ABSTRACT

The Central Puget Sound Regional Transit Authority (Sound Transit) operates high-capacity transit systems consisting of commuter (heavy) rail, light rail, and buses in the greater Seattle metropolitan area. The commuter rail system consists of 82 track miles and 12 stations, extending from Lakewood south of Tacoma to Everett north of Seattle, on BNSF trackage between Tacoma and Everett. The light-rail system currently consists of 16 track miles and 13 stations, and will be expanded to 55 miles and 33 stations to ultimately serve the area from Federal Way south of Seattle to Lynnwood north of Seattle.

As each component of the Sound Transit system has been conceived and planned, detailed and comprehensive Environmental Impact Statements (EISs) have been prepared to meet requirements of the National Environmental Policy Act (NEPA) and the State of Washington Environmental Policy Act (SEPA). Sound Transit prepares these EISs in concert with other stakeholder agencies including the Federal Transit Administration, the Washington State Department of Transportation, and the Federal Railroad Administration. Sound Transit has successfully applied a comprehensive environmental management strategy that combines environmental documentation and review at the project planning and development stage with ongoing environmental compliance through the design and operation phases of each project.

INTRODUCTION

Sound Transit (the Central Puget Sound Regional Transit Authority) operates high-capacity rail and bus transit systems in the Seattle metropolitan area. These systems are centralized in Seattle (King County) and serve the major cities of Everett to the north (Snohomish County) and Tacoma to the south (Pierce County), as shown on Figure 1.
The commuter rail system (Sounder) uses BNSF trackage between Everett and Tacoma and Sound Transit trackage between Tacoma and Lakewood. The light rail system (Link) currently operates between downtown Seattle and Seattle-Tacoma International Airport (Central Link) and a short connecting line between downtown Tacoma and the Tacoma Sounder station (Tacoma Link).

OVERVIEW OF SOUND TRANSIT

Sound Transit History and Rail Service Milestones

The following events are key milestones in the rail history of Sound Transit:

- 1981: Regional planning began with a study (funded by the Puget Sound Council of Governments [PSCOG]) which concluded that rail transit was feasible and warranted additional detailed evaluation.

- 1987: PSCOG amended its federally required Regional Transportation Plan to incorporate rail transit as an option in the north, east, and south regional corridors. An initial evaluation of implementing commuter rail services on Burlington Northern (now BNSF) tracks between Seattle and Tacoma was deemed feasible and recommended for further analysis.

- 1993: The three metropolitan area county councils (King, Pierce, and Snohomish) voted to participate in a Regional Transit Plan and to create a Regional Transportation Authority (RTA).

- 1996: The RTA Board adopted Sound Move, a 10-year, $3.9-billion transit package to be supported by an increase in sales and vehicle taxes, which was approved by voters in November of that year.

- 1997: The project scoping and environmental review process for Central Link light rail began.

- 1998: The conceptual design and environmental review process for the Seattle-Tacoma and Seattle-Everett Sounder routes was initiated.

- 1999: An agreement in principle for $322M in track, signal, and safety improvements on BNSF tracks between Seattle and Tacoma was completed by key stakeholders BNSF, the Ports of Seattle and Tacoma, Amtrak, and the Washington State Department of Transportation (WSDOT).

- 2000: Sounder commuter rail service began between Seattle and Tacoma.

- 2003: Sounder service was initiated between Seattle and Everett, and service on the Tacoma Link light rail system started.
2009: Central Link light-rail service connecting downtown Seattle with Seattle-Tacoma International Airport began.

2009 – Present: Construction is underway for the University, Northgate, and South 200th Link Extensions and the new Tukwila Sounder station; final design is in progress for the East Link Extension.

Ongoing Rail Transit Development and Future System Plans

Future plans call for increasing the frequency of Sounder service between Seattle and Tacoma by working with BNSF on signal improvements and additional main-line track installation. The Link system, which currently consists of 16 track miles and 13 stations, and will be expanded to 55 miles and 33 stations, with a service the area from Federal Way south of Seattle to Lynnwood north of Seattle. Sound Transit is in the process of implementing the environmental review process to update its Regional Transit Long-Range Plan, which will guide future system expansion after 2023, when currently funded projects are scheduled for completion.

ENVIRONMENTAL FRAMEWORK

In order to understand the comprehensive environmental process followed by Sound Transit in planning and implementation of Link light rail and Sounder commuter rail projects, a discussion of the overall environmental framework is useful, including the Sound Transit organizational structure.

Sound Transit Organization

Departmental Organization

The head management structure of Sound Transit is similar to other large transit organizations that encompass a large number of employees and a significant amount of infrastructure. The 18-member Sound Transit Board is comprised of 17 elected officials from the tri-county metropolitan area and the WSDOT Secretary. The Executive Department is led by the Chief Executive Officer, who reports to the Board.

The Sound Transit departments that report to the CEO are the key implementers of the environmental management process that applies to all rail and bus system projects. The Planning, Environment, and Project Development Department (PEDD) is charged with evaluating and addressing potential environmental impacts during the multi-year process required to conceive, plan, budget, and implement comprehensive project review and ultimately approval to proceed. The Design, Engineering, and Construction Management (DECM) Department is responsible for design and construction of capital rail transit projects, including project and construction management, real property management, and community outreach. The Operations Department assures delivery of transit services to customers, maintenance of Link system equipment and infrastructure, oversight of third party contracts for Sounder rail operations and
maintenance, and maintenance of rail-related facilities owned by Sound Transit (parking garages, stations, and administrative spaces).

These three key departments create the basic fabric of environmental management at Sound Transit, and their environmental responsibilities over the evolutionary phases of a typical rail transit project are shown in Table 1.

Table 1. Generalized Environmental Management Responsibility Matrix for Sound Transit Rail Projects

<table>
<thead>
<tr>
<th>Project Planning/Impact Analysis</th>
<th>Site Purchase and Cleanup</th>
<th>Project Construction Sites</th>
<th>In-Service Facilities</th>
<th>Sustainability Plan Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning, Environment, and Project Development (PEPD)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Design, Engineering, and Construction Management (DECM)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Operations</td>
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<td>X</td>
</tr>
</tbody>
</table>

**Environmental Policy**

Sound Transit follows an environmental policy designed to address the wide range of services, projects, and activities that fall within the agency’s purview. Elements of this policy are summarized as follows:

- Fully comply with all environmental laws and regulations.
- Restore the environment by providing mitigation and corrective action, and by monitoring to ensure that environmental commitments are implemented.
- Avoid environmental degradation by minimizing releases to air, water, and land.
- Prevent pollution and conserve resources by reducing waste, reusing materials, recycling, and preferential purchasing of materials with recycled content.
- Increase environmental awareness among employees with education and training, and educate the public regarding the benefits of environmental stewardship.
- Enhance the environment by building relationships with contractors, vendors, consultants, and transit partners that support sustainability and environmental protection.
- Establish and maintain an Environmental and Sustainability Management System (ESMS).

**Sustainability Program**

Sound Transit has implemented a Sustainability Plan through the ESMS and has been one of a select number of transit agencies nationwide to achieve certification to the international ISO 14001 standard. Examples of specific actions conducted under this program include environmental compliance audits at project construction sites, preparation of stormwater management plans for permanent facilities, and staff training to support ongoing compliance with environmental regulations. Sound Transit also was one of the first transit systems in the nation to earn the “gold” signatory status in 2012 from the American Public Transportation Association, for the organization’s commitment to sustainability.

**ENVIRONMENTAL REVIEW PROCESS**

**Project Life Cycle**

Environmental management occurs at multiple stages of the Sound Transit life cycle for rail transit projects. A typical project life cycle includes the following phases:

- Alternatives development;
- Environmental review and preliminary design;
- Final design and permit acquisition;
- Construction and construction mitigation;
- Testing and pre-operations; and
- Start of service.

The second stage of the cycle, environmental review and preliminary design, can be further broken down into a sequential process with the following major milestones:

- Determination of significance: is an Environmental Impact Statement (EIS) necessary?
- Draft Environmental EIS, including public involvement;
- Identification of the preferred alternative by the Sound Transit Board;
- Preliminary design, including station access and basic layout;
- Final EIS;
- Selection of the final project alternative to be built (Sound Transit Board); and
- Issuance of the Record of Decision (ROD) by the Lead Agency sponsoring the EIS.
Project Planning and Environmental Review

Environmental Impact Analysis

As each component of the Sound Transit rail system is conceived and planned, detailed and comprehensive EISs are prepared to meet requirements of the National Environmental Policy Act (NEPA) and the State of Washington Environmental Policy Act (SEPA). Sound Transit prepares EIS documents for rail projects in concert with other stakeholder agencies (identified as lead, cooperating or participating agencies), including the Federal Transit Administration (FTA), the Federal Railroad Administration (FRA), WSDOT, and the Washington State Department of Ecology (Ecology). The lead agencies for the SEPA and NEPA EIS process are Sound Transit and FRA, respectively. Federal and state laws require a thorough presentation of project alternatives, potential environmental impacts, measures to mitigate these impacts, and a recommended project alternative that is supported by the analysis.

Project components subjected to analysis are land acquisition, construction, and operation. Potential environmental consequences evaluated include those associated with land use, air quality, ecosystems, water resources, geology and soils, and hazardous materials. Discipline reports prepared by subject experts provide the technical support for the process. A very useful and frequently referenced guide to preparing discipline reports for Sound Transit rail projects is the WSDOT Environmental Procedures Manual (WSDOT 2013).

Rail transit projects or components thereof may require environmental documentation under NEPA, SEPA, or a combination of both, depending upon the complexity, funding sources, and anticipated project impacts. The following is a general description of the basic environmental impact analysis elements for NEPA and SEPA.

Environmental Assessment (EA) An EA, as described in NEPA, is a concise public document that has three defined functions:

1. Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS;
2. Aid an agency's compliance with NEPA if an EIS is unnecessary; and
3. Facilitate preparation of an EIS when one is necessary.

Findings of No Significant Impact (FONSI) The FONSI is a NEPA document in which the agency briefly explains the reasons why an action will not have a significant effect on the human environment and, therefore, why an EIS will not be prepared.

SEPA Checklist This checklist is a detailed set of questions covering multiple elements of the environment that could be negatively affected by a proposed project. The purpose of the SEPA checklist is to determine if preparation of an EIS is necessary under SEPA.

Determination of Non-Significance (DNS) The DNS is a SEPA document in which the agency briefly explains the reasons why an action will not have a significant effect on the environment and, therefore, why an EIS will not be prepared. If an EIS is not
required and the checklist provides sufficient documentation of potential impacts, a DNS is issued and the project can proceed.

**Draft Environmental Impact Statement (DEIS)** The DEIS is the major formal document in which the proposed project is presented in detail, including multiple project alternatives that are being considered, the potential impacts of each alternative to a comprehensive set of environmental elements, which impacts are avoidable or unavoidable, and proposed measures to mitigate unavoidable impacts. The comprehensive and detailed nature of the DEIS is illustrated by the following list of typical environmental components contained in this type of document:

- **Project Description**: geographic segments/routes, conceptual design features, projected operational information, preliminary project sequencing and schedule
  - build alternatives that are combinations of segments
  - the no-build alternative
- **Existing conditions, potential short- and long-term impacts, and proposed mitigation measures** for the following project elements:
  - transportation
  - acquisitions
  - displacements and relocations
  - land use
  - economics
  - social impacts
  - community facilities/neighborhoods
  - visual/aesthetic resources
  - air quality and greenhouse gases
  - noise and vibration
  - ecosystem resources
  - water resources
  - energy
  - geology and soils
  - hazardous materials
  - electromagnetic fields
  - public services
  - utilities
  - historic and archaeological resources
  - parkland and open space
  - environmental justice
  - park and historic resources
- **Cost, funding, and cost-effectiveness**
- **Preferred project alternative**
- **Discipline reports and technical appendices**
Final Environmental Impact Statement (FEIS) The FEIS is completed after public and stakeholder agency comments on the DEIS have been thoroughly evaluated and addressed, and accomplishes the following:

- Describes the alternatives and their potential impacts;
- Provides environmental information to assist decision-makers in selecting the project to be built;
- Identifies measures to avoid and minimize impacts and, when necessary, compensate for adverse impacts;
- Considers cumulative impacts as part of the environmental review process; and
- Provides information regarding compliance with federal, state, and local environmental laws and regulations.

Supplemental EIS (SEIS) If the EIS process (including public and agency input) results in a need to re-define project alternatives or add additional alternatives, a SEIS may need to be prepared. A SEIS does not analyze actions, alternatives, or impacts previously studied or decided, but focuses on those alternatives (or portions of alternatives) that have changed from those in the DEIS and require additional analysis. The SEIS goes through draft and final stages, similar to the EIS.

Review and Approval of Environmental Documents

Review and comment by the public, project stakeholders (such as local governments, Tribes, environmental groups, neighborhood organizations, etc.), and regulatory agencies is a fundamental element of the environmental review process for Sound Transit rail projects.

Public and Stakeholder Review The volume and complexity of environmental documents associated with Sound Transit rail projects requires consistent and diligent management of the document production process, including providing timely and convenient access of these documents for review. Sound Transit facilitates opportunities for public and stakeholder review of documents through a combination of web-based access (electronic form) and “brick-and-mortar” repositories (such as libraries) for hard copies. Project open houses and public meetings are also scheduled and advertised on the Sound Transit web site and in local news media to encourage public input.

Agency Review A DEIS for a Sound Transit rail project is subject to review by multiple agencies that have a connection to the project from a permitting, impact, and impact mitigation standpoint. Table 2 provides an overview of typical agency roles in the project environmental review process, including the types of permits and approvals provided by each type of agency.
Table 2. Overview of Typical Agency Roles in a Sound Transit Rail Project Environmental Review Process

<table>
<thead>
<tr>
<th>Agency</th>
<th>Permit/Approval</th>
</tr>
</thead>
</table>

**Federal Agencies**

- **Federal Transit Administration**  
  Section 4(f) and 106 review

- **U.S. Department of the Interior**  
  Section 6(f) Review

- **U.S. Army Corps of Engineers**  
  Sections 404 and 10, Clean Water Act

- **U.S. Fish and Wildlife Service/NOAA National Marine Fisheries Service**  
  Federal Endangered Species Act Review

**State of Washington Agencies**

- **Department of Fish and Wildlife**  
  Hydraulic Project Approval

- **Department of Natural Resources**  
  Aquatic Use Authorization and Aquatic Lease

- **Department of Ecology**  
  National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit  
  Coastal Zone Management Consistency Certification  
  Temporary Modification of Water Quality Criteria  
  Underground Storage Tank Notification  
  Section 401 Water Quality Certification

- **Public Utility Commission**  
  Public Utility Permits

**Regional and Local Agencies**

- **Puget Sound Clean Air Agency**  
  Notification of intent to perform demolition or asbestos removal

- **Cities**  
  Permits: shoreline, street use, construction, right-of-way, development, landmark preservation  
  Reviews/approvals: critical/sensitive areas; planning commissions; design
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<thead>
<tr>
<th>Agency</th>
<th>Permit/Approval</th>
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<tbody>
<tr>
<td></td>
<td>review</td>
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<tr>
<td></td>
<td>Variances: noise; street vacations</td>
</tr>
<tr>
<td>Utilities</td>
<td>Easements and use agreements; pipeline and utility crossing permits</td>
</tr>
</tbody>
</table>

**Record of Decision (ROD)** After review and consideration of the environmental review documents (DEIS, SEIS, and FEIS), the FTA is the agency responsible for confirming that the statutory requirements of NEPA have been met. This action is documented in a ROD, which provides approval for proceeding with the construction and operation of the project.

**Environmental Management During Later Project Stages**

After the project environmental review process has been completed and approved by the reviewing agencies and the Sound Transit Board, project design can proceed. This section provides an overview of the role environmental management plays subsequent stages of the project life cycle: design, construction, operation, and maintenance.

**Design Standards**

Of the numerous codes, manuals, regulations, and other requirements that govern design of Sound Transit rail systems, many focus on or reference environmental elements of project design. In addition, Sound Transit’s own design standards for Sounder rail and express bus passenger facilities (PBQD, 2007) incorporate environmental recommendations and requirements. For example, minimizing stormwater runoff by use of pervious surfaces, infiltration facilities, and low impact techniques is encouraged, as well as specification and use of sustainable building materials and environmentally friendly cleaning products.

**Project Design, Construction, and Operation Phases of Projects**

As Sound Transit rail projects progress through design, construction, and operation, a variety of tools and techniques are applied to maintain the comprehensive management of project-related environmental issues and concerns. A complete discussion is beyond the scope of this paper; however, the examples shown below in Table 3 provide a representative overview of environmental management associated with these later project lifecycle phases.
<table>
<thead>
<tr>
<th>Project Stage</th>
<th>Potential Environmental Issues</th>
<th>Environmental Management Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property acquisition</td>
<td>Identification of contamination from prior site uses</td>
<td>Phase I environmental site assessments per ASTM (2013) and WSDOT (2013) standards</td>
</tr>
<tr>
<td></td>
<td>Quantification of site contamination</td>
<td>Phase II environmental site assessments per ASTM (2013) and WSDOT (2013) standards, and Ecology regulations</td>
</tr>
<tr>
<td>Demolition, grading, and construction</td>
<td>Hazardous building materials (such as asbestos and lead paint)</td>
<td>Abatement, segregation, testing, and disposal at permitted sites</td>
</tr>
<tr>
<td></td>
<td>Leaks and spills from construction equipment and materials</td>
<td>Spill Prevention Control and Countermeasure (SPCC) plans</td>
</tr>
<tr>
<td></td>
<td>Soil erosion and turbid stormwater runoff</td>
<td>Temporary Erosion and Sediment Control (TESC) plans</td>
</tr>
<tr>
<td>Cleanup of contamination</td>
<td>Remediation of contamination (soil, groundwater, surface water, sediment) to meet cleanup standards</td>
<td>Collaboration with Ecology to develop and implement Cleanup Action Plans</td>
</tr>
<tr>
<td>Operation and Maintenance</td>
<td>Hazardous materials and hazardous waste management</td>
<td>Use of less toxic materials; waste minimization; compliance with generator permits</td>
</tr>
<tr>
<td></td>
<td>Hazardous materials releases</td>
<td>SPCC Plans; containment systems</td>
</tr>
<tr>
<td></td>
<td>Stormwater runoff</td>
<td>National Pollutant Discharge Elimination</td>
</tr>
</tbody>
</table>
## CASE HISTORY SUMMARY OF THE ENVIRONMENTAL DOCUMENTATION PROCESS FOR A SOUND TRANSIT RAIL PROJECT

The East Link Extension provides an example of a complete EIS process for a Sound Transit rail project. The public scoping for this project began in September 2006, followed by completion of the DEIS in December 2008. Over the next 2 years, the public, stakeholders, and agencies provided review comments on the DEIS, and a detailed discussion of route alternatives occurred with the City of Bellevue, through which much of the 14-mile extension was slated to pass. A number of new alternatives arose as a result of this dialog, which were subsequently evaluated in a supplemental document (SDEIS) that was completed in November 2010.

The FEIS (which incorporated the results of the DEIS, SDEIS, and associated public and agency comments) was completed in July 2011. Extended discussions between Sound Transit and the City of Bellevue followed regarding design options for the downtown Bellevue segments of the project, which led to a memorandum of understanding (MOU) between the two parties in November 2011. The MOU established a collaborative framework to assess cost sharing and cost-saving design options for the tunnel portion of the alignment. With this agreement in place, the FTA issued the ROD approving the East Link Extension alignment in November 2011, followed immediately by Sound Transit Board approval to begin the final project design.

Subsequent analysis and discussions led to completion of an initial design cost savings summary report in June 2012, completion of a SEPA addendum to the FEIS in March 2013, and a final public involvement summary in April 2013 of the public open houses and comments resulting from this stage of the process. Throughout the environmental review process conducted between 2006 and 2013, 24 route alternatives were evaluated, more than 1,800 comments were received, and 28 public meetings (including open houses, hearings, and workshops) were held to gather community input.

In April 2013 the Sound Transit Board selected the final East Link Extension cost saving options and associated final design details regarding the route, profiles, and station locations. This was followed by permitting, pre-construction sequencing, property acquisition and final design, all of which are scheduled for completion by the end of 2014. Construction is slated to begin in 2015 and run through 2021, followed by testing and pre-operations activities in 2022 and the start of service in 2023.

## CONCLUSION

Sound Transit has successfully applied a comprehensive environmental management strategy for planning, environmental documentation, design, and operations of light rail.
and commuter rail projects in the Puget Sound region. This has been accomplished through a combination of a functional environmental organization, a clear environmental and sustainability policy, strict adherence to federal and state environmental regulations, preparation of robust environmental documentation, and flexibility in adapting environmental processes to meet the needs of each specific rail transit project.

REFERENCES


LISTING OF TABLE TITLES AND FIGURE CAPTIONS

Table 1. Generalized Environmental Management Responsibility Matrix for Sound Transit Projects

Table 2. Overview of Typical Agency Roles in a Sound Transit Rail Project Environmental Review Process

Table 3. Examples of Environmental Management Tools Applied During Design, Construction, and Operation of Rail Systems at Sound Transit

Figure 1. Current Sound Transit System and Proposed Future Projects