Washington State

Amtrak *Cascades* Environmental Overview Technical Report

VOLUME 7

Washington State Department of Transportation

February 2006

Prepared by the Freight Systems Division
Washington State Department of Transportation

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Prepared for the

Washington State Department of Transportation

By

The Resource Group Consultants, Inc.

in association with
HDR Engineering, Inc.

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Preface

The Washington State Department of Transportation (WSDOT) Rail Office prepared and released this Pacific Northwest Rail Corridor (PNWRC) *Environmental Overview* in December 1998. Although some of the general introductory information contained in Chapters One and Two are somewhat outdated, the overall environmental review is still relevant today. It therefore seems appropriate to reprint this document as part of the *Washington State Long Range Plan for Amtrak Cascades* supporting documentation.

Why did WSDOT reprint this document?

To ensure that consideration was given to the environmental resources along the corridor, in 1998 WSDOT compiled corridor environmental and community data and identified potential impacts and benefits which could occur as a result of the Amtrak *Cascades*' twenty year program. The results of the analysis have been used throughout the course of the planning process. WSDOT staff believe that this environmental overview is a critical component to this long-range plan and, as such, should be included as part of the technical background material.

As an accompaniment to this *Environmental Overview* is a series of corridor maps which depict the various environmental resources presented in this document. These maps are available from the Rail Office on CD-ROM.

What environmental regulations govern the Amtrak *Cascades* program?

The state's rail program is governed by both the *National Environmental Policy Act* (NEPA) and the *State Environmental Policy Act* (SEPA). SEPA requires that most actions (policy or project) undergo an environmental review. As part of this review, a local government or state agency acts as the lead agency, ensuring that the process meets state law. WSDOT is the lead agency under SEPA for these rail projects.

Under a NEPA action, a federal agency is the designated lead agency. It is the lead agency's responsibility to ensure that the requirements and intent of NEPA are fulfilled. In 1993, under the five-year, high speed rail initiative, the Federal Railroad Administration (FRA) was charged with the responsibility of overseeing the high speed rail program. It partnered with the Federal Highway Administration (FHWA), which has staff and resources in the Pacific Northwest, and gave FHWA the designation as federal co-lead. In addition, it was agreed that the Pacific Northwest Rail Corridor project should follow FHWA environmental procedures. A *Memorandum of Understanding*

was developed among FHWA's Washington and Oregon Division, the FRA and the state to address the roles and responsibilities for NEPA actions. These parties signed the *Memorandum of Understanding* in October 1995.

Under both NEPA and SEPA two types of environmental documents are required for implementation of the Amtrak *Cascades* program: a programmatic (or corridor level) environmental analysis and numerous project-level environmental analyses.

Does this environmental overview replace any of these environmental documents?

After extensive discussion with the FRA, the FHWA and the state Attorney General's staff, it was determined that the preparation of a corridor-wide environmental overview, in conjunction with a long-range plan, would fulfill the intent of the NEPA – in lieu of a programmatic *Environmental Impact Statement* (EIS). It was agreed by all parties that the plan would periodically be updated and would provide a foundation for future NEPA and SEPA project-level environmental documentation.

Table of Contents

CHAPTER ONE
INTRODUCTION

Washington State is incrementally upgrading the Amtrak passenger rail system along the Pacific Northwest Rail Corridor (PNWRC) in western Washington. The State's ultimate goal is to provide faster, more frequent, safe and more reliable passenger rail service.

The vision of reduced travel times and better passenger rail service in the Pacific Northwest began in the late 1980s when the Washington State legislature funded a program to improve rail depots across the state. A few years later, in 1991, the Washington State Legislature directed (SHB 1452) WSDOT to develop a comprehensive assessment of the feasibility of developing a high speed ground transportation system in the State of Washington.

In April 1993, the Washington State Department of Transportation (WSDOT) was directed (RCW Chapter 47.79) to develop "high-quality intercity passenger rail service ... through incremental upgrading of the existing [Amtrak] service."

Federal Designation

Also in the early 1990's the Federal Railroad Administration (FRA) designated the Pacific Northwest Rail Corridor one of five high speed rail corridors in the United States. This designation potentially provides federal funds to assist the State with planning and implementing improved passenger and freight rail service throughout the corridor.

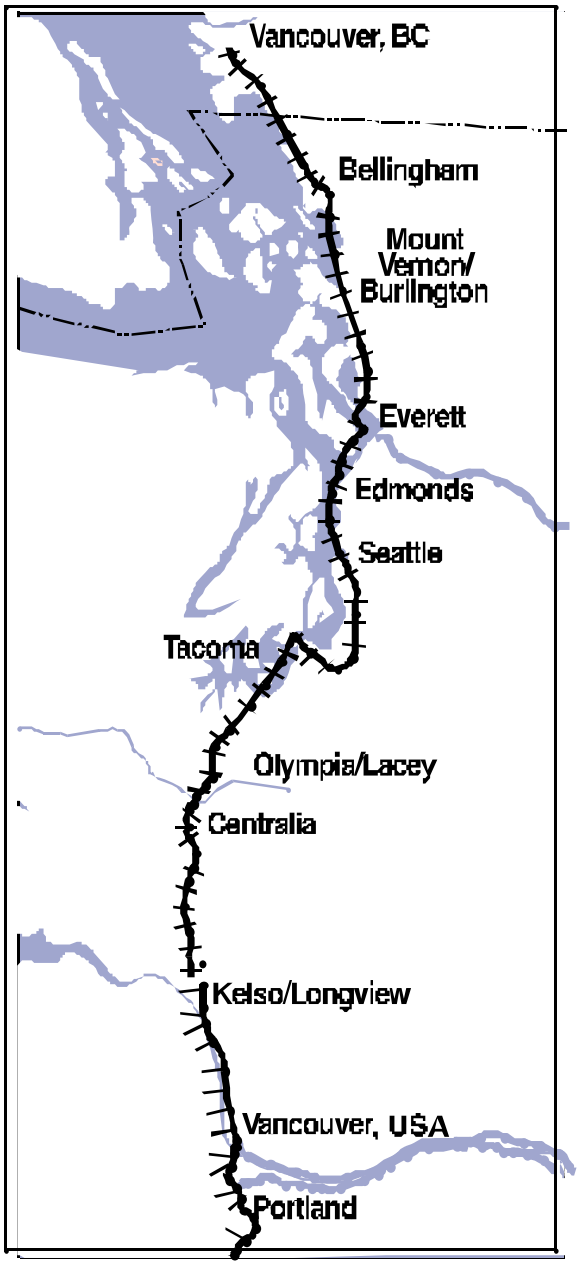


Figure 1. Pacific Northwest Rail Corridor Station Stops

WHERE DO THE TRAINS RUN?

Amtrak operates intercity passenger service in the State of Washington over the Burlington

Northern Santa Fe Railroad (BNSF) main line. The alignment roughly parallels Interstate 5 and runs through nine counties in western Washington. These counties are: Clark, Cowlitz, Lewis, Thurston, Pierce, King, Snohomish, Skagit, and Whatcom. In addition, the rail line also traverses a number of cities and towns. In Oregon, the alignment travels through Portland, Salem, Albany and Eugene. The Oregon portion of the corridor is discussed in a separate document prepared by the Oregon Department of Transportation.

PURPOSE OF THIS ENVIRONMENTAL OVERVIEW

The feasibility of a plan and its implementation often depends on whether it will have impacts on the communities that it is intended to serve, or if construction of its components will impact the surrounding natural environment.

The purpose of this overview is to provide a general discussion of potential impacts and mitigation measures that may result from implementation of the Pacific Northwest Rail Corridor program, as presented in the Revised Intercity Passenger Rail Plan for Washington State 1998 – 2018, December 1998.

WSDOT's Intercity Passenger Rail Plan

WSDOT's passenger rail service plan extends over a twenty-year period. In order to achieve the program's service goals (increased service and reduced travel times), independent project improvements along the corridor will need to be implemented in order to achieve desired speeds and capacity. The plan identifies a series of service levels – each to be implemented in approximately five year increments. The implementation of a service level is not dependent upon additional service (for example, implementation of service for the year 2003 does not require that additional service be implemented by the year 2008). The service levels are independent from each other. Some individual projects may be dependent on others and therefore have to be addressed collectively in the NEPA document. Each phase has a program of projects addressed in the EIS's.

Identification of Needed Improvements

In order to increase service, certain improvements along the right-of-way are necessary (for increased capacity and safety and reduced travel times). However, because the right-of-way is owned by the Burlington Northern Santa Fe Railroad (BNSF), WSDOT does not have the authority to plan and design improvements over a twenty year period – it will require long range planning and negotiation with the railroad. Additionally, BNSF's business plans only cover a five year horizon, thus making it difficult to plan for the program's full build out.

As such, it is impossible at this stage to identify specific project improvements that may be needed along the corridor, beyond the five year horizon of the EIS that is underway. The plan, therefore, only discusses potential types of projects that may be implemented over the next twenty years – specific geographic locations are not identified at this time.

As WSDOT moves closer to each new service level, we will work with BNSF and our other partners to identify, plan and design the associated project improvements for the next service level. As project improvements are identified we will initiate detailed environmental review of these projects and their proposed service level. Given the twenty-year time frame of WSDOT's program, the plan will be updated every two to three years.

Other information presented in the plan includes the State's vision for intercity passenger rail, projects needed to meet the State's first service level goals, and financial implications of the overall intercity passenger rail program.

The Plan's Relationship to NEPA and SEPA

The State's PNWRC program is governed by both the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA). SEPA requires that most actions (policy or project) undergo an environmental review. As part of this review, a city or state agency acts as the lead agency, ensuring that the process meets state policy. WSDOT is the lead agency under SEPA.

Under a NEPA action, a federal agency is the designated lead agency. It is the lead agency's responsibility to ensure that the requirements and intent of NEPA are fulfilled. In 1993, under the five-year high-speed rail initiative, the FRA was charged with the responsibility of overseeing the high-speed rail program. FRA partnered with FHWA, which has staff and resources in the Pacific Northwest, – giving FHWA the designation as co-lead. In addition, it was agreed that the PNWRC project should follow FHWA environmental procedures. A Memorandum of Understanding was developed between FHWA's Washington and Oregon Division, FRA and the state to address the roles and responsibilities for NEPA actions. WSDOT, FRA and FHWA signed an MOU in October 1995.

WSDOT has been working with FHWA and FRA to identify the appropriate level of environmental analysis for their intercity passenger rail program. Assumptions and methodologies developed among these agencies include:

- An environmental overview (this document) that presents general impacts and mitigation as they relate to potential project improvements and service levels; and

- Detailed NEPA/SEPA documentation for service level projects, as they are identified. WSDOT is currently performing detailed NEPA/SEPA environmental review for the project improvements needed to implement service level one. This document is expected to be available to the public some time in 1999.

This Environmental Overview, NEPA and the Plan

Extensive discussion with FRA, FHWA and the State Attorney General's staff (for SEPA) has lead to WSDOT's environmental approach. It was determined that given the limitations imposed by conflicting policy and planning practices between the state of Washington and BNSF, it is difficult and impractical to analyze a twenty-year program at the level of detail required by an EIS. However, to ensure that we consider the environmental resources along the corridor, this environmental overview was developed. This overview will ensure early and meaningful evaluation of alternatives and avoid commitments to improvements before they are fully evaluated in each project level EIS.

It was determined that this approach fulfilled the intent of NEPA – to consider the environment at the planning stage – while giving the state flexibility to design an incremental service program.

This document was developed as a technical appendix to the Plan. A summary of this document, including potential impacts and mitigation are presented in the Plan.
This document is not intended to replace project level environmental analysis.

General Methodology and Assumptions

This document presents potential impacts and mitigation for the twenty-year intercity passenger rail program. It also discusses secondary and cumulative impacts along the corridor. In order to develop this information, WSDOT and FHWA agreed on a number of assumptions and methodologies. These assumptions were:

- Future project improvements are not known at this time. Therefore, "project-types" will

be presented in the plan. Project-types will be based upon the types of projects that are being implemented in our first service level. Project-types will include, but not be limited to, such projects as: sidings, crossovers, turnouts, new signalization, etc. Specific locations for these projects will not be presented. Future projects and their locations will be analyzed in future project-level EISs.

- Given the incremental nature of the rail program, it is impossible to identify specific future projects, and thus specific impacts. Because we do not know the specific geographic locations of future projects, a worse-case scenario will be presented – that is, any critical environmental feature within our corridor will be identified as having a potential impact.
- Sound Transit's plans will be included in the discussion of secondary and cumulative impacts. However, information will only be extracted from the environmental documents that Sound Transit has released to the public at the time this overview was developed.
- The overview will present generalized mitigation and avoidance measures that will be taken from various existing reports. The mitigation section will be general in nature and not project or geographic specific.
- Only existing data will be used for the environmental analysis. No new field research will be performed.

CONTENTS OF THIS DOCUMENT

This document contains an environmental overview for the Pacific Northwest Rail Corridor Intercity Passenger Rail Program. Chapter 2 presents a summary of the programs service level goals and potential project improvements. Chapter 3 presents an overview of the affected environment along the corridor. Chapter 4 presents potential impacts, mitigation and secondary and cumulative impacts. At the end of this document is a bibliography of research sources.

Volume 2 of this report presents GIS mapping of the affected environmental resources.

CHAPTER TWO
SERVICE LEVEL GOALS AND PROJECT IMPROVEMENTS

Traditionally, when we think of transportation improvements that connect major cities, we think of building or expanding interstate highways and airports. However, new or expanded highways and airports are expensive and extremely difficult to build. In addition, these major intercity transportation corridors are becoming increasingly congested. Existing air and highway modes are facing severe congestion. [i]

At the present time, between six and seven million people live in locations within 20 miles of the PNWRC,[ii] and the corridor population is expected to grow over 40 percent during the next 20 years.[iii] With this growth comes a stronger economy, a predicted 36 percent increase in jobs,[iv] and a 75 percent increase in regional intercity travel.[v]

Freight and passenger rail is an important part of our state's transportation system. Moving people and goods by rail is safer and more environmentally friendly than adding traffic to our already congested highways. Improvements to the State's rail system, whether funded by the private sector or the public sector, can help mitigate the impacts of our fast growing economy and population. As such, the purpose of this WSDOT's passenger rail program is to:

- Provide a viable, cost effective, travel mode that significantly increases the options for accommodating intercity travel.
- Respond to the direction given in Revised Code of Washington, RCW Chapter 47.79, to develop high quality passenger rail service through the incremental upgrading of the existing service. One specific purpose of an incremental approach is to prevent as little harm as possible on the environment.
- Increase safety throughout the corridor.
- Improve, with our partners, passenger, freight, and port operations throughout the corridor by providing for more efficient, predictable, reliable, and cost effective movement of people and goods.

WHY DO WE NEED THIS PLAN?

This plan provides a road map for needed improvements to our intercity rail system to meet the demands of the next twenty years, with an ultimate goal to provide hourly daylight service between Seattle/Tacoma and Portland with frequent connections to Vancouver, BC. While congestion increases on our highways, traveling between Seattle and Portland by train will take only about 2 ½ hours.

Improving our Pacific Northwest rail system is an option that could cost-effectively ease our region's growing pains. The efficient movement of people and goods within the region is crucial to the ability to compete in world markets, to protect the environment, and to maintain a high quality of life. Given the level of urbanization, coupled with pristine sensitive areas along the corridor, increasing the capacity of the existing highway system would have significant environmental impacts and prove extremely expensive. This plan identifies efforts that have recently been completed in the corridor and projects that are currently underway. In addition, this plan presents improvements to the rail corridor that will be needed in the future so that we can increase service, incrementally, over the next twenty years.

THE STATE'S VISION

The State's vision for passenger rail in the Pacific Northwest extends over a twenty-year horizon. The vision is to reduce travel times and provide more frequent, safe and reliable service

between Portland, OR and Vancouver, BC. The vision will be implemented through an incremental approach in service levels. Service will be increased over time, based on market demand and legislative funding.

TABLE 1
ROUND-TRIP CORRIDOR TRAINS (PER DAY)*

Destination	**1998**	**2003**	**2018**
Portland, OR to Seattle, WA	3	8	13
Seattle, WA to Vancouver, BC	1	3	4
Vancouver, BC to Portland, OR	N/A	2	2-3

**Does not include the Coast Starlight*

In order to provide such service, a number of railroad infrastructure improvements are required. Reduced travel times and more frequent passenger rail in the Pacific Northwest Corridor will require additional or improved rail geometrics, new trackage, more sidings, new passenger equipment, and more advanced signals and communications systems. These improvements are needed because the existing rail facilities cannot accommodate reduced travel times due to the curves along the corridor.

In addition, the limited capacity of the existing rail line creates conflicts between slower freight trains and higher speed passenger trains. These conflicts adversely affect passenger and freight train scheduling and reliability.

State sponsored research indicates that once these infrastructure improvements are in place, passenger rail service can be increased to a level that will result in up to 2.2 million passengers per year; 300 million passenger miles per year; and hourly service between Seattle and Portland and service every two to four hours between Seattle and Vancouver, BC.

WHAT ARE THE STATE'S SERVICE GOALS?

Trains link major population centers throughout the corridor. Amtrak operates intercity rail passenger service, with stations located in Portland; Vancouver, USA; Kelso/Longview; Centralia; Olympia/Lacey; Tacoma; Seattle; Edmonds; Everett; Mt. Vernon/Burlington; Bellingham; and Vancouver, BC.

Based on its vision of providing reduced travel times and more frequent, safe and reliable service, WSDOT is proposing to incrementally increase train operations over the next twenty years.

WSDOT's current plans for improved service and infrastructure along the corridor will be implemented by the years 2002 through 2005. Between the years 2005 and 2020, the railroad infrastructure and service will be incrementally upgraded based upon market demand and legislative authorization.

Table 1 presents an overview of the number of round-trip passenger trains per day for current and future service along the corridor. Table 2 , on the following page, summarizes travel times for this service.

More information regarding the state's service goals can be found in the Revised Intercity Passenger Rail Plan for Washington State 1998 – 2018 and the Pacific Northwest Rail Corridor Operating Plan Years 2003-2018, December 1997.

Table 2
Corridor Travel Times (plus/minus ten minutes)

Destination	**1998**	**2003**	**2018**
Portland, OR to Seattle, WA	3:30	3:15	2:30
Seattle, WA to Vancouver, BC	3:55	3:40	2:57
Vancouver, BC to Portland, OR	N/A	6:57	5:37

WHAT TYPES OF ASSOCIATED IMPROVEMENTS WILL BE NEEDED TO MEET THESE GOALS?

To date, this incremental approach has included analysis of the entire corridor system including the operation of freight rail, commuter rail, and intercity passenger rail. Improvements identified by WSDOT and our partners include:

- Upgrade grade crossings;
- Increase speeds to improve corridor capacity and travel times;
- Enhance train control signals to improve rail corridor capacity, increase train speeds, and enhance safety;
- Upgrade tracks and facilities to relieve congestion, improve ride quality, safety and increase train speeds and to improve corridor capacity;
- Purchase new passenger train equipment to operate along the corridor to increase frequencies and use tilt technology to decrease travel time; and
- Improve stations and their ability to serve neighboring communities and provide modal connections.

This chapter discusses these types of improvements and their relationship to the passenger rail program. Once improvement types and locations are finalized, WSDOT will work with our partners to allocate costs for each improvement.

Grade Crossing Upgrades

Grade crossings are designated places where cars, trucks, buses, bicyclists, and pedestrians cross the railroad tracks. At-grade crossings are where the roadway and the tracks cross each other at the same elevation. Grade-separated crossings are where the roadway either goes over or under the railroad tracks. Most crossings along the corridor are at-grade.

Depending upon the speed of the train and the amount of vehicular traffic that crosses the tracks, federal guidelines recommend certain types of warnings at the crossings.

Speed Increases

Higher speeds reduce travel times resulting in better passenger and freight service. Speeds are limited by safety requirements , by the train signaling system, and by track design. Trains typically can not go fast around sharp curves or up steep grades.

BNSF and Amtrak are working with local jurisdictions and the WUTC to increase freight and passenger speeds to keep trains running on schedule in the Pacific Northwest Rail Corridor.

Proposed freight speed increases range from five to 15 mph, with some up to 30 mph. Maximum speeds set by the FRA for the current type of track and signal system along the corridor are 79 mph for passenger and 60 mph for freight service.

Enhanced Train Signals And Communication
Enhancements to the existing signal and communication system along the rail line are crucial for the development of better passenger service in the corridor.

Signal and communication systems, such as Centralized Traffic Control (CTC), route and monitor the location and direction of trains on the tracks. Upgrading these systems can help improve safety, increase the number of trains that can simultaneously use the rail system, and reduce the time it takes to get from one place to another.

Sidings and Siding Extensions
Siding tracks are secondary tracks parallel to the main line. Sidings are used so that trains on the same track can pass each other -- one train will switch off the main line and wait on the siding track while the other passes on the main line track.

As rail corridors become increasingly congested, extensions to existing sidings and new sidings are required. Sidings provide more and longer areas for trains to pass each other resulting in increased capacity along the corridor.

Rail Storage and Maintenance Facilities
Rail storage and maintenance facilities, or rail yards, are used to store, maintain and sort rail cars before they are loaded, unloaded or connected together into trainsets. Efficient rail yard operations are essential for the successful operation of a railroad system – both freight and passenger rail.

Additional yard improvements are necessary as rail corridor traffic increases. More rail traffic, thus more trains, requires larger and more efficient yard operations. Projects may consist of providing more storage tracks, larger maintenance facilities, different layouts of storage and running tracks, or additional running tracks to get trains through or around a yard.

Additional Main Line Tracks
This type of project would add another main line track alongside the existing track(s). Additional main lines are required corridors when traffic congestion is significant. Additional tracks provide increased capacity in a similar way that additional traffic lanes provide increased capacity for highways.

Crossovers and Turnouts
A turnout is a track configuration that allows a train to move from one track onto another track. Turnouts consist of a switch and a layout of track and ties. Turnouts can vary in operation and configuration. There are power operated turnouts with switches that can be operated remotely, and manual turnouts with switches that can only be thrown (operated) manually.

Crossovers consist of back-to-back turnouts between two tracks. It allows for a train to cross or move from one track to another. A train will switch off of one track and then turn onto the adjacent parallel track.

Crossovers and turnouts are fairly small projects and are done regularly by BNSF as part of their maintenance and upgrade program. As part of the five year projects and the full 20 year program, crossovers and turnouts will be placed, as needed, along the corridor. These are the least disruptive and least costly types of improvements that will be added along the corridor.

Main Line Relocation
A main line relocation is when the track (or tracks) is shifted from its current location. This type of improvement may be required when a new track needs to be added within the existing right-of-way. Often, by moving the main line, more space is then available to add another track or siding, or sharp curves are reduced.

Bypass Tracks
A bypass track is a track that goes around other railroad facilities. It is really a siding or new

main line. It may be as simple as a track that bypasses a small yard or may be as significant as a complete route revision. Bypass tracks are needed, in certain instances, to provide better passenger service without impacting existing freight service.

Utility Relocation

There may be significant utility relocations required for the construction of the program's infrastructure projects. Utilities are located throughout the PNWRC. Some utilities, such as fiber optics, parallel the right-of-way while many others cross under or over the railroad tracks.

Utilities will be routinely identified as part of the design and environmental process. A determination will then be made as to whether the specific utilities will need to be relocated or may remain in place. Depending on easements, rights-of-way and agreements, utility relocations may be done by the utility company, WSDOT, BNSF, or some combination of all three.

Stations Improvements

Throughout the corridor, intercity passenger rail stations (Amtrak stations) have been undergoing expansion and renovation. Since the early 1990s, WSDOT has been working with local communities to upgrade existing passenger rail stations throughout the state.

Between Portland and Vancouver, BC there are currently twelve Amtrak stations (ten in Washington, one in Oregon, and one in British Columbia). The condition, size and amenities of the stations vary widely.

However, the most important factor for all of these stations is their ability to serve future passengers. As ridership and service increases, existing roadway and transit systems surrounding the station will need to be reviewed. Other factors that will need to be revisited include the amount of parking available and the station's ability to accommodate increased passengers.

As WSDOT works with local jurisdictions to improve and expand their intercity passenger rail stations, environmental analysis, as necessary will be performed.

Currently, between Lakewood and Everett, Sound Transit is implementing its Sounder Commuter Rail program. Commuter trains will be sharing stations with intercity passenger trains. As such, it is anticipated that this new commuter service will bring impacts to station areas that will far exceed any impacts resulting from intercity passenger rail. Separate environmental documents are currently being produced by Sound Transit regarding these station area impacts.

What Work Has Already Been Done Or Is Currently Underway?

Over the past five years, the states of Washington and Oregon have commissioned a series of feasibility studies intended to assess the practical problems, costs, and benefits of providing public investment to upgrade the corridor for increased passenger rail service.

Specific projects that have been completed include track improvements between Seattle and Vancouver, BC and station improvements and renovations throughout the corridor.

These efforts have resulted in expanded service between Portland and Seattle (1994 and 1998); reinstated service between Seattle and Vancouver, British Columbia (1995); train service between Portland and Eugene (1994); and purchase of three new train sets for the corridor (1996).

What Else Is Going On In The Corridor?

WSDOT is committed to developing rail passenger service as a part of a balanced

transportation system. Efforts have been made to develop state, regional, local and private interest in the corridor. Numerous activities are currently underway in the same corridor which require extensive coordination among the various agencies and organizations.

In order to meet the program's stated service goals, it is critical that the PNWRC program recognize that the State's partners also have their goals (based on their particular needs) for the same corridor, and that we plan for some of these activities. The major programs and/or plans that will be implemented within the near future, include:

- ***Burlington Northern Santa Fe (BNSF) Business Plan.*** The railroad is continually maintaining and upgrading the existing rail line to accommodate continued projected growth. A projection of this growth has been factored into the capacity projections developed for the PNWRC program.

- ***Freight Action Strategy for Seattle-Tacoma (FAST) Corridor.*** WSDOT, working together with the Puget Sound Regional Council and other area agencies, is developing a high priority project list for railroad crossings and port access. The goal of the FAST Corridor is to provide the necessary improvements at these locations, and to facilitate the safe and efficient movement of auto and freight traffic (truck and rail). Projects have been targeted in Seattle, Tacoma, Everett, Auburn, Kent, Puyallup, and unincorporated Pierce County.

  FAST is in the process of applying for federal highway funds. Funds review and action should be completed by sometime in the Spring of 1999, and FAST projects are ready to move on construction as soon as funding approval has been secured.

- ***Central Puget Sound Regional Transit Authority (Sound Transit) Commuter Rail Program.*** Voter-approved Sound Transit commuter rail service could be running in the Central Puget Sound area by late 1999. These commuter rail trains will share tracks and some stations with the PNWRC Amtrak service. The commuter rail service will run from Lakewood through Tacoma, north to Seattle, through Edmonds, and terminate in Everett. WSDOT is currently working with the Sound Transit to ensure that WSDOT's passenger rail improvement program and the Sound Transit commuter rail project compliment each other and make the most of every taxpayer's dollar.

  Environmental review of project improvements and operations for the commuter rail segment between Seattle and Tacoma was completed in the summer 1998. Service is scheduled to begin in late 1999. Environmental documentation for the corridor between Seattle and Everett is currently underway with service targeted to begin in early 2001. The corridor segment between Tacoma and Lakewood is also scheduled to begin service in early 2001. Environmental review for the latter two segments is currently underway.

How Will These Activities Affect WSDOT's Corridor Program?

These activities will add more trains to the BNSF main line and will change facilities along the railroad tracks. WSDOT's passenger rail program recognizes that other partners have additional needs along the corridor. WSDOT is currently working with each of these agencies to review specific improvements.

WSDOT is working closely with Sound Transit to ensure that environmental documents and plans are consistent. In addition, capacity analyses performed by both WSDOT and Sound Transit incorporate both programs as well as Burlington Northern Santa Fe's projected freight needs.

CHAPTER THREE
AFFECTED ENVIRONMENT

The feasibility of a plan and its implementation often depends on whether it will have impacts on the communities that it is intended to serve, or if construction of its components will impact the surrounding natural environment.

The purpose of this chapter is to provide a general discussion of the general environmental features along the corridor. Volume 2 of this document has detailed geographic information system (GIS) mapping of these features. GIS database sources included: Washington Department of Health, U.S. Environmental Protection Agency, Washington State Department of Transportation, Washington Department of Ecology, and the Federal Emergency Management Agency.

Other data sources that were used for this analysis are briefly discussed with each resource, and a detailed listing of sources can be found in the Bibliography of this report.

It is imperative to keep in mind that affected resources were identified using various maps and reports. Field review was extremely limited. Therefore, in some cases identified resources, may not, in fact be located within the study area. On the other hand, a few resources may have been overlooked, due to the scale of the maps being used for research. In addition, it was very difficult to identify if the rail corridor truly passed next to or through a particular resource (i.e. historic building, park, or habitat). Therefore, except for waterways, we have not identified whether the rail line was actually next to a resource or if it passed through it (park or natural habitat).

WATERWAYS AND HYDROLOGICAL SYSTEMS

Research for this section was completed using various published data sources (see Bibliography), and Burlington Northern Santa Fe sources. No fieldwork was conducted other than a general windshield survey of the corridor. Floodplains were identified from the county and city comprehensive plans and Federal Emergency Management Agency Floodway maps. Supporting data was gathered from a review of the Soil Survey maps for the respective counties.
Geographic information database sources included: FEMA, WSDOT, and the Washington Department of Ecology.

Waterways, ground water resources and floodplain information were inventoried within 1000 feet of the corridor. This section presents an overview of the resources within this specified geographic area.

Accompanying mapping for this environmental resource can be found in Volume 2 (Group A) of this report.

Surface Water

Our image of Washington State is of a land of sparkling lakes, rivers and coastal waterways. The need to keep these waters clean is critical not only to the natural beauty of our communities but also to the survival of animal species and fisheries that depend upon these waterways for water and food. By inventorying potentially impacted surface water features, we can ensure that during construction and operations the quality of these waterways will not be compromised.

Existing Conditions

The right-of-way extends from the Port of Vancouver along the Columbia River northward, past the mouth of Burnt Bridge Creek at Vancouver Lake. North of here, the right-of-way extends along the lakeshore, crossing Salmon Creek, and paralleling Lake River to Ridgefield. The right-of-way crosses the tributaries to Lake River, including Whipple and Flume Creeks. From Ridgefield the right-of-

way extends due north to Woodland in Cowlitz County.

The existing rail right-of-way crosses the Lewis River into Cowlitz County. It extends northward until its path is intercepted by Interstate 5 in the vicinity of Burris Creek. At this point both the highway and the rail line shift westward paralleling the banks of the Columbia River. The route continues crossing Columbia River tributaries, such as Schoolhouse, Bybee and Mill Creeks, past Kalama and crossing the Kalama and Coweeman Rivers. At Kelso the route turns northward, again paralleling Interstate 5 along the east side of the Cowlitz River. North of the Toutle River crossing, the route splits from the Interstate alignment and crosses the Cowlitz River. It continues northward toward the town of Vader in Lewis County.

The rail line enters Lewis County near the town of Vader. It crosses Stillwater Creek and then parallels Olequa Creek northward. The route continues northward to Napavine, crossing the Newaukum and Dillenbaugh Rivers to Chehalis. North of Chehalis and Centralia the track runs along the east shore of the Skookumchuck River crossing Hanaford Creek in the vicinity of Schaefer State Park.

The alignment enters Thurston County just north of the Schaefer State Park in Lewis County. It travels northeasterly, paralleling the east bank of the Skookumchuck River until it crosses the river just south of Bucoda. From Bucoda the route turns northward traversing Tenino, Chain Hill and Plumb. The right-of-way crosses the Deschutes River in the vicinity of it confluence with Spurgeon Creek. From this location the tracks enter the urbanized area of Olympia, and then veers eastward toward Lacey. The route continues, crossing Medicine Creek just prior to leaving Thurston County.

The alignment enters Pierce County crossing the Nisqually River. It skirts the eastern side of the Nisqually River delta before reaching the shore of the Puget Sound. It parallels the sound from the Nisqually delta to Salmon Beach, north of the Tacoma Narrows Bridge. Through this stretch the tracks run along beaches and cross several creeks. The larger creeks crossed are Sequalitchew Creek and Chambers Creek. Chambers Creek, home of the Garrison Springs Hatchery, drains to the Puget Sound via Chambers Bay. The alignment tunnels through portions of Tacoma, emerging along Commencement Bay near Thea Foss Waterway. From Tacoma the route continues eastward toward Puyallup and Sumner, crossing the Puyallup River.

The alignment traverses King County in a north-south manner, entering King County due south of Auburn. It crosses the White River prior to reaching the existing Auburn Yard, crosses the Green and Black Rivers, before turning into the Seattle area. The Green and Black Rivers are both in urban settings at the alignment crossings. North of the King Street Station the alignment goes underground through metropolitan Seattle, before crossing Salmon Bay near the Howard Chittenden Locks. North of Ballard the alignment crosses the small creeks of Boeing Creek and Pipers Creek where they enter Puget Sound. The track parallels the shoreline northward into Snohomish County.

The railroad right-of-way enters Snohomish County in the vicinity of Point Wells along the coast of the Puget Sound. The tracks hug the coastline for most of the route north to Everett. From Everett the tracks cross the Snohomish River, Steamboat Slough, and Ebey Slough heading into Marysville. The right-of-way crosses Quilceda Creek north of Marysville. It then turns slightly westward, passing to the west of Twin Lakes Park, and tributaries to the Stillaguamish River. The route crosses the Stillaguamish River near Norman, and continues in a northwesterly direction towards Stanwood. Near Stanwood it crosses Jorgenson Slough, and tributaries to Douglas Slough. North of

Stanwood the tracks head into Skagit County paralleling Tom Moore Slough.

The railroad right-of-way enters Skagit County from the south, paralleling Tom Moore Slough, the southern most slough in the Skagit River delta. The tracks continue northward through Conway to Mount Vernon and cross the Skagit River and Gages Slough between Mount Vernon and Burlington. North of Burlington the tracks cross the Samish River, west of Interstate 5. The route shifts to a northwesterly alignment and reaches the coast of the Puget Sound just south of Samish. The tracks continue to parallel the coast northward out of the county towards Bayview State Park near Padilla Bay Reserve. The tracks enter Whatcom County along the coast south of Larabee State Park. The tracks enter several tunnels in the vicinity of Pleasant Bay, before paralleling Chuckanut Bay. North of Chuckanut the route enters Fairhaven and Bellingham. It crosses Whatcom and Squalicum Creeks just inland from Bellingham Bay. The tracks parallel the bay until the vicinity of the Bellingham International Airport. At this location they turn more northward, crossing the Nooksack River near Ferndale. From Ferndale the alignment parallels Interstate 5 crossing tributaries to California Creek, and Dakota Creek before heading into Blaine. At Blaine the route parallels Drayton Harbor, and heads northward to the Canadian border.

Ground Water

In addition to surface waters, groundwater and aquifers are also critical elements of our environment. Groundwater is an important natural resource. For many residents of western Washington, groundwater is their sole source of water for drinking and washing, for farming and manufacturing, indeed, for all their daily water needs.

Although groundwater exists everywhere at varying depths, some parts of the saturated ground contain more water than others. An aquifer is an underground formation of permeable rock or loose material that stores useful quantities of water and can be tapped by a well. Aquifers provide drinking water for our communities throughout the corridor.

Groundwater quality, like surface water, can be eroded by contaminants introduced by various domestic, industrial, and agricultural practices. Even where we might not use it directly as a drinking water supply we must still protect groundwater, since it will carry contaminants and pollutants from the land into the lakes and rivers from which other people get a large percentage of their freshwater supply.

Existing Conditions

The right-of-way in Clark County lies above sedimentary rock deposits that yield ground water from the Lewis aquifer region. The aquifers lie in the Troutdale Formation, and in more recent alluvial deposits.

The Washington Department of Ecology and the federal Environmental Protection Agency as part of a groundwater quality monitoring network for Washington State have tested ground water in Clark County. The groundwater in the vicinity is primarily soft to moderately hard calcium-magnesium bicarbonate-type water. Surface water quality data is available for Burnt Bridge Creek. Tests show that this water currently does not meet 1994 state surface water quality standards for ph, dissolved oxygen, temperature or fecal coliform.

Groundwater resources inventoried in Cowlitz County indicate the county is underlain by two aquifer regions the Lewis and Cowlitz aquifers. Alluvial deposits were found to be the most productive sources of groundwater in the county.

In Cowlitz County, Although nitrate concentrations were generally low, iron concentrations exceeded the maximum contaminant level recommended by the U.S. Environment Protection Agency as shown in

many samples taken both close to the rail alignment and further east near Toutle Lake.

Groundwater resources inventoried in Lewis County indicate the county is underlain by two aquifer regions, the Chehalis and Cowlitz aquifers. Wells sampled in the county tap numerous water bearing formations, including Tertiary rock formations, glaciofluvial deposits and alluvial deposits. Glaciofluvial deposits were found to be the most productive sources of groundwater in the county.

For Lewis County, in some wells, iron and magnesium concentrations generally exceeded the maximum contaminant level as recommended by the U.S. Environment Protection Agency, both close to the rail alignment and further west near along the upper Chehalis River.

Thurston County was affected by several periods of glaciation, which influenced the development of aquifers in the region. The glacial deposits here are thousands of feet thick. Major river valleys, including the Nisqually, contain unconsolidated sediments that are water bearing. Although northern Thurston County has four major aquifers, the southern part of the county, and the Tenino areas are underlain by a single shallow aquifer. Generally the water is soft, with lower iron and manganese than in other areas of the Puget Sound.

As with Thurston County, Pierce County was affected by several periods of glaciation, influencing the development of aquifers in the region. The glacial deposits are thousands of feet thick. The Puyallup River valley contains evidence of volcanic mudflows. No individual aquifers were distinguished in the Department of Ecology and EPA study.

Both coastal seawater intrusion and urban development affect water quality in the vicinity. Generally the water was found to be soft, with iron and manganese concentrations exceeding secondary drinking water regulations for quality. In addition, sediment contamination is a problem in Commencement Bay.

Water quality for King County was also sampled as part of the agency study. Although the ph of water tested in King County was higher than the average, iron and manganese concentration were lower than much of the state, meeting or below than drinking water standards. Similarly to other urban areas, water quality in King County is affected by pollution. Stormwater runoff quality is compromised in urban industrial areas.

As with the rest of the Puget Sound counties, Snohomish County was affected by several periods of glaciation, influencing the development of aquifers in the region. The glacial deposits are thousands of feet thick. No individual aquifers were distinguished in the Department of Ecology and EPA study.

In Snohomish County, generally the water was found to be soft, with iron and manganese concentrations exceeding secondary drinking water regulations for quality.

Skagit County was affected by several periods of glaciation, influencing the development of aquifers in the region. The glacial deposits are thousands of feet thick. The Skagit River valley also contains evidence of volcanic mudflows. No individual aquifers were distinguished in the Department of Ecology and EPA study.

For Skagit County, generally the water quality in wells was found to be compromised by nitrates and dissolved solids, in addition to iron and manganese concentrations which exceed secondary drinking water regulations for quality. Nitrate concentrations most likely reflect the agricultural land use of the county, whereas dissolved solids are indicative of seawater intrusion.

Water quality in Whatcom County shows similarities to water quality in Skagit County. In both areas moderate concentrations of dissolved solids and moderate to high levels of nitrates were found in wells tested by the Department of

Ecology. The dissolved solids findings indicate some seawater intrusion occurring along the coast. Nitrates are most likely caused by agricultural land use.

Floodplains

Floodplains are lowland areas adjacent to lakes, wetlands and rivers that are covered by water during a flood. The ability of the floodplain to carry and store floodwaters needs to be preserved and respected in order to protect human life and property from flood damage. Also, undeveloped floodplains provide many other natural and economic resource benefits.

Floodplains often contain wetlands and other areas vital to a diverse and healthy ecosystem.

Floodplain vegetation provides important resting, feeding and nesting areas for many waterfowl species. Undisturbed floodplains have high natural biological diversity and productivity. River corridors are frequently used as flyways for migrating birds.

Floodplain vegetation and soils serve as water filters, intercepting surface water runoff before it reaches the lake, stream or river. This process aids in the removal of excess nutrients, pollutants and sediments from the water and helps reduce the need for costly cleanups and sediment removal.

Much of the corridor passes through floodplain or flood fringe areas.

Existing Conditions

The corridor in Clark County generally follows the Columbia River basin from the Oregon border to the Cowlitz County line at the Lewis River. Large portions of the corridor in Clark County are within the "Flood Fringe" of the Columbia River and Lewis River. The corridor crosses the floodplain of the Lewis River at the Cowlitz County line.

In Cowlitz County the corridor follows along the Columbia River and continues northerly along the Columbia and Cowlitz River basins and along Olequa Creek to the Lewis County line in the north. The corridor crosses over the Lewis River at the Clark County line and then crosses the Kalama, Coweeman, Toutle and Cowlitz Rivers before leaving Cowlitz County. The corridor is in the floodplain or is in the flood fringe throughout much of the county, as it crosses or borders the river basins.

In Lewis County the corridor follows Olequa Creek, then travels north through Vader, Winlock, Napavine, Chehalis, Centralia, and up the Skookumchuck River into Thurston County. Areas along the Newaukum River, Chehalis River, and Dillenbaugh Creek are frequently flooded and other areas near China Creek and along the Skookumchuck River are occasionally flooded.

In Thurston County the corridor follows the Skookumchuck River northerly to the town of Bucoda. The corridor then proceeds northeasterly crossing Scatter Creek, the Deschutes River, Chambers Creek, Patterson Lake, and the Nisqually River. All these crossings and that portion of the alignment along the Skookumchuck River are within the 100-year floodplains as noted by Thurston County.

In Pierce County the corridor crosses the floodplain of the Nisqually River and then proceeds north into Tacoma and into the Puyallup River basin. The corridor leaves Tacoma and proceeds up the Puyallup River basin crossing the floodplain of Clarks Creek in Puyallup and East 15th St. in the city of Puyallup.

In King County the corridor crosses through the city of Auburn near the White River. The corridor travels north through the floodplains of the Green River before it enters Seattle. The corridor is within the 100-year floodplain of the Green River while in the city of Kent. In the northern portion of the county, along the waters

of Puget Sound, the corridor crosses the Boeing Creek floodplain.

In Snohomish County line the corridor follows along the shoreline of Puget Sound proceeds northerly to the city of Everett. The corridor then travels through floodplains of the Snohomish River, Steamboat Slough, Union Slough, Ebey Slough, Quilceda Creek, Portage Creek, South Slough and the Stilliguamish River.

In Skagit County the corridor crosses the lowlands of the Skagit and Samish Rivers and then along the shores of Samish Bay. Most of the corridor in Skagit County falls within the floodplains for the Skagit and Samish Rivers. The corridor along Samish Bay is adjacent to the floodplain of Samish Bay.

In Whatcom County the corridor follows along the shores of Samish Bay and then along the shores of Puget Sound to the city of Bellingham. The corridor in this area is in or borders on the floodplains of Puget Sound in several locations. From Bellingham to the city of Blaine at the Canadian border the corridor crosses the floodplains of the Nooksack River and Dakota Creek.

HAZARDOUS MATERIALS

Finding and cleaning up hazardous materials along the corridor is for the benefit and safety of railroad workers, rail passengers and local residents. It is not anticipated that there will be exposure to potentially hazardous sites and materials during construction or operations. However, there is a possibility of finding a historical spill or dump site anywhere along the corridor. As the right-of-way is primarily used for freight hauling, any commodity being hauled along the route during the past 100 years could have spilled at any location. Recent legislation requires records and clean ups of such incidences. Any spill events prior to the 1970s were generally not recorded.

Data for these hazardous sites were obtained from the Washington State Department of Ecology, WSDOT, and the U.S. Environmental Protection Agency. GIS databases were used to locate and map the affected sites along the corridor. Accompanying mapping for this can be found in Volume 2 (Group A) of this report.

Existing Conditions

Years ago, many wastes were dumped on the ground, in rivers, or left out in the open. As a result, thousands of uncontrolled or abandoned hazardous waste sites were created. Some common hazardous waste sites include abandoned warehouses, manufacturing facilities, processing plants, and landfills. In response to growing concern over health and environmental risks posed by hazardous waste sites, Congress established the Superfund Program in 1980 to clean up these sites. The Superfund Program is administered by the U.S. Environmental Protection Agency (EPA) in cooperation with individual sites throughout the United States.

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is the official repository for site and non-site specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). It contains information on hazardous waste site assessment and remediation from 1983 to the present.

Superfund sites were inventoried in the corridor within 2000 feet of the right-of-way. In Clark and Cowlitz Counties, over a half dozen sites are located within the corridor study area. Lewis County has four known sites within the study area. Thurston County does not have any CERC sites within the study area. Pierce and King Counties each have over ten sites, the majority of which are located near the Port of Tacoma facilities and in the industrial areas in south Seattle. Snohomish County's ten CERC are predominately located in the Everett area. Skagit County does not have any known

Superfund sites. Whatcom County has about a dozen, located mainly in the Bellingham area.

Another source of hazardous waste is monitored through the Resource Conservation and Recovery Information System (RCRIS), in support of the Resource Conservation and Recovery Act (RCRA). RCRA requires that generators, transporters, treaters, storers, and disposers of hazardous waste (as defined by the federally recognized hazardous waste codes) provide information concerning their activities to state environmental agencies. These agencies then provide the information to regional and national U.S. Environmental Protection Agency (EPA) offices.

Sites tracked by RCRIS are also located throughout the study corridor. Four recorded sites are located within King County. No other sites are located within the study corridor.

Another source of hazardous waste is discharge by industries of waste into our water systems. The NPDES permit program regulates direct discharges from municipal and industrial wastewater treatment facilities that discharge into the navigable waters of the United States. Wastewater treatment facilities (also called "point sources") are issued NPDES permits regulating their discharge.

NPDES sites are located throughout the study corridor and are found in every county.

The State of Washington tracks toxic cleanup sites through its Toxic Cleanup Program (TCP). These sites include known and suspected hazardous materials sites, including some landfills. Clark County has almost a dozen sites, the majority of which are located in or near the City of Vancouver. In Cowlitz County, a few sites are located in Kalama and Kelso, within the study corridor. Centralia and Chehalis, in Lewis County each have about one half dozen known TCP sites. Thurston County has less than four sites, while Pierce County (mainly in Tacoma) has over twenty TCP sites in the study corridor.

King County has the majority of sites in the study corridor, approximately fifteen in the Auburn area, thirty in the Tukwila/Kent area, and approximately sixty in Seattle. In Snohomish County, the City of Everett has almost two dozen TCP sites. Skagit County has less than five sites, and Whatcom County, mainly near Bellingham, has over two dozen TCP sites.

BIOLOGICAL RESOURCES/ECOLOGY

The preservation of our wildlife, fisheries and vegetation has long been a priority of Washingtonians. The rail corridor lies adjacent to and crosses many water resources within the state. Most of the water resources are fish bearing streams or rivers. Fish species in the corridor include steelhead, Chinook, coho and sockeye. Marine mammals can also be found off the coast and in Puget Sound, within the corridor study area.

Wildlife habitat is abundant along the Columbia River and other lakes and stream crossings along the corridor. Threatened and endangered species, and species of concern, likely to occur in the corridor vicinity include the bald eagle, peregrine falcon and osprey.

Vegetation throughout the corridor varies. It transitions from prairie grasses to wooded areas, with concentrations of Douglas fir, alder, and big leaf maples.

To preserve our wildlife, fisheries and habitats, a number of federal and state programs and regulations have been put into place. These programs include:

- The Endangered Species Act is a federal law initially passed by Congress in 1973 in an attempt to counteract the alarming rate of species extinction. The Act provides a means of conserving plants and animal species that are currently in danger of extinction (endangered species) and those that are likely to become endangered within the foreseeable future (threatened species). It

also protects the habitat needed for their survival.

The U.S. Fish and Wildlife Service and the National Marine Fisheries Service are responsible for ensuring that government and citizen actions do not further harm species that are listed as endangered or threatened, as well as for developing and implementing a plan for recovering the species to a stable population.

- Washington State Department of Fish and Wildlife oversee the protection and preservation of state threatened, endangered, sensitive and candidate species.

  State Endangered Species is defined in WAC 232-12-297, Section 2.4, to include "any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state."

  State Threatened Species is defined in WAC 232-12-297, Section 2.5, to include "any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats."

  State Sensitive Species is defined in WAC 232-12-297, Section 2.6, to include "any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats."

  State Candidate Species is defined in WDFW Policy M-6001 to include fish and wildlife species that the Department will review for possible listing as State Endangered, Threatened, or Sensitive. A species will be considered for designation as a State Candidate if sufficient evidence suggests that its status may meet the listing criteria defined for State Endangered, Threatened, or Sensitive.

- To help prevent further loss of the state's ecosystems, the Legislature established the Washington Natural Heritage Program (WNHP) within the Department of Natural Resources in 1981.

  The WNHP collects data about existing native ecosystems and species to provide an objective, scientific basis from which to determine protection needs. The program also develops and recommends strategies for protection of the native ecosystems and species most threatened in Washington.

Much of our wildlife and vegetation depend upon the numerous wetlands in western Washington. Wetlands were once thought of as swampy, bug-filled "wastelands" that were useful only when they were filled in and developed for industry, housing, or businesses. Today, however, society is beginning to realize that wetlands are unique, natural areas, important to the ecosystem we all share, and should be conserved and protected.

Wetlands occur wherever land is inundated, covered, or influenced by the presence of water. Wetlands support the growth of water-loving/tolerant vegetation that is adapted to wet sites.

At times of flooding, wetlands at the mouths of streams and rivers receive the overflow water, which is rich in nutrients and sediments. In the stillness or gentle motion of the wetlands, these sediments settle out and clearer water percolates into the groundwater. Thus, wetlands play an essential role in filtering nutrients and sediments out of water before it enters lakes and bays. By storing and releasing flood water, wetlands also moderate the damage that flooding could cause.

Wetlands are also located throughout stream and river systems, providing nutrient and sediment traps and flood control all along the way.

Wetlands often have very close connections with the groundwater system. Some may serve as important groundwater recharge areas. Others are receptors for significant amounts of groundwater discharge. Thus, if the underlying groundwater is contaminated, the consequences will be felt by the wildlife and all other resources dependent on that wetland.

Numerous and diverse types of wetlands are located within the corridor, in particular where the railroad crosses the many waterways.

Wetlands

Wetlands were identified from county and city comprehensive plans and agency wetland mapping, including National Wetland Inventory (NWI) mapping. Additional information was gathered from the Soil Survey maps for each county, field observations, and rail corridor video. GIS mapping was developed using NWI mapping databases. Mapping of wetlands can be found in Volume 2 (Group B) of this document.

Existing Conditions

The corridor in Clark County follows the Columbia River basin from the Oregon border to the Cowlitz County line, remaining in the lowlands throughout. Scrub-shrub wetlands are identified along Vancouver Lake, where the corridor borders the lake, and in the city of Ridgefield. Similar wetlands exist where the corridor crosses or borders upon Lancaster Lake, Lake River, Burnt Bridge River, Salmon Creek, Whipple Creek, Flume Creek, Gee Creek and the Lewis River.

In Cowlitz County the corridor follows the Columbia and Cowlitz River basins and then along Olequa Creek to the Lewis County line in the north, passing through the cities of Woodland, Kalama, Kelso, Longview, and Castle Rock. The corridor encounters several scrub-shrub and emergent wetlands as it borders or crosses Wallace Slough, Burris Creek, Canyon Creek, Mill Creek, Bybee Creek, Schoolhouse Creek, and Ostrander Creek. Ponds and wet areas are also noted in the cities of Woodland and Castle Rock.

The corridor in Lewis County follows Olequa Creek northerly into the Chehalis River basin, passing through Vader, Winlock, Napavine, Chehalis, Centralia, and then up the Skookumchuck River into Thurston County. The corridor encounters several small wet spots, water and scrub-shrub wetlands along Olequa Creek, a variety of wetlands at Hanaford Creek, McMurphy Creek, Salzer Creek, China Creek, in the Chehalis River basin, and along the Skookumchuck River.

In Thurston County the corridor follows the Skookumchuck River northerly to the town of Bucoda. The corridor then proceeds northerly through Tenino, East Olympia, Lacey and into Pierce County crossing the Nisqually River near the city of Du Pont. NWI mapping identifies wetlands encountered at various locations along the corridor. Wetlands are noted adjacent to the corridor along the Skookumchuck River, Scatter Creek, Deschutes River, Chambers Creek, Patterson Lake, Medicine Creek, and the Nisqually River.

In Pierce County, the corridor crosses the Nisqually River southwest of the city of Du Pont crossing wetlands in the process. The corridor then climbs out of the Nisqually valley into the city of Tacoma. After Tacoma the corridor drops into the Puyallup River valley in Tacoma and follows the River to Puyallup encountering several wetlands. The corridor then turns north along the White River entering King County near Auburn. Specific wetlands areas are noted at Lake Sellers in the city of Du Pont, Swan Creek and Clear Creek in Tacoma, Clarks Creek in the city of Puyallup, and near East 15th St in the city of Puyallup. Emergent and scrub-shrub wetlands are evident throughout the Puyallup

Valley between the rail line and adjacent land uses.

In King County the corridor follows the Green River Valley in the south traveling through the center of the cities of Auburn, Kent, Tukwila, Seattle. North of Seattle the corridor follows the shoreline of Puget Sound through the city of Shoreline to the Snohomish County line. The corridor encounters several small emergent and scrub-shrub wetlands along the corridor. The corridor falls next to the meandering Duwamish River in several locations. In the north part of the county the corridor closely follows the shoreline of Puget Sound often bordering tidal waters. The upland side of the corridor includes several pockets of scrub-shrub wetlands.

In Snohomish County the corridor follows the shoreline through Edmonds, Mukilteo and Everett, then crosses the Snohomish River traveling through Marysville and Stanwood and entering Skagit County near the shoreline of Skagit Bay. The corridor crosses the Snohomish River, Ebey Slough, the Stilliguamish River, Church Creek, Shell Creek, Lunds Gulch, Big Gulch, Powder Mill Gulch, Merriland Ring Creek, Pigeon Creek, Pilchuck Creek, and other smaller stream creeks and sloughs. Scrub-shrub wetlands occur south of Everett's estuarine, emergent wetlands occur between Everett and Marysville, and scrub-shrub wetlands occur north of Marysville.

In Skagit County the corridor travels north through Conway, Mt. Vernon and Burlington through the lowlands of the Skagit River and Samish River to Samish Bay and then along the shore of Samish bay to the Whatcom County line. The corridor crosses the Skagit River, Samish River, Tom Moore Slough, Fisher Creek, Gages Slough, Oyster Creek, Edison Slough, and Colony Creek. Scrub-shrub wetlands occur south and north of the Skagit Valley and a mix of emergent and scrub-shrub occurs in the valley between the corridor and adjacent farming communities.

In Whatcom County the corridor follows along the shoreline of Puget Sound on Samish Bay and continues along the shoreline of Puget Sound up to Bellingham crossing Chuckanut Bay. The corridor passes through Bellingham along the waterfront and proceeds northwesterly through Ferndale to the town of Blaine at the Canadian border. The corridor crosses or borders on Chuckanut Bay, Bellingham Bay, Chuckanut Creek, Padden Creek, Squalicum Creek, the Nooksack River, California Creek, Dakota Creek, and Drayton Harbor near Blaine. Scrub-shrub and some forested wetlands appear in several other locations both south and north of Bellingham.

Vegetation, Fisheries and Wildlife (including Threatened and Endangered Species)

Wildlife and vegetation were identified using the Priorities Habitats and Species List habitat program for the state of Washington and city and county comprehensive plans along the rail corridor. The Wildlife Habitat Profile for King County was also used. Fact sheets and ESU (Evolutionarily Significant Unit) maps, obtained from the National Marine Fisheries Service web site were also used for this analysis. Field reviews and review of the rail corridor video supplemented the literature search. Research for this section was completed using various published data sources and conversations with Department of Fish & Wildlife staff. GIS mapping for threatened and endangered species was developed using U.S. and State Department of Wildlife databases. Mapping can be found in Volume 2 (Group B) of this document.

Existing Conditions

In Clark County, vegetation and wildlife will predominately be located in riparian areas and wetlands along the Columbia River, Vancouver Lake and other bordering lakes or stream crossings, as well as the Ridgefield Wildlife Refuge. Primary vegetation is black

cottonwood, Himalayan blackberry, Indian plum and a variety scrub-shrub species. Wildlife habitat is abundant along the Columbia River and other lakes and stream crossings along the corridor. A threatened and endangered species likely to occur in the corridor vicinity is the bald eagle. Other species of concern likely to be in the corridor are the great blue heron, and black-crowned night heron.

The BNSF rail corridor enters into Washington on bridges above the Columbia River, which is a migration route for spring and fall Chinook, coho, and sockeye salmon, sea-run cutthroat trout, and winter and summer steelhead trout. The corridor continues northward along the Lake Vancouver Shore, which provides breeding and rearing environment for warm water species such as bass and perch. The rail corridor continues northward along the Lake River past tributaries including Salmon Creek, Whipple Creek, Flume Creek, and Gee Creek. These tributaries support small runs of steelhead and sea-run cutthroat trout.

In Cowlitz County, vegetation and wildlife is associated with the several wetlands and riparian areas along the many rivers, creeks and floodplains that are dominant throughout the corridor. Wetland vegetation, primarily scrub-shrub, is found throughout the corridor. Pockets of western red cedar, Douglas fir, black cottonwood and red-osier dogwood exist near riparian open water areas. Wildlife species are similar to the Clark county section. Birds of interest include the peregrine falcon and osprey.

Entering Cowlitz County the rail corridor crosses Lewis River that is a migration route for fall and spring Chinook, coho, summer and winter steelhead trout, sea-run cutthroat trout and a small chum population. In addition, Chinook, coho and chum also spawn in the lower section of the Lewis River.

The alignment then parallels the Columbia River, crossing several tributaries including Burris Creek, Canyon Creek, Mill Creek, Bybee Creek and Schoolhouse Creek. These tributaries support runs of sea-run cutthroat and small steelhead trout populations. Northward, the Kalama River is a migration corridor for spring and fall Chinook, coho, sea-run cutthroat and winter and spring steelhead trout. Chinook and coho also spawn in the lower reaches of the Kalama River. The Coweeman River is a migration corridor for fall Chinook, coho, sea-run cutthroat and winter steelhead. The Cowlitz River produces runs of spring and fall Chinook, coho, sea-run cutthroat, and spring steelhead trout. Chinook and coho also spawn in the lower reaches of this river. Ostrander Creek supports runs of coho, winter steelhead, and sea-run cutthroat trout. Before entering into Lewis County the rail corridor crosses the Toutle River that is a migration corridor for spring Chinook, coho, and summer and winter steelhead trout.

In Lewis County, a predominance of wetlands and floodplains occur along the corridor similar to what is found in Cowlitz County. Much of the vegetation between the corridor and adjacent farmland is scrub-shrub wetland. Wildlife occurring in this corridor includes the bald eagle, osprey, and peregrine falcon.

Upon entering Lewis County the rail corridor crosses Stillwater Creek, a tributary to the Cowlitz River that produces runs of coho and winter steelhead trout. The corridor crosses the Newaukum River and Dillenbaugh Creek before entering the city of Chehalis. The Newaukum River produces runs of spring and fall Chinook, coho, sea-run cutthroat and winter steelhead trout. Dillenbaugh Creek supports a run of coho salmon. Before entering Centralia the railway crosses Salzer Creek, a tributary to the Chehalis River which is a migration route of coho.

In Thurston County, lands are transitional from a more aquatic systems in Lewis County to more terrestrial systems near the fringe of the Nisqually Wildlife Refuge. Vegetation transitions from prairie grasses to wooded areas in the north county area dominated by Douglas fir, red alder and big leaf maple. Wildlife

occurring in the corridor includes the bald eagle, marbled murrelet, peregrine falcon, osprey and black-tailed deer.

The Skookumchuck River produces runs of spring and fall Chinook, chum, coho, sea-run cutthroat and steelhead trout. The lower Deschutes River, including Capitol Lake, is the major migration route for this river. Upstream of the BNSF line the river provides the main spawning area for Chinook and coho salmon. Juvenile Chinook and coho are raised in the lower reaches of the Deschutes and in Capitol Lake. In addition, Chinook are reared artificially in net pens in Capitol Lake. Coho and chum salmon are also found in the Woodard-Smith Creek drainage into Henderson Inlet.

In Pierce County, Douglas fir, big leaf maple, and red alder dominate vegetation. Oregon oak groves exist in the Fort Lewis area where understory vegetation is dominated by prairie grasses. As the corridor progresses through Tacoma to the Puyallup, vegetation transitions into areas that are farmed or in floodplains where numerous wetlands or drainages with wetland vegetation exist. Wildlife species of concern in the corridor include bald eagle, peregrine falcon, and osprey near Point Defiance. The marbled murrelet and western gray squirrel exist in other parts of the corridor, particularly in the oak hardwood groves.

The Nisqually River produces large runs of Chinook, chum, pink and coho salmon. Suitable spawning habitat begins above river mile 3.0, in the vicinity of the BNSF tracks, and extends upstream in both the mainstem and side channels. Coho and chum salmon utilize Sequalitchew drainages. These salmon use the area adjacent to the BNSF tracks primarily as a migration corridor. No spawning occurs in the very lower reaches of these creeks.

In addition to the salmonid resources, the adjacent saltwater intertidal area of Puget Sound provides habitat for numerous shellfish resources. These include: littleneck and butter clams, horse clams, geoducks, Dungeness crab and, in some locations, shrimp.

BNSF tracks cross Clear and Clarks Creeks along the lower Puyallup River. Coho and chum are found in both of these streams. The tracks crossed the Puyallup River east of Puyallup; in this area Chinook, coho, pink and chum salmon are using the river as a migration route and for some spawning. Steelhead also uses this area as a migration path.

In King County, vegetation varies dramatically; floodplain and wetlands in the south county area, and wooded riparian vegetation in the north county. The south county area includes a variety of wetland scrub-shrub vegetation. The north county area includes a mixture of forested areas with shrub understory in a primarily suburban residential and commercially developed area.

The White River provides a migration corridor for spring and fall Chinook, pink, coho, chum and steelhead. Most of the spawning in the White River occurs several miles upstream of the rail crossing. Fall Chinook, coho, and chum salmon spawn and rear in this section of the mainstem Green River. Steelhead use this area as a migration corridor. The Black River is dammed upstream of the railroad line; fish passage is provided for coho. Along Puget Sound, salmon resources are found in Pipers Creek, site of a chum rearing facility.

North of the Salmon Bay Ship Canal and northward into Snohomish County, shellfish resources are found in the intertidal and nearshore beaches of Puget Sound. These resources include butter and littleneck clams, horse clams, geoducks and Dungeness crab.

In Snohomish County, steep hillside on the upland side and shoreline on the west dominate the south county corridor. Big leaf maple, western red cedar, Douglas fir and western hemlock on the upland side dominate vegetation. Scrub-shrub vegetation exists at the toe of the upland slopes and along the riparian areas. Vegetation north of Everett after crossing the

Snohomish River is dominated by estuarine emergent wetlands in the vicinity of Ebey Slough. Wildlife is prevalent throughout the corridor except in the downtown Everett area. Wildlife in the corridor includes a number of songbirds, great blue heron, bald eagle, osprey, and black-tailed deer.

The short coastal streams between Point Wells and Everett generally do not support salmonid resources. The two exceptions are Deer Creek near Edmonds and Pigeon Creek No. 1. A small hatchery is located on Deer Creek. Pigeon Creek No. 1 supports a small salmonid run.

The Snohomish River and the two side channels crossed by the railroad, Steamboat Slough and Ebey Slough provide transportation routes for Chinook, coho, pink and chum salmon. The Ebey Slough runs include those entering Quilceda Creek on the Tulalip Reservation as well as those moving upstream to the Skykomish and Snoqualmie Rivers.

Fish Creek and Portage Creek are tributaries to the Stillaguamish River in Snohomish County. The former supports a coho run and the latter runs of coho, pink and chum salmon.

In Skagit County, the corridor vegetation is predominately wetlands and grasses in the Skagit River valley bordered by farmlands and pockets of black cottonwood and alder groves. North of the Skagit River, vegetation becomes more upland transitioning from big leaf maple, cottonwood and red alder to a mix of deciduous, Douglas fir and western red cedar vegetation. Wildlife varies with a variety of songbirds in the farmed valley and bald eagle in the variety of river and creek crossings. Also found in the corridor are the peregrine falcon, osprey, black-tailed deer and marbled murrelet.

The Lower Stillaguamish River with its side channels, Jorgenson Slough and South Slough, supports runs of coho, chum, Chinook and pink salmon. South Slough and the mainstem Stillaguamish are the main transportation routes for salmon using the river, although there is some spawning and rearing in this reach of the river. All juvenile salmon utilize the lower 4 miles for rearing as they acclimate to the marine environment.

The railroad crosses the Skagit River at approximately river mile 16.5. The lower mainstem Skagit River within this section provides transportation and rearing for all five species of salmon. Rearing is extensive within the sloughs and along the estuaries and islands downstream of the railroad crossing. Spawning generally occurs upstream.

The Samish River supports Chinook, coho, and chum salmon, steelhead and cutthroat trout. All three salmon species spawn within the reach of the river near the railroad crossing. Rearing takes place throughout the lower river.

In Whatcom County, vegetation is predominately upland vegetation east of the corridor with Douglas fir, red alder and big leaf maple as the primary trees and a variety of understory vegetation. The vegetation along Chuckanut Bay and Bellingham Bay includes a variety of shrubs in areas that have been riprapped to contain the rail line. North of Bellingham, vegetation is a mixture of upland deciduous trees and shrubs in the proximity of the rail line itself. Pockets of wetland scrub-shrub vegetation exist in low land areas. Estuarine habitat and riparian habitat exists throughout much of the corridor. Birds found in the vicinity of the corridor include common loon, marbled murrelet, great blue heron, cavity-nesting ducks, snow goose, bald eagle, northern goshawk and osprey. Black-tailed deer also inhabit the corridor area.

Whitehall, Harrison and Oyster and Chuckanut Creeks adjacent to the Chuckanut region of Samish Bay support coho and chum salmon. The lower portions of Whitehall, Harrison and Oyster Creeks provide low gradient with good spawning gravels for chum and coho; Chuckanut Creek is also accessible for spawning for chum and coho in the vicinity of Chuckanut

Bay. Puget Sound intertidal and nearshore beaches support clam and oyster populations.

Continuing northward, Padden Creek in the Fairhaven area of Bellingham has had small runs of coho and chum salmon in central Bellingham, Whatcom Creek has both natural and hatchery reared runs of coho and chum. Farther north, Squalicum Creek has runs of coho and chum.

The railroad crosses the Nooksack River at approximately river mile 6.0 near Ferndale. The Nooksack River is a major transportation corridor for Chinook coho, pink, chum and sockeye. The mainstem of the river is used for spawning and rearing by Chinook while the tributaries are used by the other species; mostly upstream of the railroad crossing.

Recent findings (February 1998) by the National Marine Fisheries Service have resulted in the proposed designation of certain salmonoids as threatened or endangered species. Within the study corridor, Chum Salmon, in the Columbia River area, have been proposed to be listed as a threatened species. Chinook salmon, located throughout the Puget Sound and Columbia River areas are also proposed to be listed as threatened species. It is anticipated that some time in 1999, these species will be formally listed as threatened species.

AIR QUALITY

Polluted air can cause or worsen lung-related diseases, such as emphysema, chronic bronchitis and asthma; and can cause breathing difficulty and even death. Easily inhaled small particles, called particulate matter, are perhaps the most significant health concern related to poor air quality.

Polluted air can contribute to water pollution. It can also damage building materials, cloth and metals and lead to decreased visibility and damage trees, agricultural crops and other living organisms.

Air quality in Washington is considered moderate to good. In 1995, thirteen areas in the state were identified as being in "non-attainment" (not meeting federal health-based standards) for one or more of four air pollutants: ground-level ozone, small particulate matter, carbon monoxide and sulfur dioxide. Ten of those areas are now clean enough to meet federal standards.

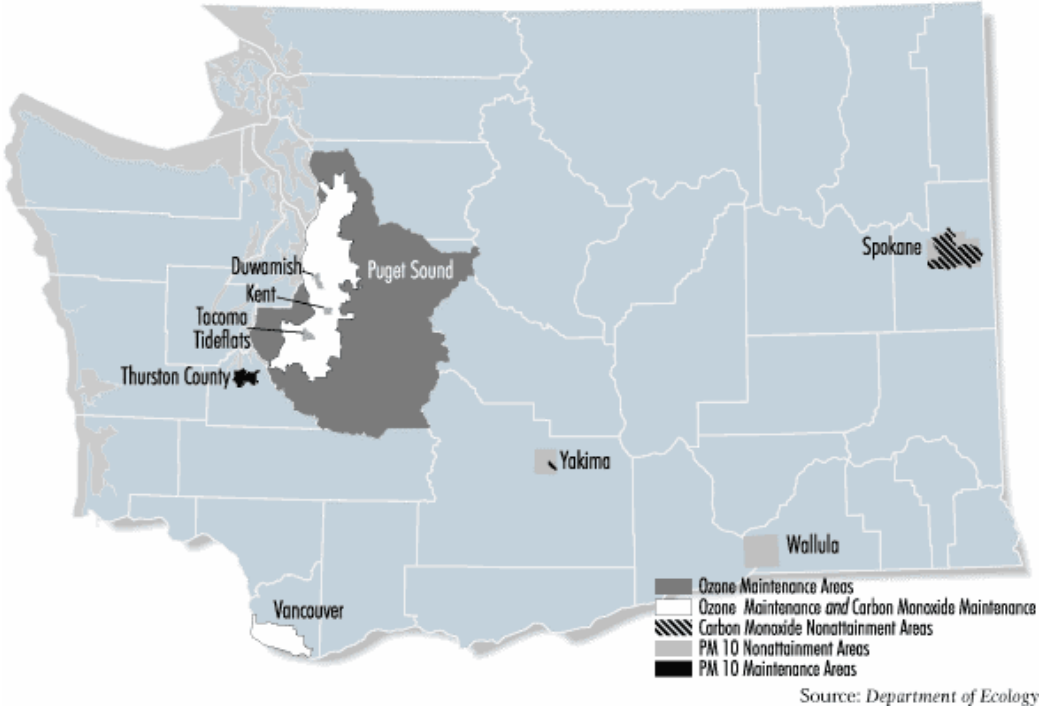
Existing Conditions

The nine counties, and their air quality status, located within the study area are presented in Volume 2 (Group C) of this document.

The primary cause of poor air quality in Washington is motor vehicle exhaust. Exhaust from motor vehicles contains many toxic pollutants, including carbon monoxide. Motor vehicles are also a source of particulate matter and ground level ozone.

In addition, high levels of particulate matter are caused by tiny particles of soot, dust and unburned fuel from woodstoves, fireplaces, backyard burning, agricultural burning and industry.

The project is located within the Puget Sound ozone and carbon monoxide maintenance areas, the Vancouver ozone and carbon monoxide maintenance, and the Tacoma Tide Flats, Kent and Duwamish PM10 nonattainment areas. The carbon monoxide maintenance area includes the entire Puget Sound Metropolitan Urban Area Boundary. It extends from north of Everett in Snohomish County to just south of DuPont in Pierce County. The maintenance area is bounded on the eastern side by the Cascade foothills. The Puget Sound ozone maintenance area includes the southwestern half of Snohomish County and most of King County and all of Pierce County. The Vancouver ozone maintenance and carbon monoxide areas include the entire Vancouver Metropolitan Urban Area



Boundary. The Tacoma Tideflats PM10 nonattainment area includes the industrialized Port of Tacoma area northwest of I-5. The Kent PM10 nonattainment area includes the industrialized area around Kent. The Duwamish PM10 nonattainment area includes the Port of Seattle area northwest of I-5.

Federal Transportation Conformity Rules apply to only the railroad crossings where changes are made to the roadway. Railroad crossings are specifically exempted under both the State and Federal Transportation Conformity Rules. These rules recognize that safety impacts may be greater than potential air quality impacts. Consequently air quality conformity analysis of motor vehicles due to changes in railroad crossings in not required under the Transportation Conformity Rules.

Federal General Conformity Regulations apply to the increased service of passenger trains being provided for by this project. Emissions outside the nonattainment and maintenance areas are not expected to exceed the NAAQS and are not required to be analyzed.

Soils And Geology

Knowing the types of soils and geologic formations in a project area is very important. The types of soils dictate how a project should be constructed as well as the potential for landslides in the area, and the area's susceptibility to vibration (caused by trains).

In addition, steep slopes throughout the corridor can be disrupted during construction of rail improvements. It is critical that these areas be identified as part of project planning.

Soil and geology was identified from a review of the Soil Survey maps for each respective county. Additional information was gathered by reviewing the city and county comprehensive plans. Slope stability information was developed through various sources including the State's Coastal atlas, comprehensive plans, and various publications from the State Department of Natural Resources.

Mapping of the general slope stability of the corridor can be found in Volume 2 (Group D) of this document.

Existing Conditions

In Clark County the corridor generally follows the Columbia River basin from the Oregon border to the Cowlitz County line remaining in the lowlands throughout. Soils are predominately silt loam. The corridor crosses slopes exceeding 40% within the city of Vancouver just south of Vancouver Lake. The corridor occasionally borders slopes greater than 40% on the east side of the Columbia River basin. Landslides are a potential in Clark County. Slope stability of most concern in the Vanouver/Ridgefield area.

In Cowlitz County the corridor follows the Columbia River and continues along the Columbia and Cowlitz River basins and along

Olequa Creek to the Lewis County line. The predominate soil type found throughout the county in this corridor is silt loam. The slopes range from level to nearly level, except slopes of 30 to 50% as the corridor nears the valley bluffs to the east. The corridor occasionally encounters rock bluffs as the railroad nears the eastern edge of the lowlands. The corridor tunnels through a rock bluff near the city of Kelso. Slope stability is of concern in the Kelso/ Longview area.

The corridor in Lewis County follows Olequa Creek encountering nearly level silt loam soils. The corridor proceeds north to Winlock encountering slopes occasionally ranging up to 15% with silt loams. Silt clay and silty clay loam with slopes from 0 to 5% and 5 to 15% are also encountered. The corridor proceeds north through Chehalis and Centralia area passing through the Newaukum River, Dillenbaugh Creek and China Creek basins, the slopes are level to nearly level with soils of silt clay loam. The corridor then follows the Skookumchuck River where fine sandy loam is encountered with level to nearly level slopes. No potential landslide areas are noted in the corridor. Slope stability is of most concern in the Napavine and Centralia area.

In Thurston County the corridor follows the Skookumchuck River and along the river basin to the town of Bucoda. The soils along the river are primarily silty clay loam. The corridor then proceeds northerly toward Tumwater, Olympia, and Lacey. Leaving the river basin, soils transition to more gravely sandy loam or loamy fine sand.

Slopes are level to nearly level ranging up to 3%. The corridor crosses several streams or rivers where soils change to more typical river basin silts. The corridor proceeds northeasterly crossing the Nisqually River near the city of Du Pont. Prior to crossing the river the corridor enters a large cut section of mixed soil conditions ranging from loam sand to gravelly sand loam with slopes up 30%.

In Pierce County the corridor crosses the Nisqually River near the city of Du Pont and enters into gravelly soil conditions. The corridor proceeds northeasterly to Tacoma. The corridor enters the Puyallup River valley and proceeds through Puyallup and Sumner to the city of Auburn. The slopes are level or nearly level. Soils in the valley range from silty clay loams to muck. Potential for liquefaction in a seismic event is noted in those areas as well as the areas within the Port of Tacoma rail access area. Slope stability is of major concern along the entire shoreline from Du Pont into Tacoma.

In King County the corridor passes through Auburn near the White River close to the east side of the Valley. From that point into the industrial area of Seattle the corridor remains on silt loam type soils of level or nearly level topography. The underlying soils are of rich farming types typical of the floodplain areas of south Puget Sound. Within the city of Kent the corridor encounters a seismic hazard area, due to the soft muck soil conditions. Near the Duwamish River in Tukwila the corridor lies between steep bluffs and the river with landslide potentials. From downtown Seattle northerly the corridor follows the shores of Puget Sound to Snohomish County. In this area the tracks lie on a low bench with high bluffs on the east and the waters of Puget Sound on the west. Landslide potential exists along this area. Slope stability is of major concern all along the shoreline north of Shilshole Bay.

In Snohomish County the corridor follows the shoreline of Puget Sound to the city of Everett passing through Edmonds and Mukilteo. Along this shoreline the slopes range from 25 to 75% with potential for landslides next to the corridor. Some areas adjacent to the corridor are fills in the tidewaters of Puget Sound. The corridor proceeds northerly from Everett through the floodplains of the Snohomish River. Soils are level to nearly level silts and loams throughout. Slope stability is of most concern along the

shoreline from the King/Snohomish border to Mukilteo.

In Skagit County the corridor follows north through the floodplains of the Skagit River. The soils are primarily silts deposited from the frequent flooding with level to nearly level slopes except at the river crossings. Along Samish Bay to the Whatcom County line the corridor follows the shoreline with steep slopes ranging from 65 to 90 % with rock outcrops. Landslide potential exists along this portion of the corridor. Slope stability is of most concern in northern Skagit County, along the shoreline of Samish Bay.

In Whatcom County the corridor follows along the shoreline of Samish Bay and to the city of Bellingham along the shores of Puget Sound. The soils are loam over sandstone or bedrock on severe slopes of 30 to 60 %. Landslide potential is evident along this portion of the corridor. Within Bellingham the soils are classified as urban with slopes varying from 0 to 3% to 0 to 8%. The corridor proceeds from Bellingham to Blaine with soils of silt, clay, loam, and muck. with level to nearly level terrain. Near Blaine the soils are silt, loam on marine terraces. High water tables exist through out this portion of the corridor. Slope stability is of most concern in northern Bellingham and Blaine.

LAND USE

Land use refers to the types (uses) of buildings and land (for example, commercial, residential, agricultural) in an area. It is important to look at land uses for two reasons. First, is the proposed project compatible with surrounding land uses? For example, building a new freeway through a regional park would not be considered a compatible use.

Second, will existing land uses change as a result of the new transportation facility? Sometimes it is desired to have the existing land use change, and sometimes it is not desirable.

Throughout the corridor there are many different land uses. In Clark, Cowlitz and Lewis Counties, the land uses are primarily rural in nature. In the larger cities, such as Tacoma or Seattle, the land uses are concentrated with a mix of industrial uses and commercial uses. In the northern portions of the corridor, in Skagit and Whatcom Counties, there are many agricultural uses. In a few of the smaller communities, some housing is located close to the railroad tracks.

Another aspect of land use is the development and enforcement of comprehensive plans. In 1990, the Washington State Legislature adopted the state's first comprehensive growth management act (GMA) that is designed to help communities direct urban growth, reduce sprawl, and protect its resources. As part of GMA, many communities are required to develop land use plans that will dictate the character and direction of growth within their cities. Changes to the passenger rail system and its facilities must now be compatible with these plans.

Information used for this resource included limited field visits and reviews of comprehensive plans and policies. The Bibliography at the end of this document provides a detailed listing of sources used for this research.

Existing Conditions

In Clark County, the rail corridor extends through the incorporated cities of Vancouver and Ridgefield the unincorporated areas of Clark County.

Through the comprehensive plan, Clark County has provided guidelines for future development with the goal of managing and accommodating growth for the next 20 years while preserving its existing character. The transportation element within the plan anticipates a transition from private to transit vehicles, including high-capacity transit and light rail. The Plan supports new or improved passenger rail transportation

along the Pacific Northwest Rail Corridor as an alternate form of transportation to the single occupant vehicle.

The city of Vancouver serves as the largest urban growth area in Clark County. The land uses that abut the corridor are a mixture of industrial, residential and open space. In 1994, the City of Vancouver adopted its Comprehensive Plan, titled, "Visions of Vancouver Urban Area; Growth Management Plan," which includes the city's Mobility Management Plan. The purpose of the Mobility Management Plan is to assure efficient travel for business, industry, and residents. The Plan supports passenger rail as a form of alternate transportation and its expansion to the City of Vancouver.

The city of Ridgefield's comprehensive plan outlines its future growth strategies, including its desire to maintain a strong and vibrant downtown and increasing commercial type of waterfront activities and access to the areas located on the east and west side of the tracks respectively.

From Clark County, the rail corridor continues north through Cowlitz County, passing through the incorporated cities of Woodland, Kalama, Kelso, Longview and Castle Rock, and the expansive unincorporated areas.

The Cowlitz County Comprehensive Plan, updated May 1981, serves to manage the County's growth in an orderly, positive, and constructive fashion. The Comprehensive Plan encourages efficient transportation systems and alternate modes of transportation.

The comprehensive plan strives to manage and protect available resources and maximize the potential of available lands for future growth. Industrial activity is favored along the rail line as well as the continuation of growth in areas with similar land uses within existing industrial and residential areas.

The city of Woodland's comprehensive plan designates the areas along the rail corridor as heavy and light industrial with small pockets of low and high density residential. A number of vacant lots exist along the rail corridor, providing the opportunity for the corridor to eventually meet the desired density of activity as stated in the Comprehensive Plan.

All through Woodland and Kalama, the corridor are primarily agricultural with pockets of industrial and rural residential. Suburban and rural residential and industrial uses are found close to the city of Kalama. The City of Kalama Comprehensive Plan, adopted December 7, 1994, serves to guide development while considering natural and economic elements. The Plan addresses support for expanded railroad freight service, specifically additional spur lines, but does not directly address high-speed passenger rail services.

The city of Kelso provides for passenger rail in its current and future plans. The areas along the rail corridor are similar to other jurisdictions in Cowlitz County, ranging from industrial and commercial uses to open space and agricultural.

The Longview Comprehensive Plan designates the rail corridor for heavy industrial use. However, along the northern and southern segments of the corridor, within city limits, the Plan designates residential use. Currently, a similar mixture of uses exist along the corridor.

The 1986 Castle Rock Comprehensive Plan was created as a tool to provide for uniform development of the region. The corridor is currently bordered by vacant land (for future residential uses) and low and high-density residential units. The Comprehensive Plan does not provide reference to future developments and the role the railroad. The Plan does however acknowledge the existence of the BNSF right of way, a provides a small buffer from future land uses along the rail corridor.

From Cowlitz County, the rail corridor extends north into Lewis County's unincorporated areas

and its incorporated cities of Vader, Winlock, Napavine, Chehalis and Centralia.

Lewis County developed its current comprehensive plan in 1991. The plan provides an overall direction for land use planning in Lewis County. Lewis County's plan, designates the unincorporated areas located south of Napavine as rural mixed use. The unincorporated areas north of Napavine are designated as urban and some suburban. The existing land uses in these areas reflect their designated uses.

Vader's 1996 Comprehensive Plan designates the area around the rail corridor for community services (primarily for open space and park areas), residential, commercial and industrial. Land uses are primarily commercial, residential and open space.

The city of Winlock is in the process of updating their 1969 Comprehensive Plan to reflect the changes experienced within the city and to integrate the requirements of the Growth Management Plan. Land uses are primarily commercial, residential and open space.

The 1981 Chehalis Comprehensive Plan favors a multiple center or cluster concept for future development patterns. Under the desired approach, land uses would be grouped in pockets of residential neighborhoods, parks and open space, commercial and industrial activities. The existing land uses are in a similar pattern, with more industrial activity occurring in the middle of the city than proposed in the comprehensive plan.

Centralia is the largest city in Lewis County. The goals and corresponding policies in the city of Centralia comprehensive plan include the preservation and enhancement of residential neighborhoods and orderly development in the designated commercial areas, while reducing the long-range public costs of development. Existing land uses within the city are typical for a small urban area, ranging from industrial to commercial to undeveloped areas. The comprehensive plan also acknowledges that the rail lines often border or divide common land use activities, including residential neighborhoods and industrial areas.

The rail corridor extends in a northerly direction through the cities of Bucoda, Tenino, Lacey and the unincorporated areas of Thurston County. The majority of the corridor extends through sparsely developed unincorporated areas. The Thurston County Comprehensive Plan emphasizes the need to preserve this low density and other county resources. Land uses along the corridor are designated for a mix of commercial, agricultural, and residential uses.

Current land uses in the city of Tenino are predominately low density residential. The city, in its comprehensive plan, has designated this corridor for continued residential use in the southern and northern sections of the city. The central portion is designated for industrial use.

The city of Lacey's Transportation Plan identifies the rail corridor for rail transportation and other public purposes. The rail corridor extends through the city's urban growth boundary.

The Pierce County Comprehensive Plan was created in accordance with the Growth Management Act. The purpose of the plan is to provide policies and strategies for current and future land uses and development for the next 20 years throughout the county.

The unincorporated areas of Pierce County consist of a diverse range of land uses. The Fort Lewis Military Reservation, which is under the authority of the Federal government, is primarily utilized as open space. The remaining areas throughout the county include residential and rural activity centers(including agriculture, residential and limited commercial activities to support area residents).

The city of Du Pont's 1995 Comprehensive Plan designates the rail corridor as a sensitive areas

buffer. Due to the steep topography, the area is only appropriate for open space use.

The Steilacoom Comprehensive Plan acknowledges that the existing and proposed land uses are very much the same with only small changes focused on environmentally sensitive areas. The plan acknowledges the future of increased passenger service in the corridor. Support for rail is reflected through the town's desire to work with BNSF on the future track and grade crossing improvements.

The incorporated city of University Place adopted Pierce County's Comprehensive Plan format as their interim plan. The Generalized Proposed Land Use Map found in the Pierce County Comprehensive Plan reflects existing uses, with very little changes. The shoreline and steep slopes make it difficult to develop along the corridor. Current uses include some residential, open space, and a scattering of mixed uses. Future activity along the corridor may be limited through the guidelines set forth in the Shoreline Master Plan and the Critical Areas Ordinance currently utilized by the city of University Place.

The town of Ruston's Comprehensive Plan provides guidelines for the town's future growth in accordance with the Growth Management Act and the desires of the current residents. The existing land uses include commercial and residential activity in the corridor. Proposed land uses for the area are similar, but also include a commercial and industrial activity center along the Pearl Street and North 51st Street corridors.

Land uses along the corridor within the city of Tacoma are a mixture of commercial, industrial, port activities, and highway uses. The city of Tacoma's Comprehensive Plan recognizes these current uses and encourages higher density commercial, retail and hotel uses in the area near the Tacoma station.

The city of Puyallup's Comprehensive Plan designates land uses along the rail corridor for mixed residential, auto-oriented commercial, and light manufacturing and business and parks.

The city of Sumner's Comprehensive Plan recognizes the rail corridor as a critical link in their intermodal transportation goals. Current uses in the corridor range from commercial to light industrial.

Over 35 miles of the project corridor traverses King County, the most populous county in the state of Washington. The corridor, as it extends through the western area of the county, is comprised of the incorporated cities of Auburn, Kent, Tukwila, Renton, Seattle, and Shoreline and unincorporated areas under the jurisdiction of King County.

According to King County's Comprehensive Plan, the corridor passes through a number of incorporated and unincorporated areas that have been designated as King County's Urban Growth Areas and Manufacturing/ Industrial Centers. Some of these growth areas include the city of Tukwilla, areas within the city of Seattle, Duwamish, Ballard/Interbay, Kent, and the Aurora/Richmond area.

In the southern region of King County, the comprehensive plan designates much of the unincorporated area for agricultural/natural resource lands, mining and open space. The plan also supports the concept of maintaining these activities in support of focusing growth in adjacent urban growth areas.

The city of Auburn anticipates future industrial and commercial growth in the corridor due to the number of vacant and underutilized lots in the area. The comprehensive plan outlines the city's goal for the rail corridor within their downtown as Rail Yard Special Planning Area. It is bounded by Ellingson Road on the south and State Route 18 on the north to east of the rail lines and west of A Street SE. Through its designation, the city of Auburn acknowledges the need to give consideration to BNSF and to provide access between the east and west side of the city when future land uses are proposed. The shoreline master plan will also dictate future

land uses in the corridor's crossing of White River.

The city of Kent's existing land-uses range from commercial, industrial to a general mixture of uses. Similar uses are laid out in the 1995 comprehensive plan for the city of Kent. The Comprehensive Plan also supports the goal of improved pedestrian circulation through land-use design throughout the area. The enhancement of pedestrian circulation in the downtown area, including the linkage of the east and west side of the railroad tracks, is also favored. The city of Kent's Shoreline Master Plan has established guidelines for future development occurring on the banks of Green River, which the rail corridor crosses.

The existing land uses along the rail corridor within the city of Tukwila represent a variety of uses, from industrial to public recreational lands. The comprehensive plan supports the continued development and support of the industrial area along the rail corridor for the next 20 years.

The Comprehensive Plan for the city of Seattle outlines policies furthering the creation of urban centers and villages, reflecting the desire to maintain and enhance the city's character while accommodating growth through the designations of growth areas. Existing uses are found, in general, to be in conformance with the goals and land use designations referenced in the comprehensive plan. Land uses along the corridor vary significantly in the Seattle, with the southern portion predominately industrial port uses, traveling north through parkland and open space, with scattered residential. The city of Seattle's shoreline management plan will also guides future land use activities in those areas of the Duwamish River, Lake Union, Salmon Bay and the coast line of Puget Sound.

The city of Shoreline is currently utilizing the King County Comprehensive Plan as their Interim Comprehensive Plan. According to the Plan, the land use designation for the area is for open space/recreation (Richmond Beach) and residential uses along the corridor. Due to the proximity of the corridor to the water and steep hillsides, the city's shoreline master plan and critical area ordinance (currently following King County documents) also guides future land use activities.

From King County, the rail corridor enters Snohomish County and extends in a northerly direction for approximately 46 miles. The rail corridor passes through the town of Woodway, the cities of Edmonds, Mukilteo, Everett, Marysville and Stanwood and the unincorporated areas of Snohomish County.

According to Snohomish County's 1995 GMA Comprehensive Plan/General Policy Plan, the corridor passes through the composite urban growth area (UGA) of Snohomish County, consisting of several smaller UGA's. The goals set forth include orderly development, the provision of public facilities, increased densities of various uses and to protect and enhance rural areas. These goals and others are to be incorporated into the Cities' comprehensive plans as well.

Snohomish County's plan indicates that the rail corridor and its existing surrounding uses are in general conformance with designated future land uses. Open space, including wetlands and waterways, are discussed in the county's shoreline management plan and the county's critical area ordinance. A great number of the areas referred to open space in the existing land use descriptions have been identified as protected areas as mandated by those two documents.

The Town of Woodway was incorporated in 1958 as a means to protect and preserve the area and to retain its original concepts. Those concepts were to maintain the area as a low-density residential area, prohibiting commercial activities and to maintain control over property taxes and the area's roadways. Existing uses reflect these early town goals. Areas along the rail corridor consist of open space and steep

bluffs. The bluffs are protected under an ordinance regarding critical areas.

Existing land uses along the corridor in the city of Edmonds consist of water-oriented recreational uses, residential uses, and scattered industrial uses. According to the 1995 city of Edmonds Comprehensive Plan and Concept Map, little change in land use is expected in for the future. A master plan development, under the direction of the Port of Edmonds, is located in the vicinity of the marina extending east to State Route 104. The city and port of Edmonds are working together to relocate the existing ferry terminal and the existing Amtrak station, as part of a multi-modal transportation facility. The preferred site for this facility is at Point Edwards.

Significant land use and growth changes are being considered by the city of Mukilteo, such as the development of a multimodal facility which includes relocating the existing ferry terminal, a commuter rail station and redeveloping their downtown waterfront area.

According to the city of Mukilteo's 1995 Comprehensive Plan, a significant amount of undeveloped land is proposed for residential and industrial. The area in the vicinity of the ferry terminal and to the east is designated as residential and downtown commercial, which includes land uses that are public and quasi-public in nature.

The current land uses along the rail corridor range from recreational to residential to industrial. Similar uses are proposed along the corridor as part of the city of Everett's 1994 Comprehensive Plan. Critical areas, as determined by the city of Everett's Critical Areas Ordinance and the city's shoreline master plan, will not be developable due to the impacts such activities may have to those areas.

The recently adopted 1996 Comprehensive Plan for the city of Marysville provides a detailed review of the sub-areas of the city and their designated land uses. Throughout the sub-areas, the existing land uses are similar, if not the same, to those designated for proposed land uses, and include residential, commercial and agricultural. The sub-area discussions integrate the goals of the land use element with discussion of the existing land uses and how they can be blended into the desired outcome. Some of the goals included in the land use element include improved patterns of growth and services to accommodate growth, provide balanced mix of commercial activities to meet needs of residents, with downtown servicing as the commercial focal point and include industrial areas in planning efforts so that the city may benefit from the positive benefits contributed to economic growth and stability.

A review of the city of Stanwood's Final Comprehensive Plan (1995) indicates future land development within the rail corridor. Existing land uses are less dense than the planned future uses. The immediate area adjacent to the corridor is currently bordered by industrial, commercial uses and public facilities. Since the purpose of the Comprehensive Plan is to serve as a guide to future planning and development and the growth forecasts for Snohomish County are strong, the city of Stanwood may realize the uses and densities proposed within the next twenty years.

The rail corridor extends from the Snohomish County border north through the cities of Mount Vernon and Burlington and the unincorporated areas of Skagit County (communities Conway and Bow), generally paralleling Interstate 5.

In addition to the comprehensive plans that reflect desired land use goals within these communities, the "County-wide Air, Rail, Water and Port Transportation System Study" (1996) recommends the county and cities undertake efforts to make the rail line more efficient for both passenger and freight service and to carefully monitor the development of spurs to serve local industry.

The 1995 Comprehensive Plan for the city of Mount Vernon integrates goals set forth by the state and county including concentration of densities in cities and their urban growth boundaries. The existing land uses are in general conformance with those desired for future growth, including future growth in the downtown area. However, the large amount of sensitive areas may limit future development or lessen the desired densities. Reviews of these areas will be required prior to granting applications for development.

The comprehensive plan acknowledges the rail corridor and encourages the development of the new multi-modal transportation center at the current station site.

The city of Burlington's 1994 Comprehensive Plan Map identifies goals to preserve the character of the community, upgrade infrastructure to meet growing demand, protect sensitive areas and continue to include public involvement in the planning activities. In addition to the goals, rail corridor activity is supported and recognized as the key to the early growth of the city in the 1800's and potentially future growth.

The rail corridor continues north from Skagit County through Whatcom County to the United States/Canadian Border. As it traverses through Whatcom County, it passes through the cities of Bellingham, Ferndale and Blaine and the unincorporated areas of the County.

Whatcom County adopted a set of countywide Planning Polices. These policies established guidelines for the county and its cities to follow in their efforts for growth management planning. From those policies, came the 1996 Whatcom County Comprehensive Plan. The plan incorporated the goals of the Growth Management Act and other goals favored by the residents of Whatcom County, including the desire to maintain the rural areas of the county.

Throughout the county, in both the incorporated and unincorporated areas, existing land uses include a mixture of rural, agricultural and crossroad commercial. Short segments of the rail corridor are located within the "Urban Growth Areas" (UGA). Areas with the UGA designation serve as limits for future growth within the region. The remaining areas will be maintained as agricultural, open space (undeveloped land) and rural.

According to the 1995 Bellingham Comprehensive Plan's Zoning Map, the land uses located along the rail corridor include industrial, public (park area), commercial and residential. Future designations for this area reflect current uses.

FARMLANDS

In this ever growing urbanized society, the federal government and the State of Washington have recognized the importance of preserving our depleting farmland. As such it is imperative that projects minimize the disruption to these agricultural resources as much as possible.

Farmland information was obtained through sources from the U.S. Department of Agriculture's Natural Resources Conservation Service.

Existing Conditions

The corridor in Clark County follows the Columbia River basin from the Oregon border to the Cowlitz County line, remaining in the lowlands throughout. The corridor encounters farmlands on both sides of the corridor between Vancouver and Ridgefield.

In Cowlitz County the corridor follows the Columbia River and continues along the Columbia and Cowlitz River basins and along Olequa Creek to the Lewis County line in the north. The corridor follows the lowlands throughout. It borders or crosses over numerous farms except within the urban growth or forested areas.

In Lewis County the corridor follows Olequa Creek, traveling north through Vader, Winlock,

Napavine. The corridor then travels north through Chehalis, Centralia, and up the Skookumchuck River to the Thurston County line. Farmlands are encountered along the corridor between Winlock and Napavine. Near Chehalis the corridor crosses large farmland tracts. Smaller farms are also encountered along the Skookumchuck River.

In Thurston County the corridor follows the Skookumchuck River to the town of Bucoda. The corridor then proceeds northeasterly through Thurston County passing through the town of Tenino and the city of Lacey. The corridor borders or bisects several small farms and some larger dairy farms along the Skookumchuck River. Between Tenino and Lacey there are long term agricultural zones noted adjacent to the corridor.

In Pierce County the corridor crosses the Nisqually River near Du Pont and travels northeasterly into Tacoma. The corridor then follows the Puyallup River to Sumner turning north along the White River. Much of the corridor along the Puyallup and white rivers is farmland on both sides of the tracks except within the cities of Tacoma, Puyallup, and Sumner.

In King County the corridor passes through the city of Auburn and travels north through the Cites of Kent, Tukwila, Seattle, and Shoreline. Much of the land in the south county within this corridor was once considered prime farmlands but has been replaced with commercial, industrial, and residential uses. Several large farms are present in the corridor. In the northern portion of the corridor, from Seattle City center northerly to the Snohomish County line, there are no farmlands.

In Snohomish County the Corridor follows the shoreline of Puget Sound and travels north to Everett encountering no farmlands. North of Everett the area has class II farmlands within the lowlands of the Snohomish and Stilliguamish Rivers.

In Skagit County the corridor travels north through the Skagit Valley, passing through large tracts of farmland on both sides except in the urban areas of Conway, Mt. Vernon, and Burlington. From there the corridor proceeds northerly along the shorelines of Samish Bay and Puget Sound where shellfish are raised commercially.

In Whatcom County the corridor follows Samish Bay and Puget Sound to Bellingham. No farmlands are in this region. From Bellingham northerly to Blaine, prime and unique farmlands, used mostly for dairy, are indicated with potential for greater use of farmlands where the soils are well drained.

Prime farmlands, that is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, are located in the corridor. Skagit and Whatcom Counties have the largest percentage of prime farmlands within the corridor.

PARKS AND CULTURAL RESOURCES

Cultural resources include state and nationally designated historic buildings, districts, and archeological sites. Western Washington is rich in cultural resources ranging from Native American burial sites and villages to the historic Fairhaven district in Bellingham. The majority of the historic sites along the corridor are listed on the National Register of Historic Places.

The corridor is also rich in park and recreation facilities. They range from small playgrounds to sandy beaches to large state facilities. The rail right-of-way parallels numerous parks and recreation facilities.

Section 4(f) of the Department of Transportation Act of 1966, as amended, provides protection for significant publicly owned parks, recreation areas, wildlife refuges, and historic sites. Transportation projects that adversely affect such resources may not be approved by the

Secretary of Transportation unless a determination is made that there is no feasible and prudent alternative, and all possible planning has been done to minimize harm.

Section 106 of the National Historic Preservation Act of 1966, as amended, requires that federal agencies identify and assess the effects of federally assisted undertakings on historic properties, consult with others to find acceptable ways to avoid or mitigate adverse effects, and afford the Advisory Council on Historic Preservation an opportunity to comments.

Cultural Resources

Given the scope of this environmental overview, only recorded data were used to inventory existing conditions located within 1000 feet of the rail right-of-way. Information was obtained from the Washington State Historic Preservation Office. Maps indicating the general areas of these historic resources are located in Volume 2 (Group E) of this document. (Note: the accompanying list of resources can be found in Chapter 4 of this document).

Existing Conditions

A number of historic resources are located within 1000 feet of the rail right-of-way. The majority of these resources are located in urbanized areas.

Within Clark County, the cities of Vancouver and Ridgefield have historic resources located within the study area. In Vancouver, the Vancouver-Hayden Island Bridge and the Vancouver-Portland Bridge, are both located within 1000 feet of the rail line.

In the Ridgefield area, three resources: the William Henry Shobert House, the Basalt Cobblestone Quarries District, and the Judge Columbia Lancaster House are all located within the study area.

In Cowlitz County, the Hulda Klager Lilac Gardens, located in Woodland, are located within the study area. The remaining historic resources are located in Kelso: the Adam Catlin House, the Monticello Convention Site, and the Nat Smith House.

Centralia and Chehalis have a number of historic resources located within the study area. In Centralia, the following resources are within 1000 feet of the rail line: the George E. Birge House, the Centralia Massacre Site, the Centralia Union Depot, the Olypmic Club Saloon, and The Sentinel.

In Chehalis, six resources are within the study area: the Burlington Northern Depot, the Hillside Historic District, the O.B. McFadden House, the O.K. Palmer House, the Pennsylvania Avenue Historic District, and the St. Helens Hotel.

In Vader, the Ben Olsen House is also within the study area.

Thurston County historic resources are located in Bucoda (the Shead House) and Lacey (the Jacob Smith House).

Pierce County has a considerable number of historic resources, the majority of which are located in the City of Tacoma. Over 30 historic resources are located within the study area in Tacoma. A listing of these sites can be found in Chapter 4 of this report.

Other historic resources in Pierce County are located in Steilacoom (Steilacoom Historic District; Steilacoom Catholic Church; Nathaniel Orr Home and Orchard; First Protestant Church; and Davidson House) and Ruston (Winnifred Street Bridge).

In King County, as in Pierce County, the majority of the historic resources are located in the largest urban area – in this case, the City of Seattle. Within 1000 feet of the rail line (in the City of Seattle), there are 34 historic resources (see Chapter 4 of this document for a listing of these resources).

Other cities in King County also have historic resources located within the study area: Auburn (the Auburn Public Library; the Patton Bridge, and the Oscare Blomeen House); Kent (Carnation Milk Factory); and Tukwila (James Nelsen House).

Many of the communities in Snohomish County have historic resources located within the study area. These are: Edmonds (Brackett's Landing; Edmonds High School; First School in District No. 15; Stevens Hotel; and Wells Residence); Everett (Coaster II-Quissett (Vessel); Everett Public Library; Roland Hartley Hosue; Pioneer Block; Rucker Hill Historic District; Rucker House; and Weyerhaeuser Office Building); Marysville (Marysville Opera House); and Mukilteo (Mukilteo Cemetery; Mukilteo Light Station; and Point Elliot Peace Treaty Site).

Two historic resources are located within the study area in Skagit County: the Lincoln Theatre and Commercial Block (Mount Vernon) and the Burlington Carnegie Library (Burlington).

Over one dozen historic resources are located within the study area in Bellingham (see Chapter 4 for a listing of these resources). Other resources in Whatcom County include: the Hovander Homestead (Ferndale) and the International Peace Arch (Blaine).

Park and Recreation Facilities

Research for this section was completed using published maps, city and county comprehensive plans, and field review. In addition, some interviews were conducted with local representatives. Maps of the generalized areas of parks and recreation facilities are located in Volume 2 (Group E) of this document. (Note: the accompanying list of resources can be found in Chapter 4 of this document).

Existing Conditions

The rail corridor enters Washington State by crossing the Columbia River into the city of Vancouver. Within the city of Vancouver the rail corridor runs near three parks and several water recreation areas. Access to these areas is primarily from the east and does not require crossing over the rail corridor. The rail corridor crosses the Stewart Glen Burnt Bridge Creek Greenway. The Greenway and Burnt Bridge Creek lead to the eastern edge of Vancouver Lake, a multiple use resource.

North of the city of Vancouver and toward Ridgefield the rail corridor runs along Lake River and near water bodies such as Green Lake, Salmon Creek, and Campbell Lake that are used for water-oriented recreation. In Ridgefield the rail corridor continues along Lake River but does not pass near any city of Ridgefield parks. Access to the Lake River shoreline and the marina from the city crossing the rail corridor. North of Ridgefield, the rail corridor is adjacent to the Ridgefield Wildlife Refuge. The rail corridor continues north toward the city of Woodland running near Lancaster Lake and crossing the Lewis River, both utilized for water-oriented recreation. The Cowlitz County jurisdictional boundary follows the midway mark of the Lewis River.

The rail corridor enters Cowlitz County by crossing the Lewis River and entering the city of Woodland. No recreational areas are located near the rail corridor in the city. Recreational access to the Columbia River, located west of the rail corridor is via two roads that cross the rail corridor. The corridor continues toward the city of Kalama and recreational access to the Columbia River is by selected exits from the I-5 corridor. In the city of Kalama the rail corridor runs through the western edge of the city and access to the Columbia River shoreline requires crossing the rail corridor. The rail runs near the Port of Kalama including Marine Park and access to this area is by an overhead pedestrian walkway or by a vehicular overpass at Marine

Drive. North Park is located on the west side of the railroad before leaving city limits.

North of Kalama the railroad crosses the Kalama River. A public boat launch, R.V. park and water-oriented recreation activities are located in this area. The rail corridor continues through Cowlitz County to the cities of Kelso and Longview. In Kelso, the rail passes by more water-oriented facilities and Three Rivers Golf Course, a private recreational area. A community park just north of Cowlitz Way is proposed for the shoreline area. Potential bicycle trails are west of the rail corridor from the Three Rivers Golf Course north following the rail corridor into downtown Kelso. Recreational access to the Cowlitz River is generally provided by grade separated roadways.

Lewis County jurisdiction begins just south of the city of Vader. The rail corridor runs on the western edge of the city and no parks are adjacent to the railway. The tracks continues northward running along Olequa Creek, past the city of Winlock, the city of Napavine and crossing Newaukum River and Dillenbaugh Creek. As tributaries to the Cowlitz River they offer local water-oriented recreational opportunities. The rail corridor bisects the city of Chehalis where it passes near baseball diamonds and soccer fields located on the east side of the rail alignment. North of Centralia the only recreational facility, Schaefer State Park, is located northwest of the rail corridor in unincorporated Lewis County. The park offers recreational opportunities along the Skookumchuck River.

The rail corridor enters Thurston County following Highway 507 toward the city of Bucoda. Access to fishing and other recreation on the Skookumchuck River in this vicinity requires crossing the rail corridor. The rail continues north along Highway 507 toward the city of Tenino. Parks in the city of Tenino are located away from the rail corridor. A trail begins along the rail corridor that runs from Tenino to Yelm. North of Tenino, Wolf Haven American Wildlife Refuge is located on the east side of the rail. Continuing to East Olympia, the rail corridor crosses the Deschutes River and its water-oriented recreation, but does not pass near any County Parks. The Chehalis Western Trailhead crosses the rail corridor in the East Olympia area. The railway heads northeasterly across Patterson Lake just south of Lacey. The rail corridor also passes Long Lake and continues toward the Nisqually River. All of these areas are used for water-oriented recreation, however, the BNSF right-of-way does not impede access to these areas.

The rail corridor enters Pierce County after crossing the Nisqually River and entering the Fort Lewis Military Reservation. It then follows the Puget Sound coast into the Du Pont area. A trail system and viewpoints are located along the bluff area in the Du Pont area along the old narrow gauge railroad tracks.

Northward along the Puget Sound shoreline the rail passes through the city of Steilacoom. Ferry access to McNeil Island and local access to the marina requires crossing the rail corridor. Saltar Park is located west of the railroad and Pioneer Park is located to the east. The rail corridor bisects Sunnyside Beach Park. Several private and public shoreline access points cross the tracks within city limits.

The rail corridor continues along Puget Sound, crosses Chambers Creek and enters the city of University Place. Day Island, accessed by a bridge across the rail corridor, has two private recreational areas, a marina and the Day Island Yacht Club. The railroad enters the city of Tacoma following the Puget Sound/Tacoma Narrows shoreline. It bisects Titlow Beach Park and Living War Memorial Park, and heads east through a tunnel under Point Defiance Park. The alignment re-emerges in the Ruston Way area before heading southeast along the Commencement Bay shoreline. The rail runs near, but not adjacent to Marine Park, Fireman Park, Hamilton Park and Commencement Park. These shoreline parks are accessible by crossing

the alignment at marked grade crossings to Ruston Way or by an overpass. Puget Park and Garfield Park are located on the bluff above the rail in this area.

Outside of Tacoma, the rail corridor parallels the Puyallup River toward the Puyallup-Sumner area in unincorporated Pierce County. The city of Puyallup has a bike path on the edge of Stewart Street along the tracks. A proposed park abuts the track on Pioneer and 2nd Street Northeast. Upon exiting the city of Puyallup the railway crosses the Puyallup River with its water-oriented recreation areas, and enters the city of Sumner. St. Seibenthaler Park is located adjacent to the east side of the tracks. Access to White River recreation is provided by several road crossings. The corridor heads north through unincorporated Pierce County and enters King County south of Auburn.

The railway corridor enters King County paralleling the East Valley Highway through Pacific and Auburn. The rail follows C Street through the city and is near GSA Park and Auburn Municipal Airport. The Interurban trail also follows the rail corridor at times. The rail corridor continues due north crossing the Green River. In the city of Kent, Railroad Park abuts the west side of the railway and a Kiwanis Park is located on 1st Avenue. The rail corridor bisects Burlington Green Park and crosses near Borden Playfield. The rail corridor then heads northwest and into the city of Tukwila, passing near the Fort Dent Park. Located west of the railroad is the Green River and Foster Golf Links area.

The railroad continues along the I-5 corridor and into the city of Seattle. Land surrounding the rail corridor is primarily industrial in the southern portion of Seattle, and is straddled by the I-5 corridor to the east and Boeing Field to the west.

The alignment heads into King Street Station, adjacent to the King Dome and the Mariner's stadium. North of the station, the alignment tunnels through downtown, emerging along Elliott Bay near Myrtle Edwards Park and Elliott Bay Park. Heading north into the Interbay area, the rail runs near the Interbay Golf Course and Interbay Athletic Field. The rail corridor then heads northwest towards Salmon Bay and runs near Kiwanis Memorial Park located west of the railway. The corridor crosses Salmon Bay via an overhead bridge into the Ballard area. The bridge crosses both the canal and Seaview Avenue Northwest just west of the Hiram M. Chittenden Locks. The locks are a public viewing and recreation area. The rail does not affect the park facilities on either side of Salmon Bay. The rail corridor then runs on the east side of Seaview Avenue Northwest. Located on Seaview Avenue Northwest along Shilshole Bay are the Shilshole Marina and a public boat launch. The rail corridor bisects Golden Gardens Park, but pedestrian and vehicular access to this recreational area are by roadway underpasses. Continuing along the waterfront and into Snohomish County the railway runs below the bluff at Carkeek Park and bisects Richmond Beach Park. Public access to the shoreline beaches at these parks is provided by pedestrian overpasses.

The rail corridor enters Snohomish County in the Shoreline area and continues to follow the waterfront. A private shoreline park abuts the railway in the Pt. Edwards area before Edmonds. Entering the Edmonds area the railroad runs on the eastside of Admiral Way. Recreational areas located west of Admiral Way and requiring rail crossing include Edmonds Marina, the Marina Beach, Kingston Ferry, Olympic Beach, Brackets Landing Park, Edmond's Underwater Park, and Brackett's Landing Beach. These areas are accessible by marked grade crossings at street intersections. Continuing in Edmonds along the waterfront the railway runs near residential areas with scenic overlooks, including Overlook Park, a small park located east of the railroad on the bluff above the alignment.

In the Meadowdale area the railway abuts Meadowdale Beach Park. Public access to the beach at this park is by a pedestrian overpass. The rail corridor bisects Picnic Point Park in Norma Beach area and continues north along the waterfront through the Mukilteo area. In northern Mukilteo, the rail runs on east side of Mukilteo State Park, the lighthouse, and Clinton Ferry dock. Access to these facilities is by crossing the rail corridor at grade crossings. In the Everett area the railroad runs near Edgewater and Harborview Park to the east, and runs adjacent to Howarth Park, Forest Park, Maggies Park and Grand Avenue Park. In the Port of Everett the railway must be crossed to access Marina Village, the Port of Everett piers, Yacht Club, Marine Park, a public boat launch, North and South View Parks, and the Everett Marina. There are multiple ways to access these facilities including at grade crossings and an underpass near Hewitt Avenue.

The rail corridor crosses the Snohomish River and related water-oriented recreation areas and enters into the Marysville vicinity. In the city of Marysville, the closest park to the railroad is Comeford Park located east of the corridor. North of Marysville, in unincorporated Snohomish County the rail corridor heads northwest toward Lakewood and Stanwood. The railway continues, approximately following Highway 9 then heading west toward Stanwood, then north into Skagit County. The unincorporated area is primarily rural agricultural land, with no established parks located near the rail corridor.

The railroad corridor enters Skagit County near Skagit Bay, a habitat management area. Northward, in the Conway area the railroad runs near Conway Park and the Field & Stream Estuary. In the city of Mt. Vernon, the rail runs near the Skagit River shoreline with water-related recreation, and Lions Riverside Park. The railroad alignment continues northward, crossing the Samish River, approaching the waterfront at Samish Bay in north Skagit County. Padilla Bay National Estuarine Research Reserve lies on both sides of the rail line.

The railroad corridor enters Whatcom County bisecting Larrabee State Park, with public access to the shoreline by a pedestrian underpass. The corridor is tunneled and re-emerges along the waterfront south of the Fairhaven area. In Fairhaven the corridor abuts Post Point Marine Park and it is necessary to cross by marked at-grade crossings, to reach the Bellingham Cruise Terminal and public boat launch. Approaching downtown Bellingham the railroad corridor passes through the lower part of Boulevard Park and runs adjacent to the main portion of the park which includes a small art studio. A recreational trail runs on the east side of the rail from Boulevard Park into downtown Bellingham. The rail corridor continues through the industrial waterfront area of downtown Bellingham and crosses the Whatcom Creek waterway. The railroad runs adjacent to Roeder Avenue and access to the Marina, Port of Bellingham, Marina Park and public boat launch, all located west of the rails is provided by at-grade or separated-grade road crossings. Exiting the city limits, the railway bisects Little Squalicum Park via an overhead trestle. The corridor then diverges from the waterfront and runs northeast toward Ferndale. In the city of Ferndale the railroad abuts Tennant Lake County Park to west and runs near Hovander Homestead Park which contains a public boat launch. Exiting the city of Ferndale the rail heads northwest running on the west side of Highway 548 through Custer, toward Blaine and the Canadian border. In the city of Blaine, the rail corridor runs near the Loomis Trail Golf Course to its east and crosses Dakota Creek. Following the Drayton Harbor waterfront area, the corridor runs near the Marina, Marine Park, and a public boat launch, bisects Peace Arch Park and enters Canada.

SOCIAL AND ECONOMIC

In environmental planning, the technical area called social and economic resources includes

review of access and safety to social and educational facilities (religious institutions, schools, community centers), emergency vehicle access, community cohesiveness, disruption to the community through displacements and relocation, and general impacts to disadvantaged groups (minorities and low-income individuals and families).

When building a new project or implementing a new program, these elements play a vital role in the placement of the new facility or program. It would be illogical to plan and implement a bus system if it did not go from a residential neighborhood to a commercial area. It is important to make sure the facilities can truly serve the community.
In the case of intercity passenger rail, many of the communities cannot be served directly (because they don't have a station in their community and they are not on the rail line), but it is still critical to look at the social and economic resources throughout the corridor to make sure that the rail system will not impact the social structure of the existing communities.

Another important aspect of the social and economic conditions of a community is to understand the communities' views of safety. Many residents feel that more trains and faster trains will make their communities less safe. Residents feel uncomfortable driving or walking over railroad tracks. Also, since the tracks separate neighborhoods from shorelines, many people illegally walk over the tracks to get to the beach to fish, walk, or picnic.

Community Cohesion and Safety

Given the scope and purpose of this environmental overview, it would be impractical to inventory every social and emergency facility and grade crossing. For the purposes of this general review, a listing of local city and towns along the corridor is provided, as well as an approximate number of legal, public grade crossings within the corridor.

Existing Conditions

The rail corridor travels through nine counties and numerous cities and towns. The southern portion of the corridor, from Portland to Tacoma, includes four Washington counties and numerous jurisdictions. In Clark County, the communities of Vancouver, Ridgefield and Woodland are bisected. In Cowlitz County, the communities of Kelso, Kalama and Castle Rock are traversed. In Lewis County, the communities of Vader, Winlock, Napavine, Chehalis, and Centralia are crossed. North of Lewis County, Thurston County communities include Bucoda, Tenino and East Olympia/Lacey. Pierce County communities along the corridor include Du Pont, Steillacoom, University Place, Lakewood, Ruston, and Tacoma.

Within this southern segment of Washington state, 99 public, at-grade crossings are located within these communities along the rail corridor. In addition, 11 pedestrian bridges/crossings provide access over the rail line.

The lower mid-section of the corridor between Tacoma and Seattle, travels through Pierce and King Counties. The communities of Tacoma, Puyallup, Sumner, Auburn, Kent, Tukwila, and Seattle are crossed by the rail right-of-way. Within this segment, 65 public, at-grade crossings are located within the corridor. There are no designated pedestrian-only crossings in this area.

North of Seattle, between Seattle and Everett, the communities of Shoreline, Woodway, Edmonds, Mukilteo, and Everett are traversed. These communities are located in King and Snohomish Counties. Within this area, seven public, at-grade crossings provide vehicular, pedestrian and bicycle access across the railroad right-of-way.

The northern segment of the corridor, from North Everett to Blaine, travels across Snohomish, Skagit and Whatcom Counties. The

rail line crosses the communities of Everett, Marysville, Stanwood, Mt. Vernon, Burlington, Bellingham, Ferndale, and Blaine. This segment of the corridor contains 99 public, at-grade crossings and five pedestrian-only designated crossings.

These public crossings serve as access points for local residents. They are also used by emergency vehicles (fire, police and ambulances) and social service organizations (such as school buses, paratransit and senior services). In addition, they serve as links for those communities that are separated by the rail line, thus linking local residents to their shops, parks, religious institutions, families and friends.

Relocation

It is sometimes necessary to relocate families and businesses because the new transportation facility may either impact the home or business to the point where that property is no longer usable, or the new transportation facility may need more right-of-way to accommodate its design.

Through review of county and city comprehensive plans, designated urban growth areas were identified. In particular, areas that overlap or cross the rail right-of-way were mapped and are illustrated in Volume 2 (Group F) of this document.

Existing Conditions

At this time, it is impossible to guess what type of land requirements future projects may require. It is anticipated that most, if not all, potential project improvements over the next twenty years, will be constructed within the existing rail right-of-way. However, for the purposes of this study, we have identified areas of potential growth, that could possibly be disrupted.

Communities that have designated urban growth areas within the rail corridor include: Vancouver, Ridgefield,Vader, Napavine, Tenino, Puyallup, Sumner, area between Edmonds and Mukilteo, Mt. Vernon, Bellingham, Ferndale and Blaine.

Review of these urban growth areas, together with review of existing land uses within the study corridor, it is assumed that potential projects could potentially displace residences, retail uses, or some industrial uses.
In cases where business or residential displacements occur, the WSDOT will comply with the Uniform Relocation Assistance and Real Property Acquisition Act, state law, and with its own adopted policies and procedures to protect the interest of current landowners. Appropriate compensation and assistance in relocation will be provided consistent with applicable laws and procedures and available to all displaced businesses and residents.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was promulgated on February 11, 1994. The Executive Order requires each federal agency, to the greatest extent practicable and permitted by law, to achieve environmental justice as part of its mission. Agencies are to identify, and address as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects of their programs, policies, and activities on minority and low-income populations. In June 1997, the U.S. Department of Transportation (DOT) implemented Order 5610.2 to establish procedures for DOT agencies, including FHWA and FRA, to comply with the Executive Order. In December 1998, *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* established polices and procedures for FHWA to use in complying with EO 12898.

The methodology used for this section entailed mapping (via GIS) census tracts along the corridor. Census tracts that were parallel or

traversed by the rail line were identified. Database inquiries, on the U.S. Census internet site, were then performed for population, minority population and below-poverty level households. Data, by census tract, were then compiled.

Existing Conditions

Executive Order 12898 requires that low income populations be identified. As such, using U.S. Census information, census tracts within the study area whose population contains at least 20 percent of persons in poverty were identified.

As such, the following counties had such populations: Clark (three census tracts); Cowlitz (five tracts); Lewis (two census tracts); Pierce (six tracts); King (eight tracts); Snohomish (two) and Whatcom (four census tracts).

Minority populations are another indicator for environmental justice review. Executive Order 12898 states that projects should be reviewed to ensure that the study area population does not consist of over 50 percent minority population or have a disproportionate amount of minority population in comparison with the overall population. Within the rail corridor study area, very few census tracts had a disproportionate amount of minorities or 50 percent or higher minority population. Only King County had such populations, with seven tracts that contained at least 50 percent minority population including Black, Asian and Hispanic.

VISUAL QUALITY

This program provides for improvements to passenger rail service. These improvements include standard track improvements along existing right-of-way, which are not expected to impede visual quality. Some planned improvements include replacing existing grade crossings and bridge or overpass facilities with new upgraded facilities. Although these facilities may impede visual quality in certain location, as upgrades they will be replacing current structures that already impede, or depending upon perspective, provide views.

A typical visual quality analysis would entail the use of complicated models developed by the U.S. Department of Transportation. The visual quality assessment used the Federal Highway Administration U.S. Department of Transportation's (FHWA USDOT) Visual Impact Assessment model to examine the vividness, intactness, and unity of the view toward and from the improvement site. The model uses a scale from 0 - 10 (0 being very low, and 10 being very high). Another technique of visual analysis would include use of Washington State Department of Transportation's Visual Impact Assessment for Highway Improvements.

Existing Conditions

A number of views must be considered when evaluating visual quality. Views from and toward the rail right-of-way, outside of the rail right-of-way and extending to the visible landscape.

The typical landscape viewed by the passenger along the southern segments of the corridor are rural valley farmlands or areas along the Columbia River. Limited industrial areas can also be viewed. In the northern portion of the corridor, landscapes are comprised of urban setting such as Tacoma and Seattle. Moving further north, one can view rural valley farmlands and distant views of the mountains or Puget Sound. Other views include brief glimpses of small rivers, streams, or lakes.

The corridor primarily runs through agricultural areas and often runs adjacent or near highway corridors. Through municipalities, the rail line primarily runs through industrial property and along rail support structures. The view is a side view, as passengers cannot see ahead, nor can they see he tracks the train is riding on.

Views of the existing track structure are often limited to the view of the existing embankment. Most of the existing ROW and tracks are approximately fifteen feet above grade through much of the improvement.

ENERGY

Energy and its conservation in general are important factors to consider when implementing a transportation program.
A passenger rail train consumes about 350,000 BTUs of energy per vehicle mile. This energy is in the form of diesel fuel, a hydrocarbon-based petroleum product. A typical automobile consumes about 6,200 BTUs of energy (in gasoline form) per vehicle mile. Thus because of its high passenger capacity, the passenger train carrying 56 or more passengers, is more efficient than a single occupant automobile. In 1996 when annual ridership was 425,000 patrons using the corridor, an average of approximately 275 passengers were carried per train.

Existing written material was utilized to estimate future fuel consumption rates with the introduction of new Talgo type trains to replace the existing Superliner passenger trains servicing the Portland to Seattle route. Amtrak provided information on the existing fuel consumption (averaged from FY 1995 to FY 1997) of the Seattle to Vancouver, British Columbia Amtrak route, which uses a Talgo type train.

Discussions with Amtrak personnel, BNSF employees, WSDOT personnel, and others were the primary means of information gathering. No effort was made to confirm figures received by these authorities. The discussion included information regarding standard business practices during railroad operations and maintenance, train performance and composition, and mileage from location to location.

Existing Conditions

Estimations of fuel consumption were based on the existing average fuel consumption, averaged from FY 1995 to FY 1997 for the Seattle to Vancouver, British Columbia of 549 gallons per round-trip. Further fuel consumption figures for the new model Talgo trains were obtained from WSDOT. The gallon per mile fuel consumption was then estimated to the nearest 0.01, and rounded. This estimation was then applied to the additional 186 miles (each way) of the Seattle to Portland, Oregon route. In addition, Amtrak personnel provided the statistic for current diesel locomotive engine fuel consumption at 60 gallons of diesel fuel per hour while idling.

Idle fuel consumption for the locomotive engines that pull either style train is 60 gallons per hour. The existing Seattle to Vancouver, B.C. Talgo train uses an average 275[1] gallons of fuel for this one-way trip of 155 miles, thereby consuming approximately 550 gallons for the round trip. Fuel consumption for the Seattle to Vancouver, B.C. trip is about 1.77 gallons/mile. Current Amtrak travel time between Seattle and Vancouver, B.C is 3 hours and 55 minutes, and the route is run once a day.

The track distance between Seattle and Portland, Oregon is about 186 miles. Current Amtrak travel time between Seattle and Portland, is also about 3 hours and 55 minutes, and the route is run 3 to 4 times daily. Using the 1.77gallons/mile rate, fuel consumption for one round trip between Seattle to Portland onboard the Talgo is about 660 gallons. Based upon existing service, total fuel consumption for the three Seattle to Portland round trips and one Seattle to Vancouver, B.C. round trip is approximately 2,530 gallons of diesel fuel per day. These figures do not reflect any additional fuel consumption due to unusual delays.

NOISE AND VIBRATION

An increase in noise can affect the peacefulness of your home, the sacredness of your religious institution, or the serenity of a park or historic site. It is therefore important to measure changes in noise, and mitigate any adverse affects.
Railroad noise varies because of operating factors and conditions. Operating factors include the type of train, the numbers and

[1] Source: Amtrak.

lengths of trains, and operating speeds. Conditions include the number of curves on the tracks, track maintenance, and the terrain in which the track is set. In addition, grade crossings require certain whistles and warning bells. The significance of the noise depends not only on conditions, but also on the particular land uses and activities that occur along the corridor and their sensitivity to noise.

Two descriptors of noise are used when discussing rail noise, $L_{eq}(h)$ and L_{dn}. $L_{eq}(h)$ is the average noise energy present over any one hour time period. The L_{dn} descriptor is an energy average of 24 hourly L_{eq}'s that have had a ten decibel penalty added to the night time hours of 10pm to 7am. While $L_{eq}(h)$ provides a good description of a noise environment by taking into account moment to moment fluctuations in sound levels, L_{dn} is useful when considering the annoyance factor of noise occurring during hours of sleep.

Vibration consists of rapidly fluctuating motions with an average motion of zero. The vibration associated with train operations is the result of the steel wheels rolling on steel rails creating vibrational energy which is then transmitted through the transit structure and ground to nearby buildings. When sufficient vibrational energy reaches a building it may result in perceptible motion of objects and a rumbling noise that is generated by the motion of the structural surfaces in the rooms. Two descriptors are used when discussing the effects of vibrations produced by trains, VdB and dBA. VdB is a logarithmic measure of vibrational velocity in millionths of an inch per second. The ground borne noise generated by the motion of the building is measured in dBA.

While vibration from rail operations have been known to cause human annoyance or interfere with the use of sensitive equipment, it is extremely rare for vibration from train operations to cause any sort of building damage. If a fragile historic structure was found to be located near the right-of-way closer examination of the situation would be warranted.

A noise and vibration analysis for a rail corridor would typically be performed in accordance with the guidance provided by the Federal Railroad Administration and the Federal Transit Administration (FTA).

FRA and FTA noise impact criteria were developed by researchers who analyzed the percentage of people who would be expected to be highly annoyed by the addition of any given amount of noise to their current noise environment. The criterion for the improvement noise which will bring about the onset of impact varies according to the existing noise level. As existing noise levels go up, the amount of noise that a improvement can generate without causing an impact will go up, however, the amount of increase that is allowed in the cumulative noise level (the sum of the existing noise and the improvement noise) without causing an impact will go down.

Existing Conditions

As part of the Pacific Northwest Rail Corridor Environmental Impact Statement, a Noise and Vibration Discipline Report was prepared.

The existing noise levels were modeled by considering freight traffic only. It was assumed that the freight trains run 24 hours a day and that the average freight train consists of 100 cars and 4 diesel locomotives. Maximum train speeds and average daily freight traffic volumes were obtained from the WSDOT rail office operations manager.

The (service level one) improvement noise levels were modeled by considering all future passenger train traffic. In accordance with future schedules, all passenger trains were assumed to run during daytime hours only. Maximum passenger train speed on the improvement was used in the model.

The FTA vibration impact criteria used in this analysis were developed by studying the vibration levels necessary to cause annoyance in people or interfere with the use of vibration sensitive equipment. They are based on the maximum levels for a single event and take into account type of land use as well as frequency of events. Higher vibration levels are allowed without causing an impact for infrequent events and less sensitive land uses.

This discipline report found that existing noise levels in the corridor, in areas of service level one improvements, ranged from 57 L_{dn} to 72 $L_{eq,}$. This range reflects the varying land uses along the corridor, from quiet, rural farmlands to urban, industrialized areas. Vibration levels throughout the corridor ranged from 97 VdB to 102 VdB.

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[i] RCW 47.79 & High Speed Ground Transportation Study, Washington State Department of Transportation, October 1992

[ii] RCW 47.79

[iii] Washington State Department of Transportation. Trends Analysis Report: A Report on Trends and Our Future. April 1998.

[iv] Ibid.

[v] RCW 47.79

CHAPTER FOUR

IMPACTS AND MITIGATION

General impacts were documented. Since specific project improvements and their locations are not known at this time, a "worst case scenario" is presented. This scenario presumes that all of the affected environmental features within the study corridor will be impacted by some type of construction project within the next twenty years.

It is imperative to keep in mind that affected resources were identified using various maps and reports. Field review was extremely limited. Therefore, in some cases identified resources, may not, in fact be located within the study area. On the other hand, a few resources may have been overlooked, due to the scale of the maps being used for research. In addition, it was very difficult to identify if the rail corridor truly passed next to or through a particular resource (i.e. historic building, park, or habitat). Therefore, except for waterways, we have not identified whether the rail line was actually next to a resource or if it passed through it (park or natural habitat).

WATERWAYS AND HYDROLOGICAL SYSTEMS

This section discusses potential impacts, mitigation and secondary and cumulative impacts to surface water, ground water, and floodplains. Waterway features and crossings located within 500 feet of the rail line were also documented and discussed in a general nature.

Potential Impacts

The rail corridor crosses a number of rivers and streams, and their associated floodplains and habitats. In addition, a number of these water features are located within close proximity to the corridor. Although most types of potential project improvements will occur within the existing rail right-of-way, some of the water features may be impacted. The construction of a new siding beyond the right-of-way, a bypass line, or a new main line, would all disrupt the quality of water features that may be within the study area. It is not anticipated that construction of cross-overs, turnouts, or signal/communication systems would have any impact on water resources. Table 3, on the following page, presents a listing of water resources that may be potentially impacted. Mapping in Volume 2 of this document also provides general locations of these resources.

Physical improvements will be designed to meet standard engineering practices to prevent impacts to water quality. These designs include, but are not limited to, bridge structures, culverts, swales and water retention facilities. Engineering design and facility construction will be consistent with all regulatory requirements for protection of water resources.

It is not anticipated that improvements to grade crossings and signals and communication systems would cause to floodplains. Substantial impacts, due to the placement of fill sections, are anticipated for larger track improvement projects. These fill sections can restrict the natural flow of floodwater, and damage tracks due to washouts.

Operations

Increased operations of intercity rail may produce more stormwater runoff due to increased activity along the railroad tracks. However, existing engineering standards are designed to moderate runoff so potential changes to stormwater runoff are mitigated and stormwater is absorbed into the groundwater below the rail right-of-way.

Excess water from sources located off the right-of-way is also handled by standard practices. This water is usually channeled away from the

Table 3
Water Resource Features Located Along the Rail Corridor
Potential Impacts

County	Water Crossings	Miles of Shoreline (Parallel)*	Within 1000 feet	Associated Floodplains
Clark	Columbia River Salmon Creek Whipple Creek Flume Creek Gee Creek		Burnt Bridge Creek Vancouver Lake Lake River Green Lake Curtis Lake Carty Lake Lancaster Lake	Lewis River Columbia River
Cowlitz	Lewis River Schoolhouse Creek Bybee Creek Mill Creek Kalama River Coweeman River Cowlitz River Toutle River Wallace Sslough Burris Creek Canyon Creek Owl Creek Ostrander Creek Olequa Creek	4 miles	Burris Creek Columbia River Horseshoe Lake Kress Lake	Lewis River Cowlitz River Kalama River Toutle River
Lewis	Stillwater Creek Newaukum River Dillenbaugh Creek Skookumchuk River Hanaford Creek Olequa Creek Salzer Creek			Olequa Creek Newaukum River Salzer Creek Dillenbaugh Creek Hanaford Creek Skookumchuk River
Thurston	Skookumchuk River Deschutes River Medicine Creek Scatter Creek Beaver Creek Pattison Lake		Spurgeon Creek Mud Lake	Skookumchuk River Deschutes River Scatter Creek
Pierce	Nisqually River Sequalitchow Creek Chamber Creek Puyallup River Salmon Creek	20 miles	Puget Sound Wapato Creek	Nisqually River Puyallup River

**Within 500 feet of the rail corridor. Includes shorelines of the Columbia River and Puget Sound.*

Table 3 Continued
Water Resource Features Located Along the Rail Corridor
Potential Impacts

County	Water Crossings	Miles of Shoreline (Parallel)*	Within 1000 feet	Associated Floodplains
King	White River Green River Balck River Salmon Bay Boeing Creek Pipers Creek Springbrook Creek	10 miles	Puget Sound	White River Green River
Snohomish	Snohomish River Steamboat Slough Ebey Slough Quilceda Creek Stillaguamish River Jorgenson Slough Douglas Slough Picnic Point Creek Church Creek	18 miles	Puget Sound Tom Moore Slough	Snohomish River Stillaguamish River
Skagit	Skagit River Gages Slough Samish River Oyster Creek	5 miles	Tom Moore Slough Puget Sound	Skagit River Samish River
Whatcom	Whatcom Creek Squalicum Creek Nooksack River California Creek Dakota Creek Bellingham Bay	12 miles	Puget Sound	Nooksack River

**Within 500 feet of the rail corridor. Includes shorelines of the Columbia River and Puget Sound.*

elevated tracks by ditches paralleling the track structure. Culverts are placed at regular intervals to allow water to drain to the lower side, thus allowing the water to continue its flow to the lowest point, which is frequently the Puget Sound. Thus rail operations, in general, have been or will be mitigated through standard engineering design and maintenance.

It is not anticipated that any operational increases will impact floodplains in the corridor.

Construction Impacts

During construction, contractors are responsible for ensuring that any waste materials do not endanger ground or surface waters. Applicable construction permits will be obtained where required, including National Pollution Discharge Elimination System (NPDES) permits. Construction Best Management Practices (BMPs) will be utilized. Examples of Best Management Practices include silt fencing, dust control, settling ponds

and permanent seeding after construction is complete.

Mitigation

Water quality impacts would be avoided or minimized during operation through compliance with Ecology-approved city and county grading and drainage ordinances or, where appropriate, the Stormwater Management Manual for the Puget Sound Basin. Ordinances generally require the on-site detention and/or treatment of stromwater generated from a project site and use of Best Management Practices. For construction sites disturbing more than five acres, a NPDES permit would be required. In addition, a 401 Water Quality Certification would be required for the project to verify that federal water quality standards would not be violated.

Mitigation will include incorporating culverts or bridges into fill sections or building elevated sections on trestles to allow floodwater to flow freely.

Secondary and Cumulative Impacts

Because the majority of the facilities used in this project are existing, and have been in use for many years, the secondary and cumulative impacts on water resources will be negligible.

No significant cumulative water quality impacts are anticipated. Future commuter rail service and increases in freight rail service would operate largely on the same BNSF track and/or use the same stations as the proposed rail program. As a result, little new construction would be required, and no significant water quality impacts are anticipated.

HAZARDOUS MATERIALS

Construction of potential project improvements may disrupt some existing hazardous waste sites, and thus impact the health of train passengers, workers and local residents.

Table 4
Known Hazardous Sites Located with 2000 feet of the Rail Corridor
Potential Impacts

County	NPDES	RCRA	TCP	CERC
Clark	6	0	10	7
Cowlitz	3	0	8	7
Lewis	1	0	12	4
Thurston	0	0	2	0
Pierce	12	0	20	11
King	10	4	109	15
Snohomish	9	0	33	10
Skagit	2	0	4	0
Whatcom	7	0	28	10

NPDES: National Pollution Discharge Elimination System
RCRA: Resource Conservation and Recovery Act
TCP: Toxic Cleanup Program
CERC: Comprehensive Environmental Response, Compensation, and Liability Act

Potential Impacts

Hazardous waste sites located within 2000 feet of the rail corridor were inventoried. The majority of potential hazardous waste site disruptions could occur in King County. A quantified summary of these sites are presented in Table 4. Mapping in Volume 2 of this document also provides general locations of these sites. Based on this review,

impacts of the rail project on human health are expected to be minimal. Based on the review of available information, no known contamination will be encountered during construction, and exposure of the public to potentially contaminated soil is not expected to occur.

The intercity passenger rail service will not transport hazardous materials. The BNSF rail line will continue to function as a freight railroad line, and hazardous materials may be transported along the corridor. Any previous spills and releases as well as potential future spills and releases present potential impacts to passenger's and other's safety along the right-of-way and at stations. Shipments of hazardous materials are subject to control under the Resource Conservation and Recovery Act, thus ensuring a minimal risk of spillage. The potential for releases, and the potential risk to passenger's and other's safety along the right-of-way is low. In the unlikely event of a spill, protocols are in place to control and minimize contamination under BNSF's emergency spill response control plans.

Construction Impacts

During construction the contractor will be required to follow the applicable Washington Industrial Safety and Health Administration (WISHA) regulations, in addition to applicable rules and regulations regarding the use of hazardous materials or the discovery of hazardous waste. Discovery of hazardous materials is not anticipated for construction sites.

Mitigation

Properties to be purchased will be subject to a Level 1 Environmental Site Assessment (ESA or environmental audit). The Level 1 process will include records searches, historical reviews, and site inspections. If a Level 1 ESA suggests there is some potential for contamination, a Level 2 Site Assessment may be undertaken to identify soil and groundwater contaminants as well as migration pathways. Level 2 assessments can include the collection of soil, soil gas, and groundwater samples; laboratory analysis of samples for suspected contaminants; and literature searches. If the findings of these studies are inconclusive, subsequent studies can be used to delineate the extent of contamination, and design a program of remediation. If a given site is contaminated and an alternative site is not chosen or identified, remediation may be required, consistent with applicable law. Remediation could include the removal of contaminated materials, on-site treatment of the materials, or other remedy.

Appropriate health and safety monitoring would be conducted on work sties with potential hazardous materials. Proper clothing, breathing equipment, and other measures would be used to provide a safer working environment for construction workers.

Secondary and Cumulative Impacts

No negative secondary or cumulative impacts will occur with the operation or construction of the planned facilities. Increases in freight rail and implementation of commuter and intercity passenger rail would use the same tracks and stations. The improved facilities may increase rail safety for all forms of rail traffic, including freight movement of hazardous materials.

BIOLOGICAL RESOURCES/ECOLOGY

Wetlands and biological resources were inventoried within 2000 feet of the rail corridor. This section presents a quantified summary of the potential impacts.

Potential Impacts

The rail corridor runs through a number of rivers and streams. In addition, a number of

Table 5
Summary of Potential Impacts to Wetlands
Located Within 1000 feet of the Rail Corridor
(in approximate acres)

County	Less than 500 acres	500 to 750 acres	751 acres to 1,000 acres	Over 1,000 acres
Clark	XX			
Cowlitz			XX	
Lewis		XX		
Thurston	XX			
Pierce				XX
King			XX	
Snohomish				XX
Skagit	XX			
Whatcom			XX	

Note: these figures are approximations of wetlands (many located along shorelines) within 1,000 feet of the rail corridor.

Table 6
Summary of Potential Impacts to Vegetation and Wildlife Habitat
Located Within 1000 feet of the Rail Corridor

County	Washington and Puget Sound Rare and Native Plant Sites	Wildlife Heritage Data Sites	Seabird Colony Sites	Spotted Owl Critical Habitat*	Marbled Murrelet Detection Section*
Clark		4			
Cowlitz	6	10			200 acres
Lewis		1			
Thurston	12	5			
Pierce	7	5	2	50 acres	180 acres
King		9	2		
Snohomish	1	9	1		10 acres
Skagit	2	1			72 acres
Whatcom	4	1	2		11 acres

**This figure reflects the number of acres of this resource that are located within 1000 feet of the rail corridor.*

these water features are located within close proximity to the corridor. Although most types of potential project improvements will occur within the existing rail right-of-way, some of the wetlands can be impacted. The construction of a new siding beyond the right-of-way, a bypass line, or a new main line, would all disrupt water features that may be within the area. It is not anticipated that construction of cross-overs, turnouts, or signal/communication systems would have any impact on wetlands. Tables 5 and 6 present a summary of the wetland and ecological resources that could potentially be impacted by construction of project improvements along the rail corridor. Mapping in Volume 2 of this document also provides general locations of these resources.

As a result of these potential impacts (to wetlands and habitats), animals may be displaced to adjacent.

Improvements to grade crossings and improved signals and communication systems may cause minor impacts to wetlands. Substantial impacts, due to the placement of fill sections or large cuts, are anticipated for track improvements such as sidings, bypasses and new main lines.

Impacts can be avoided, in some cases, by placing new tracks or sidings in locations where wetlands are not present (for example, building a new section on the opposite side of the tracks from wetlands). Other steps would include building new tracks close to the existing tracks thereby minimizing wetland disruptions. If wetlands are impacted, they will be replaced, restored, or enhanced in consultation with federal and state agencies such as the Army Corps of Engineers and the Department of Ecology.

There will be moderate impacts to fisheries, vegetation and wildlife in areas where placement of fill sections or large cuts are anticipated for improved or additional tracks and grade separated crossings.

Operations

Faster and more frequent trains will not physically intrude on the wetlands although there will be potential minor noise, air and water quality impacts to the wildlife habitats associated with wetlands.

Minimal impacts to vegetation will result from operation of more frequent and faster trains. However, additional train trips on the railroad alignment will increase noise along the corridor, potentially affecting wildlife in vegetated areas and wetlands.

Normal operations will not affect fishery resources. With the increased train traffic and speeds, there is an incremental increase in the potential for a train derailment and subsequent spill, primarily of fuel. In the unlikely event of a spill, the impact on fisheries resources will depend upon the location, timing, quantity spilled, and the toxicity of the spilled material. However, as discussed in the hazardous materials section of this document, all regulatory and safety requirements will be met concerning hazardous materials.

Construction Impacts

Impacts that may result from construction activities in streams, wetlands, and uplands include erosion of exposed soils by rain events during site grading and construction, which could cause erosion of exposed soils and result in sediment deposition into wetlands and creeks. Accidental spills of fuel, oils, and chemical could also occur, entering wetlands and streams. Where new bridge work is proposed, in-water work would be avoided to the maximum extent practicable during construction, and best management practices would be implemented during construction to minimize erosion and runoff.

Mitigation

Mitigation measures would follow a hierarchy of avoidance, minimization, and compensation for impacts.

Options to avoid new construction along the corridor is limited. As such, appropriate mitigation goals for the corridor could include: maintaining the pre-construction hydrologic regime of the area; creating replacement wildlife habitat and improving overall habitat quality; and improving water quality.

Restoration of degraded wetlands, enhancement of existing wetlands or creation of new wetland habitat can be employed to compensate for adverse impacts, if any, to palustrine wetlands.

Enhancement of existing wetlands within the immediate project area may involve eradicating invasive plant species and planting native vegetation. Wetland restoration typically involves re-establishing wetland hydrology to a former wetland area that has been effectively drained or excavating fill out of a former wetland, and replanting the area with native wetland plants.

Incorporating revegetation elements into the design and construction plans will minimize vegetation and wildlife impacts around stations.

Engineering designs are being developed to minimize impacts to aquatic resources. In addition, the use of best management practices to prevent sediment will minimize construction impacts. Finally, the actual construction of projects will be done when fish species will be least impacted. This construction will be done in accordance with Washington Department of Fish and Wildlife regulations.

Secondary and Cumulative Impacts

Secondary and cumulative impacts to habitats along the rail line should be minimal from operations or construction. Improvements presented in this Plan were designed to improve safety and speed along the route.

AIR QUALITY

Air quality impacts from rail projects, including operational changes, are governed by the Environmental Protection Agency's General Conformity Rules 40 CFR 51 and 93. The rule requires that a conformity determination must be made for projects that emit more than the de minimis level for each criteria pollutant. Information for this section was gleaned from the Air Quality Discipline Report developed for the Pacific Northwest Rail Corridor Environmental Impact Statement.

Potential Impacts

The Environmental Protection Agency (EPA) has established emission standards for oxides of nitrogen (NOx), hydrocarbons (HC), carbon monoxide (CO), particulate matter (PM) and smoke for newly manufactured and reman-ufactured diesel-powered locomotives and locomotive engines. For the purpose of this analysis, a worst case scenario was assumed for train emissions. This was conservative estimate as state of the art equipment is being employed for the passenger service.

Operations

The de minimis air quality analysis that was performed for rail operations indicated that the de minimis levels for each criteria pollutant were not exceeded. As such, this analysis confirms that the rail program’s increased operations conform with the purpose and intent of the State Implement Plans and Maintenance Plans for achieving the National Ambient Air Quality Standards.

Construction Impacts

The major air quality impacts during construction are expected to be dust, odors other particulate matter and hydrocarbons. These are caused by heavy machinery traffic, and removal and/or placement of materials. Local weather conditions, fuel aromatic content and engine efficiency will affect odor intensity and particulate effects. Construction

impacts in the project area are expected to be temporary and intermittent only, and they will be diluted at increasing distances from the project.

Mitigation

Contract specifications will be written stating that those performing the construction work shall comply with federal, state and local air quality regulations. These regulations cover temporary construction conditions such as dust and smoke emissions. Some of the control measures that could be used to reduce the particulate pollution caused by construction are street sweeping at rail crossings and watering. Since construction will be a temporary condition only, it is anticipated that no other measures will be necessary to control emissions.

No other impacts on air quality are anticipated, therefore no other mitigation is proposed.

Secondary and Cumulative Impacts

No secondary and cumulative impacts are expected as a result of increased freight, passenger and commuter rail traffic along the corridor. However, it is likely that the increased operations of passenger rail along the corridor will have a positive effect on air quality.

Soils And Geology

Areas of significant unstable slopes were inventoried and mapped (see Volume 2 of this document), and are discussed in general terms in this section.

Potential Impacts

A review of the existing environment indicates that unstable slopes and landslide hazard areas are located in areas throughout the corridor, predominately along shorelines. Some of these areas range in size from ¼ mile long to 15 miles in length. Table 7 summarizes the locations of these unstable slopes.

The construction of new track in areas adjacent to or at the foot of unstable slopes could result in potential impacts. It should be noted that although the tracks are located in a natural slide prone area, the housing located above the tracks (on the adjacent bluffs) makes the potential for slides worse.

Attempts will be made to locate new tracks and grade crossings in areas where landslides and unsuitable foundations are less evident. Where steep bluffs are unavoidable, attempts will be made to minimize the disruption of soils and to apply current soil stabilization techniques. Retaining walls will also be utilized. As a last resort, steep slopes will be laid back to a reasonable angle so the future landslide risk is minimized.

Substantial landslide impacts are in evidence in the corridor and any construction of new tracks or grade crossings may increase the

Table 7
General Locations of Unstable Slopes in the Corridor

County	General Location
Clark	North of Vancouver
Cowlitz	North of Kelso
Lewis	
Thurston	
Pierce	Du Pont, Steilacoom, University Place, Tacoma
King	Shilshole (North Seattle) to Snohomish County
Snohomish	South of Edmonds, North Edmonds to Mukilteo
Skagit	Samish Bay
Whatcom	South of Bellingham, Blaine

risk of landslides by encroaching upon the steep hills. Liquefaction (ground failure) is possible in much of the corridor. The potential for sections of track to be dislocated is also possible during an earthquake.

Operations

Moderate impacts to soils and geology are expected. Faster and more frequent trains will increase frequency of vibration. However, design and construction practices will take into account any potential soils-related problems that might be caused by increased vibration levels.

Construction Impacts

Erosion impacts during construction are primarily related to the increased potential for erosion resulting from exposure of excavated soils to water. If not controlled, such erosion could result in the deposition of silt and/or sediment in wetlands, streams, or any other adjacent surface water. It is also likely that soils could be tracked onto nearby paved roads by construction vehicles. Wind action over exposed soils could generate dust.

Mitigation

Potential erosion during project construction would be mitigated by the use of best management practices specified in the erosion and sedimentation control plans for the project, as required by state and local jurisdictions. Typical measures include erosion fences, sediment ponds, and covering of stockpiled soils when practicable. Re-establishment of vegetation in non-paved cleared areas as soon as possible and application of appropriate ground cover will minimize the potential for erosion hazards during operation.

Proper subgrade preparation and embankment compaction will reduce the risk of liquefaction and roadway damage in any areas of liquefaction-prone soils encountered during construction.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to soils and geology are anticipated as a result of this program, increased freight traffic or commuter rail service. However, it is recognized that the tracks are in a geologically fragile area. BNSF is currently working with communities along the corridor to stabilize slopes.

LAND USE

A qualitative discussion of potential land use impacts is presented in this section.

Potential Impacts

The railroad is embedded into the communities it serves and has served for over 100 years. The railroad right-of-way varies in width, but generally averages 100 feet. Because of its unique use of land, and the long narrow configuration of the property, adjacent land uses have evolved based upon general local land use, not because of the location of the tracks. Local planning agencies have zoned areas accordingly, often after the actual development has occurred.

Because of this scenario, a variety of land uses are present adjacent to the rail corridor. Most of the corridor is in rural areas, however as local land use evolves into a denser concentration of people and businesses, the local zoning reflects this increased use of the surrounding land. Regardless, the railroad right-of-way has remained a constant on the landscape, however additional track crossings have been placed as development has occurred, and joint use of the right-of-way by various utilities has occurred in some locations.

State, regional and county plans throughout the corridor have incorporated the Amtrak passenger rail service (and its associated facilities) into their comprehensive plans. Many of the smaller jurisdictions have also recognized the rail service in their plans, especially in the cities that have stations.

Overall, the intercity passenger program is compatible with existing comprehensive plans and policies.

Some impacts may result from the construction of new sidings, bypasses and main lines. All efforts will be made to keep the project limits within the railroad's current right-of-way. However, in some cases, it may not be possible and as a result, depending upon the location, some land uses may be disrupted.

Construction Impacts

It is anticipated that project improvement construction will occur within existing railroad right-of-way. Temporary construction will follow Washington Department of Transportation's 1998 Standard Specification for Road, Bridge, and Municipal Construction of the State of Washington, including daily backfilling, erosion control, and procedures on wet earthwork.

Most track construction, performed on the right-of-way, will not impact surrounding land uses, any more than routine track maintenance. This is because some of the activities associated with railroad construction will occur using specially designed track mounted vehicles which create railroad grades and lay track structures while on the tracks themselves. Most additional work may be performed using standard construction vehicles and tools.

Mitigation

No long term impacts to land use are anticipated to result from implementation of the intercity rail program and its associated projoct improvements; thus, no mitigation is proposed.

Secondary and Cumulative Impacts

Increased rail and freight service and new commuter rail service may have the effect of inducing growth in commercial and retail uses serving customers at the stations. It is unlikely that industrial and agricultural areas would change. Commuter rail service will incrase traffic and induce development at the station areas, and thus will have a greater impact on these local communities than will increased intercity passenger rail service.

FARMLANDS

A qualitative discussion of potential impacts to farmlands is presented in this section.

Potential Impacts

Impacts to farmlands will be minor, because most of the new track construction will occur inside of the existing railroad right-of-way.

Some impacts to farmlands, due to the placement of fill sections, are anticipated for new tracks and at grade-separated crossings.

Narrow strips of farmland adjacent to the existing right-of-way may be required for project improvements. As such, implementation of this program may slightly impact some farmlands.

Construction Impacts

It is anticipated that most construction will occur within existing railroad right-of-way. Temporary construction will follow Washington Department of Transportation's 1996 Standard Specification for Road, Bridge, and Municipal Construction of the State of Washington, including daily backfilling, erosion control, and procedures on wet earthwork.

Most track construction, performed on the right-of-way, will not impact other land use, any more than routine track maintenance. This is because some of the activities associated with railroad construction will occur using specially designed track mounted vehicles which create railroad grades and lay track structures while on the tracks themselves. Some additional work may be performed using standard construction vehicles and tools.

Mitigation

No long term impacts to farmlands are anticipated to result from implementation of the intercity rail program and its associated projoct improvements; thus, no mitigation is proposed.

Secondary and Cumulative Impacts

Increased rail service and upgraded stations may have the effect of inducing growth in commercial and retail uses serving customers at the stations. It is unlikely that industrial and agricultural areas would change.

PARKS AND CULTURAL RESOURCES

An inventory of park/recreation and cultural resources located within 1000 feet of the rail corridor was compiled. This information is presented in Table 7. Maps indicating the general locations of these facilities are located in Volume 2 of this document. These illustrate the worst-case scenario of potential impacts to parks and cultural resources.

Potential Impacts

Throughout the corridor, the rail line traverses through or near a number of parks and cultural facilities. As such, construction projects such as new sidings, bypasses or additional mainlines could potentially impact these resources. Such impacts could result in the taking of parkland, disruption/change in access to the facilities, or increased noise and vibration.

Construction Impacts

The primary issue related to construction activity and recreational activities is delay of access at crossings, if any, during construction. Public safety at crossings is an ongoing concern of BNSF railroad and efforts have been made, and will continue, to further public safety.

Mitigation

The Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act create a process by which federally assisted undertakings are reviewed for their effect on properties listed in or eligible for listing in the National Register of Historic Properties. Such rules govern the appropriate changes that are permissible near the property as well as determine if adverse effects to the property will result.

Mitigation for parkland is also covered by federal regulations. Pursuant to Section 4(f) of the Department of Transportation Act of 1966, parkland can not be taken unless it is proven that no other feasible and prudent alternative exists. As such, very strict guidelines are imposed on the disruption to parkland.

As the intercity passenger rail program moves forward, Section 106 and Section 4(f) analyses will be performed for as project improvements are identified.

SOCIAL AND ECONOMIC

Impacts analysis for this section entails a qualitative discussion of potential impacts to community cohesion and safety. It also discusses potential relocation and environmental justice issues. Given the nature of this technical area, it is virtually impossible to quantify potential impacts without knowing the exact location and type of project improvement. As project improvements are identified, further analysis will be performed regarding these areas of concern.

Potential Impacts

The communities along the rail line developed along the many river valleys. These early settlements were later linked by roadways and rail lines. Most of the cities were incorporated in the late 19th and early 20th centuries, and were farming-based communities for much of

their history. Rail lines, including the Northern Pacific, were central to the communities'

development. The railroads carried produce, freight, and passengers north and south to depots in the town centers.

With the construction of I-5, I-405 and SR 167 in the 1950s and 1960s, urbanized development began to spread. Most of the BNSF corridor today is dominated by commercial and industrial land uses. Few residential neighborhoods lie close to the rail lines.

Potential effects of the rail program on community cohesion could result from increased train traffic along the line and from construction of associated facilities.

Table 7
Parks and Cultural Resources Located Within 1000 Feet of the Rail Corridor

Map Number	Park or Recreation Facility	Cultural Resource
1	John Ball Park (Vancouver) Fruit Valley Park (Vancouver) Franklin Park (Vancouver) Stout Glen Burnt Bridge Creek Greenway (Vancouver) Washington State Wildlife Refuge (Vancouver0	Vancouver-Hayden Island Bridge (Vancouver)* Vancouver-Portland Bridge (Vancouver)
2	Ridgefield Wildlife Refuge (Clark County)	William Henry Shobert House (Ridgefield) Basalt Cobblestone Quarries District (Clark County)
3	Davis Park (Ridgefield)	Judge Columbia Lancaster House (Clark County)
4	City Park on Park Drive (Woodland)	Hulda Klager Lilac Garden (Woodland)
5	Gearhart Park (Cowlitz County)	Adam Catlin House (Kelso) Monticello Convention Site (Kelso)* Nat Smith House (Kelso)
6	Stan Hedwall Park (Chehalis)	Ben Olsen House (Vader)
7	GW Park (Centralia) Parkins Park (Centralia) Schaefer County Park (Centralia) Seminary Hill Natural Area (Centralia)	Burlington Northern Depot (Chehalis) Hillside Historic District (Chehalis) O.B. McFadden House (Chehalis) O.K. Palmer House (Chehalis) Pennsylvania Avenue Historic District (Chehalis) St. Helens Hotel (Chehalis)
8	City Park at 6th and Main (Bucoda)	George E. Birge House (Centralia) Centralia Massacre Site (Centralia) Centralia Union Depot (Centralia)
9	Saltar Park (Steilacoom) Pioneer Park (Steilacoom) Sunnyside Beach Park (Steilacoom)	Shead House (Bucoda)*
10	Titlow Beach Park (Tacoma) Living War Memorial Park (Tacoma)	Tenino Depot (Tenino) Tenino Stone Company Quarry (Tenino)

**Listed in the Washington Heritage Register only*
***Listed as a National Historic Landmark*
All others are listed in the National Register of Historic Places and the Washington Heritage Register

Table 7 Continued
Parks and Cultural Resources Located
Within 1000 Feet of the Rail Corridor

Map Number	Park or Recreation Facility	Cultural Resource
11	Marine Park (Tacoma) Hamilton Park (Tacoma) Commencement Park (Tacoma) Puget Park (Tacoma) Old Town Park (Tacoma) Garfield Park (Tacoma) Firemans Park (Tacoma) Jefferson Park (Tacoma)	Jacob Smith House (Lacey)*
12	Swan Creek Park (Pierce County)	Davidson House (Steilacoom) First Protestant Church (Steilacoom)* Nathaniel Orr Home and Orchard (Steilacoom) Steilacoom Catholic Church (Steilacoom) Steilacoom Historic District (Steilacoom) Old Tacoma Narrows Bridge Ruins (Tacoma area) Tacoma Narrows Bridge (Tacoma area)*
13	Grayland Park (Puyallup) Pioneer Park (Puyallup)	Winnifred Street Bridge (Ruston)
14	Heritage park (Sumner) Seiben-Thaler Park (Sumner)	Bowes Building (Tacoma) City Waterway Bridge (Tacoma) Dadisman House (Tacoma) Dickman Lumber Company Head Saw (Tacoma)* Henry Drum House (Tacoma) East 34th Street Bridge (Tacoma) Engine House No. 4 (Tacoma) Fireboat No. 1 (Tacoma)** Haddaway Hall (Tacoma) Hob Nob Restaurant (Tacoma) Masonic Temple Building (Tacoma) Northern Pacific Office Building (Tacoma) Old City Hall (Tacoma) Old City Hall Historic District (Tacoma) Pacific Brewing and Malting Company (Tacoma) Pacific National Bank Building (Tacoma) Pantages Theatre/Jones Building (Tacoma) Puyallup Waterway Crossing (Tacoma)* Pythian Temple (Tacoma) Rhodes Medical Arts Building (Tacoma) Slavonian Hall (Tacoma) Sprague Building (Tacoma) St. Peter's Episcopal Church (Tacoma)

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Table 7 Continued
Parks and Cultural Resources Located
Within 1000 Feet of the Rail Corridor

Map Number	Park or Recreation Facility	Cultural Resource
14 (continued)	Heritage park (Sumner) Seiben-Thaler Park (Sumner)	Stadium-Seminary Historic District (Tacoma) Sunset Telephone and Telegraph Company Building (Tacoma) Union Depot-Warehouse Historic District (Tacoma) Union Passenger Station (Tacoma) Walker Apartment Hotel (Tacoma) Wright Park and Seymour Conservatory (Tacoma) YMCA Building (Tacoma)
15		Auburn Public Library (Auburn) Patton Bridge (Auburn) Oscar Blomeen House (Auburn)
16		Carnation Milk Factory (Kent)*
17	Foster Park (Kent) Kiwanis Park (Kent) Naden Park (Kent) Milwaukee Playfield (Kent) Commons Playfield (Kent) Kent Commons (Kent) Borden Playfield (Kent)	
18	Fort Dent Park (Renton) Black River River Riparian Forest (Renton)	Maple Donation Claim (Seattle)* Seattle Electric Company, Georgetown Steam Plant (Seattle)** James Nelsen House (Tukwila)
19	Duwamish Park (Tukwila)	Alaska Trade Building (Seattle) Barnes Building (Seattle) Bell Apartments (Seattle) Butterworth Building (Seattle) Chinatown Historic District (Seattle) Chinese Baptist Church (Seattle) Colman Building (Seattle) Colman Dock Site (Seattle)* Colonial Hotel (Seattle) Federal Office Building (Seattle) Ferry Service to West Seattle (Seattle)* First Post Office Site (Seattle)* Globe Building, Beebe Building, and Hotel Cecil (Seattle) J.S. Graham Store (Seattle) Grand Pacific Hotel (Seattle) Great White Fleet Disembarkation Site (Seattle)* Guiry and Schollestad Buildings (Seattle) Holyoke Building (Seattle) Hospital Ship Idaho (Seattle)*

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Table 7 Continued
Parks and Cultural Resources Located
Within 1000 Feet of the Rail Corridor

Map Number	Park or Recreation Facility	Cultural Resource
19 (continued)		Hull Building (Seattle) Iron Pergola (Seattle) King Street Station (Seattle) Pike Place Market Historic District (Seattle) Pioneer Building, Pergola and Totem Pole (Seattle) Pioneer Square-Skid Road Historic District (Seattle) Start of 1889 Seattle Fire Site (Seattle)* Ton of Gold and Sailing of Willapa Site (Seattle)* Triangle Hotel and Bar (Seattle) U.S. Immigration Building (Seattle)
20	Playground at Lucille and 13th (Seattle) Playground at Corson (Seattle)	Ballard Bridge (Seattle) Chittenden Locks and Lake Washington Ship Canal Historic District (Seattle) Salmon Bay Great Northern Railroad Bridge (Seattle)*
21	Myrtle Edwards Park (Seattle) Elliott Bay Park (Seattle) Kinnear Park (Seattle)	Brackett's Landing (Edmonds)* Edmonds High School (Edmonds)* First School in District No. 15 (Edmonds)* Stevens Hotel (Edmonds)* Wells Residence (Edmonds)*
22	Lawton Park (Seattle) Commodore Park (Seattle)	Mukilteo Cemetary (Mukilteo)* Mukilteo Light Station (Mukilteo) Point Elliot Peace Treaty Site (Mukilteo)*
23	Golden Gardens Park (Seattle) Sunset Hill Viewpoint Park (Seattle)	Coaster II-Quissett (Vessel) (Everett) Everett Public Library (Everett)* Roland Hartley House (Everett) Pioneer Block (Everett)* Rucker Hill Historic District (Everett) Rucker House (Everett) Weyerhaeuser Office Building (Everett)
24	Carkeek Park (Seattle)	Marysville Opera House (Marysville)
25	Innis Arden Reserve (King County) Richmond Beach Park (King County)	Lincoln Theatre and Commercial Block (Mount Vernon)
26	Woodway Park (Edmonds) Brackets Landing Park South (Edmonds)	Burlington Carnegie Library (Burlington)
27	Snohomish County Park (Edmonds)	George H. Bacon House (Bellingham) Alfred L. Black House (Bellingham) Citizen's Dock (Bellingham) Eldridge Avenue Historic District (Bellingham) Eldridge Homesite and Mansion (Bellingham) Fairhaven Historic District (Bellingham)

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Table 7 Continued
Parks and Cultural Resources Located
Within 1000 Feet of the Rail Corridor

Map Number	Park or Recreation Facility	Cultural Resource
27 (continued)		Flatiron Building (Bellingham) Fort Bellingham Site (Bellingham)* Great Northern Passenger Station (Bellingham) Pickett House (Bellingham) Lottie Roth Block (Bellingham) U.S. Post Office and Courthouse (Bellingham) Whatcom Museum of History and Art (Bellingham)
28	Meadowdale Beach County Park (Snohomish County)	Hovander Homestead (Ferndale)
29	Mukilteo State Park (Mukilteo)	International Peace Arch (Blaine)
30	Edgewater Park (Everett) Harborview Park (Everett) Howarth Park (Everett) Forest Park (Everett) Maggies Park (Everett) Grand Avenue Park (Everett)	
31	South View Park (Everett) North View Park (Everett) American Legion Memorial Park (Everett)	
32	Comeford Park (Marysville)	
33	Gissberg Twin Lake County Park (Snohomish County)	
34	Park at Heuly Road (Snohomish County)	
35	Lions Riverside Park (Mount Vernon) Park at East Meadow Boulevard (Mount Vernon)	
36	Park at Whitemarsh Road (Burlington) Burlington Edison Regional Park (Burlington)	
37	Larabee State Park (Skagit and Whatcom Counties)	
38	Port of Bellingham Marine Park (Bellingham) Padden Creek Estuary Park Nature Area (Bellingham) Boulevard Park (Bellingham) Forest and Cedar Park (Bellingham)	
39	Carl Lobe Park (Bellingham) Little Squalicum Creek Park (Bellingham)	
40	Havender Homestead Park (Ferndale) Pioneer Park (Ferndale) Vanderyacht Park (Ferndale)	
41	Park at Bennett Avenue (Blaine) Marine Park (Blaine) Peace Arch Park (Blaine)	

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Table 8
GMA Designated Urban Growth Areas Along the Rail Corridor

County	Designated Area
Clark	Vancouver: east side of rail corridor, opposite Vancouver Lake Ridgefield: across corridor, north of existing city limits
Cowlitz	None
Lewis	Winlock: west side of corridor, north of existing city limits Napavine: across corridor, south of existing city limits Napavine: east side of corridor, north of city limits to Chehalis
Thurston	Tenino: across corridor, south and north of existing city limits Lacey: across corridor, east of city limits
Pierce	Puyallup: across corridor, east and west of existing city limits Sumner: east side of rail corridor, east of city limits
King	None
Snohomish	Area between Edmonds and Mukilteo, across corridor
Skagit	Mount Vernon: across corridor, south of existing city limits
Whatcom	Bellingham: across corridor, north of existing city limits Ferndale: across corridor, north of existing city limits Blaine: across corridor, south of existing city limits

Construction of new bypass tracks and additional main lines could potentially disrupt neighborhoods and businesses by changing access. However, it is not anticipated that any improvements will be constructed outside the rail right-of-way.

As discussed in Chapter 3, some areas along the corridor have been designated as urban growth areas. It is these areas that may be potentially impacted by construction projects. As potential rail improvements are identified, close coordination with the local community will be imperative to ensure that other planned uses are not underway for those designated growth areas. Table 8 lists the communities that have designated urban growth areas parallel to or around the rail corridor.

Frequent and faster trains are not expected to require any homes or businesses to be relocated. It is not anticipated that these trains will result in extremely high levels of noise or vibration that will make homes or businesses adjacent to the railroad tracks unusable.

In addition, the rail program would not involve any significant adverse impacts on populations protected by the Environmental Justice Executive Order. As discussed in Chapter 3 of this document, very few census tracts along the corridor have over 50% minority populations or large populations below poverty level. Six census tracts, all located within King County, have a minority population over 50%, ranging from 53% to 84%. Four of these tracts (100, 104, 110 and 117) are located adjacent to (east side) the corridor in the South Seattle/Tukwilla area. The remaining two tracts (91 and 93) are also located in Seattle, in the Beacon Hill area.

Table 9, on the following page, provides a summary, by census tract, of populations along the corridor. Implementation of this program would not result in substantial noise level increase, violations of ambient air quality

Table 9
Environmental Justice Determination
Population by Race and Poverty Level
1990 U.S. Census by Tract or BNA

County	Tract	Total Population	White	%	Other	%	Hispanic	%	Below Poverty Level	%
Clark	403	3644	3555	98%	89	2%	74	2%		
	409.02	6397	6214	97%	183	3%	26	0%		
	409.03	6297	5946	94%	351	6%	116	2%		
	410.03	3334	3130	94%	204	6%	87	3%		
	410.05	2122	1886	89%	236	11%	138	7%	576	27%
	410.07	3084	2951	96%	133	4%	41	1%		
	420	1412	1338	95%	74	5%	33	2%		
	430	1720	1533	89%	187	11%	87	5%		
Cowlitz	2	3038	2928	96%	110	4%	38	1%	599	20%
	3	656	609	93%	47	7%	6	1%	167	25%
	8	6134	6013	98%	121	2%	95	2%		
	9	4855	4683	96%	172	4%	33	1%		
	10	1566	1398	89%	168	11%	144	9%	454	29%
	11	5227	4849	93%	378	7%	103	2%	1263	24%
	12	3889	3821	98%	68	2%	41	1%		
	13	3462	3288	95%	174	5%	145	4%		
	14	497	470	95%	27	5%	45	9%		
	15	5452	5217	96%	235	4%	128	2%		
	16	3775	3664	97%	111	3%	23	1%		
	17	3724	3582	96%	142	4%	144	4%		
	20.01	3000	2843	95%	157	5%	6	0%		
	20.02	4770	4630	97%	140	3%	63	1%		
Lewis	9704	4332	4144	96%	188	4%	80	2%	882	20%
	9707	3740	3668	98%	72	2%	75	2%		
	9708	3752	3568	95%	184	5%	126	3%		
	9709	1530	1488	97%	42	3%	28	2%		
	9710	2588	2475	96%	113	4%	4	0%		
	9713	3574	3481	97%	93	3%	113	3%		
	9714	1775	1666	94%	109	6%	51	3%		
	9715	5122	5075	99%	47	1%	91	2%		
	9716	2792	2659	95%	133	5%	76	3%		

Table 9 Continued
Environmental Justice Determination
Population by Race and Poverty Level
1990 U.S. Census by Tract or BNA

County	Tract	Total Population	White	%	Other	%	Hispanic	%	Below Poverty Level	%
Thurston	116.1	5195	4752	91%	443	9%	159	3%		
	116.2	7168	6559	92%	609	8%	104	1%		
	117	6161	5879	95%	282	5%	166	3%		
	123	10479	7955	76%	2524	24%	515	5%		
	124	7139	6771	95%	368	5%	241	3%		
	124.02	1044	994	95%	50	5%	0	0%		
	126	6968	6791	97%	177	3%	130	2%		
	127	7846	7468	95%	378	5%	293	4%		
Pierce	602	274	235	86%	39	14%	0	0%	55	20%
	602.99	254	239	94%	15	6%	15	6%	54	21%
	603	3144	2881	92%	263	8%	77	2%		
	604	3991	3785	95%	206	5%	97	2%		
	605	4064	3900	96%	164	4%	107	3%		
	606	5527	5037	91%	490	9%	29	1%		
	609.01	8364	7215	86%	1149	14%	277	3%		
	609.02	8857	7702	87%	1155	13%	210	2%		
	610	7323	6384	87%	939	13%	335	5%		
	615	4346	3752	86%	594	14%	136	3%	1000	23%
	616.01	1102	896	81%	206	19%	27	2%	504	46%
	621	2947	1643	56%	1304	44%	114	4%	746	25%
	706	694	630	91%	64	9%	37	5%		
	710	6059	5766	95%	293	5%	131	2%		
	712.02	6778	6398	94%	380	6%	120	2%		
	712.04	7081	6683	94%	398	6%	101	1%		
	721.09	3277	2792	85%	485	15%	285	9%		
	723.03	7879	7231	92%	648	8%	77	1%		
	723.08	6140	5301	86%	839	14%	259	4%		
	728	625	489	78%	136	22%	21	3%		
	729.02	22224	13947	63%	8277	37%	1928	9%		
	733	7287	6948	95%	339	5%	209	3%		
	734.01	5216	4906	94%	310	6%	190	4%		
	734.03	7085	6779	96%	306	4%	77	1%		
	734.04	5901	5729	97%	172	3%	112	2%		
	735	691	640	93%	51	7%	36	5%		

Table 9 Continued
Environmental Justice Determination
Population by Race and Poverty Level
1990 U.S. Census by Tract or BNA

County	Tract	Total Population	White	%	Other	%	Hispanic	%	Below Poverty Level	%
King	5	3123	2972	95%	151	5%	39	1%		
	14	4384	4045	92%	339	8%	62	1%		
	15	2372	2184	92%	188	8%	109	5%		
	16	3759	3583	95%	176	5%	63	2%		
	31	5764	5544	96%	220	4%	64	1%		
	32	7035	6520	93%	515	7%	218	3%		
	57	5373	4805	89%	568	11%	201	4%		
	58.01	4142	3728	90%	414	10%	71	2%		
	58.02	4002	3524	88%	478	12%	162	4%		
	71	1498	1318	88%	180	12%	55	4%		
	80	2912	2511	86%	401	14%	21	1%	694	24%
	81	1893	1318	70%	575	30%	90	5%	743	37%
	91	1569	515	33%	1054	67%	102	7%		
	92	1680	873	52%	807	48%	78	5%	896	24%
	93	2057	959	47%	1098	53%	74	4%	494	38%
	100	7557	1975	26%	5582	74%	258	3%		
	104	7832	2070	26%	5762	74%	128	2%		
	109	1210	795	66%	415	34%	136	11%	287	24%
	110	6251	997	16%	5254	84%	275	4%	2359	38%
	117	4232	1033	24%	3199	76%	292	7%		
	201	3186	2996	94%	190	6%	8	0%		
	208	4556	4333	95%	223	5%	54	1%		
	209	3269	2865	88%	404	12%	32	1%		
	210	5609	4499	80%	1110	20%	88	2%		
	259	209	159	76%	50	24%	17	8%	55	26%
	261	5390	3272	61%	2118	39%	37	1%		
	262	4179	3416	82%	763	18%	112	3%		
	263	1162	952	82%	210	18%	35	3%		
	292.01	4462	3950	89%	512	11%	186	4%		
	292.02	5869	5225	89%	644	11%	165	3%		
	297	5684	5347	94%	337	6%	126	2%		
	305.01	1559	1287	83%	272	17%	77	5%		
	308	8403	7758	92%	645	8%	337	4%		
	309	5551	5064	91%	487	9%	199	4%		
	310	1079	941	87%	138	13%	66	6%		

Table 9 Continued
Environmental Justice Determination
Population by Race and Poverty Level
1990 U.S. Census by Tract or BNA

County	Tract	Total Population	White	%	Other	%	Hispanic	%	Below Poverty Level	%
Snohomish	402	4450	3856	87%	594	13%	87	2%	1429	32%
	405	2468	2269	92%	199	8%	151	6%		
	406	939	868	92%	71	8%	5	1%		
	407	2973	2737	92%	236	8%	68	2%	611	21%
	408	1922	1864	97%	58	3%	42	2%		
	409	2389	2264	95%	125	5%	8	0%		
	413	7948	7453	94%	495	6%	214	3%		
	420.01	5170	4811	93%	359	7%	87	2%		
	420.02	2856	2538	89%	318	11%	44	2%		
	420.03	2954	2667	90%	287	10%	34	1%		
	501	4755	4273	90%	482	10%	115	2%		
	502	4010	3740	93%	270	7%	14	0%		
	503	5495	5255	96%	240	4%	47	1%		
	505	6008	5780	96%	228	4%	118	2%		
	506	875	847	97%	28	3%	7	1%		
	521.04	1191	1112	93%	79	7%	13	1%		
	528.02	7171	6916	96%	255	4%	158	2%		
	528.03	3833	3707	97%	126	3%	120	3%		
	528.04	5388	5169	96%	219	4%	283	5%		
	529.01	6353	6114	96%	239	4%	210	3%		
	529.02	6953	6614	95%	339	5%	153	2%		
	531	4962	4894	99%	68	1%	53	1%		
	533	6478	6223	96%	255	4%	75	1%		
Skagit	9508	4581	4421	97%	160	3%	209	5%		
	9516	2871	2763	96%	108	4%	159	6%		
	9517	2680	2417	90%	263	10%	365	14%		
	9518	2251	2066	92%	185	8%	196	9%		
	9522	3037	2865	94%	172	6%	134	4%		
	9523	7063	6228	88%	835	12%	969	14%		
	9524	5403	5105	94%	298	6%	223	4%		
	9525	2520	2178	86%	342	14%	228	9%		
	9526	3046	2723	89%	323	11%	275	9%		
	9527	2752	2309	84%	443	16%	114	4%		

Table 9 Continued
Environmental Justice Determination
Population by Race and Poverty Level
1990 U.S. Census by Tract or BNA

County	Tract	Total Population	White	%	Other	%	Hispanic	%	Below Poverty Level	%
Whatcom	2	4250	3925	92%	325	8%	81	2%		
	3	4884	4634	95%	250	5%	110	2%		
	4	6560	6165	94%	395	6%	173	3%		
	5	7442	6786	91%	656	9%	237	3%	1841	25%
	6	598	506	85%	92	15%	57	10%		
	10	5941	5327	90%	614	10%	170	3%	1479	25%
	11	5900	5688	96%	212	4%	91	2%		
	12	7409	7144	96%	265	4%	63	1%	1605	22%
	104.01	5119	4940	97%	179	3%	68	1%		
	104.02	4524	4294	95%	230	5%	117	3%		
	105	8131	7488	92%	643	8%	281	3%		
	106	5029	4864	97%	165	3%	134	3%		

standards, or other environmental health hazards. It is possible that if homes or businesses are displaced, one or more could be owned by a member of a protected population, but the overall numbers of displacements will be small, and relocation assistance would be provided in accordance with federal and state law. The rail program will actually provide mobility benefits to minority populations.

Operations

Impacts of increased train traffic and train speed on actual community will be minimal. Faster speeds will actually result in shorter wait times at railroad crossings. However, additional trains and increased speed will impact public access and safety at corridor crossings. Public safety is already an important issue with all railway operations, and will continue to be addressed by the rail lines.Of particular concern are waterfront, beach, and recreational facility access points at railroad crossings, and the recreation trails that parallel the rail corridor at points. The rail lines are posted “No Trespassing” and levies fines for violation of these notices. In addition, the Railroad meets all federal and state regulations regarding signals, bells and whistles at grade crossings. Public safety impacts could be mitigated with increased public education of the hazards of crossing the rail corridor.

The majority of safety issues will result from the increase in the number of trains in the corridor and the incremental increased speed of existing trains in the corridor. The areas of greatest safety concern are typically where the highest concentrations of people live and work near the tracks (increasing the potential for collisions and other accidents). In these areas, railroad accidents are most likely to occur at grade crossings with roadways. Accidents at railroad grade crossings often are due to ignorance of the risks or errors in judgment, both of which can result in disregard of the warning devices intended for personal safety. Common examples include walking along

railroad tracks and driving around lowered crossing gates.

Typical safety measures that are used to enhance pedestrian and vehicular safety at grade crossings range from community education to passive devices to active controls. Railroad locomotives are also equipped with whistles that are commonly used to alert motorists when a train is approaching. However, by the time engineers see motorists, it is often too late to stop. Additional safety measures that are used along railroad right-of-way include the installation of security fencing and posting of no trespassing signs.

Walking along a railroad track or crossing a track at an area that is not a designated crossing is illegal – the railroad right-of-way is private property owned by the railroad. Since it is not intended for people to walk in these areas, safety warnings are not present. It is only at designated crossings (pedestrian bridges, trail and roadways) that warning signs are in place.

In addition, increased passenger train operations will not greatly impact existing communities or disrupt neighborhoods. Slight increases in noise and air quality may also impact residents. Communities of minorities, elderly, handicapped, or others with special needs will not be adversely affected. Increased passenger trains, may however, cause slightly longer response times for emergency vehicles (if a train is blocking the tracks, the vehicle may not be able to cross).

Construction Impacts

Impacts to the community and access to social services/recreational facilities include possible temporary delays during construction. Possible disruption to some homes and businesses may also result due to construction.

Mitigation

During the design process, the exact location of rights-of-way will be determined. Right-of-way acquisition would begin once plans are approved and the project is funded.

The amount of land required will be dependent upon several factors, including the stability of the soils and topography, engineering recommendations on design and placement, and environmental requirements. Once these factors have been determined, monetary compensation would be provided to the current title holder for the necessary land required.

The project's acquisition and relocation procedures are based on the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and state law in Chapter 8.26 of the Revised Code of Washington. Any persons displaced from homes, businesses or farms are guaranteed uniform and equitable treatment.

Properties to be acquired will be independently appraised for fair market value. Eligible individuals, families, businesses or organizations will receive advisory services and may receive moving costs, housing replacement, rental assistance, or business relocation benefits to minimize hardship and provide the assistance necessary to accomplish this consistently.

To address safety concerns, WSDOT is working with local communities up and down the corridor to improve, close and consolidate grade crossings and educate the public on the dangers of railroad trespassing. In addition, the volunteer group, Operation Lifesaver, provides extensive community education and outreach about the dangers of trespassing on railroad property. Currently, all along the corridor, Operation Lifesaver is working with grade schools and teachers to educate children.

Secondary and Cumulative Impacts

WSDOT's goal is to disrupt the communities along the corridor as little as possible.

Cumulative impacts of increased train traffic and speed include continued and increased

concern for public safety at grade crossings. Also of continued concern is public trespassing to use, or cross, the right-of-way for recreational purposes. As more trains traveling at higher speeds use the corridor, the public will be forced to use planned and approved access to the recreational facilities. Although this may cause some congestion at access points, it will result in increased public safety.

Most individuals are concerned with safety – the safety of crossing the tracks (either on foot, bicycle or in an automobile) and safety from train derailments and spills.

WSDOT recognizes the need to provide a safe environment as the passenger rail program moves forward. Many of the projects in this Plan (and other WSDOT programs) were designed to create a safer environment around railroad tracks and facilities. As WSDOT moves forward with the program, site specific analysis will be done for individual projects.

VISUAL QUALITY

This section discusses the qualitative impacts on the visual quality of the environment. As projects are identified and studied, in-depth visual analysis will be performed.

Potential Impacts

Most railroad improvements will occur within the existing right-of-way, where existing track and supporting structures already exist. The addition of additional railroad facilities will be a small incremental change, which will be unnoticeable in most locations. The improvements will allow trains to move through residential views faster, especially at siding locations. The improved sidings will allow trains to move past each other concurrently, rather than forcing one to stop and wait while the other passes. Overall there is not expected to be any change in visible quality from the project. However, when viewing the area from Puget Sound, there could be some visual disruption resulting from cuts and retaining walls.

A typical cross section for potential projects may include single or multiple sets of tracks, the supporting rock ballast and vegetated right-of-way. The actual tracks stand eight inches above ground and the right-of-way extends approximately 50 feet out from each side of the track centerline. Rail signals and/or cross traffic warning signals are located at specific locations.

The actual rail configurations are often unnoticeable by the viewing public, whether passenger or bystander. The rail corridor is most visible at times when railroad freight or passenger trains pass. The siding extension improvements will allow trains to pass more quickly through the view of the onlooker. Currently trains must stop and wait on sidings for opposing train traffic to pass. The siding extensions will allow trains to move past each other concurrently.

Grade crossings, bridge and road crossings are the most apparent feature, both when in use (with flashing signals and/or gates) and not in use. The improvement sites may have grade separated or at-grade crossings which include the related crossing guards, crossing signs and "signal houses" (small square structures which control switches and crossing guards). Most of these will be similar to facilities already in place.

A number of bridges may also be constructed. Most bridges will probably built along side of existing bridges, as the existing bridges are too narrow to allow additional track. Most of the existing bridges are timber trestles on multiple creosote timber pilings, or steel truss bridges on concrete pilings. The new bridges will be constructed in one of three methodologies, depending upon the geology of the location. Regardless all new bridges will be constructed of concrete pilings.

Operations

Operations of increasing numbers of trains will have the same impacts as existing trains going through the corridor. Depending on personal perspective, individuals may find viewing the passenger trains that will briefly enter and leave their line of sight aesthetically pleasing. Whether communities or individuals view the trains positively or negatively, the actual change in view will be momentary.

Construction Impacts

The most significant visual quality impacts will be resulting from temporary construction. Equipment will be visible to the resident, although generally railway construction is completed during a short turn around time. It is anticipated that the construction crews, equipment and timing will be similar to regularly scheduled maintenance operations, such as replacing fouled ballast. The greatest impacts from construction will occur at the bridge crossing when footings and pilings are being placed. Currently little mitigation for visual quality is planned, although timing of the placement of these structures will be dependent upon WDF&W approvals where applicable. Temporary construction impacts could be mitigated by use of BNSF design standards, which include revegetation along cut and fill slopes.

Construction of physical improvements may cause some temporary degradation of visual quality. Most likely the actual construction will occur quickly, and be similar to existing maintenance along the right of way. However some types and locations of improvements will require temporary construction equipment, and the use of best management practices to isolate the site. These best management practices often include the use of silt fencing or construction barriers. Typically, construction barriers are brightly colored to improve worker safety.

Mitigation

To mitigate the temporary construction impacts, timing of placement of the crossings and necessary partial street closures will be coordinated with local authorities.

Additional mitigation may include replacing removed vegetation with native vegetation or locating vegetative buffers beneficial to the visual quality along portions of improvement sites where cuts or fills have occurred, within site of residential viewers. Following construction, the visual quality is anticipated to return to near pre-existing conditions for most improvement sites.

Secondary and Cumulative Impacts

Because this program improves rail facilities, resulting in increasing train service, any changes in visual quality caused by the passenger train traffic will decrease in duration, but increase in frequency. As the existing rail is well established through out the corridor, the addition of the plan upgrades will probably be visually unnoticeable and unremarkable to the general public. Thus no secondary or cumulative impacts to visual quality are expected.

ENERGY

This section presents a general discussion of energy and its relationship to implementation to the rail program. Information for this section was extracted from the Pacific Northwest Rail Corridor Energy Discipline Report.

Potential Impacts

A primary goal of this project is to reduce the existing bottlenecks in the rail system. This will result in an overall decrease in travel time. A portion of the decrease in travel time will be accomplished by decreasing the waiting periods trains currently experience on limited numbers of sidings. Additionally, the project involves reconfiguration of some track curvature, and upgrading turnouts, signals and

crossovers which will increase speed and fuel efficiency.

By increasing the number of usable sidings, and creating other improvements, trains will be able to pass each other while moving. Currently trains must wait for opposing traffic to pass at a few sidings. By decreasing the time the trains sit idling on a siding, the project may greatly improve energy efficiency through reduced fuel consumption. Although the distances vary, current travel time between Seattle and Vancouver, B.C is 3 hours and 55 minutes and current Amtrak travel time between Seattle and Portland, Oregon is also 3 hours and 55 minutes. The difference in travel speed, and therefore fuel consumption, may reflect a variety of causes for slower movement between Seattle and Vancouver, including terrain, track layout and track traffic.

At completion of the improvements after service level one, the travel times are estimated to decrease 15 minutes each way between Seattle and Vancouver, and 38 minutes each way from Seattle to Portland. At current service levels, a total daily decrease of approximately 334 minutes of travel time is expected, and a decrease in fuel consumption of about 464 gallons per day.

Additional fuel efficiency will be realized with the use of the new models of locomotives being built for this route. The new F59PHI locomotives are more fuel efficient than the existing F40PH. Additional reductions in energy consumption are expected because of higher, more constant operating speeds, and the lower less wind resistant design of the Talgo train.

The Talgo trains consume approximately 550 gallons of diesel per round trip, based on the existing Seattle to Vancouver, BC service. Fuel consumption for one round trip between Seattle to Portland onboard the Talgo is about 660 gallons. Current total consumption of fuel is approximately 3,200 gallons.

Future levels of service are expected to triple on the Seattle to Vancouver route and double on the Seattle to Portland route. Because the project is expected to increase the number of trains, the total consumption of fuel will increase to approximately 6,000 gallons.

Local supplies of diesel fuel will not be impacted by passenger train service. When contemplating the amount of fuel to be spent if train passengers drove their own vehicles, to the amount of fuel projected to be used by the new trains, a greater overall fuel efficiency will occur with the building of the improvements and the increase of passenger rail service. Finally the project will not generate growth, therefore there will be no increased energy demands from growth related service.

Operations

During operations electricity will continue to be used to operate switches, crossing guards and communication devices. Diesel fuel will be required to operate the diesel locomotive engines.

Construction Impacts

A temporary increase in energy consumption will occur at project areas during construction. This energy use will include diesel fuel to operate heavy machinery, electrical or gas powered hand tools, and battery or generator electrical lighting and safety signals.

Specialized heavy machinery which is track mounted will be fueled at the BNSF railyards. These procedures are standard with any track maintenance or improvement. Contractor vehicles and hand held tools will be replenished with local supplies.

Mitigation

Since no impacts are anticipated, mitigation is not recommended.

Secondary and Cumulative Impacts

Ridership forecasts for 2018 indicate the passenger line train traffic between Seattle and Portland may increase to 13 - 17 round trips per day. Average annual ridership is expected to be 1,250,000 passengers by 2018. At this level of service train loads would average 200 – 265 passengers. Given an average train energy consumption of 350,000 BTUs per mile, this is the equivalent to 1320 - 1750 BTUs per passenger per mile. The amount of energy expended per mile per single-occupancy-vehicle is typically 6,200 BTUs.

NOISE

Information for this section was taken from the Pacific Northwest Rail Corridor Noise Discipline Report. Although this report was written for service level one improvements, it has been assumed that impacts along the corridor, for similar projects, would be the same.

Potential Impacts

General noise and vibration analyses were conducted for improvement areas in the Pacific Northwest Rail Corridor in accordance with federal guidelines. Existing freight noise and vibration levels, and the noise and vibration which will be added by the improvement, were predicted at the nearest sensitive receiver to the track for each improvement studied. It was discovered that noise and vibration levels are already high throughout the program corridor due to existing freight operations. The proposed transit improvements will not noticeably add to existing levels of noise or vibration in these areas. This led to a finding of no noise or vibration impacts for all of the improvement areas studied. For this same reason, one can logically conclude that the increase in the number and speed of passenger trains will not result in impacts in any of the areas between improvements

Construction Impacts

During construction, people working and living near the improvement may be exposed to noise and vibrations originating from the contractor's construction equipment and operations. Railroad construction is not typical construction. Some large vehicles are used, but some of the work is done by track mounted specialty vehicles. These vehicles place and shape ballast, and lay the track and supporting structures. In addition, railroad construction is completed much faster than typical road projects. The primary source of noise and vibration during construction will be the large machinery, track mounted specialty vehicles and pile driving operations. However, noise and vibrations of this type would tend to be intermittent and of a temporary nature.

Noise levels of typical construction equipment are measured at 50 feet (15.2 meters) from the source. Construction equipment noise levels decrease at six decibels per doubling of the distance provided there is a clear line of sight to the equipment. For example, a bulldozer creating 80 dBA at 50 feet (15.2 meters) will have an observed value of 74 dBA at 100 feet (30.5 meters) and 68 dBA at 200 feet (61.0 meters).

Contractors are required to comply with all state and local regulations governing equipment source levels and noise resulting from the construction site activities during the life of the improvement, however, daytime construction activities are generally exempt from these limits. Despite this legal exemption, construction noise can annoy people living in the area, and some simple and inexpensive techniques can be used to minimize the negative effects. Stationary noise sources should be placed as far from sensitive receivers as possible. Portable noise barriers can be used to further shield sensitive receivers and demonstrate the contractor's commitment to the public to limit construction noise

annoyance during construction. Construction noise can be further reduced through the use of properly sized and maintained mufflers, engine intake silencers, ambient sensitive backup alarms, engine enclosures, turning off idling equipment, confining operations to daylight hours, driving forward instead of backward whenever feasible and lifting instead of dragging materials.

Mitigation

The need for mitigation is based on the magnitude of impact and consideration of factors specifically related to the proposed improvement and affected land uses. Every reasonable effort should be made to reduce predicted noise and vibration to levels deemed

Table 10
Vibration and Ground-Borne Noise Impact Criteria

	Ground-Borne Vibration Impact Levels (VdB re 1 micro inch/sec)		Ground-Borne Noise Impact Levels (dB re 20 Micro Pascals)	
Land Use Category	Frequent[1] Events	Infrequent[2] Events	Frequent[1] Events	Infrequent[2] Events
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB[3]	65 VdB[3]	-4	-4
Category 2 Residences and buildings where people normally sleep	72 VdB	80 VdB	35 dBA	43 dBA
Category 3 Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48dBA

1. "Frequent Events is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
3. The criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Vibration sensitive equipment is not sensitive to ground-borne noise.

acceptable for impacted sensitive land uses. Any decision to include mitigation would be madeafter site specific analysis.

Since no noise or vibration impacts were found at this level of analysis at any of the improvement areas studied, no mitigation isexpected to be required.

Even though this analysis has shown that these improvements will not cause any noise or vibration impacts under federal criteria, annoyance caused by noise from rail operations along this corridor does exist and can be expected to continue. Measures that should be considered when attempting to reduce the human annoyance caused by noise from rail operations include limiting night time operations, the use supplimentary safety measures to replace train whistles at problem crossings, and a maintenance program dedicated to preventing the degradation of rails and wheels.

Secondary and Cumulative Impacts

Because this program improves facilities and increases the speed of trains, the typical noise will decrease in duration. In addition new track will be continuous welded steel, thus no joint noise will occur as the train rolls over the tracks.

However, while actual train noise volume associated with the program may decrease, the frequency of the noise will increase as a result of more frequent train service. Secondary and cumulative impacts of increased frequency of noise may be heard and felt in urban areas adjacent to the route. It should also be noted that the existing and new Talgo equipment has proven to be quieter than the other train equipment currently used on the corridor.

Freight and commuter traffic will continue to make the loudest noise. We anticipate that construction and increased passenger service will not significantly increase noise levels.

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