manual.

1.9.4 Maintenance Base Site

The maintenance base site reduces existing impervious surfaces. Stormwater runoff will be collected and conveyed to storm sewers. On-site water quality mitigation will include: bioswales or other treatment for runoff from parking lots, treating and recycling wash water, using filters and oil/water separators prior to discharge, requiring spill control in paint shops, and recycling grease.

1.10 ENERGY

1.10.1 Common to all Segments

Mitigation Features of the Project

Sound Transit will incorporate relevant City, County, and Washington State energy code requirements into all design aspects of the system, stations, maintenance facility, and parking areas. Sound Transit will also work with Seattle City Light and Puget Sound Energy to design facilities to conserve electricity.

1.11 GEOLOGY AND SOILS

1.11.1 Common to all Segments

Mitigation Features of the Project

Using the appropriate seismic parameters in the design of the system will reduce the impact of earthquake shaking on the proposed light rail system. Damage due to soil liquefaction will be reduced or eliminated by a number of methods. For at-grade alignments, the ground may be improved by densifying or replacing potentially liquefiable materials that may be present beneath the alignments. The liquefaction prone soils may be designed for by placing the light rail on a raft of non-liquefiable soils, by founding the rails on piles, and/or by planning a maintenance schedule to re-level or repair system components if settlement occurs. Elevated and tunnel alignments generally mitigate liquefaction potential by the design of the structure. The appropriate level of mitigation will depend upon the severity of the liquefaction hazard and the specific light rail components in those areas.

For existing steep slopes along the corridor, mitigation will be accomplished through the application of proper engineering and design.

1.12 HAZARDOUS MATERIALS

1.12.1 Common to all Segments

Mitigation Features of the Project

The project will implement standard operating procedures at the maintenance facility to address management of hazardous materials as part of system operation. These procedures involve development of a programmatic health and safety plan, worker training, materials use planning and tracking, documentation, and a waste management program, in compliance with local, state and Federal regulations and permitting requirements. Properties left with residual contamination will be clearly identified in documentation provided to the state Department of Ecology.

1.13 ELECTROMAGNETIC FIELDS

1.13.1 Common to all Segments

No known significant unavoidable adverse impacts associated with electromagnetic fields or electromagnetic interference are expected and, therefore, no mitigation is anticipated.

1.14 PUBLIC SERVICES

1.14.1 Common to all Segments

Mitigation Features of the Project

Sound Transit will incorporate the following mitigation measures to help ensure system safety and minimize the potential impacts of light rail operation on public services:

- Develop a system safety and security program that defines activities and management controls, plans, and monitoring processes to prevent patrons, personnel, and property from being exposed to hazards or unsafe conditions during light rail operation. The program will be developed in close coordination with local fire, police, and other public service agencies as part of Sound Transit's emergency management plan. The program will also:
  - Incorporate safety considerations, compatible with other system requirements into light rail facilities, equipment, plans, and procedures to minimize the potential for accidents during operation.
  - Identify and eliminate or minimize hazards associated with light rail and eliminate or minimize to ensure acceptable safety levels.
  - Implement a safety certification program that requires all elements of a safe transit system are present before revenue service begins.
  - Maintain a proactive safety philosophy that emphasizes preventive measures over corrective measures to eliminate unsafe conditions.
  - Analyze and use historical data generated by the newer transit properties with characteristics similar to light rail to support the system safety program.
  - Coordinate safety and fire/life safety considerations with reliability, maintainability, and identified testing activities.
- Design and operate stations to provide patron safety and station security through architectural configuration and station design; electronic monitoring, sensing, and communications; and manned surveillance, including the following: (Many of these concepts are designed for deep tunnel stations, but where feasible or deemed necessary will be applied to other stations.)

- Design stations to be open and spacious, well-lit, and uncluttered with open access and high ceilings.
- Minimize turns in public circulation areas, avoid or minimize interior columns, and avoid blind corners or nooks that are beyond a patron's or a security camera's field of vision.
- Provide clear and direct access from a station entry to a station platform by limiting the number of entry points and avoiding long corridors or walkways.
- Provide uniform lighting throughout the station area and place fare machines in one location per entrance.
- Install closed circuit television (CCTV) surveillance cameras at strategic locations to effectively cover public areas. CCTV will be located to provide adequate coverage of all entry points; fare machines, money changers, and bank machines; paths from entry to platform, including corridors, stairs, escalators, and entry points to elevators; in elevators of deep tunnel stations; platform areas; emergency telephone locations; and any vending and other self-service areas.
- Install a public address system to provide information to transit passengers. This system will be used in conjunction with CCTVs to address emergencies or antisocial behavior and will provide adequate coverage of all public areas in stations.
- Install passenger assistance telephones that provide direct contact with security or emergency response personnel. These phones will likely be located in fare collection and platform areas, near a CCTV camera, and will be prominently identified.
- Provide security personnel to rove between stations. These personnel will likely be contracted with local law enforcement or private agencies, but could also be provided directly by Sound Transit. More precise needs for manned surveillance will be determined as the safety and security program advances.

- Implement system security criteria at and around station sites that enhance patron security through: ensuring maximum visibility of the entrances and the facility from adjacent areas; planting vegetation that does not hinder fields of vision; providing adequate lighting and site accessibility; and provide clear lines of sight of parking lots, adequate illumination, and ease of access for surveillance.
- Provide radio communication capabilities for emergency train operations and police and fire emergencies; provide two-way communication capability from within elevator cabs between the patron and the light rail operations.
- Install and maintain an intrusion and alarm system to protect against unauthorized entry into security sensitive areas of the system such as fare vending machines, traction power substations, and money counting and storage rooms; lock or otherwise prevent access to tunnel and elevated sections when the light rail system is closed wherever possible.
- Develop an emergency management plan in close coordination with Seattle, Tukwila, SeaTac, King County, and Port of Seattle police and fire departments, transportation divisions, and others through Sound Transit's Fire-Life Safety Committee during preliminary and final design, and construction, and operation of the proposed facilities. This plan will provide that reliable emergency access is maintained, alternate plans or routes are developed to avoid delays in response times, and general emergency services are not compromised.
- Work with local police departments to implement crime prevention through environmental design (CPTED) principles when feasible. This will include design elements such as installing appropriate lighting around the station areas, tunnels, parking facilities, and other system facilities, and incorporating other design features to help deter crime.
- Work with local fire and police departments to address training necessary to teach personnel about the light rail system facilities (tunnels, elevated sections, at-grade crossings) and operations.

- Work with local school districts to educate school officials and children about the light rail system and safe street-crossing procedures, especially on at-grade sections.
- To reduce effects on response times, design at-grade tracks and curbs that will physically allow crossing by emergency vehicles if determined appropriate.
- Completion of hazard analysis for fire/life/safety issues in the joint operations of the downtown tunnel.

1.15 UTILITIES

1.15.1 Common to all Segments

Mitigation Features of the Project

Based on design measures and coordination with utility service providers, impacts to utilities during light rail operation will be minimal. Sound Transit will continue to work with utility providers to minimize any potential service interruptions and to conserve resources. The light rail project will include the following measures to prevent or minimize potential operational impacts on utilities:

- Coordinate with both municipal and private utilities to ensure acceptable and safe relocation of manholes and other access points for ongoing utility maintenance once light rail is in operation; adopt design standards for providing access for repair and maintenance of utilities.
- Design the system to reduce the effect of stray current, install devices to reduce the impact of stray current between the traction system and the utilities facilities, or replace particularly susceptible metallic utility infrastructure with nonmetallic materials.
- Coordinate with affected water utilities and local fire departments to ensure that access to fire hydrants and water use, especially at the maintenance facility, does not compromise flow required for fire protection.
- Comply with applicable utility policies and strategies as specified in the adopted operational Seattle, Tukwila and King County comprehensive plans (as applicable) including those provisions related to levels of service, conservation strategies, and coordination of service providers. Sound Transit will discuss the undergrounding of relocated aboveground utilities with the local jurisdictions.
- Incorporate and comply with Seattle, Tukwila, King County and the State of Washington (as applicable) energy, building and fire codes, design guidelines, and other requirements applicable to utilities into all design aspects of the system, stations, maintenance facility and parking areas.
- Use industry-standard methods to reduce the potential impacts of vibration on underground pipes and special infrastructure concerns such as lead joint pipes; closely coordinate with utility owners to determine appropriate measures to protect against potential elevated and at-grade Link facility settlement.

1.16 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Mitigation measures for historic and archeological resources are described in the Programmatic Agreement, and its amendments, between the FTA, State Historic Preservation Officer (SHPO), and the Advisory Council for Historic Preservation (ACHP).

1.17 PARKLANDS

1.17.1 Segment D (S. McClellan Street to Boeing Access Road)

Mitigation Features of the Project

Improvements to Cheasty Boulevard will be prepared in consultation with the Seattle Parks Department. Improvements will include:

- New sidewalks, landscaping, lighting, and street trees along Cheasty Boulevard in the light rail station area in a manner compatible with the documented Olmsted design concepts for Seattle's boulevards.
- Reconnecting the Olmsted-designed Cheasty Boulevard and Mt. Baker Boulevard by providing at-grade pedestrian and bicycle access across Rainier Avenue S. and MLK Jr. Way S.

Minimizing to the extent practicable the physical encroachment into the right-of-way of Cheasty Boulevard.Minimizing to the extent practicable the obstruction of views from Cheasty Boulevard toward Mt. Baker Boulevard.

1.17.2 Segment E

The Tukwila Freeway Route will cross over the Duwamish/Green River Trail on an elevated structure. Support columns for the elevated trackway will be placed as far away from the trail as practical. The mitigation measures for the alignment crossing the Ray-Carrossino Farmstead is provided in the Amendment to the Programmatic Agreement between FTA and the SHPO and ACHP.

2 Construction / Short Term Mitigation

2.1 TRANSPORTATION

2.1.1 Common To All Segments

All mitigation measures will comply with local regulations governing construction traffic control and construction truck routing. Sound Transit will finalize detailed construction mitigation plans in close coordination with local jurisdictions, King County Metro, and other affected agencies and organizations. Mitigation measures for traffic and freight impacts due to light rail construction will include the following practices:

- Follow standard construction safety measures, such as installation of advance warning signs, highly visible construction barriers, and the use of flaggers.
- Post advance notice signs prior to construction in areas where surface construction activities will affect access to surrounding businesses.
- Provide regular updates to assist public school officials in providing advance and ongoing notice to students and parents concerning construction activity near schools.
- Coordinate street sweeping services in construction areas with construction activity, particularly areas with surrounding residential and retail development.
- Use lighted or reflective signage to direct drivers to truck haul routes, to provide visibility during nighttime work hours.
- As possible, schedule traffic lane closures during off-peak hours to minimize delays during periods of higher traffic volumes.
- Cover potholes and open trenches during non-construction hours where possible, and use temporary concrete or other protective barriers to protect drivers from trenches remaining open.
- Post advance warning and install temporary traffic cones and markings to provide that peripheral surface activities do not adversely affect pedestrian and bicycle traffic.
- Develop a multi-media public information program (e.g. print, radio, posted signs and electronic web page) to provide information regarding street closures, hours of construction, business access, and parking impacts.
- Provide temporary parking to mitigate loss due to construction staging or work activities, where practical.
- Work with King County Metro to post informative signage well before construction at existing transit stops that will be affected by construction activities, and to identify ways to relocate and/or close affected transit stops.
- Work with King County Metro to identify ways to relocate or modify trolley wires in coordination with in-street excavation and construction, to allow electric trolley buses to continue operating during construction.

These mitigation measures apply to all segments in the light rail corridor and all maintenance base options. Segment-specific construction mitigation measures have been identified for Segments B and C only, as described in the following sections.

2.1.2 Segment C (Westlake Station to S. McClellan Street)

Closure of the Downtown Seattle Transit Tunnel (DSTT) will be required for a period of up to 26 months, during which time downtown streets will need to accommodate the buses that currently operate in the DSTT. Surface street modifications necessary to maintain acceptable operating levels will be

completed before closing the DSTT. Construction of the pre-closure surface street improvements may require up to 12 months.

To mitigate impacts of the DSTT closure and improvements on both transit riders and automobile users Sound Transit shall form a committee with the City of Seattle, King County and Community Transit and may be expanded to include participation by other transit agencies. to provide adequate facilities and measures to assure that public transit can effectively serve the central business district and that other users' needs are accommodated. The committee will agree on performance and travel time standards for buses operating on surface streets. The committee will also establish a monitoring program and make recommendations on changes to downtown street operations necessary to meet and maintain those performance standards during project construction. The committee will also consult with and seek the input of downtown Seattle, Seattle neighborhood and suburban stakeholders. Improvements that have been identified include:

Operational Improvements on North/South Streets

- Bus routes that currently use the bus tunnel will be reassigned to 2nd, 3rd and 4th Avenues to group routes serving similar rider markets grouped together to provide higher service frequency, add rider convenience and simplify bus routes through downtown.
- Bus stops on 2nd, 3rd and 4th Avenues will be modified, expanded and/or relocated to optimize bus flow, traffic impacts and to balance passenger demand at stops.
- To help facilitate the movement of pedestrians, autos and buses at key intersections uniformed police officers will be used to direct traffic during the peak periods.
- During the construction period buses will be concentrated on 3rd Avenue with the following operational conditions:
    - Traffic circulation on 3rd Avenue will be allowed at all times but in the peak periods, autos will only be permitted to make right turns onto and off 3rd Avenue to provide opportunities for passenger pick-up, deliveries and circulation for vehicles entering and exiting side-street parking garages.
    - Through traffic on 3rd Avenue between Stewart Street and Yesler Way will be restricted to public transit buses charter buses, and emergency vehicles on weekdays from 6-9 a.m. and 3-6 p.m. Additional analysis will be performed to determine if the hours of restricted operation can be reduced.
    - Some bus stops will be modified, closed or new ones added. Buses will operate in a skip stop pattern.
    - When the modifications are first put in place, autos on 3rd Avenue will be allowed to make left turns during the midday. However, if the monitoring program finds that this movement results in impacts to transit travel time and reliability, midday left-turn restrictions will be instituted.

Connections to I-5 in North Downtown

Providing transit priority in the north downtown area will occur with the following improvements:

- Split the buses bound for I-5 in the afternoon between Pike Street, Olive Way and Virginia Street.
- Route Community Transit and Sound Transit buses on Pike Street. (Currently only trolley service operates on Pike Street.) Add a second bus stop and shelter on the south side of Pike Street east of Sixth Avenue.
- Add a transit-only contra-flow lane on Ninth Avenue between Olive Way and Stewart Street and reconstruct the intersection of Ninth Avenue and Olive Way to allow buses to enter and exit Convention Place Station (access for the I-5 reversible lanes).

- Add a peak period transit only lane on Olive Way between Fourth Avenue and Boren Avenue (eliminate westbound auto lane between Boren Avenue and Howell Street). Using the transit lane on Olive Way, operate buses in a skip-stop pattern.
-

Connections in South Downtown

To accommodate the volume of buses entering downtown from the south and I-90 and to reduce impacts of bus travel times, bus volumes will be split between Fourth Avenue S. and Fifth Avenue S. In addition, the following changes are recommended:

- Prefontaine Place will be a transit only street at all times.
- 3rd Avenue south of Yesler Street will be restricted to public transit buses, charter buses and emergency vehicles on weekdays from approximately 6-9 a.m. and 3-6 p.m.
- Establish a contraflow lane on 5th Avenue South between Jackson Street and Washington Street. Allow auto use of the 5th Avenue South contraflow lane between Jackson Street and Washington Street, but require autos to turn right at either Main Street or Washington Street. Monitor transit travel time and reliability to determine if the transit only contra flow lane should be extended north from Washington Street to Terrace Street, and to determine if auto use of the contraflow lane is affecting bus travel time.
- Provide transit priority on Royal Brougham Way, 6th Avenue South, and Airport Way between the E-3 busway and South Jackson Street.

Sound Transit will work with the Downtown Seattle Association and other interested parties to develop a campaign to promote the downtown area during the construction period.

Construction activities in Segment C will impact the Burlington Northern Santa Fe Railroad activity. Coordination with the railroad will be necessary to minimize impacts during construction.

2.2 LAND USE AND ECONOMICS

2.2.1 Common To All Segments

Mitigation measures that reduce impacts to local businesses during project construction include:

- Establish effective communication with residents and businesses; develop and implement a public relations plan that will provide that local residents and businesses are fully informed about potentially significant disruptions: such as temporary street closures; out of the ordinary construction noise, vibration, light, or glare; changes in transit service; and parking availability. Sound Transit will work with community and neighborhood groups prior to and through the construction process to identify types of impacts that will occur and to work on ways to reduce those impacts.
- Provide a community ombudsman.
- Minimize construction-related noise, vibration, dust and dirt impacts through appropriate construction methods to minimize impacts during periods of increased sensitivity. Maintain access to businesses during construction activities.
- Clearly identify and make accessible paths to and from major transportation facilities, such as designated pedestrian routes, bicycle lanes, bus routes and stops, designated truck routes, and tunnel entrances.
- Work with affected business owners, chambers of commerce, merchants associations and others to develop a business marketing program to minimize business losses during construction. The

program could include a shuttle bus and/or increased transit service to affected areas, additional signage, advertising and promotion, and incentives to attract and retain customers.

- Request the assistance of local ethnic community organizations to help tailor business marketing programs to the specific needs of ethnic business owners whose customers are mainly from a single ethnic group.
- Provide business cleaning services on a case-by-case basis.
- Work with Community Capital Development and/or similar organizations to assist affected businesses in gaining access to technical assistance and small business loans or grants.
- Develop a 24-hour monitoring center that provides telephone access for the public to get construction information and to make complaint and incident reports.
- Develop a mitigation commitment tracking system that will provide a computerized record of all mitigation commitments and a means to track progress toward meeting those commitments.

2.2.2 Segment D (S. McClellan Street to Boeing Access Road)

Mitigation measures as described at Section 1.2.2 shall apply here.

2.3 ACQUISITIONS, DISPLACEMENTS AND RELOCATIONS

Mitigation for acquisitions, displacements and relocations is described in Section 1.3.1.

2.4 NEIGHBORHOODS

2.4.1 Common To All Segments

Noise, vibration, visual, aesthetic, and traffic impacts during construction could temporarily affect neighborhood quality. Mitigation for these impacts is described in other sections of this attachment.

2.5 VISUAL RESOURCES

2.5.1 Common To All Segments

Temporary lighting will be necessary for nighttime construction of certain project elements or at tunnel portals and along surface or elevated sections in existing road or highway rights-of-way (to minimize disruption of daytime traffic). This temporary lighting could impact residential areas by exposing residents to uncomfortable glare from unshielded light sources, or by increasing ambient nighttime light levels. Temporary lighting impacts will be reduced by shielding light sources to block direct views from residential areas, and by aiming and shielding to reduce spillover lighting in such areas. The community ombudsman referenced in Section 2.2.1 shall work with the affected community to seek to minimize temporary lighting impacts.

2.6 AIR QUALITY

2.6.1 Common To All Segments

Construction activities primarily generate particulate matter (PM_{10} and $PM_{2.5}$), as well as small amounts of CO and NO_X from construction machinery exhaust and vehicular traffic delayed in construction zones. Specific sources of particulate will be dust from earth moving-excavation activities (termed fugitive dust) and diesel smoke and odors created during paving of station areas, parking lots, and roads.

The Puget Sound Clean Air Agency enforces air quality regulations in King County, including those for controlling fugitive dust (Regulation 1, Section 9.15). Contractors engaged in construction activities must comply with this regulation, which requires the use of best available control technology to control fugitive dust emissions. Controls used to meet this standard require the following actions:

- Use water spray as necessary to prevent visible dust emissions-particularly during demolition of brick or concrete buildings by mechanical or explosive methods.
- Minimize dust emissions during transport of fill material or soil by wetting down or by ensuring adequate freeboard on trucks.
- Promptly clean up spills of transported material on public roads by frequent use of a street sweeper machine.
- Cover loads of hot asphalt to minimize odors.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Keep all construction machinery engines in good mechanical condition to minimize exhaust emissions.

2.7 NOISE AND VIBRATION

2.7.1 Common To All Segments

Noise Mitigation

Several methods of noise mitigation are available for the contractor to use that will help keep noise level increases and impacts to a minimum. Whenever feasible, noise barriers will be built between the construction site and nearby noise sensitive receiver locations. Operation of construction equipment during nighttime hours (10:00 P.M. to 7:00 A.M.) or on Sundays or legal holidays, will be restricted to the limits of the construction sites that have noise barrier walls. All engine-powered equipment will be required to have mufflers installed according to the manufacturer's specifications and all equipment will be required to comply with pertinent equipment noise standards of the U.S. EPA. During nighttime work, either smart backup alarms or spotters will be used to reduce noise from equipment operating in reverse gears. Sound Transit will limit the use of impact or impulse tools and activities that produce the highest noise levels to daytime hours of 8:00 A.M. to 5:00 P.M., or as specified in noise regulations and variances. As stated, maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 ft. Mitigation of the noise associated with pile driving could include auguring piles, rather than driving piles, or limiting the time during which the activity can take place. Pile driving will be restricted to daytime hours of 8:00 A.M. to 5:00 P.M.

Truck haul routes will be selected to have the least adverse effect on noise sensitive receivers (e.g. residential) and will be subject to approval of the local jurisdiction.

Sound Transit will obtain noise variances to noise control regulations from the local government jurisdictions and the State of Washington where necessary to address conditions specific to the project.

Vibration Mitigation

The construction contract specifications will contain a section specific to vibration, and include, at a minimum, vibration monitoring of all activities that produce vibration levels near the U.S. DOT maximum recommended vibration level whenever there are structures located near the construction activity. This includes pile driving, vibratory sheet installation, soil compacting, and other construction activities that have the potential to cause high levels of vibration.

Vibration mitigation includes limiting the hours when the vibration producing equipment can be used near sensitive receivers. Mitigation for the tunnel-boring machine may not be necessary due to the geologic conditions and type of machine expected to be used for the project. Elimination of vibration related to pile driving is not feasible, however, the use of an augur to install piles instead of a pile driver will greatly reduce the noise and vibration levels. By restricting and monitoring vibration-producing activities, vibration impacts from construction will be kept to a minimum.

During high vibration-producing activities such as pile driving and shoring installation, there is a potential for settlement and small movements of nearby structures. Design and installation of suitable shoring systems and other mitigation will reduce the potential of settlement related damage. Other mitigation includes underpinning adjacent structures, installing recharge wells to reduce de-watering induced settlement, and/or re-leveling and repairing impacted areas following construction. In addition, pre-construction condition surveys and during-construction monitoring programs for neighboring structures will be conducted and repairs made as necessary.

The community ombudsman referenced in Section 2.2.1 shall work with the affected community to seek to minimize the impacts of noise and vibration.

2.7.2 Segment B – Partial (Convention Place Station to Westlake Station)

Construction Noise

Convention Place Staging Area: The Convention Place staging area is proposed as a construction staging area (but not applicable here for Capitol Hill construction no longer in the Initial Segment.) and cut-and-cover construction will take place on Pine Street that will require the partial closure of Pine Street from just east of Seventh Avenue to Interstate 5. Cut-and-cover construction on Pine Street could cause temporary re-routing and delays for public transit, emergency response, and vehicle travel times. It will also cause utility pipes, lines, cables and other infrastructure to be relocated. There are several noise sensitive land uses in the vicinity, including the Camlin Hotel and the Tower 801. Other sensitive uses include the Washington State Convention Center, the Paramount Theatre and miscellaneous retail and commercial use structures. Construction noise at the surface will be limited by City of Seattle noise ordinances, with such variances as will be negotiated with the City to allow the necessary limited night-time and weekend surface work activities required to support the underground construction. The Contract will require the Contractor to select equipment and working methods to meet the terms of the noise ordinance, as amended by variance, which may also require a continuous noise-wall around the perimeter of the station construction staging area.

Additional mitigation may include portable noise barriers and enclosures, and restrictions on haul truck speed.

Construction Vibration

Convention Place Staging Area: Vibration sensitive land use near the Convention Place staging area include residential and hotel, and potentially some theaters. Mitigation and monitoring of vibration producing activities, as described in Section 2.7.1 and above should be sufficient for vibration control in this area. If specific complaints are received, mitigation will include restricting some vibration producing activities during nighttime hours when the impacts have the greatest affect on the nearby sensitive land uses.

2.7.3 Segment C (Westlake Station to S. McClellan Street)

Construction Noise

Major noise sources associated with the construction of Segment C include haul trucks, loaders, cranes, excavators, and tunnel locomotives. Other noise producing sources such as compressors, conveyors, backhoes, generators, fans and blowers, and light duty vehicles will also be required. Current plans call for major construction staging areas to be located west of I-5 at the west portal, and at the Rainier Valley portal. An additional staging area will also be placed at the Beacon Hill Station. Mitigation for construction noise at these locations is the same given in Section 2.7.1 with the following addition:

Beacon Hill Station and Tunnel Portals: Land use around the Beacon Hill Station includes residents, churches and schools, and is considered an area with a high potential for construction noise impacts. Construction of the underground structures at this location will require 24-hour shifts , at times for 7-days a week. Construction noise at the surface will be limited by City of Seattle noise ordinances, with such variances as will be negotiated with the City to allow the necessary limited night-time and weekend surface work activities required to support the underground construction. The Contract will require the Contractor to select equipment and working methods to meet the terms of the noise ordinance, as amended by variance, which may also require a continuous noise-wall around the perimeter of the station construction staging area.

Land use at the Rainier Valley tunnel portal includes residential to the west, and commercial and retail to the south and east. Because the residential area to the west is up hill from the portals and construction staging areas, mitigation of noise from the staging areas may be difficult. Construction activities at this location will be required to meet the local noise control ordinance, however, at certain periods during construction, such as when the tunnel boring machine reaches the tunnel east portal after construction of the tunnels from the west, and during certain tunnel finishing operations, 24-hour shifts may be necessary for a short period. Land use around the west portal construction staging area is I-5 freeway, industrial uses and open space. This is the principal TBM tunnel construction staging area for Beacon Hill. This West Portal area will be used 24-hours a day 6-days a week throughout the tunnel construction, with all the tunnel materials and muck removal being trucked to and from here. For these 24-hour operations, a noise variance from the City of Seattle may be required. The Contract will require the Contractor to select equipment and working methods to meet the terms of the noise ordinance, as amended by variance. These mitigation measures, along with those given in Section 2.7.1, will mitigate noise impacts.

Construction Vibration

Major vibration producing activities and equipment likely to be used in Segment C include tunnel excavation using a boring machine, tunnel and shaft excavation by conventional methods, and possible soil compacting or pile driving. A construction vibration monitoring program along with public meetings and the vibration mitigation measures given in Section 2.1.2 are recommended in this area.

2.7.4 Segment D (S. McClellan Street to Boeing Access Road)

Construction Noise

Because the alignment is at-grade through this segment, construction noise levels are not expected to be as high as projected for the tunnel construction staging areas. As sections of track are finished, the construction activity will move away and begin working on other sections.

If nighttime construction activities are performed, mitigation measures may be necessary and could include temporary noise barriers and restriction of certain types of activities, such as excavation and demolition. The mitigation measures provided in Section 2.7.1, along with information provided here, should be sufficient to mitigate construction noise levels along Segment D.

Construction Vibration

The only major vibration producing activities expected in this segment are pavement demolition and soil compacting the track bed prior to track installation. The vibration mitigation measures provided in Section 2.7.1 should keep any vibration impacts to a minimum.

2.7.5 Segment E (Tukwila)

Construction Noise and Vibration

Construction of the elevated section of the alignment could involve the use of pile driving, which can cause noise levels in excess of 100 dBA at nearby noise sensitive receivers. Therefore, pile driving, if used, will be performed only during daytime hours. Otherwise, the mitigation measures provided in Section 2.7.1 should be sufficient to mitigate construction noise and vibration levels along the Tukwila Freeway Route.

2.7.6 Maintenance Base Site

No construction noise or vibrations impacts are expected at the maintenance base site.

2.8 ECOSYSTEMS

2.8.1 Common To All Segments

Mitigation for short-term ecosystem impacts will be based on a hierarchy of avoiding and minimizing impacts and compensating for unavoidable adverse impacts. The implementation of best management practices (BMPs) such as silt fencing, stabilizing exposed soils, landscaping with native plants, marking the limits of clearing, and collecting runoff during construction will minimize impacts on wetlands, wildlife, and fish. Minimization of the construction footprint will reduce new and existing impervious surface area. Additional mitigation measures are described below.

In many instances, construction timing can reduce or eliminate impacts on wetlands, fish habitat, and threatened and endangered species. Restricting construction in wetland areas to the drier summer months minimizes the impact on those wetlands that flood only during winter and early spring months and reduces wetland impacts caused by stormwater runoff. Staging areas will be located outside of wetlands or potential wildlife habitat.

Impacts on some fish species will be avoided by using methods to avoid or minimize in-water work. If in-water work is required, it will be conducted during construction windows established by the appropriate regulatory agencies, including the Washington Department of Fish and Wildlife. The hydraulic project approval permit (HPA) will specify construction periods. The project will comply with the conditions of the HPA and all other applicable permits. To avoid sediment runoff to the Duwamish River and its tributaries and adverse effects on salmonids and other fish species, a temporary erosion and sedimentation control plan and BMPs will be implemented (see Water Resources). At construction sites over or near the river and its tributaries, water quality will be measured regularly throughout the construction period to ensure control measures are in place and functioning properly. . Removing invasive riparian vegetation and re-vegetating and monitoring the disturbed areas will minimize the degradation of properly functioning stream channel conditions. Additionally, the light rail transit cars will be designed to prevent pollutant releases.

2.8.2 Segment C (Westlake Station to S. McClellan Street)

Potential impact of removal of tunnel spoils will be mitigated by implementation and strict of BMPs to control sediment runoff along the truck route and stockpile site.

2.8.2 Segment E (Tukwila)

Wetland impacts that could occur during construction in this segment include increased sediment and pollutants in runoff from exposed soils and construction equipment, and placement of temporary fill for construction access . The Boeing Access Road Station footprint is approximately 50 ft from a wetland and will temporarily impact less than 0.10 acre of the wetland buffer during construction. Mitigation for these impacts include the best management practices and timing restrictions identified at the beginning of this section.

Impacts on migrating chinook and coho salmon could occur due to increased turbidity in the Duwamish/Green River (AR-45, 46) resulting from bridge construction over the Duwamish/Green River and construction in the vicinity of Gilliam Creek (AR-52, 53, and 55) and the mainstem of Southgate Creek (AR-48). Impacts on listed fish can be minimized by performing in-water construction, between July 16 and October 31, when chinook salmon are not migrating through the project area and by implementing best management practices during construction.

2.9 WATER RESOURCES

2.9.1 Common To All Segments

Water quality degradation resulting from erosion and sedimentation and the release of pollutants during construction will be minimized through the use of BMPs. An NPDES permit will be obtained for construction activities associated with this project. The NPDES permit requires development of a Storm Water Pollution Prevention Plan (SWPPP) for erosion and sedimentation control and for control of pollutants other than sediment. The SWPPP documents all of the BMPs recommended for specific construction sites. Table 2.9-1 summarizes general BMPs that are recommended for construction sites.

Table 2.9-1. Temporary Erosion and Sediment Control Best Management Practices

Category	Applicable BMPs
Preventative practices	Preservation of existing vegetation
	Identification and delineation of sensitive areas
	Buffers
Temporary cover practices	Temporary seeding
	Straw mulch
	Bonded fiber matrices
	Clear plastic covering
Structural erosion control BMPs	Stabilize construction entrance
	Tire wash
	Construction road stabilization
	Dust control
	Interceptor dike and swale
	Check dams
Sediment retention	Filter fence
	Storm drain inlet protection
	Sedimentation basins

Further requirements will apply to specific construction sites limit in-water construction to designated construction periods. A variety of special BMPs are available to mitigate construction impacts at crossings or adjacent to streams or watercourses. In addition, temporary creek bypasses will be constructed to route creek water around work sites during pipe replacement or extension. Bypasses will be designed to handle high flows during storm events.

2.9.2 Segment C (Westlake Station to S. McClellan Street)

Dewatering of the tunnels could impact water quality at the discharge points. Construction water will be pre-treated prior to discharge to either the storm or sanitary sewer systems in accordance with permits and regulations.

2.9.3 Segment E (Tukwila)

BMPs for instream work and sediment and erosion control will be implemented during construction and fill activities near river and creek crossings and those activities associated with culvert extensions.

2.9.4 Maintenance Base Sites

With construction practices described in Section 2.9.1 maintenance facility construction is not expected to have any significant impacts to water resources.

2.9 GEOLOGY AND SOILS

2.10.1 Common To All Segments

To control erosion and sloughing during construction, contractors will employ BMPs within the construction limits. These BMPs will be consistent with Subsection K of Section 80 of the King County Sensitive Area Ordinance (King County, 1990), as amended, and other local ordinances, and will include one or more of the following:

- Minimize areas of exposure.
- Retain vegetation where possible, especially on steeper slopes.
- Seed or plant vegetation that is appropriate on exposed areas as soon as work is completed.
- Route surface water through temporary drainage channels around and away from disturbed soils or exposed slopes.
- Use silt fences, temporary sedimentation ponds or other suitable sedimentation control devices to collect and retain possible eroded material.
- Cover exposed soil stockpiles and exposed slopes with plastic sheeting, as appropriate.
- Use straw mulch and erosion control matting to stabilize graded areas and reduce erosion and runoff impacts to slopes.
- Intercept and drain water from any surface seeps if they are encountered.
- Incorporate contract provisions allowing temporary cessation of work under certain, limited circumstances, if weather conditions warrant.
- Install final retaining walls in front of cut-and-fill slopes as soon as scheduling permits.

Underground construction will generate large volumes of spoils. Potential impacts include erosion at stockpile and disposal sites. Erosion mitigation is discussed above.

For tunneling and mined stations, standard mitigation measures will minimize the erosion potential of the spoils and stockpiles. A closed-face, positive pressure tunnel boring machine could reduce the

need for dewatering during tunneling. Using the mitigation discussed for construction-induced vibrations and settlement will help to alleviate settlement-related impacts.

2.11 HAZARDOUS MATERIALS

2.11.1 Common To All Segments

A formalized health and safety plan and a contaminated soil and groundwater management plan will be required before construction work begins. Public health and safety measures will be implemented to minimize exposure through both airborne and direct contact routes. Increased setbacks, additional barriers to public access, and expeditious removal of contaminated materials may be required to limit contact by the public. The health and safety plan will also identify measures to ensure construction worker safety, outline emergency medical procedures, and specify reporting requirements.

The soil and groundwater management plan will specify methods and procedures for stockpiling, transportation, disposal, and treatment of contaminated soil, as well as groundwater removal, storage, treatment, discharge (to sewer), transportation, and disposal. Most encounters with hazardous materials are expected to involve petroleum products that will be managed using standardized approaches and in accordance with the Washington State Department of Ecology policies, procedures and requirements.

Throughout the construction process, encounters with hazardous materials will be documented and reported appropriately. Project planning will accommodate regulatory agency requirements as well as disposal or treatment facility requirements.

2.11.2Segment C (Westlake to McClellan Street)

Handling of contaminated material encountered during tunnel and station excavation and contaminated groundwater pumped during dewatering will be handled per techniques described in Section 2.11.1.

2.11.3 Segment E (Tukwila)

Impacts will be mitigated using the techniques described in 2.11.1

2.11.2.2.11.4 Maintenance Base Site M1-D (Rainier Brewery/Roadway Express)

The M1-D site has had two petroleum releases to soil. This maintenance base site is situated on top of a historic landfill with reported releases to groundwater. All impacts will be mitigated using techniques described in Section 2.11.1

2.10 2.12 ELECTROMAGNETIC FIELDS

There will be no electromagnetic impacts or mitigation during construction.

2.11 2.13 PUBLIC SERVICES

2.13.1 Common To All Segments

Sound Transit will continue to work with the cities of Seattle, Tukwila, SeaTac, King County, and Port of Seattle police and fire departments, transportation divisions, and others through Sound Transit's Fire-Life Safety Committee during project construction to ensure that reliable emergency access is maintained and that alternate plans or routes are developed to avoid significant delays in response times. Sound Transit will coordinate with local police departments to ensure adequate staffing during

construction for traffic and pedestrian movement control and other necessary policing efforts. Additional staffing requirements and financial responsibilities for police services required during construction will be determined in collaboration with the local police departments. Sound Transit will coordinate with fire departments and hospitals during water utility relocations (see Utilities) to prevent water supply disruptions to these facilities, and it will notify school districts of major construction activities that may affect bus routing during the upcoming school year. Alternative solid waste collection locations, modified collection times, or other elements to minimize potential impacts to solid waste collection operations will be developed in coordination with solid waste haulers. Mitigation for construction of a maintenance base will be similar to that described above.

2.14 UTILITIES

2.14.1 Common To All Segments

Primary measures to mitigate impacts to utilities during construction include identifying affected utilities, developing technical solutions to relocate or protect them, identifying funding sources, developing a work plan that minimizes impacts on both utility service and light rail construction, and minimizing potential interference between light rail and utility operation and maintenance functions. These measures include the following:

- Sound Transit will seek to establish formal agreements with local jurisdictions, including requesting enforcement of applicable provisions of existing franchise, license, and other utility agreements to allow light rail implementation.
- Sound Transit will provide utility relocation benefits associated with relocation of existing city-owned utilities in accordance with city code or charter provisions. Incremental costs of upgrades will be funded by the city.
- Compensation for relocation of private utilities in public rights-of-way will be funded by the utility, unless Sound Transit finds the relocation costs constitute an "extraordinary expense." This will unfairly burden the utility, in accordance with the agency's Real Property Acquisition and Relocation Policy, Procedures, and Guidelines and applicable state and federal law.
- If construction disrupts private utilities within the private utility's easement or on private property, Sound Transit will provide utility relocation benefits.
- General utility relocation and protection methods for crossings parallel and installations have been established.
- Sound Transit will use utility company base maps as the primary source of the utility information and conduct a limited program of field surveys and reconnaissance to check accuracy of utility locations before final design and construction. The agency will request that utility companies review the accuracy of the base maps.
- Sound Transit may complete design of private utility relocations in public rights-of-way in accordance with the utility's criteria and Sound Transit guidelines. If conflicts arise, the more restrictive provisions will govern.
- Utilities relocated or protected in conjunction with light rail will be turned over to the utility company to own, operate, and maintain.

In addition, the following measures are proposed:

- Continue to meet with and coordinate closely with both municipal and private utilities to ensure minimal impact to utilities during construction, including acceptable and safe relocation of manholes and other maintenance access points.
- Work with Seattle City Light and Puget Sound Energy to maintain energized electrical lines to provide continuous service to their customers during construction; and maintain clearances of

temporary and permanent overhead lines and poles according to Washington Administrative Code safety standards.

- Develop a contingency plan to address any potential utility service disruptions during construction and notify utility customers of planned disruptions, if any.
- Comply with city requirements and procedures for utility construction, inspection, and operation; coordinate relocations and large service connections with Seattle's Utility Coordinating Committee and similar entities.
- Use temporary pipe support, trench sheeting and shoring, and other precautionary measures during construction to minimize the potential for damage to exposed utilities.
- Mitigation for construction of a maintenance base will be similar to that described above.

2.15 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Mitigation measures for historic and archaeological resources are described in the Programmatic Agreement, and its amendments, between the FTA, State Historic Preservation Officer, and Advisory Council on Historic Preservation. 2.15 PARKLANDS

Mitigation for the loss of vegetation in parks and greenbelts is discussed in Section 1.8.

2.15.1 Segment D (S. McClellan Street to Boeing Access Road)

Construction of the elevated structure across Cheasty Boulevard, and the McClellan Station (options B and C) immediately north of the boulevard, may require temporary street closures and impede access to the boulevard. To the extent feasible, closures will be minimized and temporary access will be provided. Construction activities will also generate noise, dust, and truck traffic that could have an adverse effect on the boulevard. Mitigation measures for these impacts are discussed in Section 2.1, 2.6, and 2.7.

2.15.2 Segment E (Tukwila)

The Tukwila Freeway Route will cross the river and the Duwamish/Green River Trail on a new bridge adjacent to the existing Interurban bridge – impacts will include construction noise and vibration from truck traffic and the use of heavy equipment for the placement of the structure foundation, and dust. The impacts will be mitigated by providing a temporary trail detour and restoring the site to pre-project construction conditions. Mitigation for the loss of vegetation in parks and greenbelts is discussed in Section 1.8. If necessary, trail detours will be developed during work across or above the trail. Dust will be mitigated through use of dust control measures.

3 Mitigation Monitoring Program

When a project is unusually complex and the FTA environmental record for it consists of multiple documents, FTA requires that a mitigation monitoring program be established during final design, construction, and start-up. The purpose of the mitigation monitoring program is: (1) to assist the transit agency in fulfilling its commitments set forth in the many environmental documents, and (2) to give FTA a means of checking that its mitigation requirements are, in fact, being met. The Initial Segment is such a project.

Therefore, Sound Transit will establish a program for monitoring the implementation of the mitigation measures identified for the project in the FTA environmental record. The Amended ROD provides

information on the monitoring program required. In addition, in broad terms, the monitoring program will consist of three activities:

1. The maintenance and updating of the list or database of mitigation commitments by Sound Transit.

This Amended ROD appendix, perhaps with added specificity in the mitigation descriptions, or with references to appropriate pages of the environmental documents where the added specificity may be found, should serve as an initial version of the mitigation database. As various required consultations are conducted, the mitigation actions resulting from those consultations would be added to the database. For example, the Section 106 Programmatic Agreement calls for consultation with SHPO on various design issues, and the mitigation of parking impacts requires consultation with local jurisdictions, etc. Additional updates may be needed as various Federal permits, such as NPDES or Section 404 permits, are received. Any conditions on those permits relating to mitigation of project impacts would be added to the database.

2. Tracking the status of implementation of the mitigation measures by Sound Transit.

Sound Transit would assign a party (e.g., a design or construction contractor or in-house department) responsible for implementing each measure, or the mechanism (a particular contract) for implementation would be stated. The current status of the implementation of each measure would be indicated.

3. Periodic review by Sound Transit and FTA.

Sound Transit will periodically review with FTA the status of the implementation of the mitigation actions. Normally, the Project Management Oversight quarterly review meetings would be the forum for this review, but other meetings focused primarily on this subject may also be used.

The mitigation monitoring program is intended to ensure that FTA and Sound Transit are fulfilling their responsibilities and living up to their commitments. If Sound Transit has existing procedures in place that will accomplish this end, new procedures are not needed.