City of Sherwood Oregon

COPY

RESOLUTION 2000-894

A RESOLUTION ENDORSING THE LOCALLY PREFERRED ALTERNATIVE FOR THE WILSONVILLE TO BEAVERTON COMMUTER RAIL STUDY

WHEREAS, Washington County has sponsored the two initial feasibility studies of commuter rail in the Highway 217 – Interstate 5 Corridor, and

WHEREAS, Washington County led the Wilsonville to Beaverton Commuter Rail Study Alternatives Analysis which examined alternatives to serve the need for transit improvement in the Wilsonville to Beaverton corridor; and

WHEREAS, the Wilsonville to Beaverton Commuter Rail Study concluded that compared to a No-Build and a Transportation Management System (TSM), a Commuter Rail Alternative would:

- Provide 4,650 average daily ridership as compared to 1,520 for the TSM alternative by the year 2020.
- Provide in-vehicle transit travel time of 26 minutes as compared to 54 minutes for the TSM alternative for a Wilsonville to Beaverton Transit Center trip.
- Provide the most efficient transit links between regional and town centers.
- Best support state, regional and local transportation and land use plans and policies.
- Best support increased opportunities for pedestrian–friendly and transit oriented development.
- Provide a reliable and direct link between population and employment centers in the Corridor.
- Support and encourage continued economic growth.

WHEREAS, the study identifies the possibility of extending the commuter rail project in a second phase to Sherwood and such a move would provide good transportation services to Sherwood residents and would stimulate economic development especially in the Old Town district; and

WHEREAS, other Cities in Washington County support the construction of a Wilsonville to Beaverton Commuter Rail Project to serve commuters in the corridor and are publicly expressing their support.

NOW, THEREFORE BE IT RESOLVED that the City Council of the City of Sherwood endorses the Wilsonville to Beaverton Commuter Rail Study Locally Preferred Alternative forwarded by the Project Steering Committee on January 21, 2000 (Exhibit A) and encourages its adoption, funding, and implementation.

Adopted this 8th day of August, 2000.

Walt Hitchcock, Mayor

ATTEST:

C.L. Wiley, City Recorder

Washington County
Wilsonville to Beaverton

Commuter Rail

Draft Environmental Assessment

August 2000

Resolution 2000-894
August 8, 2000
Attachment 1

U.S. Department
of Transportation
Federal Transit
Administration

WILSONVILLE to BEAVERTON

COMMUTER RAIL

Draft Environmental Assessment

August 2000

Project Sponsors:

FTA
Metro
Tri-Met
ODOT
Washington County

City of Wilsonville
City of Tigard
City of Tualatin
City of Beaverton

Prepared by:

BRW
DKS and Associates
Dorman Company
URS Corporation

WASHINGTON COUNTY COMMUTER RAIL

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to the National Environmental Policy Act
42 U.S.C. 4322(2)(c)

by the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and

WASHINGTON COUNTY, OREGON

In cooperation with

OREGON DEPARTMENT OF TRANSPORTATION
METRO
TRI-MET

Date of Approval	Regional Administrator For Federal Transit Administration	Helen M. Knoll
Date of Approval	County Commissioner Washington County, Oregon	Tom Brian

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APPENDICES

TABLES

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
APE	Area of Potential Effect
ASTs	Above Ground Storage Tanks
BMPs	Best Management Practices
CAC	Citizens Advisory Committee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COE	U.S. Army Corps of Engineers
C-TRAN	Clark County Public Transportation Benefit Area
DDE	Dichlorodiphenyl ethane (insecticide)
DDT	Dichlorodiphenyl trichloroethane (insecticide)
DEQ	Oregon Department of Environmental Quality
dB	Decibel
dBA	A-Weighted Decibel
DO	Dissolved Oxygen
DSL	Oregon Department of State Lands
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRE	Finance Insurance and Real Estate
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
GLO	General Land Office
HOV	High Occupancy Vehicle
HPA	High Probability Area
kWh	Kilowatt Hours
L_{dn}	Day-Night (24-Hour, Time Averaged, A-Weighted) Sound Level
L_{eq}	Equivalent Continuous Sound Levels
L_{max}	Maximum Noise Levels
LOS	Level of Service
LPS	Locally Preferred Strategy
LRT	Light Rail Transit

MAX	Metropolitan Area Express
MCDD1	Multnomah County Drainage District Pump Station No. 1
MEP	Maximum Extent Practical
mph	miles per hour
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NB	Northbound
NEPA	National Environmental Policy Act
NMHC	Non-Methane Hydrocarbons
NPDES	National Pollution Discharge Elimination System
NOI	Notice of Intent
NO_x	Nitrogen Oxides
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychloride Biphenyls
PCC	Portland City Code
PDC	Portland Development Commission
PE	Preliminary Engineering
PM_{10}	Fine Particulate matter
PMG	Project Management Group
ppm	parts per million
PRC	Public Review Committee
PUD	Planned Unit Development
ROW	Right-of-Way
RTP	Regional Transportation Plan
RUGGOs	Regional Urban Growth Goals and Objectives
SAAQS	State Ambient Air Quality Standards
SB	Southbound
SHPO	State Historic Preservation Office
SIP	Federal Clean Air Act State Implementation Plan
SLMs	Sound Level Measurements
STP	Surface Transportation Program
TAZ	Transportation Analysis Zone
TC	Transit Center
TIP	Transportation Improvement Plan
TMDL	Total Maximum Daily Load
TPH	Total Petroleum Hydrocarbons
TPR	Transportation Planning Rule
Tri-Met	Tri-County Metropolitan Transportation District of Oregon
TSM	Transportation System Management

UGB	Urban Growth Boundary
UPRR	Union Pacific Railroad
UST	Underground Storage Tank
VMT	Vehicle Miles Traveled
VOCs	Volatile Organic Compounds
WLA	Waste Load Allocation
WPA	Federal Works Progress Administration

WILSONVILLE TO BEAVERTON COMMUTER RAIL
DRAFT ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

The proposed project is a commuter rail line serving eastern Washington County, from Wilsonville to Beaverton, Oregon. The commuter trains would operate on existing tracks, running parallel and west of I-5 and Highway 217, for a distance of approximately 15 miles. Users would access the line via five stations, located in Wilsonville, Tualatin, Tigard, and Beaverton. Beaverton and Tigard would share the fifth station, near Washington Square. Beaverton Transit Center's station would connect with Westside MAX Light Rail and buses serving Portland and Washington County employment centers.

The project runs through the eastern part of Washington County, which is experiencing rapid population and employment growth, with a corresponding increase in peak-hour traffic volumes. The Tri-County Metropolitan Transportation District of Oregon (Tri-Met) and South Metro Area Rapid Transit (SMART) currently provide transit service in the area. Most of Tri-Met's service is oriented to downtown Portland and SMART's fixed-route service limited to one bus route from Wilsonville to Barbur Transit Center. Area residents wishing to use public transit from Wilsonville to Beaverton are currently underserved with the present transit options. The availability of commuter rail would increase the diversity of options available to transit users in the region.

The Federal Transit Administration (FTA) is the Lead Federal Agency for the National Environmental Policy Act (NEPA) review of the project. Washington County, Tri-Met, and Metro will support FTA on a local level. Washington County is the Lead Agency for the local NEPA analysis and will serve as the local applicant for all federal, state, and local permits.

In addition to the proposed project, this Environmental Assessment (EA) investigates two alternatives to commuter rail, a Transportation System Management (TSM) Alternative and a No Build Alternative. Two earlier alternatives, which included a terminus at the Merlo light rail station and one alignment option for reaching the Beaverton Transit Center, were rejected from further analysis and are not included in this EA. The Merlo light rail station alternative was rejected due to lack of public support, considerable out-of-direction travel for most users, and the need for nine additional gated crossings. Lombard Avenue West Alignment Design Option was rejected because of potential adverse impacts.

The TSM Alternative evaluated improving bus service in the corridor and adding a limited-stop bus line on roads paralleling the proposed project. Selected intersections along the route would be treated with bus priority elements, and 15-minute bus headways were modeled to compare directly with those planned for the proposed commuter rail service.

The No Build Alternative evaluated the existing transportation system and included improvements and projects specified in the financially constrained Regional Transportation Plan (RTP), while assuming no changes in transit service other than those currently planned.

Potential Impacts

The impact analysis considers those impacts that are likely to occur under three scenarios: a No Build Alternative, which assumes that the commuter rail project would not be built; a TSM Alternative,

which includes improved bus service and a new limited-stop bus line in the rail corridor; and the commuter rail project which, except for a 2,000 foot spur, would be built on an existing freight rail line. Under all three scenarios, it is assumed that projects included in the financially constrained RTP would be built. Thus, for example, a finding of no impacts under the No Build Alternative addresses only the concept of not building the commuter rail project. Environmental impacts related to RTP projects that would be built in the future might exist, but these impacts would be addressed when the RTP projects are designed and permitted and are not addressed in this EA.

Traffic and Transportation

A potential traffic and transportation impact of the Commuter Rail Alternative would be improved access (as measured by the number of households within a 30-minute, in-vehicle, peak-hour transit time to major activity centers) to community facilities and services. This alternative could also result in a 50-percent reduction in peak-hour, in-vehicle transit travel time over the TSM Alternative and a 66-percent reduction over the No Build Alternative. Other impacts from the Commuter Rail Alternative would be a VMT reduction of 15,300 miles and 17,400 miles over the TSM and No Build Alternatives, respectively, improved travel time over auto trips in the corridor, and a gain of 2,350 and 2,600 new transit riders compared to the TSM and No Build Alternatives, respectively. The roadway network could be impacted with automobiles queuing at key corridor intersections from commuter rail operations. Key corridor intersections would operate at acceptable levels of service for existing traffic levels and any additional commuter rail-related traffic, but improvements would be needed to accommodate projected traffic levels by the year 2020. The potential problems in level of service at these intersections would also exist under the TSM and No Build Alternatives. Potential spillover parking could impact areas adjacent to park & rides. The TSM Alternative would increase transit service for residents and employees in the project corridor during commute hours and provide more transfer locations to other transit routes. Under the TSM Alternative, travel times would increase in the project corridor as traffic congestion increases. The No Build Alternative would impact traffic and circulation as congestion throughout the region increases.

Air Quality

The air quality analysis looked at both regional and local air quality issues. The study area for the regional analysis included the Portland-Vancouver area (also known as the Portland-Vancouver Air Quality Maintenance Area). The proposed Commuter Rail project is located in the southwest corner of the region. Locally the analysis looked at areas within one mile of the commuter rail corridor. Pollutants that were analyzed include carbon monoxide (CO), nitrogen dioxide (NO_2), ground-level ozone (O_3), sulfur dioxide (SO_2), particulate matter less than 10 microns in size (PM_{10}), lead (Pb) and Total Suspended Particulate Matter (TSP). At this time the Portland Metropolitan area is considered an attainment area for all pollutants of concern.

The air quality analysis shows that the commuter rail project would not contribute regionally to increases in any pollutants of concern. Local CO analysis evaluated the No Build Alternative against the proposed Commuter Rail at three intersections of concern: Tualatin-Sherwood Road at Boones Ferry Road, Scholls Ferry Road at Cascade Avenue and Farmington Road and Lombard Avenue. There is no increase in CO levels at Tualatin-Sherwood Road with either the proposed Commuter Rail or No Build Alternative. The Commuter Rail Alternative shows minor decreases in CO at Scholls Ferry Road and minor increases in CO at Farmington Road. All CO readings are below both the one-hour and eight-hour standards for CO.

Noise

The Noise and Vibration analysis evaluated noise impacts from the proposed Commuter Rail, TSM and No Build Alternatives. The analysis shows that the Commuter Rail Alternative may result in an impact to one property. This impact can be readily avoided and/or reduced to a level of insignificance. Vibration analysis was conducted for the Commuter Rail Alternative only. Ground-borne vibration would not adversely impact any adjacent sensitive uses. Long-term (24-hour) noise readings were conducted at 17 locations and short-term readings were conducted at 36 locations. The methodology for evaluating noise and vibration impacts is contained in FTA's "Transit Noise and Vibration Impact Assessment Manual" (Final Report No. DOT-T-95-16; FTA, April 1995).

Land Use and Planning Policy

The Commuter Rail Alternative would operate within an existing right-of-way and is permitted under existing zoning. This alternative could provide for an intensification of land uses and development in the Regional and Town Centers, but would result in no significant cumulative impacts. Stations and park & rides could require local land use approvals, but no significant land use or zoning impact is expected. There would be no land use impacts from the TSM or No Build Alternatives.

Biology

The Commuter Rail Alternative would result in the permanent loss of 18.5 acres of shrub and meadow vegetation at the two southern park & rides and along the Tonquin siding, but no rare plants or communities would be affected. Park & ride and bridge construction would potentially impact 2.3 acres of wetlands. Stormwater runoff would need to be treated and could potentially cause indirect, long-term impacts to wetlands near the new parking facilities for the Commuter Rail Alternatives. Trestle removal along Fanno Creek from the proposed project could improve conditions for steelhead, an endangered species. The TSM Alternative would result in the permanent loss of either 8.7 or 6.2 acres of vegetation at the park & ride in Wilsonville, depending on the selected location. The area is already highly disturbed and it is unlikely that any rare or sensitive plants would be affected at either site. The TSM alternative would not impact wetlands. The No Build Alternative would not change or accelerate any current trends in loss, or alter vegetation or wetlands.

Water Quality/Resources

Potential impacts of the Commuter Rail and TSM Alternatives could occur from construction activities, project elements such as new impervious surface area, and operations and maintenance associated with the project. Water quality impacts are expected to be limited and would be addressed with erosion control and stormwater quality standards for new development. Any potential runoff from the park & rides will need to be pretreated before entering storm drains in the area. The No Build Alternative would not result in any water quality impacts, other than those associated with projects to be built under the financially constrained RTP.

Environmental Hazards

The Commuter Rail Alternative might result in the potential for exposure to hazardous substances in areas where rail line or bridge modifications, excavation, and construction activities are scheduled. Several areas of concern exist along the project corridor, including the Tyco Manufacturing Facility and an operating gas station, both with the potential for the offsite migration of contaminated water, and the existence of lead based paint on the Tualatin River Bridge. The area in the vicinity of the Tigard station is the primary location where direct impacts could occur. A Phase II analysis for this

area will be conducted to further identify the nature and location of potential hazards, and a mitigation plan will be developed subsequently. The No Build Alternative would result in no increase in exposure to hazardous substances. The TSM Alternative would have no impacts due to hazardous materials.

Historic and Cultural Resources

No archaeological resources have been identified within the project corridor and only two historic resources would be affected, although not adversely, by the Commuter Rail Alternative. The rail corridor has been determined eligible for the National Register of Historic Places, but restoration would have no effect on its eligibility, as the line was historically used as commuter rail line and the project would simply be restoring service. The Sweek House is listed on the National Register of Historic Places, but would suffer no impact. The TSM and No Build Alternatives would have no impact on historic or cultural resources.

Safety and Security

The Commuter Rail Alternative would significantly increase the rail use at the many public and private crossings on the existing railroad alignment. Most, if not all, of the public crossings are gated or signalized. None of the private crossings are gated or signalized but, with the exception of two crossings, they currently have adequate sight distances. The proposed project could result in increased automobile or pedestrian accidents due to more frequent trains and greater potential for crimes-of-opportunity at the park & rides. The TSM Alternative would minimally increase the use of the existing park & rides and is not expected to increase safety and security issues. The No Build Alternative would have no safety or security impacts.

Environmental Justice Considerations

The Commuter Rail Alternative and the TSM Alternative would positively impact populations that depend on public transit by offering increased service and transit connectivity. There would be no cumulative significant impacts to minority or low-income persons due to the Commuter Rail or TSM Alternatives.

Energy

The Commuter Rail Alternative would be consistent with state and regional goals for increasing the use of fuel-efficient transportation modes, and is expected to reduce VMTs and reliance on single-occupancy vehicles within the project corridor. The No Build Alternative would result in an increase in VMTs and petroleum use and would not be consistent with state and regional goals.

Land Acquisition

Impacts of the Commuter Rail Alternative would be the potential displacement of seven businesses in two buildings, and a reduction in existing parking in the downtown Beaverton area. The immediate area has sufficient commercial vacant space for lease to accommodate any displaced businesses. Land acquisition for the proposed alternative would include one to two acres in downtown Beaverton for right-of-way and three acres in Wilsonville for a park & ride. The TSM and No Build Alternatives would not require any land acquisition or displace any structures.

Social and Economic Effects

The Commuter Rail Alternative would result in an increase of up to fourteen new jobs and an annual budget of $3.9 million, which would represent new spending in the region. The realignment through downtown Beaverton would result in a loss of from twenty-five to seventy-four jobs, depending on the alignment options, but the loss is not expected to be permanent as sufficient relocation space is available in the immediate area. The TSM Alternative would create ten new jobs and generate $1 million in spending in the region.

Visual and Aesthetic Effects

Except for the extension on Lombard Avenue to the Beaverton Transit Center, the Commuter Rail Alternative would run on an existing railway, maintaining the current visual and aesthetic environment. The park & ride lots would be at grade level and would not impact current views in the area. The Tigard station would replace existing vegetation on the site with a structure and automobile parking. This would impact existing views, but would not create a negative visual impact. There would be no visual or aesthetic effects due to the No Build or TSM Alternatives.

Construction Impacts and Mitigation

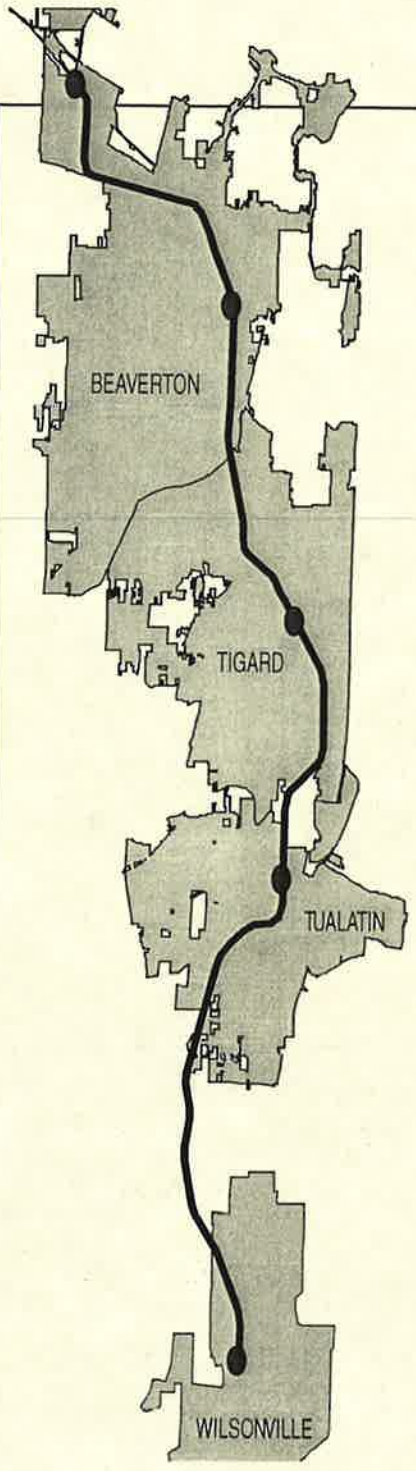
Construction of the Commuter Rail Alternative would impact transportation, transit, and the roadway during construction, but staging of construction could mitigate impacts. Parking would not be impacted during construction, nor would land use or zoning. Some short-term impacts to biology, wetlands, and water quality might occur, but would be mitigated. There would be no impacts to safety and security or environmental justice impacts due to construction of the Commuter Rail Alternative. Construction would have positive social and economic effects, with an increase in short-term employment of 543 to 591 jobs (not all directly related to construction). Energy impacts would be minimal, and visual and aesthetic effects temporary. The TSM and No Build Alternatives would not require construction and would have no impacts.

Secondary and Induced Impacts

There would be no significant secondary or induced impacts from the proposed project.

Chapter 1

Purpose of and Need for the Proposed Action



Wilsonville to Beaverton

Commuter Rail

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The Portland Metropolitan area is experiencing rapid growth in population, employment and vehicle miles traveled (VMT). Plans and strategies for managing growth and reducing total per capita VMT have been developed at the state, regional and local levels. Statewide, the Transportation Planning Rule (TPR) requires cities and counties to implement strategies that incrementally reduce VMT while accommodating this growth. On a regional basis, Metro has developed and adopted a series of Regional Urban Growth Goals and Objectives (RUGGOs) that specify regional policy regarding growth management within the UGB. These goals and their clarifying objectives are intended to guide local jurisdictions in the development of local plans. The regional objective related to transportation calls for reducing reliance on a single mode of transportation through development of a balanced and cost-effective transportation system that employs highways; transit, bicycle and pedestrian improvements; and system and demand management. Since 1973, local jurisdictions have been required to adopt and implement comprehensive land use plans. Each local jurisdiction is charged with implementing planning regulations that would create increased and improved transit service in appropriate locations.

In response to these objectives, Washington County, in conjunction with the Oregon Department of Transportation (ODOT), Tri-County Metropolitan Transportation District of Oregon (Tri-Met), Metro, and the cities of Wilsonville, Tualatin, Tigard and Beaverton, is proposing a commuter rail project in eastern Washington County between Wilsonville and Beaverton, Oregon. The system would operate in an existing rail corridor that runs parallel to and west of the Interstate 5 and Highway 217 corridors, a distance of approximately 15.3 miles. The project would pass through the cities of Wilsonville, Tualatin, Tigard, and Beaverton, as well as unincorporated areas of Washington County and Clackamas County, and would provide connections to the Metropolitan Area Express (MAX) light rail system at the Beaverton Transit Center.

ODOT owns the right-of-way from Wilsonville north to Tiedeman Avenue in Tigard. The track and equipment in the ODOT portion of the corridor are owned by the Portland & Western Railroad (PWRR). The remainder of the corridor from Tiedeman Avenue to the Farmington Road crossing, along with the track and equipment, is owned by the Union Pacific Railroad (UPRR).

The Federal Transit Administration (FTA) is the Lead Federal Agency for the National Environmental Policy Act (NEPA) review of the project. Washington County, Tri-Met and Metro will support FTA on a local level. Washington County is the Lead Agency for the local NEPA analysis and will serve as the local applicant for all federal, state and local permits.

1.2 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed action is to develop a more diverse and balanced transportation system, specifically by providing another transit option for commuters in the Wilsonville to Beaverton corridor. If implemented, the system would better link regional centers, town centers, and employment areas and would capitalize on the public investment in the existing light rail system. The intent is to contribute to implementation of a series of state, regional and local planning policies.

1.3 NEED FOR THE PROPOSED ACTION

The eastern portion of Washington County is experiencing very rapid growth in both employment and population. The growth is contributing to a constrained highway system (Interstate 5 and Highway 217) that operates at capacity during peak hours. The recent growth rate in population, employment and associated traffic is expected to continue well into the future. Expansion of the existing highway system cannot be accomplished without considerable impacts and/or expense. Furthermore, there is a regional recognition that no single mode can be expected to accommodate all of the increase in travel demand. As a result, regional and local leaders have been exploring options that better utilize the existing transportation network while addressing the region's future transportation objectives and needs. Of particular interest are relatively lower cost, short-term implementation projects that offer modal options as well as the potential of providing relief to the highway system and parallel road systems in eastern Washington County. Commuter rail is one such option that is particularly attractive because it would use an existing rail line.

1.3.1 Population

Between 1990 and 1997, the population of the Portland metropolitan area increased by 14 percent. During this same period, the population of Washington County increased by 24 percent. Most of this growth has been focused along the Interstate 5 and Highway 217 corridor, and along the newly opened Westside MAX. This concentration is evidenced by the population increases and annexations by the cities located in the corridor. From 1990 to 1997, the population of Wilsonville increased by 54 percent, the City of Tualatin by 39 percent, the City of Tigard by 25 percent, and the City of Beaverton by 24 percent.

Current population projections for the metropolitan area show these growth patterns continuing into the future. Between 1997 and 2017 the metropolitan area population is expected to increase by 37 percent. During this same period the population of Washington County is expected to increase by 47 percent. The 1997 to 2017 population projections for Wilsonville show the population increasing by 125 percent, Tualatin by 17 percent, Tigard by 17 percent, and Beaverton by 29 percent.

1.3.2 Employment

Washington County's rapid population growth is exceeded by its economic growth. Between 1980 and 1990 the Portland metropolitan area experienced a 25 percent increase in employment, while Washington County had a 51 percent increase during the same period. This trend has continued throughout most of the 1990s. Between 1990 and 1996 the Portland metropolitan area showed a 21 percent growth in employment; during that same period, Washington County had an increase of 35 percent. These trends in employment growth are expected to continue.

Employment projections for the metropolitan area show a 46 percent increase in employment by the year 2017. Employment in Multnomah County is projected to increase 30 percent by the year 2017, Washington County is projected to have an increase of 68 percent, and Clackamas County's employment growth is expected to increase by 64 percent.

1.3.3 Traffic

The percentage change in peak-hour traffic volumes within the I-5/Highway 217 corridor is somewhat less than the concurrent increases in population and employment. However, the increase in

peak-hour traffic becomes more significant in light of the fact that the Highway 217 corridor was considered to be at peak-hour capacity in 1989.

As expected in an area experiencing rapid population and employment growth, there has been significant growth in peak-hour traffic volumes in the I-5/Highway 217 corridor. The south portion of the corridor, I-5 south of Highway 217, showed a 30 percent increase in peak-hour traffic between 1989 and 1995. This same segment recorded 12 percent growth between 1995 and 1997. The Highway 217 segment, from the I-5 interchange to Hwy. 26, recorded a 7 percent increase in peak-hour traffic between 1989 and 1995. Between 1995 and 1997, peak-hour traffic on this same segment increased by 3 percent.

1.3.4 Transit

Two transit agencies provide transit service in eastern Washington County: the Tri-County Metropolitan Transportation District of Oregon (Tri-Met), and the South Metro Area Rapid Transit (SMART). In addition, the Westside and Tualatin Transportation Management Associations operate shuttle services for groups of employers.

Much of the service that is currently offered by Tri-Met is oriented towards downtown Portland or designed as east-west trips between transit centers. The MAX light rail system extends from Gresham through downtown Portland and west to Hillsboro. Tri-Met also operates transit centers in Tigard, Washington Square and Beaverton, as well as several park & rides throughout the project area. SMART currently operates one fixed route bus along I-5, with service between Wilsonville and Tri-Met's Barbur Transit Center.

Existing transit service does not effectively link communities in the Wilsonville to Beaverton corridor. The proposed project would provide strong connectivity between or among the Tri-Met and SMART transit systems. It would provide a direct rail connection with the MAX system, link three transit centers, and provide improved reliability in an already congested corridor.

1.4 PROJECT DESCRIPTION

The Commuter Rail Alternative (the proposed project) is a passenger rail service that would operate on a right-of-way that currently serves as a heavy freight railroad line. The commuter rail vehicles would travel between Wilsonville and Beaverton, connecting to the MAX light rail system at the Beaverton Transit Center (BTC). The commuter rail line would operate at 30-minute headways between the hours of 6:00 a.m. and 9:00 a.m. and 3:00 p.m. and 6:00 p.m. Sixteen round trips would be made daily using two-car trains. Opening year (2005) ridership is forecast to be 2,410 riders on an average weekday; year 2020 ridership is forecast to be 4,650 riders. The total distance of the proposed project is 15.3 miles. The commuter rail corridor and the proposed project stations are shown in Figure 1.4-1. The estimated capital cost for the commuter rail project is between $67 and $73 million.

1.4.1 Rail Corridor and Stations

The proposed project would include several improvements to the rail corridor. These improvements include selected rail replacement; improvements to ties, ballast and crossings; and replacement of eight bridges and structures throughout the corridor. It would also be necessary to construct approximately 2,000 feet of new trackway at the northern terminus of the project near the Beaverton Transit Center. The new track would be located on a reconstructed Lombard Avenue. A new signal

would be required at Broadway, and signal modifications would be required at the Beaverton-Hillsdale Highway and at Canyon Road. The project also calls for double tracking between Lombard Avenue and the Bonita crossover. Sidings would be added in Wilsonville.

Five new rail stations would be constructed under the proposed project. Typically, the stations would include a 200-foot platform that would be expandable to 400 feet, a sheltered waiting area, benches, a passenger information system, and provisions for pedestrians and bicycles. In addition, all stations except the one at BTC would provide park & ride capacity. The size and capacity of each lot would vary. The location of the five commuter rail stations and the size of planned park & ride lots are described below.

- **Wilsonville** - The Wilsonville station would be located between the proposed Boeckman Road and Wilsonville Road interchange, on either the east or west side of the existing alignment. Approximately 400 park & ride spaces would be provided adjacent to the station platform on one of the two properties.

- **Tualatin** - The Tualatin station would be located north of Tualatin-Sherwood Road, east of Boones Ferry Road, on property owned by the Oregon Department of Transportation. Approximately 122 park & ride spaces would be provided adjacent to the station platform.

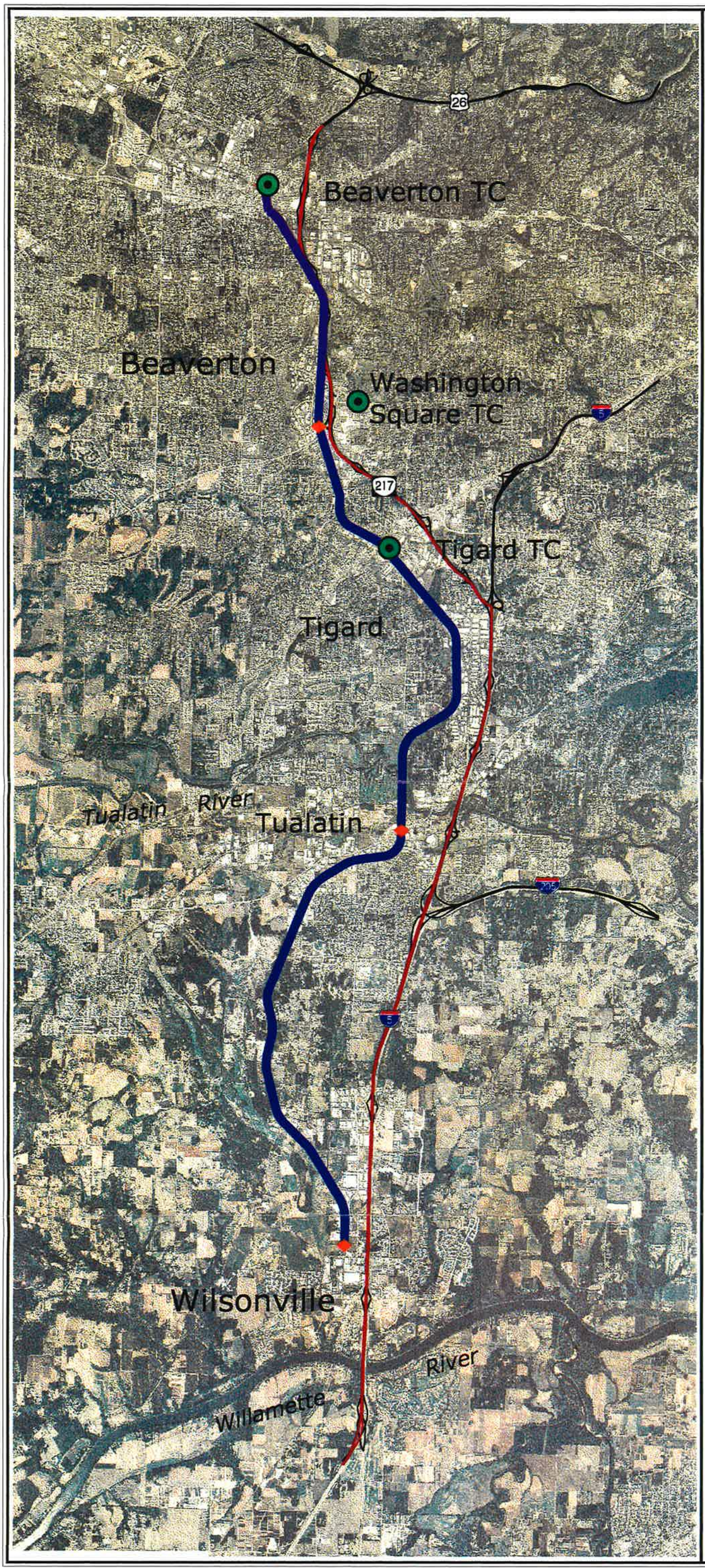
- **Tigard** - The Tigard station would be directly adjacent to the Tri-Met transit center in downtown Tigard and offer connections with five bus lines, including a major trunk line. A park & ride of approximately 150 spaces would be constructed on existing right-of-way vacated by the realignment of the tracks.

- **Washington Square** - The Washington Square station would be located on the railroad alignment just north of Scholls Ferry Road. About 200 park & ride spaces might be provided through an arrangement with nearby businesses immediately north or south of Scholls Ferry Road that do not fully utilize available parking.

- **Beaverton Transit Center** - The northern terminus of the commuter rail line would be in downtown Beaverton near the Beaverton Transit Center and Tri-Met's MAX light rail station. This alignment would provide direct connections to light rail and eleven bus lines with connecting service to Beaverton, Portland, Hillsboro, and Washington County. No park & ride would be constructed at this location.

1.4.2 Lombard Avenue Design Options

A section of new track would have to be built in order to connect the Beaverton Transit Center, the northern terminus of the commuter rail line, with the existing freight rail line. The existing Union Pacific Railroad track alignment travels west as it goes through the intersection of Farmington Road and Lombard Avenue. There is no track for the portion of the commuter rail line that would extend from Farmington Road north into the transit center, a distance of about 2,000 feet. Initially, four different designs were considered for this segment of the tracks. All of the designs assume that Lombard Avenue would be realigned, as the City of Beaverton has proposed as part of a separate transportation improvement program. One design was eliminated due to unacceptable environmental impacts.



Washington County

Wilsonville to Beaverton Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corporation

N

Scale in Miles
1 0 1 2

Potential Commuter Rail Station
Transit Center
Proposed Alignment
Freeways

Figure 1.4-1

Proposed Alignment

Print Date: May 2000
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1) In the first design option (Figure 1.4-2), the tracks would occupy the median of a realigned Lombard Avenue, beginning at the intersection of Lombard and Farmington Road and then proceed north to the BTC, where they would terminate on the southeast edge of the facility. Seven businesses would have to be relocated if the rail line was constructed along this alignment. No residents would be displaced. This alignment would require the purchase of 1.94 acres of right-of-way and replacement of existing 90-degree parking stalls at the northwest corner of Lombard Avenue and Canyon Road with parallel parking spaces. This displaced parking is associated with the displaced businesses. In addition, five bus bays would have to be relocated at the BTC. The alignment would traverse Hall Creek.

2) In the second design option (Figure 1.4-3), the tracks would be located to the west of a realigned Lombard Avenue, beginning at the intersection of Lombard and Farmington Road and continuing to Broadway, where the tracks enter the median of Lombard and continue north until they turn northeast into the BTC. Five to seven businesses would have to be relocated if the rail line was constructed along this alignment and no residents would be displaced. This alignment would require the purchase of 1.6 acres of right-of-way. It would reduce existing on-street parking capacity along Lombard Avenue, between Canyon Road and Broadway, where a tire store and auto parts store are located. As with the first design, five bus bays would have to be relocated at the BTC. The alignment would traverse Hall Creek.

3) In the third design option (Figure 1.4-4), the tracks would proceed along the eastern edge of a realigned Lombard Avenue, beginning at the intersection of Lombard and Farmington Road and traveling north to the BTC terminus. Five to seven businesses would have to be relocated if the rail line was constructed along this alignment and no residents would be displaced. This alignment would require the purchase 1.21 acres of right-of-way. It would reduce existing on-street parking capacity along Lombard Avenue, between Canyon Road and Broadway, where a tire store and auto parts store are located. With this design, seven bus bays would have to be relocated at the BTC. The alignment would traverse Hall Creek.

Table 1.4-1 summarizes the characteristics and potential impacts of each of the three design options. The impacts of these three options are analyzed in this document.

Table 1.4-1
Lombard Avenue Alignment Design Options

Characteristics	Design Options		
	1) Median Running Straight Alignment	2) Median Curved Alignment	3) East Alignment
Number of businesses to be relocated	7	5 to 7	5 to 7
Number of relocated residences	0	0	0
Right-of-way acquisition (acres)	1.94	1.60	1.21
Parking impacts	Replaces 90-degree parking stalls at N.W. corner of Lombard and Canyon with parallel parking	Impacts parking at Tire Store and Auto Parts Store	Impacts parking at Tire Store and Auto Parts Store
Wetland impacts	Low Impact to Hall Creek and adjacent vegetation.	Low Impact to Hall Creek and adjacent vegetation.	Low Impact to Hall Creek and adjacent vegetation.
Bus bay relocation	5	5	7
Impacts to BTC bus operations	Temporary	Temporary	Temporary

Source: BRW, Inc., 2000

1.4.3 Maintenance and Storage Facility

The proposed project would include a maintenance/storage facility. The facility would be sized to provide storage for an initial fleet of six vehicles (three trains with two cars each) and allow for future expansion. The functions to be provided at the facility would be secure storage of vehicles, cleaning and inspection, light maintenance, operator reporting, and administration. All major maintenance would be performed under contract to a qualified vendor and be conducted off-site. Two potential maintenance facility sites are analyzed in this document.

1) Tigard Site - The first potential site for a maintenance facility is approximately in the middle of the corridor to the south of the proposed Tigard commuter rail station. Realignment of the existing tracks in the area may provide sufficient room for the facility within existing right-of-way. This option will be further examined during Preliminary Engineering.

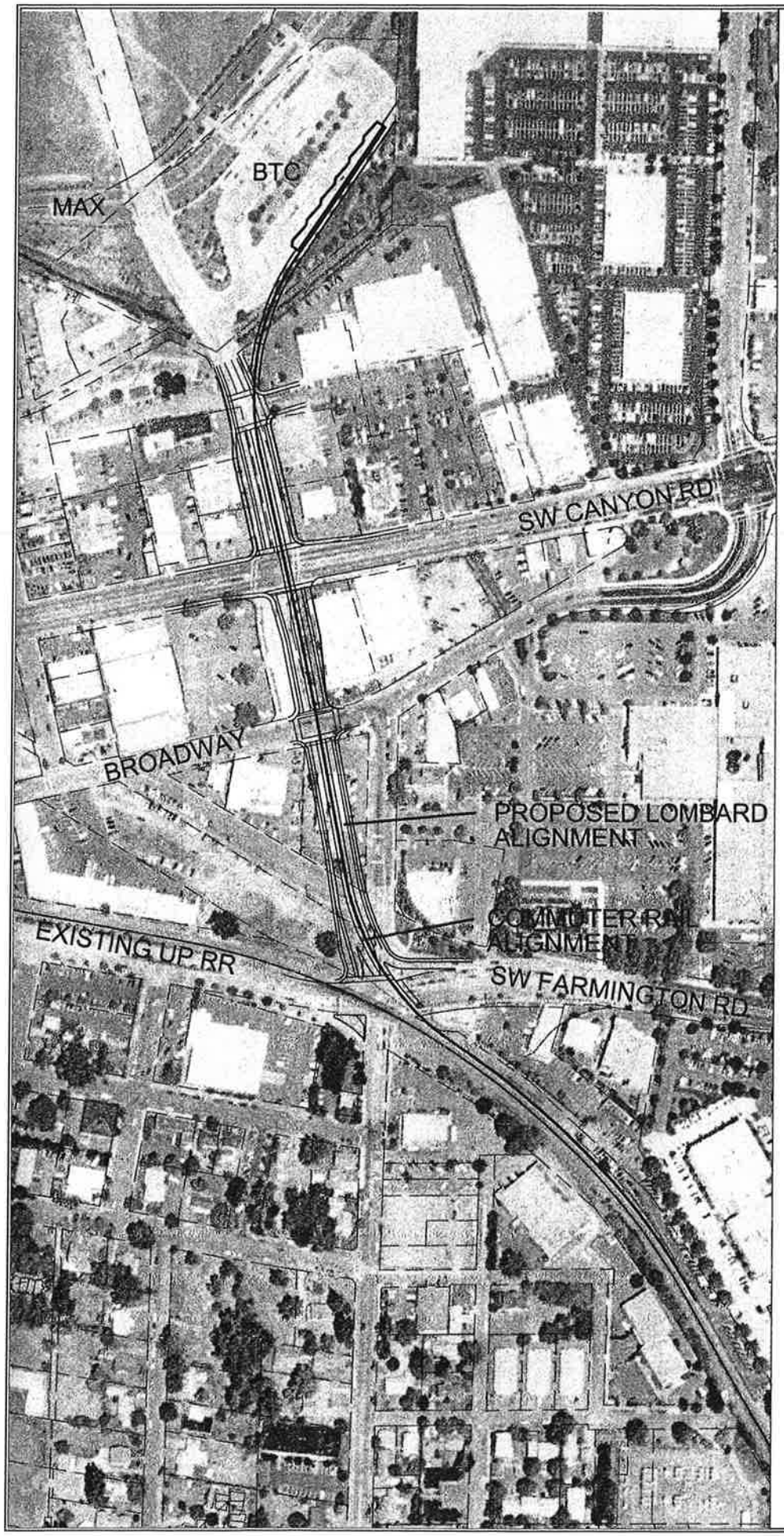
2) Wilsonville Site - The second potential site for a maintenance facility is between the proposed Boeckman Road and Wilsonville Road interchange, on either the east or west side of the existing alignment. This option will also be examined further during Preliminary Engineering.

1.5 RELATED PROJECTS

1.5.1 Transportation Projects

1.5.1.1 Oregon Department of Transportation (ODOT): Interstate 5, Highway 217 and Kruse Way Interchange

The Oregon Department of Transportation has recently awarded a contract for interchange improvements to the I-5/Highway 217/Kruse Way interchange. This project represents Phase I of the proposed interchange improvements. This project had been in the planning and design phase for several years. It is also included in the financially constrained RTP that is the basis for this project's



Washington County

Wilsonville to Beaverton

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Scale: 1"=300'

Figure 1.4-2

Design Option 1:

Median Running Straight

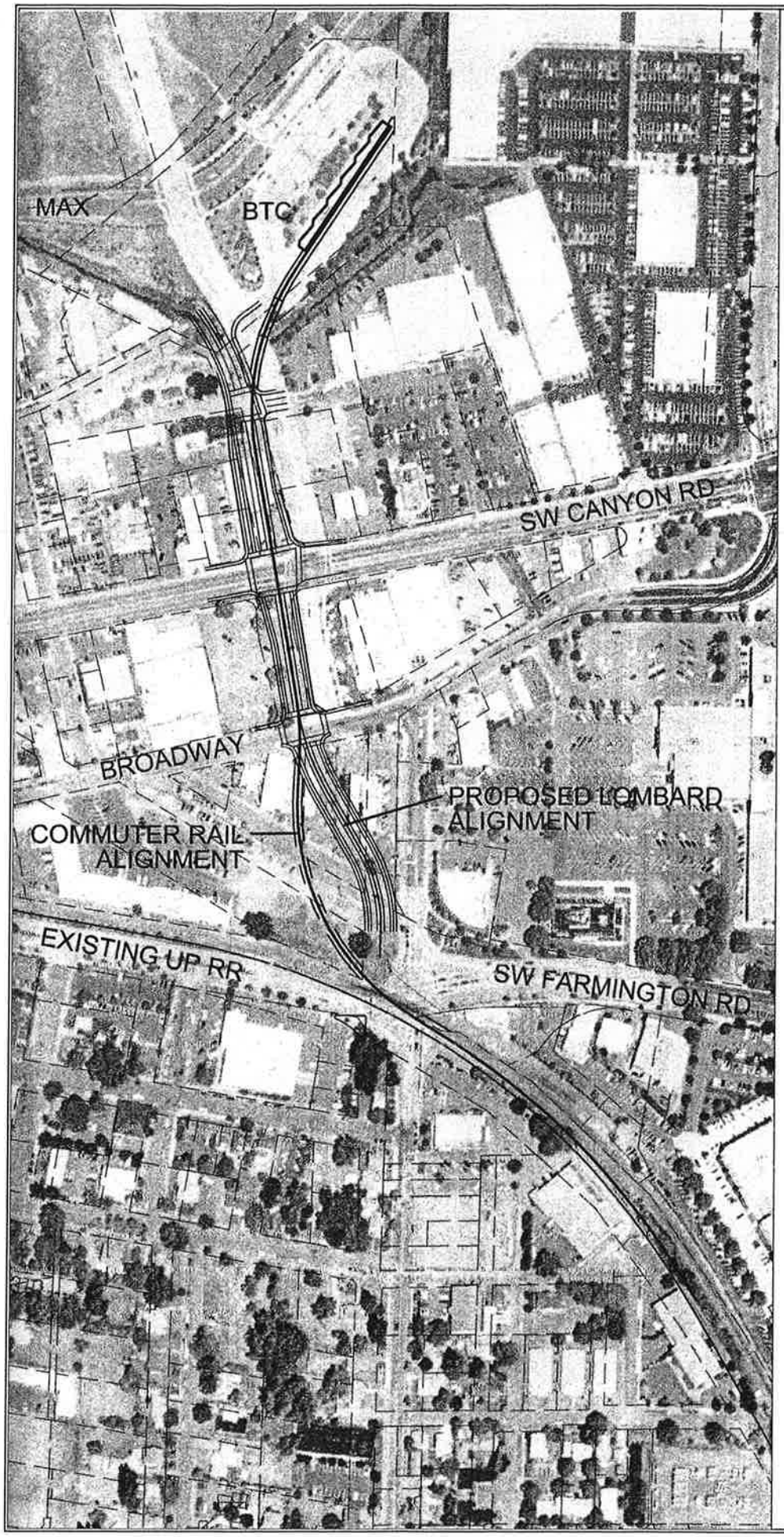

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Figure 1.4-3

Design Option 2:

Median Running Curved

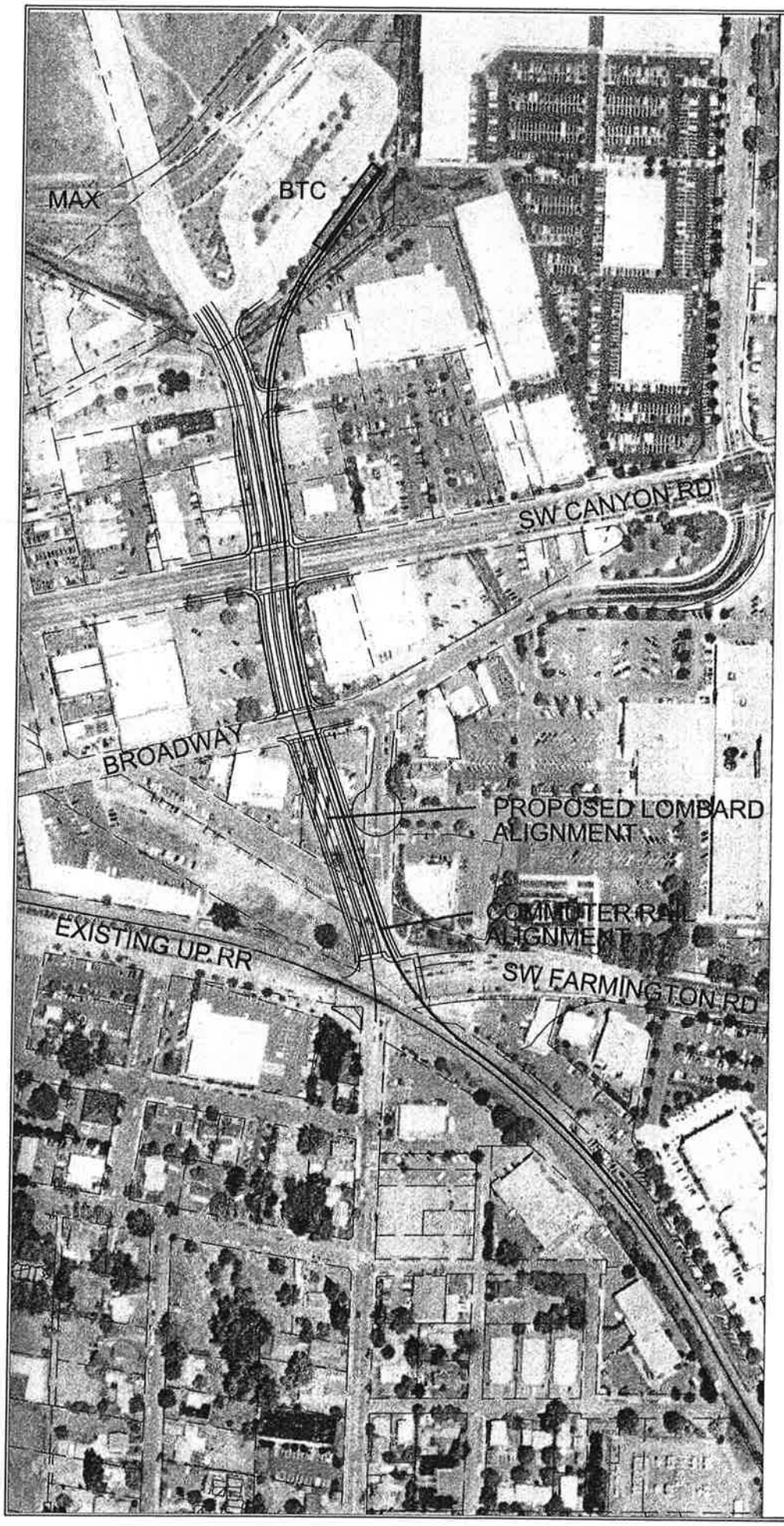

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Figure 1.4-4

Design Option 3:

East Side Running

No Build Alternative. The intent of this ODOT project is to construct interchange "fly-over" ramps that will greatly improve directional travel flow at this critical interchange. Construction is slated to begin in Spring 2000.

1.5.1.2 City of Beaverton: Lombard Avenue Realignment

The City of Beaverton is developing a project that is intended to realign a two-block portion of Lombard Avenue, between Broadway and Farmington Road. The project will realign this section with the existing grid and provide a north/south collector in downtown Beaverton. This project is included in the No Build Alternative and would occur under any alternative. The source of funds is Washington County's Major Street Transportation Improvement Program (MSTIP).

1.5.2 Regional Plans

1.5.2.1 Highway 217 Transportation Study

Metro will conduct a study to evaluate a wide range of options for improvements to Highway 217. Work on this study is anticipated to begin in spring 2000.

1.5.2.2 South Corridor Transportation Alternatives Study

Metro began a study in the Fall of 1999 that will examine transportation alternatives for serving Clackamas County. At the request of JPACT, this study will examine options for commuter rail service on the Portland and Western tracks connecting Milwaukie to Tualatin and/or Tigard.

1.5.2.3 Washington Square Regional Plan

The City of Tigard, in conjunction with other public and private partners, has recently completed a *Draft* Regional Center Plan for Washington Square. Metro's *2040 Growth Concept* identified the Washington Square "Regional Center" surrounding the node of the Washington Square Mall as a regional retail center. The overall vision calls for "a vital regional center serving the needs of Washington County residents for employment, housing, shopping and professional services", and includes the concept of a commuter rail line as part of the plan. Section 3.4, *Land Use and Planning Policy,* provides a more detailed description of this plan.

1.6 REQUIRED PERMIT APPROVALS

The permits and other regulatory requirements for approval of the proposed action are shown in Table 1.6-1.

Table 1.6-1
Potential Regulatory and Permitting Requirements and Clearances

Type/Agency	Regulatory Authority	Requirements	Notes
Section 404 (Wetlands) Permit Corps of Engineers Oregon Division of State Lands	Section 404, Clean Water Act	• Wetland delineation • Impact assessment • Permit Application • Mitigation plan • Functions and values assessment	Joint application with Oregon DSL removal and fill permit Would trigger 401 certification
Fish and Wildlife Coordination USFWS, NMFS, ODFW	Fish and Wildlife Coordination Act of 1934	• Consultations with fish and wildlife agencies • Project impacts on fish and wildlife resources; mitigation recommendations	Coordination occurs through the Corps; it provides direct input into the decision process by the state and federal fish and wildlife agencies
Water Quality Certification Oregon DEQ	Section 401, Clean Water Act	• Downstream water quality compliance • Flow impacts assessment • In-water construction impacts and restrictions	Federal permits cannot be issued without 401 certification
Oregon Removal and Fill Permit Oregon DSL	ORS 196.800-990	• Wetland delineation • Impact assessment and wetland mitigation plan • Functions and values assessment	Joint application with Corps of Engineers Section 404 Permit
NPDES Construction Permit Oregon DEQ	ORS 468.740	• Erosion control plan 30 days prior to start of construction	Required for construction activities (clearing, grading, and excavating) affecting five or more acres or bridge crossings
Cultural Resources Review State Historic Preservation Office	Section 106, Historic Preservation Act of 1966; Executive Order 11593 USDOT Act. Section 4F/6F	• Archaeological and historical resources reconnaissance; state records review	Required if federal funding and/or for fulfillment of Corps Section 404 Permit
Endangered Species Protection USFWS, NMFS, ODFW	Federal Endangered Species Act, Public Law 93-205 and Oregon State Endangered Species Act, ORS 496	• Identification of any occurrences of listed or proposed species in project area • Biological assessment for any potentially affected species • Possible assessment of sensitive species not yet listed or proposed for listing	Corps must initiate ESA review with appropriate agency(ies); it is expected that Corps would need clearance from USFWS, NMFS and FTA before authorizing the proposed action

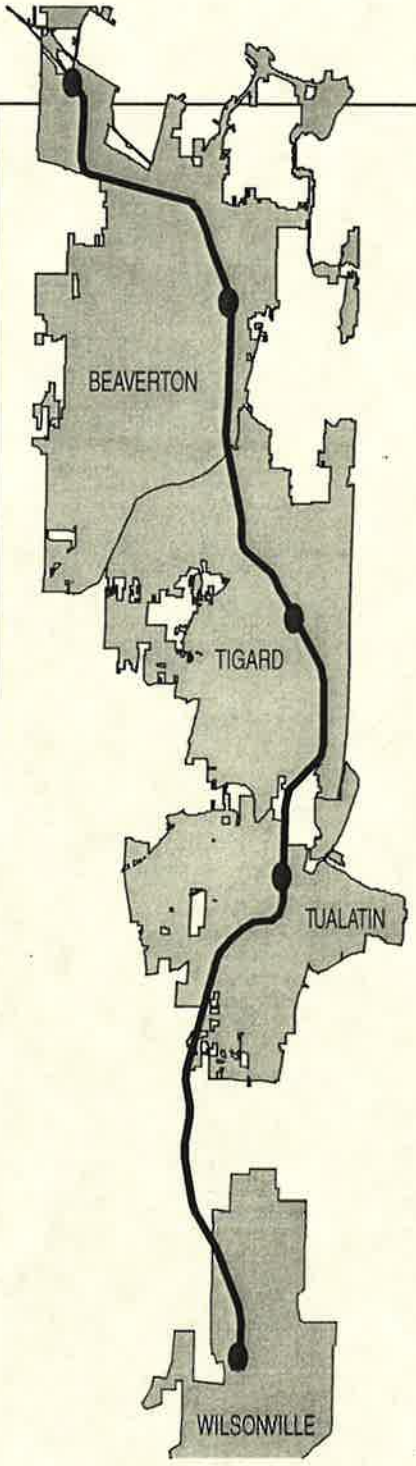
Table 1.6-1
Potential Regulatory and Permitting Requirements and Clearances

Type/Agency	Regulatory Authority	Requirements	Notes
Community Development Permit Washington County	Washington County Code 422	• Specific criteria and guidelines for construction	Necessary for development within Washington County
Easements	Private/ Public Lands	• Negotiated purchase or condemnation	Would be required for any access out of right-of-way
Railroad Crossings Oregon Department of Transportation	ODOT ORS 824.200 - 824.254	• Potential permit • Safety access issues	Necessary for road crossings
Floodplain Development Permit and Sensitive Lands Review Washington County and Cities	Chapter 178 and Code 18.84 USDOT, Order 5650.2	• Specific standards for construction in the floodplain • Standards for construction in wetlands and floodplains • Determination that the project will not cause significant encroachment into floodplain • Will not cause loss of significant beneficial floodplain values	Necessary for construction within floodplain; may also be needed for siding and Hedges Creek bridge replacement
Comprehensive Plan Amendment Planning Zone Changes Conditional Use Permits Cities of Beaverton and Wilsonville	City Codes	• Permit application • Potential traffic study	May require one or more in combination for the construction of stations
Other Federal Permits USDOT Environmental Justice Clearance	Title VI of 1964 Civil Rights Act 012898	• Show that no protected populations are required to bear an inordinate amount of impacts related to project	

Source: BRW, 1999

Chapter 2

Alternatives to the Proposed Action



Wilsonville to Beaverton
Commuter Rail

2.0 ALTERNATIVES TO THE PROPOSED ACTION

Two alternatives to the proposed action are analyzed in this EA: (1) the No Build Alternative, and (2) a Transportation System Management (TSM) Alternative. In addition, one "action" or "build" alternative was considered and rejected for further analysis: (1) a variant on the proposed action that would have located the northern terminus at the Merlo Road Light Rail Station in Beaverton (i.e., the Merlo Station Alternative). This section describes these three alternatives. Figure 2.1-1 depicts them.

2.1 ALTERNATIVES CONSIDERED

2.1.1 No Build Alternative

The No Build Alternative includes the existing transportation system plus highway and transit system improvements that are consistent with the Financially Constrained networks developed for the RTP. The No Build highway improvements consist of routine maintenance, minor roadway improvements, and a limited number of major highway projects. A list of these projects is available for review at Metro. The No Build Alternative includes transit service increases based on existing revenue sources, which would allow for service levels to increase by approximately 1.5 percent per year through 2020. The allocation of additional service hours was based on annual service plan improvements and RTP-based improvements in major corridors.

2.1.2 TSM Alternative

The TSM Alternative would improve upon the No Build Alternative by adding queue by-pass and other transit priority measures at key intersections. These intersection improvements would reduce travel times for several local bus lines within the corridor. The TSM Alternative would also add a limited-stop bus line on roads roughly paralleling the proposed 15.3-mile rail alignment from Wilsonville to Beaverton. The limited-stop bus line would operate at 15-minute headways and would travel in the service areas of both SMART and Tri-Met.

In addition to stopping at or near the locations of the five proposed commuter rail stations, the new bus line would stop at 13 other locations (see Table 2.1-1, Potential Limited Bus Line Stop Locations). These stops take advantage of transfer locations with other Tri-Met and SMART routes, existing Tri-Met park & ride locations, and activity centers. For the purpose of analyzing this alternative, Tri-Met assumed that additional parking would be available in Wilsonville and Tigard as outlined by the commuter rail proposal. By adding these facilities to the existing park & ride locations in the corridor, 1,147 total parking spaces would be available for riders of the proposed new bus line and the other bus routes in the corridor (see Table 2.1-2, Potential Locations of Park & Ride Facilities for Limited Bus Line).

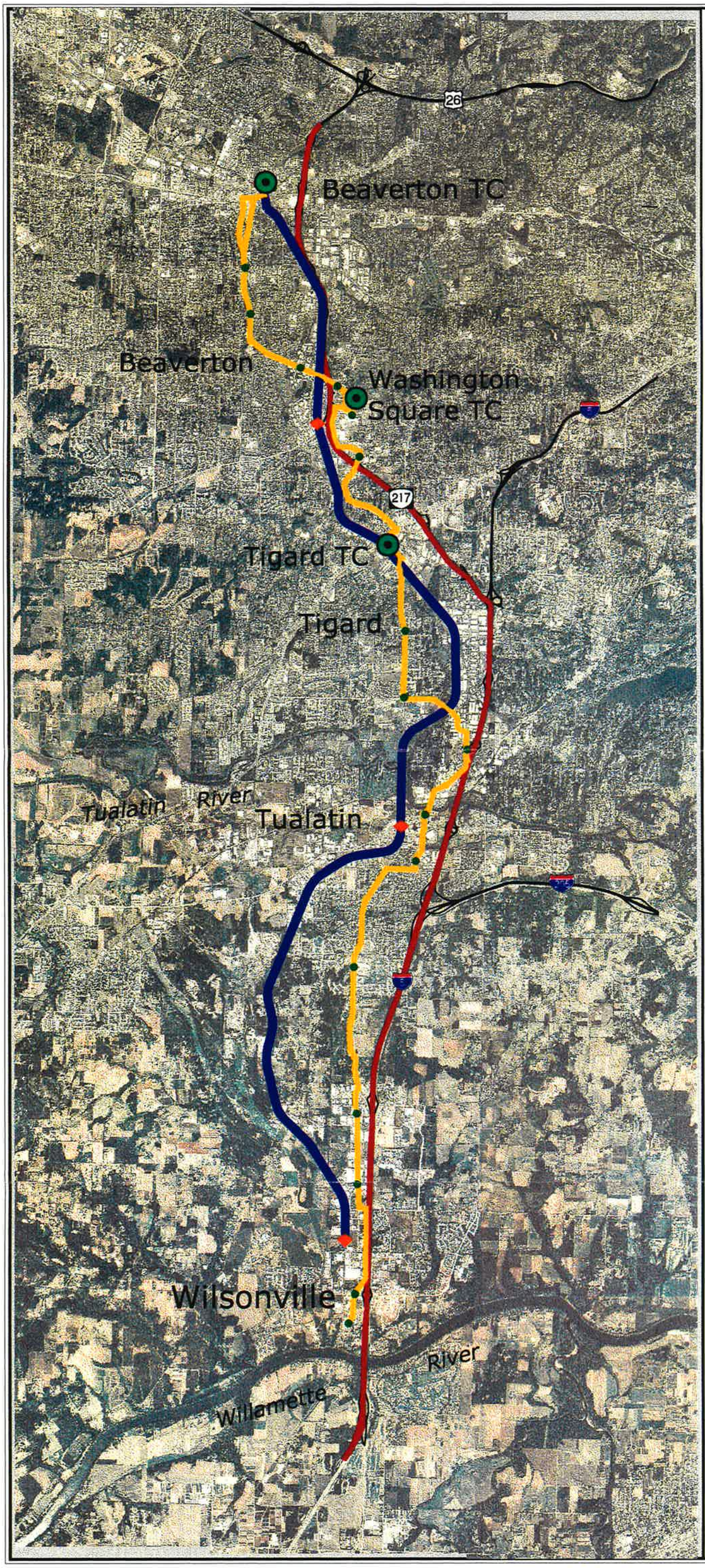
The TSM Alternative would treat 20 to 40 congested intersections with bus priority elements to improve bus travel times. Ten of these intersections have been initially identified (see Table 2.1-3, Potential TSM Bus Priority Intersection Locations). Initial estimates indicate that overall travel time of the new line could be reduced by up to ten percent. The intersection improvements would benefit both the new limited-stop bus line and portions of the existing Tri-Met lines 76 and 78, over which the new service is laid.

Table 2.1-1
Potential Limited Bus Line Stop Locations

Bus Stop Name	Location
Beaverton Transit Center	Beaverton Transit Center
Allen Boulevard	Hall Boulevard at Allen Boulevard
Denney Road.	Hall Boulevard at Denney Road
Nimbus Avenue	Hall Boulevard at Nimbus Avenue
Scholls Ferry Road	Hall Boulevard at Scholls Ferry Road
Washington Square Transit Center	Washington Square Transit Center
Washington Square Road	Greenburg Road at Washington Square Road
Tigard Transit Center	Tigard Transit Center
Bonita Road	Hall Boulevard at Bonita Road
Durham Road (Tigard High School)	Durham Road at Hall Boulevard
Tualatin Park & Ride	I-5 and 72nd Avenue
Tualatin Commons	Martinazzi Av. at Seneca Street
I-5 South/Mohawk Park & Ride	Martinazzi at Mohawk Street
Ibach (Tualatin High School)	Boones Ferry Road at Ibach
Commerce Circle	95th Av. at Commerce Circle
Hillman Court	95th Av. at Hillman Court
Wilsonville Road	Boones Ferry Road at Wilsonville Road
Wilsonville (school site)	Boones Ferry Road at Wilsonville Primary School

Source: Tri-Met, 1999

For modeling purposes, the limited-stop bus line (TSM) was analyzed at 15-minute headways. These headways are twice as frequent as those planned for the proposed commuter rail service. This change in the bus operations schedule was made as a result of comments made in the first round of public meetings. At these meetings, the public asked the project team to design the TSM Alternative such that its capacity was comparable to that of commuter rail. This 15-minute-headway peak service is better than any service that Tri-Met currently has planned for this or other suburb-to-suburb corridors. It was assumed that Tri-Met would run the new TSM bus lines between the schedules of bus lines 76 and 78, in both directions, during peak hours only. Capital costs for intersection improvements, two sets of vehicles, and added passenger amenities at stop locations are estimated to be $7 to $10 million.



Washington County

Wilsonville to Beaverton Commuter Rail

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Scale in Miles
1 0 1 2

- Potential Commuter Rail Station
- Proposed Alignment
- Transit Center
- TSM Bus Stop
- TSM Bus Route
- Freeways

Figure 2.1-1

Alternatives Considered

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Table 2.1-2
Potential Locations of Park & Rides for Limited Bus Line

Facility Name	Bus Stop	Location	Total # of Spaces	# of Spaces Available	Status
Bethel Congregational Church	Hall Boulevard at Allen Boulevard		50	30	Existing Tri-Met shared-use park & ride
Southminster Presbyterian Church	Hall Boulevard at Denney Road		20	15	Existing Tri-Met shared-use park & ride
Progress Park & Ride	Scholls Ferry Road at Hall Boulevard		130	70	Existing Tri-Met park & ride
Tigard Park & Ride	Tigard Transit Center	(TBD)	150	150	**New Facility** (from commuter rail)
Tualatin Park & Ride	Tualatin Park & Ride	I-5 & 72nd Avenue	385	0	Existing Tri-Met park & ride
I-5 South/Mohawk Park & Ride	Martinazzi & Mohawk		232	146	Existing Tri-Met park & ride
Wilsonville Park & Ride	Wilsonville	(school site)	180	180	**New Facility** (from commuter rail)
Total assumed park & ride spaces available to TSM Alternative			1,147	**591**	
Net increase in park & ride spaces above existing facilities			330	---	

Source: Tri-Met, 1999

Table 2.1-3[1]
Potential TSM Bus Priority Intersection Locations

Location/Cross Street
Canyon Road/Lombard Avenue
Hall Boulevard/Canyon Road
Watson Avenue/Canyon Road
Hall Boulevard/Farmington Road
Watson Avenue/Farmington Road
Hall Boulevard/Allen Boulevard
Hall Boulevard/Scholls Ferry Road
Greenburg Road/Pacific Hwy. 99W
Durham Road/Upper Boones Ferry Road
Boones Ferry Road/Lower Boones Ferry Road

Source: Tri-Met, 1999
[1]The TSM Alternative would improve 20-40 intersections; these 10 have been identified to date.

2.2 ALTERNATIVES CONSIDERED AND REJECTED

Early in the Alternatives Analysis process, one alternative was considered and rejected. It was a variation on the location of the northern terminus of the commuter line, which would have placed it at the Merlo Road Light Rail Station. The reason for rejecting this alternative is discussed below. The EA does not evaluate this alternative further. There were also four conceptual design options that

were developed in connection with the selected northern terminus at the Beaverton Transit Center. Three of these design options are analyzed in this EA. The fourth option was rejected from further study. The reasons for dropping this design option are described in Section 2.2.2, below. The other design options are described in Section 1.4.2.

2.2.1 Merlo Station Alternative

During the preliminary feasibility study (Phase I & II) the project considered two northern termini for the Commuter Rail Alternative, Merlo Road Station and Beaverton Transit Center. Either terminus would allow the commuter rail to connect with the existing light rail system. Both termini were presented to the public during the Alternatives Analysis phase of this study. At the end of that phase it was clear that there was little public support for the Merlo Road Station. The preliminary data generated for the Alternatives Analysis supported the public sentiment.

Reasons for eliminating the Merlo Road terminus include these factors:

- Minimal public support (see Chapter 5.0, Public Involvement);
- Eight additional gated crossings for the Merlo Road terminus, as compared to the Beaverton Transit Center terminus;
- Considerable out-of-direction travel for most commuter rail riders under the Merlo Road terminus;
- Potential adverse impacts to the Tualatin Hills Nature Preserve;
- Traffic impact along Tualatin Valley Highway; and
- Additional cost over what would be needed for a BTC terminus.

As a result, the Merlo Road terminus was dropped from further consideration.

2.2.2 Beaverton Transit Center, West Design Option

Four design options were developed for the terminus at Beaverton Transit Center. These alignment options utilize Lombard Avenue to access the Transit Center. There are two options that moved the track to either the west or east side of Lombard Avenue, and two track options were located in the center of Lombard Avenue. The option that utilized the west side of Lombard Avenue was eliminated from further consideration. Reasons for eliminating the west side option include:

- The displacement of two buildings, which house four businesses;
- The displacement of one apartment complex with low-income housing and associated potential Environmental Justice impacts; and
- Excessive right-of-way requirements.

As a result, the EA does not consider the west side conceptual design option in further analyses. Descriptions of the other three options have been refined and are described in Section 1.4.2.

Chapter 3

Affected Environment, Potential Impacts, and Mitigation Measures

Wilsonville to Beaverton Commuter Rail

3.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

3.1 TRAFFIC AND TRANSPORTATION

3.1.1 Affected Environment

3.1.1.1 Transit

Two transit agencies provide public transit service in the western part of the Portland Metropolitan area: the Tri-County Metropolitan Transportation District of Oregon (Tri-Met) and the City of Wilsonville. Tri-Met provides services within Washington, Clackamas, and Multnomah counties. It serves a population of nearly one million people and covers a service area of about 600 square miles. The City of Wilsonville operates South Metro Area Rapid Transit (SMART), providing fixed-route, demand-responsive and subscription bus services to a population of roughly 10,000 in a 12-square-mile area.

Tri-Met currently operates a fleet of 579 buses on a total of 94 bus lines. Tri-Met also operates a fleet of 78 light rail vehicles serving the existing MAX light rail lines. Tri-Met provides weekday transit service between the hours of 4:30 a.m. and 1:30 a.m. During mid-day periods, major urban bus lines and the MAX light rail lines typically operate on 10- and 15-minute headways. Suburban trunk bus lines and feeder bus lines operate on headways of about 30 minutes to one hour depending on the service area. During the 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6 p.m. peak periods, the major urban bus lines and the MAX light rail lines operate at 5- and 10-minute headways, while the suburban trunk bus lines and the feeder bus lines operate on headways of about 15 to 30 minutes. A listing of the transit services currently provided by Tri-Met and the City of Wilsonville in the study corridor is provided in Table 3.1-1 and illustrated graphically in Figures 3.1-1 to 3.1-3. The service provided by Tri-Met includes the MAX light rail line, which connects to the corridor at the Beaverton Transit Center. There are currently about 2,400 light rail boardings and 2,400 deboardings at the Beaverton Transit Center on an average weekday. Current bus boardings at the Beaverton Transit Center are about 4,200 and deboardings are about 3,400 on an average weekday.

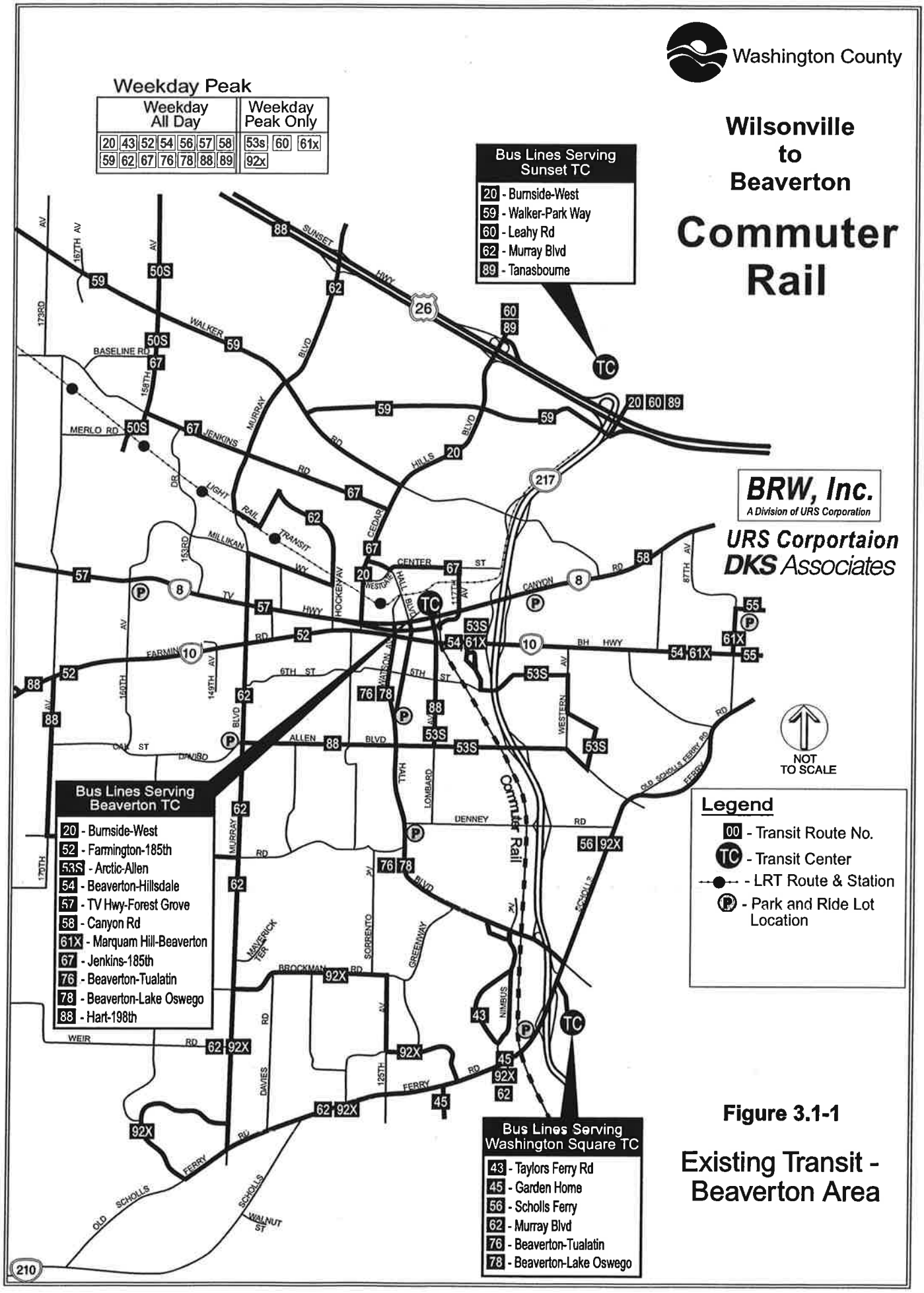
Tri-Met provides service to and from three major transit centers in the corridor: the Beaverton Transit Center, the Washington Square Transit Center, and the Tigard Transit Center.

The City of Wilsonville operates five fixed routes as well as demand-responsive and subscription service for passengers with special needs.

Table 3.1-1
Characteristics of Existing Fixed-Route Bus Transit Services in the Corridor

Location Served/Bus Route	Peak-Period Headways	Off-Peak Headways	1999 Daily Outbound Boardings	1999 Daily Inbound Boardings
Beaverton Transportation Center				
20-Burnside	15	30	3271	3080
52-Farmington-185th*	15	15	1465	1379
53S-Artic-Allen*	30	-	112	112
54-Beaverton-Hillsdale	20	30	1202	1269
57-TV Highway-Forest Grove	15	30	2950	2618
58-Canyon Road	15	30	1173	1008
61X-Marquam Hill-Beaverton	30	-	114	127
67-Jenkins-158th	30	60	384	368
76-Tigard-Tualatin	25	30	1207	1068
78-Beaverton-Lake Oswego*	20	30	1262	967
88-Hart/198th	30	30	680	483
Washington Square Transit Center				
43-Taylors Ferry Rd.	30	60	497	445
45-Garden Home	20	60	663	664
56-Scholls Ferry	15	30	1032	1040
62-Murray Blvd.	15	30	998	986
76 & 78 (see above)				
Other Washington Square Area				
92X-So. Beaverton Express	15	-	269	362
Tigard Transit Center				
12-Barbur Blvd	10	15	2961	2966
44-King City	30	60	110	19
64X-Marquam Hill /Tigard	30	-	146	168
45, 76 & 78 (see above)				
Other Tigard				
95X-Tigard I-5 Express	20	-	225	178
Tualatin Area				
37-North Shore	30	120	86	84
38-Boones Ferry Rd.	30	120	241	240
96-Tualatin I-5*	10	60	946	921
Wilsonville Area				
96 (see above)				
201-Barbur (SMART)	30-60	120	Total -190	
202-Oregon City (SMART)	90	120	Total - 60	
203-North/South Loop (SMART)	30-60	-	Total - 50	
204-Wilsonville Rd. (SMART)	40	60	Total - 170	
1X-Salem (SMART)	60	-	Total - 110	
* Less frequent service provided to portion or end of route.				

Source: Tri-Met, 1999 Passenger Census


Washington County
Wilsonville to Beaverton
Commuter Rail
Weekday Peak
Weekday All Day
20 43 52 54 56 57 58
59 62 67 76 78 88 89
Weekday Peak Only
53s 60 61x
92x
Bus Lines Serving Sunset TC
20 - Burnside-West
59 - Walker-Park Way
60 - Leahy Rd
62 - Murray Blvd
89 - Tanasbourne
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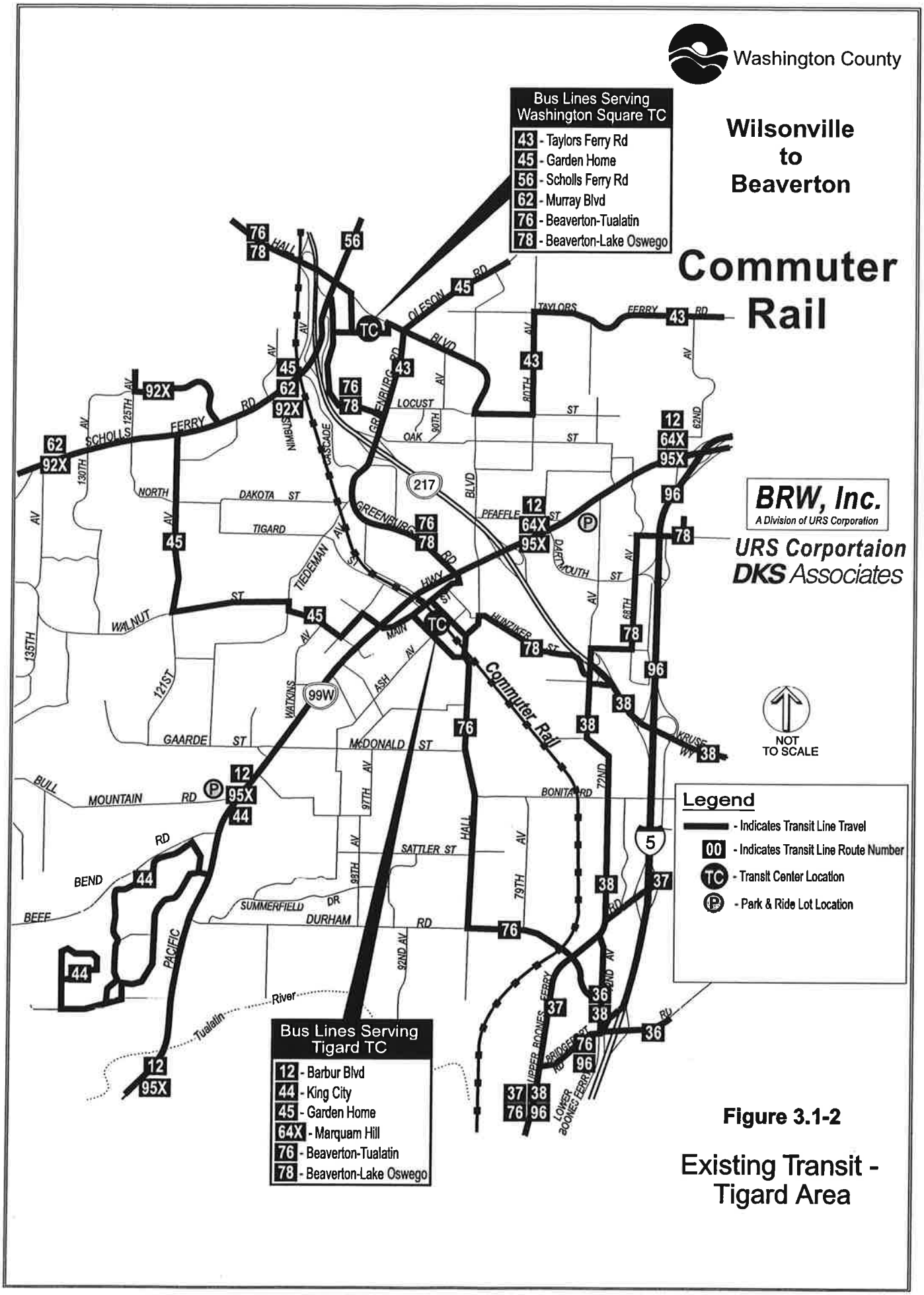
URS Corportaion
DKS Associates
NOT TO SCALE
Bus Lines Serving Beaverton TC
20 - Burnside-West
52 - Farmington-185th
53S - Arctic-Allen
54 - Beaverton-Hillsdale
57 - TV Hwy-Forest Grove
58 - Canyon Rd
61X - Marquam Hill-Beaverton
67 - Jenkins-185th
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
88 - Hart-198th
Legend
00 - Transit Route No.
TC - Transit Center
- LRT Route & Station
P - Park and Ride Lot Location
Commuter Rail
Bus Lines Serving Washington Square TC
43 - Taylors Ferry Rd
45 - Garden Home
56 - Scholls Ferry
62 - Murray Blvd
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
SUNSET HWY
WALKER RD
BASELINE RD
MERLO RD
JENKINS RD
MURRAY BLVD
CEDAR HILLS BLVD
MILLIKAN WY
CENTER ST
HALL BLVD
CANYON RD
BH HWY
FARMINGTON RD
6TH ST
ALLEN BLVD
OAK ST
DENNEY RD
BROCKMAN RD
WEIR RD
FERRY RD
OLD SCHOLLS FERRY RD
SCHOLLS FERRY RD
WALNUT ST
LIGHT RAIL TRANSIT
HALL
LOMBARD
WESTERN
GREENWAY
SORRENTO
MAVERICK TER
DAVIES
NIMBUS
125TH
158TH
153RD
150TH
145TH
117TH
87TH
173RD
185TH
Figure 3.1-1
Existing Transit - Beaverton Area


Washington County
Wilsonville to Beaverton
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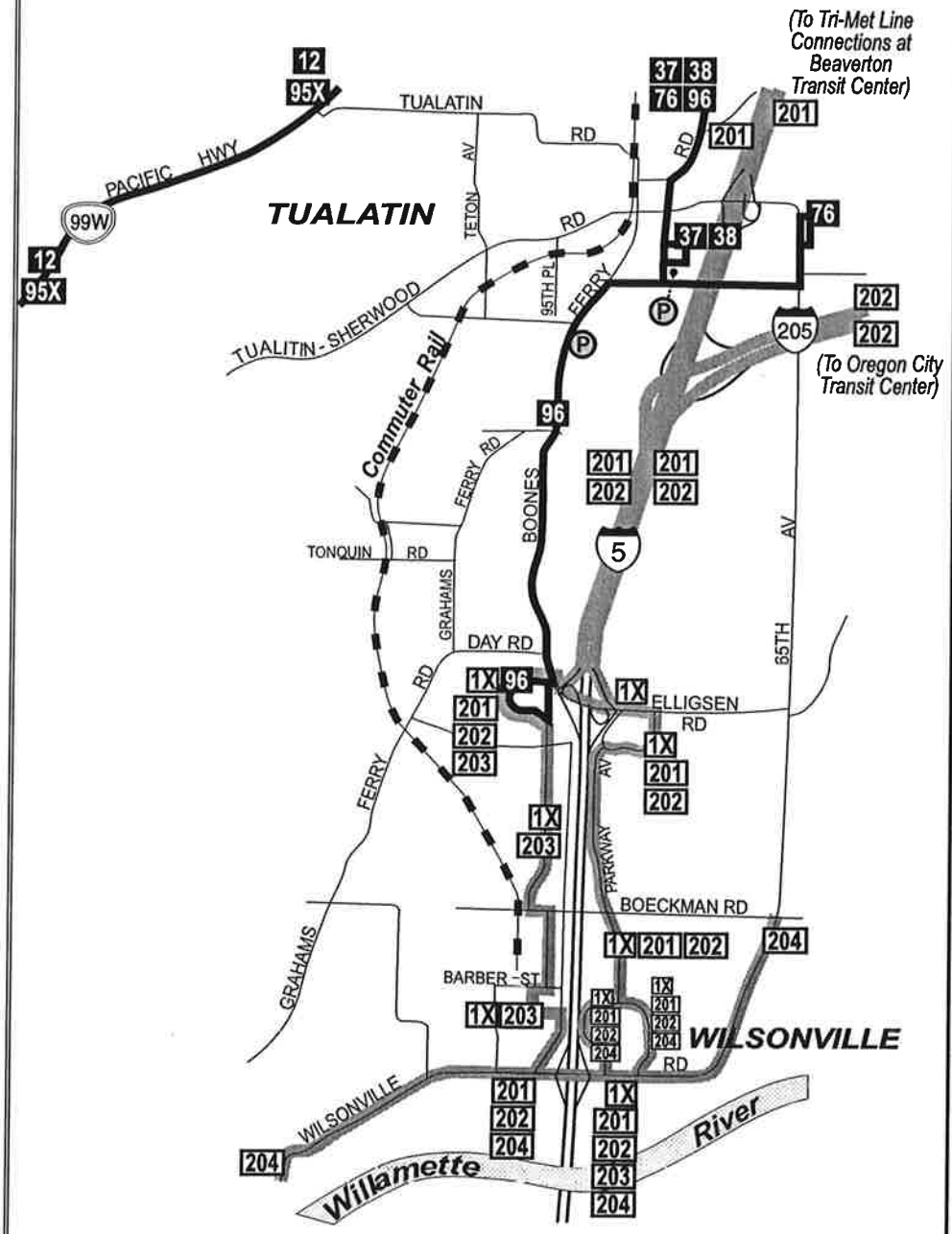
62 - Murray Blvd
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
BRW, Inc.
A Division of URS Corporation
URS Corportaion
DKS Associates
NOT TO SCALE
Legend
- Indicates Transit Line Travel
00 - Indicates Transit Line Route Number
TC - Transit Center Location
P - Park & Ride Lot Location
Bus Lines Serving Tigard TC
12 - Barbur Blvd
44 - King City
45 - Garden Home
64X - Marquam Hill
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
Commuter Rail
Tualatin River
Figure 3.1-2
Existing Transit - Tigard Area



Washington County

Wilsonville to Beaverton

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- 00 - Indicates **Tri-Met** Transit Line Travel with Route Number
- 00 - Indicates **SMART** Transit Line Travel with Route Number
- (P) - Tri-met Park & Ride Lot Location

Figure 3.1-3

Existing Transit - Tualatin/Wilsonville Area

Planned Transit Improvements

The RTP Public Transportation System plan and map include several routes, some of which connect in the corridor. These are summarized in Table 3.1-2. No specific regional transit improvements are planned along the corridor other than those being studied in this project.

Table 3.1-2
Metro Regional Public Transportation Service Designations in the Corridor

Frequent Bus	Regional Bus	Radial Community Service
Hall Boulevard (Routes #76 & 78)	Canyon Road (Route #58)	Beaverton Regional Center
Beaverton-Hillsdale Hwy. (Routes #54 & 56)	Farmington Road (Route #52)	Washington Square Regional Center
TV Highway (Route #58)	Scholls Ferry Road (Routes #56 & 62)	
	Pacific Highway [Hwy 99W] (Route #12)	
	72nd Avenue (Route #38)	**Potential Neighbor City Transit**
Light Rail Transit	Boones Ferry Road (Route #96)	Salem
MAX	Tualatin-Sherwood Hwy	

Source: DKS

3.1.1.2 Roadway Network

A network of highways, streets and intersections serve the corridor. These facilities are under the jurisdiction of the Oregon Department of Transportation, Washington County, Clackamas County and the cities of Beaverton, Tigard, Tualatin and Wilsonville.

I-5, Highway 217, Highway 99W, Hall Boulevard, and Boones Ferry Road provide the major north-south access in the corridor. I-5 is the major north-south interstate highway on the west coast of the United States, connecting Washington, Oregon, and California; and connecting the United States with Canada and Mexico. The freeway is fully access controlled with interchanges roughly every mile in this corridor. I-5 provides the most direct connection of the southern half of the corridor with downtown Portland and points north of Portland. The highway has three lanes in each direction between Wilsonville Road and downtown Portland with auxiliary lanes on key segments.

Highway 217 connects I-5 with Highway 99W, US 26, and other points in eastern Washington County. Highway 217 is currently classified by ODOT as a statewide highway (expressway) and as a freeway by the cities of Beaverton, Tigard, Tualatin, and Wilsonville. It has two lanes in each direction with auxiliary lanes over its entire length. It is also a limited access freeway facility, with interchanges spaced less than a mile apart. Vehicle flow on Highway 217 is managed using ramp metering during the peak commute periods.

Highway 99W is a principal arterial with very little access control. ODOT classifies 99W as a statewide highway as part of the national highway system. Because it angles from the southwest edge of the Portland region northeast across the region, it provides both north-south and east-west access

in the corridor. Highway 99W has five lanes with signalized intersections roughly every quarter mile (or less).

Hall Boulevard is currently classified as a minor arterial by Washington County and Metro, and as an arterial by Tigard and Beaverton. East of Highway 217, ODOT classifies Hall Boulevard as a district highway. It provides north-south and east-west circulation through the study area.

Boones Ferry Road provides north-south circulation parallel to I-5, from Wilsonville Road at the southern end of the corridor to I-5 in Tigard. Boones Ferry Road is classified as a minor arterial. Together with Hall Boulevard, Boones Ferry Road forms a corridor parallel to I-5 and Highway 217 as well as to the existing Portland & Western railroad tracks.

East-west access is provided in the corridor by three additional state routes: SW Scholls Ferry Road, Farmington Road/Beaverton-Hillsdale Highway, and Canyon Road/Tualatin Valley Highway. Other significant roadways providing east-west circulation include Durham Road, Tualatin Road, Tualatin-Sherwood Road, and Wilsonville Road.

Table 3.1-3 contains a summary of the functional classification and number of lanes for the major roadways in the corridor.

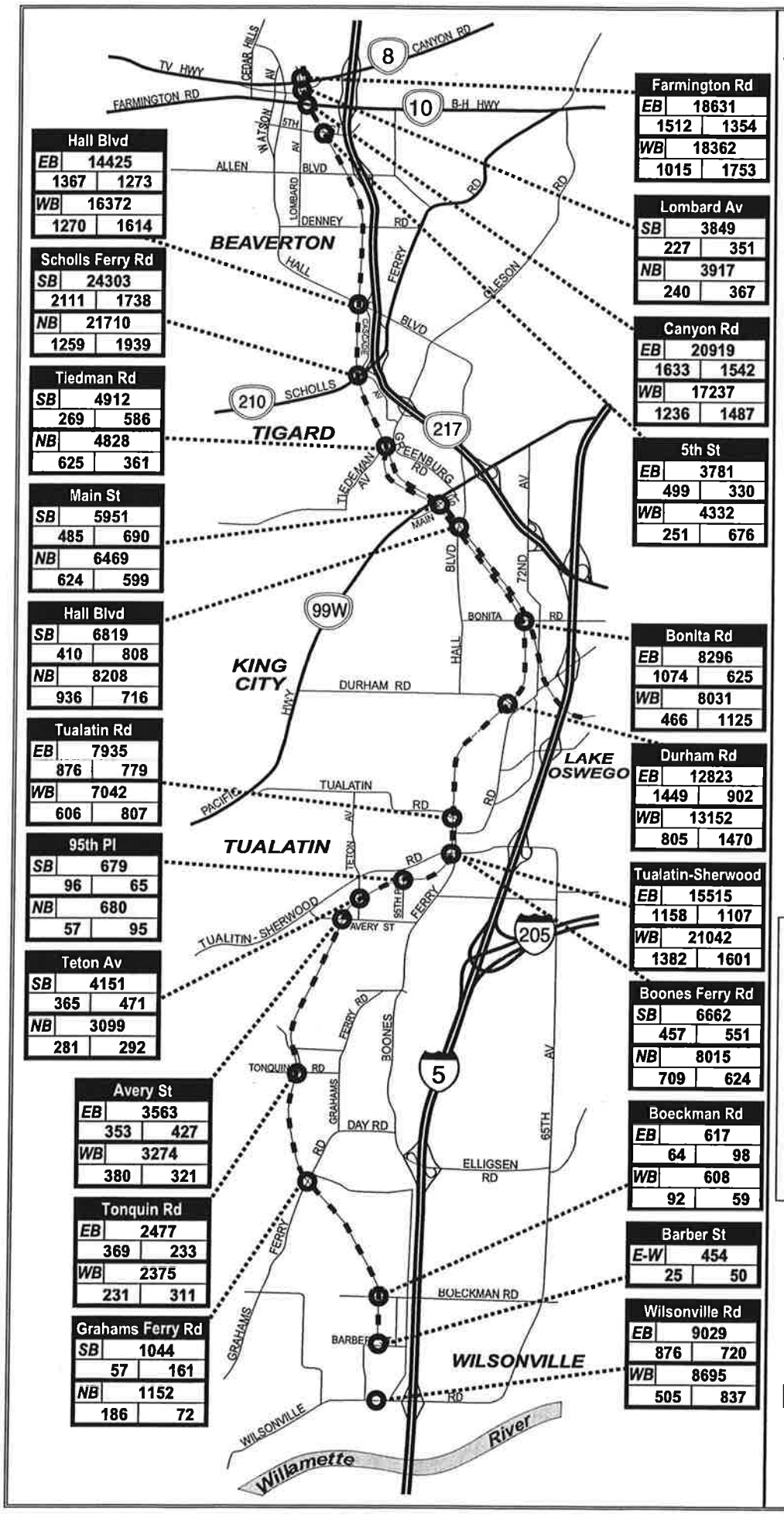
Table 3.1-3
Summary of Functional Classification for Major Corridor Roadways

Street	O	M	W	B	T	Tu	Wi	Lanes
Canyon Road/TV Highway (Highway 8)	DH	PA	MA	A				5
Beaverton-Hillsdale Hwy/ Farmington Road (Highway 10)	DH	MA	MA	A				5
Scholls Ferry Road (Highway 210)	DH	MA	MA	A	PA			5
Durham Road		MiA	MiA		A			3
Tualatin Road		MiA	MiA					3
Tualatin-Sherwood Road		MiA	MiA					5
Wilsonville Road							MA	5

Source: DKS
O=ODOT, M=Metro, W=Washington County, B=Beaverton, T=Tigard, Tu=Tualatin, Wi=Wilsonville
DH=District Highway, PA=Principal Arterial, MA=Major Arterial, MiA=Minor Arterial, A=Arterial

The existing traffic volumes on the key arterial roadways described above are illustrated in Figure 3.1-4.

Travel time for motor vehicle trips in the corridor was sampled on Highway 217 and I-5 from Beaverton to Wilsonville in the a.m. and p.m. peak periods. The results are summarized in Table 3.1-4. Travel times can vary dramatically depending upon incidents and weather conditions. For the typical days that the surveys were conducted in March 2000, the total travel times ranged from 25 to 30 minutes. (This included surface street time to Wilsonville Road/Kinsman and Murray/Canyon.)



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Street Name	
1.	2.
AM	PM
1.	2.
AM	PM

1. - Direction
2. - 24 Hour Daily Volume
AM - AM Peak Hour Volume
PM - PM Peak Hour Volume
- Commuter Rail Alignment

Figure 3.1-4

Existing Traffic Volumes at Railroad Crossings

Table 3.1-4
Sample of Existing Peak Period Freeway Travel Times in Corridor

Segment		AM Run	PM Run
Hwy 217: B-H Hwy to I-5	(5.51 mi.)		
	Northbound	8.5 min (39 mph)	9.6 min (34 mph)
	Southbound	11 min (30 mph)	11 min (30 mph)
I-5: Hwy 217 to I-205	(3.54 mi.)		
	Northbound	6 min (35 mph)	4.5 min (49 mph)
	Southbound	3.8 min (55 mph)	3.5 min (59 mph)
I-5: I-205 to Wilsonville Road	(4.43 mi.)		
	Northbound	4.3 min (61 mph)	4.5 min (60 mph)
	Southbound	5.8 min (46 mph)	5 min (55 mph)
Local Street Time (Beaverton/Wilsonville)			
	Northbound	8.9 min (13 mph)	5.9 min (20 mph)
	Southbound	5 min (24 mph)	4.8 min (25 mph)
Overall Corridor Total			
	Northbound	27.8 min (33 mph)	26.6 min (35 mph)
	Southbound	27.3 min (34 mph)	25.6 min (36 mph)

Source: Field surveys, March 2000, DKS Associates.

Planned Roadway Improvements

Planned improvements to the corridor roadway network include the following: (Of these 12 planned projects, less than half would be considered funded.)

- Highway 217 Improvements - Redesign numerous interchanges or ramps in the corridor, including the interchanges with Greenburg Road, Denny Road, and 72nd Avenue.
- Lombard Improvements - Realign the street and add turn lanes from Broadway Avenue to Farmington Road to improve access to the regional transit center. This project will also include the addition of sidewalks.
- Allen Boulevard Improvements - Widen the street to five lanes from Highway 217 to Murray Boulevard and add bicycle lanes and sidewalks.
- Hall Boulevard Improvements - Widen the street to five lanes from Scholls Ferry Road to Locust Street and provide bicycle lanes and sidewalks.
- Scholls Ferry Road Improvements - Widen the street to add turn lanes, sidewalks and bicycle lanes from Hamilton Street to Garden Home Road.
- Highway 99W Improvements - Widen the highway to seven lanes from I-5 to Highway 217; retrofit the street from Hall Boulevard to Greenburg Road to include bicycle lanes.
- Upper Boones Ferry Road Improvements - Widen the street to five lanes from I-5 to Durham Road.
- Durham Road Improvements - Widen the street from Hall Boulevard to 99W and add bicycle lanes and sidewalks.
- Tualatin Road Improvements - Widen the Street from 115th Avenue to Boones Ferry Road to include sidewalks and bicycle lanes.
- Boones Ferry Road Improvements - Widen the street to three lanes from Durham Road to Elligsen Road in Wilsonville and include completion of sidewalks and bicycle lanes.
- Tualatin-Sherwood Road Improvements - Widen street to five lanes from 99W to Teton Avenue and include sidewalks bicycle lanes and signal improvements.

- Kinsman Road Extension - Construct a two-lane extension of the street from Barber Street to Ridder Road with sidewalks and bicycle lanes. This will provide an alternative north-south route to Boones Ferry road and I-5 for local travel.

3.1.1.3 Parking

Off-street parking is provided free by virtually all businesses and multi-family residential developments in the corridor. Some limited on-street parking is also provided in the town centers at no charge. There currently is no evidence of a shortage of parking anywhere in the corridor, although the Oregon Transportation Planning Rule requires that all jurisdictions develop a strategy for reducing the number of parking spaces per capita in each jurisdiction. Regional transportation policy requires that each jurisdiction also develop maximum parking ratios (spaces per 1,000 square feet of new development) that would provide an incentive for use of alternative transportation modes.

Nine park & rides currently provide 1,255 spaces on transit routes in the corridor. These do not include park & ride lots associated with light rail transit. The nine park & rides are at the following locations:

- Montgomery Wards, 4401 SW 110th Beaverton - 170 spaces (adjacent to Beaverton Transit Center)
- Bethel Congregational Church, 5150 SW Watson Rd., Beaverton - 50 spaces
- Southminister Presbyterian Church, 12250 SW Denney at Hall Blvd., Beaverton - 20 spaces
- Progress Park & Ride, Scholls Ferry and Highway 217 - 122 spaces (adjacent to Washington Square Transit Center)
- Tigard Park & Ride, SW 74th and Pacific Highway - 220 spaces
- Christ the King Lutheran Church, 11305 SW Bull Mt. Rd. at 99W, Tigard - 48 spaces
- Tualatin Park & Ride, I-5 and 72nd Ave. - 385 spaces
- Mohawk Park & Ride, SW Martinazzi and Mohawk, Tualatin - 220 spaces
- Boones Ferry Community Church, 20500 SW Boones Ferry Rd., Tualatin - 20 spaces

Planned improvements for parking include expansion of the park & ride at Wilsonville Town Center.

3.1.1.4 Bicycles and Pedestrians

Five "Pedestrian Districts" are identified in *Draft 1999 Regional Transportation Plan* along or near the corridor: Beaverton Regional Center, Washington Square Regional Center, Tigard Town Center, Tualatin Town Center, and Wilsonville Town Center. These five centers are also served by seven Transit/Mixed Use Corridors (Canyon Road/Tualatin Valley Highway, Farmington Road, Hall Boulevard, Scholls Ferry Road, SW Pacific Highway (Highway 99W), and Boones Ferry Road). A "Multi-use Facility with Pedestrian Transportation Function" follows Fanno Creek from Highway 217 to Tigard. Extensions of this multi-use facility are planned to the north through the Beaverton Transit Center and south to Boones Ferry Road in Tigard.

Major regional bicycle routes are currently located on portions of the following roadways (some gaps still exist in each route where bike lanes do not exist):

- Tualatin Valley Highway
- Farmington Road
- Hall Boulevard

- Scholls Ferry Road
- McDonald Street
- Durham Road
- Boones Ferry Road
- Wilsonville Road

Planned improvements to bicycle and pedestrian facilities include the following:

- Addition of sidewalks and bicycle lanes on Farmington Road, Beaverton-Hillsdale Highway, Canyon Road, Tualatin Valley Highway, Watson Avenue, Hall Boulevard, Allen Boulevard, Greenburg Road, Nimbus Drive, Scholls Ferry Road, Highway 99W (bicycle lanes only), Tualatin Road, Tualatin-Sherwood Road, Boones Ferry Road, Kinsman Road, and Wilsonville Road (bicycle lanes only).
- Improvement of the sidewalks and pedestrian connectivity throughout Beaverton Regional Center, Washington Square, Tualatin Town Center, and Wilsonville Town Center.
- Extension of the Fanno Creek Greenway multi-use path from Tigard to Tualatin and north of Washington Square to Allen Boulevard.
- Study of the feasibility of a new multi-use trail along Beaver Creek from Rock Creek to the Fanno Creek Greenway.

3.1.1.5 Travel Patterns

Roughly half of the daily travel in the study area is internal trips. The remainder of travel is fairly evenly distributed between trips to and from northern Washington County (17.5 percent), trips to and from Portland (18.0 percent), and trips to and from other parts of the region (17.5 percent). Based on travel forecasts prepared by Metro, the greatest percentage growth in travel for the study area by 2020 is likely to be internal trips, trips to and from northern Washington County, and trips to and from Clackamas County, each growing by about 50 percent from 1994 to 2020. By contrast, trips to and from Portland are expected to increase by only 24 percent. Vehicular travel in the study corridor is predicted to grow by 30 to 35 percent, although the growth of some facilities may be considerably higher.

Transit presently accounts for only about two percent of all the travel into, out of, and within the study area corridor. The percentage is higher for trips to the Portland Central City area. Prior to the initiation of the Westside light rail service, approximately seven percent of the trips from the study area to the Portland Central City were by transit. By 2020 this percentage is expected to be roughly 20 percent.

3.1.2 Potential Impacts

3.1.2.1 Relationship to the Regional Transportation Plan

The Regional Transportation Plan (RTP) is currently being updated. The *Adoption Draft* (November 1999) includes a "Preferred" and a "Strategic" 20-year highway and transit plan. These two planning scenarios include highway and transit improvements recommended by local jurisdictions and regional agencies for implementation over the 20-year planning horizon. Both of the scenarios were developed to support and implement the land use policies developed through the *Region 2040 Growth Concept* and the *Regional Framework Plan.*

The Preferred scenario includes a greater level of investment in both highway and transit improvements than the Strategic scenario. Even the Strategic scenario includes a substantial investment in the regional transportation system, much of which is beyond the level of existing revenue sources. The next step in the development of the RTP includes preparing a "Financially Constrained" 20-year plan.

The travel forecasts prepared for the Wilsonville to Beaverton Commuter Rail project used 2020 highway and transit networks that were developed to be consistent with the Regional Framework Plan and RTP policies. These networks are not directly comparable to either the Preferred or the Strategic RTP scenarios. The networks used for this forecast include highway and transit improvements that are achievable within existing or committed revenue sources. These networks are similar to, but not the same as, the RTP Financially Constrained networks that will be developed in the Spring of 2000.

A conservative or financially constrained assumption was necessary in order to analyze the transportation impacts of the alternatives. There are two reasons for a financially constrained approach; 1) the uncertainty associated with future highway and transit funding; and 2) the need for the project to demonstrate to the Federal Transit Administration that the transportation analysis is based upon a realistic and affordable transit system. The regional highway and transit networks are essentially the same as the networks used for the Interstate MAX Final Environmental Impact Statement (FEIS) transportation analysis of 1999.

3.1.2.2 No Build Alternative

The 2020 No Build Alternative would maintain the existing transportation and transit system. There are no planned transit improvements for the project corridor, other than Tri-Met's annual 1.5 percent growth in service. As mentioned previously, there are 12 planned improvement projects to the corridor roadway network, of which less than half would be considered funded. Travel in the project corridor would be impacted by the projected increase in congestion throughout the region.

3.1.2.3 TSM Alternative

Under the TSM Alternative, the existing transportation system would remain unchanged with the exception of the transit priority improvements at ten intersections, initially, and then up to 40 intersections. The TSM Alternative would increase the public transit service connecting residents and employees within the project corridor during commute hours. The TSM Alternative would include 18 improved transit stops (i.e., five station and 13 additional sites) and expanded park & ride capacity at the same locations proposed for the Commuter Rail Alternative. This would allow more opportunity for transfer locations with other Tri-Met and SMART routes as well as links to major employment and activity centers.

The TSM Alternative would include proposed transit priority improvements at intersections and proposed park & rides. Although the transit priority improvements are included, the TSM Alternative would operate in a mixed-traffic environment and transit travel times would increase as congestion increases along the project corridor.

3.1.2.4 Commuter Rail Alternative

Transit Impacts

Access to Regional Community Facilities and Services

Access to regional community facilities and services would improve with the Commuter Rail Alternative compared with the No Build or TSM alternatives. (Access is measured by the number of households within a 30-minute, in-vehicle, peak-hour transit travel time to major activity centers along the Wilsonville to Beaverton Corridor.) Table 3.1-5 summarizes the number of households within 30 minutes (in-vehicle, peak-hour travel time) of downtown Beaverton, Washington Square, and downtown Tigard, Tualatin, and Wilsonville, if traveling by transit.

Table 3.1-5
Households within a 30-Minute, Peak-Hour Transit In-Vehicle Travel Time to Activity Centers, by No Build, TSM, and Commuter Rail Alternatives, Year 2020

Activity Center	No Build	TSM	Commuter Rail
Beaverton TC	201,400	209,500	238,000
Washington Square	186,100	187,900	226,100
Tigard	190,200	192,400	222,700
Tualatin	108,400	108,600	165,400
Wilsonville	26,100	28,400	73,300

Source: Metro, 2000

Operating Speeds and Travel Times

Table 3.1-6 provides a summary of the change in in-vehicle travel time with the No Build, TSM, and Commuter Rail alternatives between selected corridor locations. In-vehicle travel time includes only the amount of time it takes for a transit vehicle to travel between an origin and destination. For buses, this measure takes into account roadway speed limits, congestion, and stop dwell time. In-vehicle travel time for Commuter Rail is based on a detailed travel-time simulation that accounts for maximum speed limits, reflecting the local operating environment, alignment design, wheel-rail traction and braking performance in both uphill and downhill operations, and dwell time at stations.

Table 3.1-6
Transit and Auto In-Vehicle A.M. Peak Travel Times from Wilsonville to Selected Corridor Locations, by No Build, TSM, and Commuter Rail Alternatives, Year 2020

	No Build	TSM	Commuter Rail
From Wilsonville to:	(Minutes)	(Minutes)	(Minutes)
Transit Travel Time			
Tualatin	19	19	9
Tigard	60	35	16
Washington Square	67	43	20
Beaverton TC	76	54	26
Automobile Travel Time			
Tualatin	18	18	18
Tigard	30	30	30
Washington Square	32	32	32
Beaverton TC	40	40	40

Source: Metro, 2000

Compared to the TSM Alternative, the Commuter Rail Alternative would offer a peak-hour, in-vehicle transit travel time savings ranging from 10 to 28 minutes per trip, over a 50 percent reduction. Peak-hour, in-vehicle transit travel time from Wilsonville to Beaverton would be 54 minutes with the TSM Alternative and 26 minutes with the Commuter Rail Alternative. For the Commuter Rail Alternative, peak-hour, in-vehicle transit travel times from Wilsonville to all station locations in the corridor would be considerably faster than with the automobile. With the TSM Alternative, transit travel times for the same set of trips would be one to 15 minutes longer than the auto travel time.

Total Transit Ridership

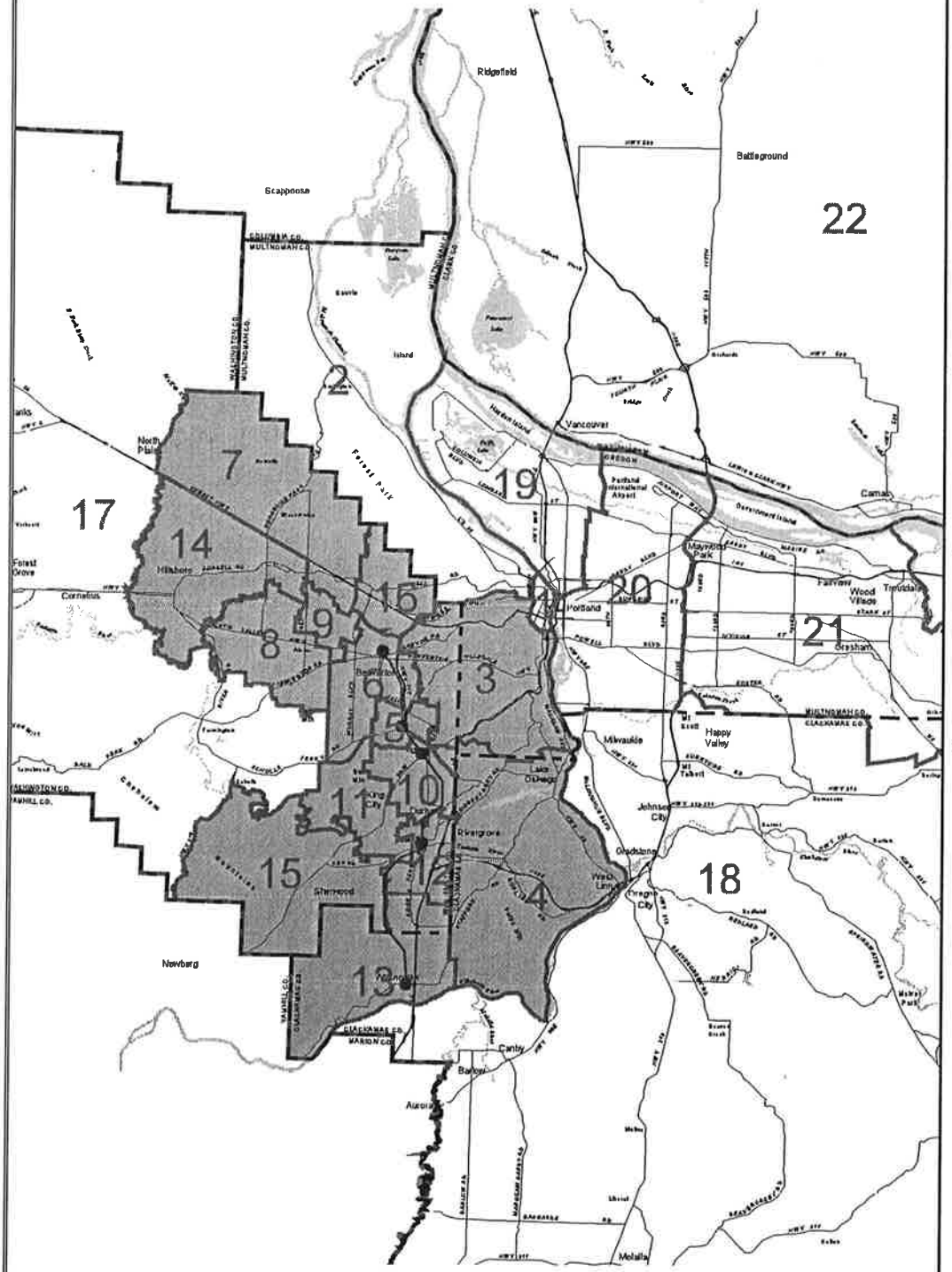
The transit ridership forecasts for the three alternatives were prepared by Metro, using the regional travel demand models. The Metro regional models are based on a standard four-step modeling procedure and are calibrated to a 1994 base year. The methods used in the analysis of the Wilsonville to Beaverton TSM and Commuter Rail alternatives are consistent with the modeling methods used to forecast ridership for the Westside Light Rail Final Environmental Impact Statement, Hillsboro Extension Final Environmental Impact Statement, Airport MAX Final Environmental Assessment, and Interstate MAX Final Environmental Impact Statement.

A detailed description of the models and their application for transit ridership forecasts is available in the *Travel Demand Forecasting Methods Report* (Metro, May 1996), which was prepared for the South/North Draft Environmental Impact Statement. The discussion in this report provides a summary of some of the key elements of the travel forecasting methods as they relate to the forecasts prepared for this study.

These forecasts have been prepared for a 20-year horizon (year 2020) using Metro's regional travel demand forecasting models. Transit ridership forecasts were prepared for the three project transit alternatives in the Wilsonville to Beaverton corridor: No Build, TSM, and Commuter Rail. The traffic analysis is based on the same 2020 travel demand forecasts used to prepare this transit ridership analysis.

Metro prepared this analysis at the request of Washington County with the cooperation of county staff, Tri-Met and the county's consulting team. The modeling assumptions and methods were developed in conjunction with a travel demand forecasting working group that included Metro, Tri-Met, BRW, The Larkin Group and DKS Associates. The modeling assumptions, methods and results were further reviewed with the project Technical Advisory Committee (TAC).

Table 3.1-7 shows the total 2020 average weekday transit ridership for all bus, light rail and commuter rail trips produced in, and/or attracted to, the Wilsonville to Beaverton corridor (Figure 3.1-5). The table shows that the Commuter Rail Alternative would generate total corridor transit ridership of approximately 98,450 rides per average weekday in 2020, an increase of 2,350 in total corridor transit trips compared to the TSM Alternative and an increase of 2,600 compared to the No Build Alternative. This difference in ridership is primarily a result of improvements in transit travel times between key locations within the Wilsonville to Beaverton Corridor and between the corridor and locations outside the corridor. Both the TSM Alternative and Commuter Rail Alternative also include increased park & ride capacity. The difference between the TSM Alternative and the Commuter Rail Alternative corridor transit ridership total (2,350) indicates the total number of new transit riders that result from the Commuter Rail Alternative.



Washington County

Wilsonville to Beaverton

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Figure 3.1-5

Wilsonville to Beaverton Corridor

Table 3.1-7
Total Washington County Corridor Transit Trips [1], by No Build, TSM and Commuter Rail, Average Weekday, Year 2020

	No Build	TSM	Commuter Rail
Total Washington County Corridor Transit Trips (originating rides)	95,850	96,100	98,450
% Change from No Build	N/A	0.26%	2.7%
% Change from TSM	N/A	N/A	2.4%

Source: Metro, 2000.

[1]Transit trips are one-way, linked trips. A person traveling from home to work and back counts as two trips. Total transit trips include all commuter rail, light rail and bus trips produced in or attracted to the Wilsonville to Beaverton Corridor.

Table 3.1-8 shows intra-corridor transit trips and transit mode share for work and non-work trips. The table shows that the Commuter Rail Alternative would have the highest transit mode share for work trips (trips taken directly between home and place of work) within the corridor, with a transit mode share of five percent.

Table 3.1-8

Intra-Corridor Transit Trips [1] and Transit Mode Share, by No Build, TSM, and Commuter Rail Alternatives, Average Weekday, Year 2020

	No Build	TSM	Commuter Rail
Home-Based Work[2]			
Transit	23,290	23,520	25,160
Total Person	505,000	505,430	504,650
Mode Split	4.6%	4.7%	5.0%
Non-Work [3]			
Transit	19,170	19,190	19,830
Total Person	1,895,120	1,895,080	1,894,260
Mode Split	1.0%	1.0%	1.0%
Total			
Transit	42,460	42,710	44,990
Total Person	2,400,620	2,400,510	2,398,910
Mode Split	1.8%	1.8%	1.9%

Source: Metro, 2000

[1]Transit trips are those that travel from an origin within the corridor to a destination within the corridor. This does not include trips with one end outside of the corridor.

[2]Home-based work trips are trips taken directly between one's home to one's place of work.

[3]Non-work trips are all trips other than home-based work trips.

Ridership by Mode for all Alternatives

Table 3.1-9 summarizes the projected 2020 commuter rail ridership for the Commuter Rail Alternative and TSM bus ridership for the TSM Alternative. The Commuter Rail Alternative is forecasted to serve approximately 4,650 riders on an average weekday in 2020. The table also shows that the Commuter Rail Alternative would have a peak-direction, peak-load point of 400 riders between Beaverton Transit Center and Washington Square.

Table 3.1-9
Commuter Rail and TSM Bus Ridership, by TSM and Commuter Rail, Year 2020

	TSM	Commuter Rail
Average Weekday Commuter Rail Ridership (boarding rides)	N/A	4,650
Average Weekday TSM Bus Ridership (boarding rides)	1,520	N/A
P.M. Peak-hour, Peak-Direction, Peak-Load Point [1]	70	400

Source: Metro, 2000.
[1]Located between Beaverton Transit Center and Washington Square.

Opening Year Ridership

A ridership forecast has been developed for an average weekday in the opening year of service with the Commuter Rail Alternative. The opening year is expected to be 2005, which assumes commuter rail operations beginning in September 2004. The transit network that would be in place for opening year represents an incremental build-up toward the service levels included in the 2020 forecasts. The amount of transit service provided is consistent with the available transit revenues forecast for the 2005 fiscal year. The transit network assumes the same refinements at station locations (Wilsonville, Tualatin, Tigard, Washington Square, and Beaverton Transit Center) as the 2020 transit network. The highway network assumed for the opening year forecast includes all roadway projects in the corridor that have been identified as having committed funding and scheduled for completion by 2005.

The population and employment forecasts that were used for the 2005 forecast year represent a straight-line projection between the 1994 base year and the 2020 forecast year. Given the population and employment growth, and the highway and transit networks, the 2005 total transit trips to, from, and within the Wilsonville to Beaverton corridor are projected to be 66,500. The total average weekday ridership with the Commuter Rail Alternative is projected to be approximately 2,410 with a p.m. peak-hour, peak-direction, and peak-load point of 165 in year 2005.

Mode of Access for Commuter Rail

Table 3.1-10 summarizes the projected average weekday 2020 mode of access to commuter rail for the Commuter Rail Alternative. The greatest number of riders, 51 percent, would access commuter rail by bus transfers. Park & ride access to commuter rail would be 33 percent, and walk access would account for 16 percent of all commuter rail trips.

Table 3.1-10
Commuter Rail Mode of Access Summary by Station
Average Weekday, Year 2020

Station of Trip Production	Walk	Bus/LRT	Auto
Beaverton	12%	88%	-
Washington Square	13%	42%	45%
Tigard	16%	71%	13%
Tualatin	29%	39%	33%
Wilsonville	14%	14%	72%
Total	**16%**	**51%**	**33%**

Source: Metro, 2000

The high level of access to stations by transit may also reflect possible impacts on local bus service. To achieve these levels of transit access to stations, there may be a need to increase local bus service to the stations or re-orient existing services to service the station more directly. Additional service may also be required during peak hours to accommodate the additional demand generated by the commuter rail service.

Boardings and Deboardings by Station for Commuter Rail

Table 3.1-11 describes station activity for each of the five stations with the Commuter Rail Alternative. The highest use station would be the Beaverton Transit Center, accounting for 33 percent of station activity. The second most heavily used station would be the Washington Square Station, accounting for 21 percent of station activity. The remaining three stations, Wilsonville, Tualatin, and Tigard, would all have a similar amount of daily boarding and deboarding activity.

Table 3.1-11
Commuter Rail 2020 Daily Station Ons and Offs

Station	Total Commuter Rail Daily Ons/Offs	Percent of Total
Wilsonville	1,340	14%
Tualatin	1,480	16%
Tigard	1,460	16%
Washington Square	1,960	21%
Beaverton Transit Center	3,060	33%
Total Ons and Offs	**9,300**	**100%**
Total Commuter Rail Ridership	**4,650**	

Source: Metro, 2000

Station-to-Station Ridership on Commuter Rail

Table 3.1-12 provides a summary of commuter rail station-to-station activity. This table shows the origin station and destination station for all of the trips using the Wilsonville to Beaverton Commuter Rail. The destination station does not necessarily represent the final destination for the trip. The destination station indicates the egress station from which riders can walk or transfer to a bus or MAX to arrive at their final destination.

The number one destination station for commuter rail trips would be the Beaverton Transit Center. Approximately 63 percent of trips deboarding from commuter rail at Beaverton Transit Center transfer to MAX. The number two destination station for commuter rail trips would be the Washington Square Station, which has the highest concentration of jobs and shopping opportunities within the immediate station area of the five proposed commuter rail stations.

Table 3.1-12
Commuter Rail Average Weekday Station-to-Station Activity, Year 2020

From:	To:	Percent of Station Total	Commuter Rail Riders
Wilsonville	Tualatin	43.2%	463
	Tigard	3.0%	32
	Washington Sq.	7.3%	78
	Beaverton	46.5%	498
		100%	**1,071**
Tualatin	Wilsonville	12.8%	87
	Tigard	11.2%	76
	Washington Sq.	28.0%	190
	Beaverton	48.0%	326
		100%	**680**
Tigard	Wilsonville	5.6%	48
	Tualatin	15.2%	130
	Washington Sq.	31.3%	269
	Beaverton	47.9%	411
		100%	**858**
Washington Square	Wilsonville	3.3%	32
	Tualatin	8.5%	83
	Tigard	5.5%	54
	Beaverton	82.7%	806
		100%	**975**
Beaverton	Wilsonville	8.4%	90
	Tualatin	22.1%	237
	Tigard	19.2%	206
	Washington Sq.	50.3%	539
Total		**100%**	**1,071**

Source: Metro, 2000

Origins and Destinations of Commuter Rail Trips

Table 3.1-13 and Figure 3.1-6 show the expected origins and destinations for all trips on the commuter rail and all trips on the TSM bus. For work trips, the origin is the home end of the trip and the destination is the work end of the trip. Areas with a large number of households and large employment centers, such as Beaverton, rank high in terms of both origins and destinations.

For the Commuter Rail Alternative, trips originating in Beaverton and Wilsonville are expected to account for approximately 45 percent of the total trips; trips originating in the Tualatin, Durham, and Lake Grove area are projected to account for 16 percent; the Tigard, King City, and Sherwood area 15 percent; the area around Washington Square 14 percent; and the Hillsboro/Forest Grove area 6 percent.

With the TSM Alternative, trips originating in Beaverton and Wilsonville account for approximately 55 percent of the trips; the Tualatin, Durham, and Lake Grove area account for 11 percent; the Tigard, King City, and Sherwood area 20 percent; the area around Washington Square 5 percent; and the Hillsboro/Forest Grove area 4 percent.

Washington County

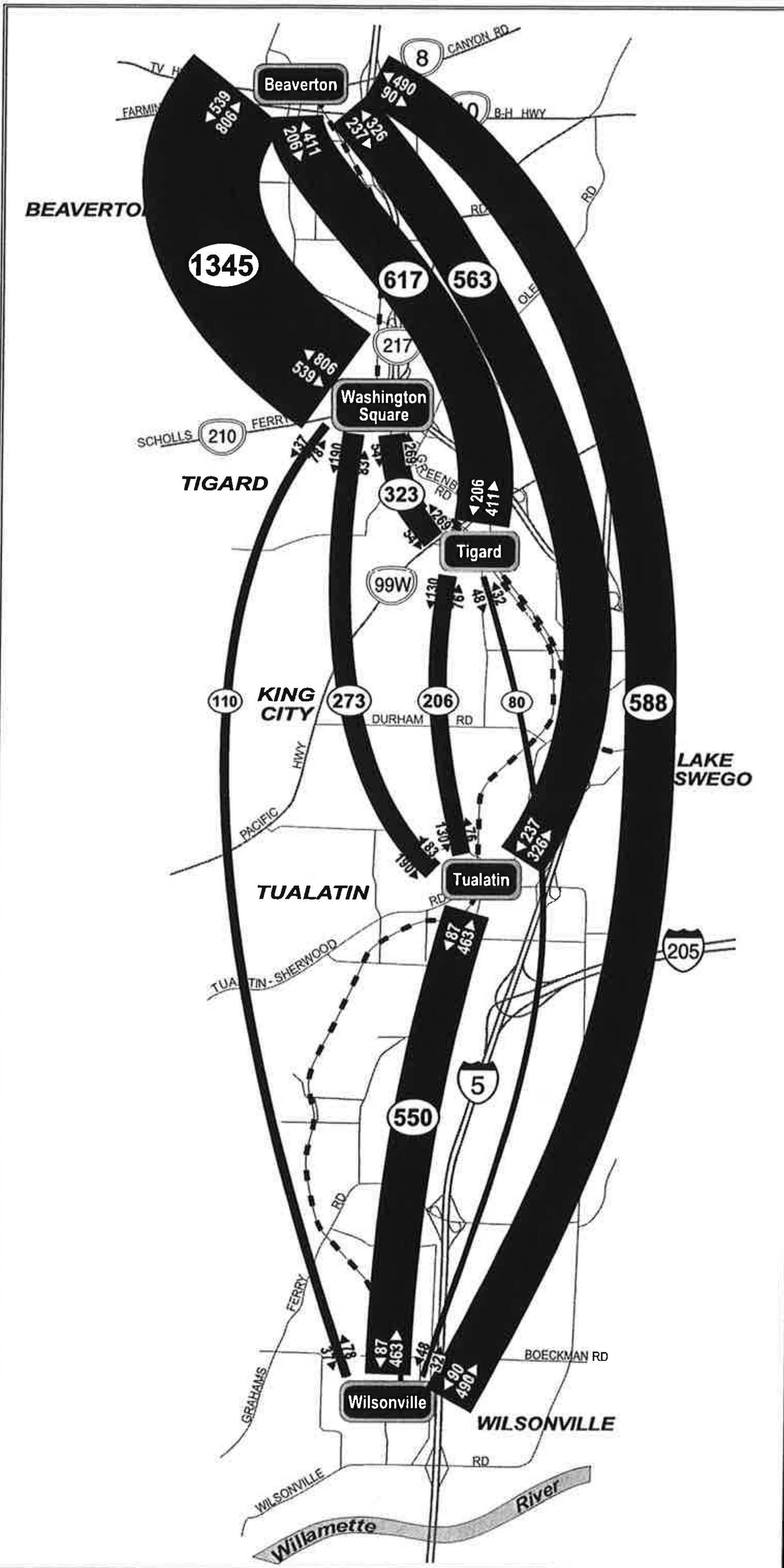
Wilsonville to Beaverton

Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corportaion

DKS Associates



NOT TO SCALE

Legend

Tualatin - Commuter Rail Station

Figure 3.1-6

Predicted Daily Ridership Patterns for Commuter Rail

Trip destinations, which tend to be employment based, are oriented towards areas with high concentrations of employment. For example, Beaverton, downtown Portland, and the area surrounding Washington Square account for 65 percent of trip destinations with the Commuter Rail Alternative. Other commuter rail destinations are Tualatin, Durham, and Lake Grove 11 percent; Wilsonville 6 percent; Tigard, King City, and Sherwood 10 percent; and Hillsboro/Forest Grove 4 percent.

With the TSM Alternative, Beaverton, downtown Portland, and the area surrounding Washington Square account for 65 percent of trip destinations. Other TSM destinations in the region are Tualatin, Durham, and Lake Grove 8 percent; Wilsonville 13 percent; Tigard, King City, and Sherwood 9 percent; and Hillsboro/Forest Grove 3 percent.

Table 3.1-13
Commuter Rail and TSM Bus Origins and Destinations, Year 2020

TSM			Commuter Rail		
Origins	**Trips**	**%**	**Origins**	**Trips**	**%**
Beaverton	536	35%	Beaverton	1,046	23%
Wilsonville	337	22%	Wilsonville	1,044	22%
Tigard/KingCity/ Sherwood	299	20%	Tualatin/Durham/ Lake Grove	734	16%
Tualatin/Durham/ Lake Grove	164	11%	Tigard/KingCity/ Sherwood	708	15%
Washington Sq.	76	5%	Wash. Square	674	14%
Hillsboro/ Forest Grove	65	4%	Hillsboro/ Forest Grove	305	6%
Rem. Region	39	2%	Rem. Region	128	3%
Portland CBD	4	1%	Portland CBD	15	1%
Total	**1,520**	**100%**	**Total**	**4,650**	**100%**
Destinations	**Trips**	**%**	**Destinations**	**Trips**	**%**
Portland CBD	369	24%	Beaverton	1,157	25%
Wash. Square	362	24%	Portland CBD	948	20%
Beaverton	255	17%	Wash. Square	913	20%
Wilsonville	202	13%	Tualatin/Durham/ Lake Grove	516	11%
Tigard/KingCity/ Sherwood	134	9%	Tigard/KingCity/ Sherwood	470	10%
Tualatin/Durham/ Lake Grove	127	8%	Wilsonville	275	6%
Hillsboro/ Forest Grove	37	3%	Hillsboro/ Forest Grove	202	4%
Rem. Region	34	2%	Rem. Region	173	4%
Total	**1,520**	**100%**	**Total**	**4,650**	**100%**

Source: Metro, 2000

Roadway Network Impacts

Change in Corridor Vehicle Trips, Vehicle Miles Traveled and Link Volumes (Daily and Peak Hour)

Table 3.1-14 shows projected corridor average weekday (year 2020) vehicle miles of travel (VMT) for the No Build, TSM, and Commuter Rail Alternatives. The TSM Alternative and Commuter Rail Alternative would reduce corridor vehicle miles traveled by 2,100 and 17,400 respectively compared

to the No Build Alternative. The Commuter Rail Alternative would reduce corridor vehicle miles traveled by 15,300 miles more than the TSM Alternative.

Table 3.1-14
Corridor Vehicle Miles Traveled by No Build, TSM, and Commuter Rail Alternatives - Year 2020

	No Build	TSM	Commuter Rail
Vehicle Miles of Travel	7,149,800	7,147,700	7,132,400
Change from No Build	N/A	-2,100	-17,400
Change from TSM	N/A	N/A	-15,300

Source: Metro, 2000

Traffic Impacts

Change in Peak Hour Intersection Volumes and Level of Service

Traffic forecasts were prepared for the No Build 2020 conditions along with the TSM Alternative and Commuter Rail Alternative. The forecasted traffic volumes were based upon the regional 2020 travel model and built upon the 2000 traffic volume data that was collected. Table 3.1-15 summarizes the daily, AM peak hour and PM peak hour vehicle traffic for the No Build, TSM, and Commuter Rail Alternatives. The TSM and Commuter Rail Alternatives would produce small changes in volumes during the 2020 peak hours (generally about 10 to 50 vehicles per hour lower per direction than the No Build Alternative). In a few cases, traffic volumes increase with the TSM and Commuter Rail Alternatives. These increases are associated with trips to station areas or major transit stops associated with the new transit services (the increases are small between 2020 scenarios).

In developing the future travel forecasts for the commuter rail, one location is of particular concern--the interchange of I-5 and Wilsonville Road. The City of Wilsonville has adopted a Public Facilities Transportation Strategy ordinance that limits the amount of development or other trip-attracting projects that impact the interchange area. The ordinance applies to all development south of Boeckman Road and north of the Willamette River in Wilsonville. No new projects can be approved without appropriate mitigation, because the allocated capacity of the interchange has been depleted due to recent development approvals. Some of the trips by passengers using park & ride as access to the Wilsonville Commuter Rail Station would have to use some part of the I-5/Wilsonville interchange area (which includes the intersections on Wilsonville Road at Boones Ferry Road and Town Center Loop West). At the same time, some vehicle trips that would be made to the interchange area without commuter rail will be diverted away from the area with commuter rail. Using the travel model, a comparison can be made of the interchange area trips with commuter rail compared to those trips made by people if there were no commuter rail. Comparing the 2020 travel forecast for the build and no build scenarios indicates that commuter rail would add approximately 25 net new (p.m. peak hour) trips to the interchange area. If the commuter rail station is located north of Boeckman Road, the Public Facilities Transportation Strategy would not apply to the project.

Table 3.1-15
Daily Roadway Volumes in Study Corridor
2000 Counts and Forecasted 2020

Roadway	Location	2000 Existing ADT	2020 Forecasted Daily Volume: No Build	2020 Forecasted Daily Volume: TSM	2020 Forecasted Daily Volume: Commuter Rail	2000 Existing AM Peak	2020 Forecasted AM Peak Volume: No Build	2020 Forecasted AM Peak Volume: TSM	2020 Forecasted AM Peak Volume: Commuter Rail	2000 Existing PM Peak	2020 Forecasted PM Peak Volume: No Build	2020 Forecasted PM Peak Volume: TSM	2020 Forecasted PM Peak Volume: Commuter Rail
Farmington Road	East of Lombard Avenue (westbound)	18,360	28,150	27,940	27,830	1,015	1,560	1,550	1,540	1,755	2,690	2,670	2,660
	West of Lombard Avenue (eastbound)	18,630	28,190	28,330	28,330	1,510	2,290	2,300	2,300	1,355	2,050	2,060	2,060
Lombard Avenue	North of Farmington Road (southbound)	3,850	9,020	9,130	9,020	230	540	550	540	350	820	830	820
	South of Farmington Road (northbound)	3,920	5,410	5,200	5,300	240	340	320	330	370	510	490	500
Canyon Road	East of Lombard Avenue (eastbound)	20,920	25,680	25,410	25,270	1,635	2,010	1,990	1,980	1,540	1,890	1,870	1,860
	West of Lombard Avenue (westbound)	17,240	21,180	21,180	21,060	1,235	1,520	1,520	1,510	1,490	1,830	1,830	1,820
5th Avenue	East of Alger Avenue (westbound)	4,330	5,160	5,160	5,290	250	300	300	310	680	810	810	830
	East of Alger Avenue (eastbound)	3,780	5,500	5,390	5,390	500	730	720	720	330	480	470	470
Hall Boulevard	West of Cascade Avenue (eastbound)	14,425	20,140	19,800	19,690	1,370	1,920	1,890	1,870	1,275	1,780	1,750	1,740
	West of Cascade Avenue (westbound)	16,370	19,260	19,260	19,370	1,270	1,500	1,500	1,510	1,615	1,900	1,900	1,910
Schools Ferry Road	West of Cascade Avenue (westbound)	21,710	26,860	26,860	27,090	1,260	1,560	1,560	1,580	1,940	2,400	2,400	2,420
	East of Cascade Avenue (eastbound)	24,300	30,450	30,590	30,590	2,110	2,650	2,660	2,660	1,740	2,180	2,190	2,190
Tiedman road	Southwest of Greenburg Road (northbound)	4,830	7,520	7,380	7,520	625	980	960	980	360	560	550	560
	Southwest of Greenburg Road (southbound)	4,910	6,470	6,380	6,380	270	360	360	360	585	770	760	760
Main Street	North of Tigard Street (northbound)	6,470	7,120	7,230	7,120	625	690	700	690	600	660	670	660
	North of Tigard Street (southbound)	5,950	7,850	8,110	8,020	485	640	670	660	690	910	940	930
Hall Boulevard	North of Burnham Street (southbound)	6,820	10,450	10,360	10,360	410	630	630	630	810	1,240	1,230	1,230
	North of Burnham Street (northbound)	8,210	11,030	10,910	10,910	935	1,260	1,250	1,250	715	960	950	950
Bonita Road	West of 72nd Avenue (westbound)	8,030	10,280	10,210	10,140	465	600	600	590	1,125	1,440	1,430	1,420
	West of 72nd Avenue (eastbound)	8,300	14,080	13,950	14,210	1,075	1,830	1,810	1,850	625	1,060	1,050	1,070
Durham Road	East of 74th Avenue (eastbound)	12,825	19,810	19,670	19,810	1,450	2,240	2,230	2,240	900	1,390	1,380	1,390
	East of 74th Avenue (westbound)	13,150	16,020	16,110	16,110	805	990	990	990	1,470	1,790	1,800	1,800
Tualatin Road	East of 86th Avenue (eastbound)	7,935	9,160	9,260	9,260	875	1,010	1,030	1,030	780	900	910	910
	East of 86th Avenue (westbound)	7,040	7,040	7,040	7,040	605	610	610	610	810	810	810	810
Tualatin-Sherwood Road	West of Boones Ferry Road (eastbound)	15,520	29,370	29,370	29,230	1,160	2,200	2,200	2,190	1,110	2,100	2,100	2,090
	East of Boones Ferry Road (westbound)	21,040	30,510	30,510	30,780	1,380	2,010	2,010	2,020	1,600	2,320	2,320	2,340
Boones Ferry Road	North of Tualatin-Sherwood Road (southbound)	6,660	6,660	6,660	6,660	460	460	460	460	550	550	550	550
	South of Tualatin-Sherwood Road (northbound)	8,015	8,900	8,980	8,850	710	720	800	790	625	630	700	690
95th Place	South of Tualatin-Sherwood Road (northbound)	680	1,010	1,010	1,010	60	90	90	90	95	140	140	140
	South of Tualatin-Sherwood Road (southbound)	680	2,310	2,310	2,200	95	330	330	310	65	220	220	210
Teton Avenue	North of Avery Street (southbound)	4,151	6,450	6,100	6,540	365	570	540	580	470	730	690	740
	North of Avery Street (northbound)	3,100	3,850	3,960	3,850	280	350	360	350	290	360	370	360
Avery Street	West of Industrial Way (westbound)	3,275	5,020	5,020	4,920	380	590	590	570	320	490	490	480
	West of Industrial Way (eastbound)	3,565	6,640	6,470	6,470	355	670	650	650	430	800	780	780
Tonquin Road	East of Waldo Way (westbound)	2,375	4,980	4,980	4,980	230	490	490	490	310	650	650	650
	East of Waldo Way (eastbound)	2,480	6,760	6,760	6,650	370	1,010	1,010	1,000	235	640	640	630
Grahams Ferry Road	North of Clackamas Co. Line (northbound)	1,150	8,050	8,050	8,050	185	1,300	1,300	1,300	70	490	490	490
	North of Clackamas Co. Line (southbound)	1,050	4,470	4,470	4,470	60	260	260	260	160	680	680	680
Boeckman Road	West of 95th Avenue (eastbound)	620	620*	620*	2,570	65	65*	65*	215	100	100*	100*	420
	West of 95th Avenue (westbound)	610	610*	610*	2,560	90	90*	90*	425	60	60*	60*	160
Barber Street	West of Boberg Road (westbound)	450	2,880	2,880	2,790	25	160	160	160	50	320	320	310
	West of Boberg Road (eastbound)**										570	570	560
Wilsonville Road	East of Seely Road (westbound)	8,700	10,470	10,570	10,360	505	610	620	610	840	1,010	1,020	1,000
	West of Seely Road (eastbound)	9,030	12,170	12,170	12,170	880	1,190	1,190	1,190	720	970	970	970

* No growth was assumed for roadway since it is a dead end street.
** Existing volumes were not available for this location. The 2020 Forecasted PM Peak Hour Volumes were obtained from the 2020 Metro Regional Travel Demand Model.

The capacity of key intersections near the commuter rail stations and rail crossings was evaluated to determine the impacts of the proposed build project. There are four major subareas along the corridor where intersection operation would be affected by commuter rail (downtown Beaverton, Hall Boulevard, Scholls Ferry Road and Tualatin-Sherwood Road). Within each subarea, intersections were evaluated utilizing Synchro V.40 (Synchro). Information regarding level of service, average delay and volume-to-capacity ratio were developed for three primary scenarios: existing 2000 PM peak hour, existing plus commuter rail and 2020 PM peak hour (utilizing the Metro travel forecast for 2020). Traffic to and from the station areas was included in the analysis. Additionally, the queuing affects of commuter rail operation were tested at every rail crossing along the corridor (see following section).

To evaluate the traffic operational performance with and without commuter rail, several operating parameters were determined. In the evening peak period there would be four commuter rail crossings (two northbound and two southbound) per hour. It was assumed that commuter rail would operate with two car trains (about 90 feet each) with operating speeds of between 20 to 30 miles per hour. The crossing gates for the commuter rail would require approximately 50 seconds of time between the initial warning to the time the gate is raised following a commuter rail crossing.

To assess the traffic operational impacts of the rail operation, Synchro was utilized to assess the operating characteristics of the intersections in the rail crossing area. Lost time was made a surrogate to simulate the rail impact on the traffic operation. The key assessment for each crossing was to determine the operational characteristics of the crossing and whether it would influence adjacent intersections (queuing). Table 3.1-16 summarizes the capacity conditions at various intersections, with and without commuter rail. The descriptions of intersection level of service designations, i.e., A, B, C, D, E, and F, are contained in Appendix A.

Table 3.1-16
Intersection Performance with and without Commuter Rail by Service Level

Intersection	Existing PM Peak Hour	Existing with Commuter Rail PM Peak Hour	2020 with Commuter Rail Unmitigated
Downtown Beaverton			
Canyon/Lombard	A 8.9 0.65	B 12.4 0.70	D 52.5 1.00
Farmington/Lombard	D 37.0 0.93	D 45.6 0.96	F >80 1.26
Washington Square			
Hall/Cascade/Highway 217 Off	C 27.0 0.85	C 33.6 0.92	D 52.6 0.99
Scholls Ferry/Cascade	C 20.4 0.80	C 22.2 0.84	F >80 1.81
Tualatin			
Tualatin-Sherwood/ Boones Ferry	D 38.6 0.87	D 46.0 0.93	F >80 1.22

C 42.0 0.98 = Level of Service; Average Delay in seconds; Volume (Demand)-to-Capacity Ratio
1997 Highway Capacity Manual methodology; see Appendix A-Traffic for definition of Levels of Service (LOS)

While the key corridor intersections operate at acceptable level of service for existing plus commuter rail, the 2020 forecasted traffic volumes cannot be accommodated without improvements. In every case where level of service F conditions exist in the future scenario, the base condition in 2020 without the project is also level of service F (see Table 3.1-17). The commuter rail does not change the level of service of these key intersections. In downtown Beaverton, a connectivity plan is proposed to relieve congestion. In Tualatin, the I-5 to ORE 99W connector is proposed in the next 20 years to improve traffic operation along Tualatin-Sherwood Road. These proposed improvements

would also help mitigate conditions with commuter rail 2020 operation to meet regional standards for performance.

The intersections of Farmington Road/Lombard Avenue, Tualatin-Sherwood Road/Boones Ferry Road, and Scholls Ferry Road/Cascade Avenue, where level of service F conditions would prevail without improvements, were evaluated with the regional improvements that have been included in city transportation plans. For Tualatin-Sherwood Road the addition of the I-5 to ORE 99W connector, along with an eastbound right turn lane, produce level of service E conditions in 2020 with or without commuter rail. At Farmington Road/Lombard Avenue, the downtown Beaverton connectivity plan reduces demand on Lombard and the TSP calls for added right turn lanes on Lombard Avenue. These improvements yield level of service E conditions in 2020 with or without commuter rail. Without the commuter rail, the demand-to-capacity ratio is 1.0 .

The intersection of Scholls Ferry Road at Cascade Avenue would operate at level of service F in 2020 without the commuter rail project. With the commuter rail project it would continue to operate at level of service F, with a slight increase in the volume-to-capacity ratio (from 1.73 to 1.81). A widening project (from 5 to 7 lanes) for this segment of Scholls Ferry Road is included in the Beaverton and Tigard TSPs, however this proposed project is not included in the financially constrained or strategic networks developed for the Regional Transportation Plan. The widening project is included in the preferred RTP network, however projects in the category would have the lowest priority for regional funding. When this intersection is evaluated with the widened Scholls Ferry Road, the level of service improves to D.

Table 3.1-17
Future Intersection Performance With and Without Mitigation
With and Without Commuter Rail Project

Intersection	2020 Without Project	2020 with Project	2020 Mitigated
Downtown Beaverton			
Farmington/Lombard	F >80 1.25	F >80 1.26	E 71.7 1.06
Washington Square			
Scholls Ferry/Cascade	F >80 1.73	F >80 1.81	D 49.8 1.00
Tualatin			
Tualatin-Sherwood/ Boones Ferry	F >80 1.12	F >80 1.22	E 59.4 1.00

C 42.0 0.98 = Level of Service; Average Delay; Volume (Demand)-to-Capacity Ratio
1997 Highway Capacity Manual methodology

For each of the rail crossings throughout the corridor, the queuing potential created by the commuter rail crossing was analyzed. Currently there are not commuter rail activities in the corridor; therefore there is no queuing associated with the rail crossing. There is queuing associated with the current intersection operation in all three key subareas noted in Table 3.1-17 (pre-existing queues noted in Table 3.1-18). The assessment of queues summarized in Table 3.1-18 focuses on the impact of the commuter rail gate operation that would be additional to any other queuing associated with peak traffic operation. Queues shown in Table 3.1-18 represent the 95th percentile queue condition created on the road crossing the rail tracks in the PM peak hour. These conditions are the unmitigated conditions with no street improvements. In some cases the queues associates with other bottlenecks extend past those caused by commuter rail. There are seven locations where the queues with

commuter rail would extend back to the adjacent signalized intersection. Each of these locations is discussed below.

Table 3.1-18
Queuing Impacts of Commuter Rail Operation at Grade Crossings
PM Peak Hour Conditions - distance shown in feet from crossing

Crossing	Direction of Travel	Existing + Project	Future 2020	Available Room to Adjacent Intersection
Boeckman Road [1]	EB	250'	250'	NA
	WB	100'	100'	200' east to 95th
Tonquin Road	EB	100'	375'	NA
	WB	150'*	400'*	100' east to Tonquin Loop
Avery Street	EB	200'	525'	1400' west to Tualatin-Sherwood
	WB	150'	250'*	175' east to 105th
Teton Avenue	NB	125'	175'	950' south to Avery
	SB	250'	500'	1000' north to Tualatin-Sherwood
95th Place	NB	50'	75'	NA
	SB	25'	100'	400' north to Tualatin-Sherwood
Tualatin-Sherwood Road	EB 300'[2]	350'	1325'*	600' south to Warm Spring
	WB 250'[2]	475'*	1525'*	775' north to Boones Ferry
Tualatin Road	NB	400'	475'	650' south to Boones Ferry
	SB	400'	400'	600' north to rail Crossing
Durham Road	EB	475'	650'	1325' west to 79th
	WB	675'*	825'*	275' east to Boones Ferry
Bonita Road	EB	550'	675'	3200' west to Hall
	WB	350'	525'	675' east to 72nd
Hall Boulevard	NB	375'*	475'*	200' south to Burnham
	SB	400'	600'	950' north to Scoffins
Main Street	NB	300'	350'	1400' south to OR 99W
	SB	375'	475'	800' north to Scoffins
Tiedeman Avenue	NB	225'	300'	850' south to Tigard Street
	SB	300'	400'	600' north to Greenburg
Scholls Ferry Road	EB 200'[2]	675'	1350'	1150' west to Nimbus
	WB 250'[2]	400'	1175'	200' east to Cascade
Hall Boulevard	NB 325'[2]	600'	950'	1500' south to Scholls
	SB 175'[2]	225'	600'	725' north to Nimbus
Fifth Street	EB	225'	275'	1400' west to Lombard
	WB	350'	450'	4000' east to Western
Farmington/B-H	EB 100'[2]	450'	500'	1050' west to Hall
	WB 575'[2]	600'	1125'	1250' east to Griffith
Canyon Road	EB 275'[2]	350'	775'	800' west to Hall
	WB 300'[2]	500'	1000'*	1000' east to 117th

Notes: Queue associated with the gate down time for commuter rail.
* Indicates location where queue extends beyond adjacent signalized intersection.
1 - Traffic volume assumes north station area and train crossing of Boeckman
2 - Existing conditions at intersection which is adjacent to crossing (isolated intersection)

Tonquin Road. Tonquin Road crossing is 100 feet from Tonquin Loop. Westbound traffic volumes are such that queues created by the commuter rail gated crossing would extend past Tonquin Loop (which is unsignalized). The next major street (Grahams Ferry Road) is 1,750 feet to the east. Because Tonquin Road/Tonquin Loop is unsignalized, the delay caused by the 95 percentile queue would result in a maximum delay to the side street of about one and a half minutes (50 seconds of

gate down time and 35 seconds of queue discharge). Because of the low volume of traffic on Tonquin Loop and the infrequency of the commuter rail crossings, this delay was not considered significant.

Avery Street. The gated crossing of commuter rail would extend a queue in 2020 beyond 105th Avenue. This is an unsignalized intersection and would not be impacted in the existing plus commuter rail scenario. The maximum delay to the side street would be less than one minute. The next major street is over 3,000 feet away to the east at Boones Ferry Road. The impact at this location was not considered significant.

Durham Road. Westbound traffic on Durham Road would queue beyond Upper Boones Ferry Road with a commuter rail crossing in the PM peak. Because the crossing is only 200 feet west of Upper Boones Ferry Road there is little room to store vehicles on Durham Road. Without mitigation this queue would have significant impact to traffic operation. To mitigate this impact requires the following: 1) pre-emption of Durham/Upper Boones Ferry Road is required from the rail crossing; 2) the traffic signal software will need to be modified to select the return traffic signal phase; 3) additional 100 feet of southbound right turn lane storage to address the 95% queue. The westbound traffic on Durham Road comes from southbound Upper Boones Ferry Road (50 percent), northbound Upper Boones Ferry Road (35 percent), and westbound Durham Road (15 percent). Based upon these relationships, the southbound right turn lane would need to be 225 feet in length for existing plus commuter rail and 275 feet for 2020 conditions to avoid blocking southbound Boones Ferry Road. With these mitigation measures, there would not be significant traffic operational impacts related to the Durham commuter rail crossing.

It should be noted that the traffic signal controller software change needed for the Durham Road crossing should also be installed at the following crossings to assure adequate operational control for peak conditions:

- Tualatin Crossing - at Tualatin/Boones Ferry Road
- Bonita Crossing - at Bonita/72nd
- Hall Crossing - at Hall/Scoffins-Hunziker
- Main Crossing - at Main/Scoffins
- Tiedeman Crossing - at Greenburg/Tiedeman

Hall Boulevard. Northbound traffic on Hall Boulevard would queue approximately 375 to 475 feet (existing plus commuter rail and 2020 scenarios) with a commuter rail crossing in the PM peak hour. There is only 200 feet between the crossing and Burnham Road. These 95th percentile queues would extend south on Hall 200 to 300 feet south of Burnham. Because the intersection of Hall/Burnham operates at level of service C conditions in the PM peak, the additional queue would have little impact with the following operational strategies: 1) railroad to traffic signal pre-emption (exists today); 2) modification of traffic signal controller software to always return to north-south traffic flow following pre-emption.

Scholls Ferry Road. The forecast in 2020 for Scholls Ferry Road is for nearly 60,000 vehicles per day. The timing of the commuter rail crossing of Scholls Ferry Road is critical to minimizing the impact to traffic operation. By departing the Washington Square Station at times that have the least impact to traffic operation (when cross streets are being served) the impact to Scholls Ferry Road can be minimized. In the future (2020) the widening of Scholls Ferry Road improves the level of service and reduces delay. The intersections of Scholls Ferry/Cascade and Scholls Ferry/Nimbus will require

traffic signal pre-empt, interconnect and new traffic signal controller software to minimize operational influence of commuter rail. With the improvements outlined in the RTP and TSPs for Beaverton and Tigard on Scholls Ferry Road, the traffic operational impacts (level of service and queuing) of commuter rail can be minimized. The street improvements planned for Scholls Ferry Road would improve the traffic operating characteristics in the 2020 PM peak hour resulting in a 900 foot eastbound queue (not reaching Nimbus) and 500 feet for westbound traffic (just reaching Highway 217 ramps).

Canyon Road/Farmington Road/Lombard Avenue. Pre-existing queueing in this subarea is extensive. To minimize the commuter rail impact in this area will require the following operational strategies. Traffic signal controller software that allows Canyon and Farmington to return to east-west operation would be necessary. Queues on Lombard Avenue would extend between Farmington Road to just south of the Beaverton Transit Center. Most motor vehicle traffic can avoid this impact by selecting between three nearby alternate routes during peak periods (Broadway to 117th, Hall/Watson or 114th). However, bus transit operation would be delayed (between one and two minutes) by the commuter rail pre-emptions. This may require consideration of alternate routing of southbound Lombard Avenue bus routes to reduce the delay impacts. In the future, the City of Beaverton TSP calls for a new east-west route north of Canyon Road that would further reduce the impact of the commuter rail on bus transit. The significant delays on Lombard are necessary to maintain overall adequate traffic operation in the subarea for the predominant east-west traffic flow.

Alignment Issues in Downtown Beaverton

There are three alignment options in downtown Beaverton as the commuter rail reaches its northernmost station at the Beaverton Transit Center. Options investigated included side running on the east side of Lombard Avenue, side running on the west side of Lombard Avenue and median running in Lombard. One other option was evaluated in early planning for the commuter rail which located the northernmost station at the Merlo Light Rail Transit Station (west of downtown Beaverton). This option was rejected early in the planning analysis due to its large amount of out of direction travel, increased travel time, impacts to numerous additional arterial streets (Murray, Hall, Watson, Cedar Hills, along with 142nd and Hocken), lack of good existing bus access, lack of adjacent high-density development and reduced ridership potential.

The alignment options on Lombard have different impacts related to safety, access, right-of-way, urban design, traffic operation, bus operations in and near Beaverton Transit Center, and station platform location. Table 3.1-19 summarizes the comparison of the alignment. Because measures can be taken to obtain comparable traffic operation from any of the options, the comparison focuses on the impact of obtaining comparable traffic operation (the prior sections assumed side running operation with gates).

Table 3.1-19
Downtown Beaverton Alignment Impact Comparison

Issue	Median Running	East Side Running
Safety	Cannot gate median option - has greater potential for collisions	Gated crossings are proven safer - less collisions
Access	Restricts all access on Lombard to right in/right out only	Requires two additional gated crossings for access to shopping centers. Also impacts auto parts store and gas station access.
Right-of-way	Require removal of left turn lanes on Lombard to minimize ROW takes to be same as west side running.	Requires property south of Canyon, east of Lombard to be acquired along with Lombard realignment property
Urban Design	Common to LRT urban design - friendly for pedestrians	Impacts east side of Lombard - not pedestrian friendly
Traffic Operation	Worse than side running unless left turns on Lombard prohibited - then same, but impacts transferred to other intersections	Noted in Table 17 and 18 - buses cannot make southbound left turn on Lombard when gates down.
Station Location	Over/near Hall Creek, 300 feet to MAX station - requires another rail crossing of Lombard to access platform	Over/near Hall Creek, 300 feet to MAX station

Parking Impact

Predicted Use of Station Parking

Roughly one-third of the commuter rail ridership predicted for 2020 would use a parking space at the production (home) end of the trip. This would amount to roughly 800 travelers and an equal number of parking spaces because of the low turnover that is characteristic of commuter rail parking. The Metro forecast of demand for the commuter rail service predicted system usage based on the assumption that there would be adequate parking to meet passenger demand at three stations: Wilsonville, Tualatin, and Tigard. The predicted park & ride demand for these stations is 386, 111 and 57 respectively, as illustrated in Table 3.1-20. No new parking would be added at the Beaverton Transit Center Station, and the spaces at the Washington Square Station would be shared with nearby businesses and provide space for roughly 200 vehicles. The planned parking for each station is compared to the predicted demand for each of the stations in Table 3.1-20.

Table 3.1-20
Proposed Commuter Rail Station Parking

Station	Original Concept Parking Provision	Planned Parking Supply	Forecasted Station Parking Demand
Beaverton Transit Center	0	0	0
Washington Square Area	200	200	221
Tigard Transit Center	150	100	57
Tualatin Town Center	122	150	111
Wilsonville	180	400	386
TOTAL	**652**	**850**	**775**

Source: DKS, 2000

Potential Spillover Parking

Although a significant amount of parking will be made available for parking at four of the five proposed commuter rail stations, for several, the supply may not be adequate to meet the future demand. No additional parking is proposed at the Beaverton Transit Center, which is expected to generate a little over 500 morning boardings. These are all assumed to be by walk, drop off, or transit access. This level of demand is likely to generate some demand for parking and may result in spillover parking that affect nearby streets and shopping centers. Parking measures established for westside MAX will be equally effective for the commuter rail project.

Other stations are also predicted to have high levels of non-auto access: Tigard (87 percent), Tualatin (67 percent), and Washington Square (55 percent). These high levels of non-auto access also suggest that there may be more demand for parking than would be provided at the stations. (Only the Washington Square Station was assumed to have a capped amount of parking in the forecast.) Some spillover parking is likely to occur at these stations. The Wilsonville Station has the lowest predicted non-auto access at 28 percent. This is still high in comparison to access mode shares on other commuter rail systems similar to that proposed in this study.

Bicycles and Pedestrians

Both "build" alternatives are consistent with regional, county, and local city policies and programs for bicycle and pedestrian accommodation. The regional, county, and local policies and programs have all encouraged use of alternative modes and have encouraged investment in sidewalks, trails, and bicycle routes as access to transit services. Because three of the proposed commuter rail stations are at or adjacent to an existing transit center, there would be even greater emphasis on improving bicycle access to these stations. The Beaverton, Washington Square, Tigard, and Tualatin Stations are planned to be in close proximity to a proposed multi-use trail adjacent to Fanno Creek over most of its length (some portions already exist). Bicycle parking would be provided at all stations.

3.1.3 Cumulative Impacts

3.1.3.1 Future Development and Transportation Investment Plans Assumed

The forecasts of future year travel patterns, transit demand, and roadway level of service were prepared using a cumulative forecast of growth and vehicular travel volumes. The forecasts were based on Metro's 2040 Growth Concept, adopted in 1996, which serves as the blueprint for future growth in the region. These growth assumptions are consistent with the proposed regional investment in transportation facilities for the 20-year time horizon of the Draft Regional Transportation Plan. The forecasts were developed using Metro's multi-modal modeling system and reflect the cumulative impacts of the alternatives, as well as other likely transportation investments, and the growth that is expected by 2020.

3.1.3.2 Potential Impact of the Project on Cumulative Impacts

Because the two "build" alternatives affect a relatively small number of corridor trips (less than 5 percent), the impact of the project on cumulative impacts is not likely to be significant. The most likely way in which the project could affect the cumulative impact is in the immediate vicinity of the proposed commuter rail stations and queues at railroad gate crossings. The additional impact over other cumulative impacts would be in parking spillover near stations, level of service at intersections near stations with a significant park & ride demand, and delays at railroad crossings where commuter

rail trains would increase the number of times each day that the gates would be down. For both "build" alternatives, there would be a small reduction in overall corridor traffic volumes as a result of diverting automobile trips to transit, and this would produce some minor benefits in traffic flow, noise and air quality over the cumulative impacts without the project.

3.1.4 Mitigation Measures

3.1.4.1 Transit

All of the alternatives analyzed will maintain existing transit services and access to existing services. The TSM and Commuter Rail Alternatives would both increase transit service and access in the corridor without reducing service or access to any populations. One potential impact to transit service from any of the three alternatives might be an increase in operating time for existing bus services as a result of queuing at railroad crossings for commuter rail service. This issue is described in the section on Roadway Network Impacts and the mitigation options for the roadway network (described in the section below) would also apply to transit. Most significant would be the consideration of alternate bus routes to southbound Lombard Avenue and the use of the future east-west street just south of the Beaverton Transit Center (new Henry Street). There may also be a need to expand existing local bus service to the proposed stations to accommodate the demand for transit access to the commuter rail service.

3.1.4.2 Roadway Network

There are several mitigation measures required with the implementation of the commuter rail project. These include:

- Modifying the traffic signal controller software at 20 intersections to allow for a fixed return phase following rail pre-emption. This will include new traffic signal timing plans at these locations.

- Installing rail pre-empt at seven intersection traffic signal controllers (Canyon/Lombard, Greeburg/Tiedeman, Main/Scoffins, Hall/Scoffins-Hunziker, Bonita/72nd, Durham/Upper Boones Ferry Road, Tualatin/Boones Ferry Road; assuming that rail pre-empt exists at Farmington/Lombard, Hall/Cascade, Scholls Ferry/Cascade and Tualatin-Sherwood Road/Boones Ferry). The other thirteen intersections already have pre-empt equipment.

- Modifying the traffic signal controller software at 20 intersections to allow for a fixed return phase following rail pre-emption. This will include new traffic signal timing plans at these locations.

- Provision traffic signal interconnect conduit across all rail crossings (specifically on Canyon, Farmington, Hall, Scholls Ferry, Main Street, Hall, Bonita, Durham, Tualatin-Sherwood and Boeckman).

- Extension of the southbound Upper Boones Ferry Road southbound right turn lane to 275 feet.

- Provision of train signaling equipment that notify departing trains of the appropriate window in the traffic system where pre-emption would have the least impact.

- Coordination with ODOT rail to minimize the rail crossing gate impacts to between 40 and 50 seconds rather than 50 to 60 seconds. This may include near side check out, new rail detection and signals, and digital radio.

In the future, with or without commuter rail, there are several street improvements that would improve traffic operations. The Transportation System Plans for the local agencies and the Regional Transportation Plan[1] identify the following improvements that would complement commuter rail by reducing traffic impacts:

- Downtown Beaverton Connectivity Plan - including the extension of Henry Street to Lombard and connecting to Center Street.
- Added right turn lanes on northbound and southbound Lombard Avenue at Farmington Road.
- Added turn lanes at Cascade/Hall - improves capacity.
- Scholls Ferry Road widening to 7 lanes and an eastbound right turn lane on Scholls Ferry Road and Cascade Avenue.
- New overcrossings of Highway 217 between Nimbus and Washington Square and between Cascade and Washington Square.
- When Highway 217 is widened, the Scholls Ferry Road overcrossing will need to be widened. When this is done, consideration of a grade separation from Washington Square over Highway 217 and over the railroad track should be considered.
- Walnut Avenue extension from ORE 99W to Burnham Street and Scoffins Street. This would improve access to the Tigard Station and provide alternate routes for traffic in the crossing area.
- Durham Road five lanes from I-5 to Hall Boulevard – would reduce queue distances.
- I-5 to ORE 99W connector - would reduce volume on Tualatin-Sherwood Road.
- Kinsman Road extension - would provide alternative access to the station in Wilsonville.
- Boeckman Road extension - would provide access to the proposed Dammasch mixed use village area.

3.1.4.3 Parking

There may be a need for some mitigation of parking impacts at or near the commuter rail stations. Because there is the potential for some spillover parking where demand for park & ride access exceeds the parking supply at the station, more spaces may be required at the stations. Where additional parking cannot be provided, either directly for the station or on a shared-use basis with adjacent businesses or other land uses, actions may be required to manage the spillover parking. This might include initiation of parking restrictions for on-street spaces (time limits or neighborhood residential parking restrictions), increased enforcement of restrictions or installation of parking meters.

3.1.4.4 Bicycles and Pedestrians

All three of the alternatives maintain existing bicycle and pedestrian access facilities.

[1] *1999 Draft Regional Transportation Plan,* Metro, December 16, 1999.

3.2 AIR QUALITY

3.2.1 Affected Environment

3.2.1.1 Study Area

The Wilsonville-to-Beaverton Commuter Rail project corridor is in the southwest corner of the Portland-Vancouver Air Quality Maintenance Area, in eastern Washington County and northwestern Clackamas County. Air pollution in Portland is regulated by the northwest regional office of the Oregon Department of Environmental Quality (ODEQ). Certain air pollutants, such as hydrocarbons and nitrogen oxides, are considered "regional" because reactive precursor ground-level impacts (of ozone, for example) can occur at considerable distances from emission sources due to complex atmospheric reactions and prevailing meteorological conditions. Therefore, emissions of such pollutants from the Portland-Vancouver area can contribute to ambient concentrations recorded at monitoring locations throughout the region. Other air quality impacts, such as odor, fugitive dust, and carbon monoxide from vehicle traffic are more localized in nature. The study area for these near-field impacts has been defined as the immediate vicinity (i.e., within 1 mile) of the commuter rail project corridor.

3.2.1.2 Regional Climatology

The Portland-Vancouver area is located in the northern Willamette Valley, where the climate is relatively mild throughout the year, characterized by cool, wet winters and warm, dry summers. The climate is influenced by the Pacific Ocean, which is approximately 60 miles west of the project site, and the Coast Range and Cascade Mountains, approximately 40 miles west and 50 miles east, respectively. Major climate controls include the Pacific high pressure system over the eastern Pacific Ocean, and the low-pressure ridge that often develops over the Aleutian Islands in Alaska. In late spring and summer, the Pacific high pressure system prevails, often resulting in dry, stable weather conditions. The dry season peaks near the end of July or the beginning of August. The Columbia Gorge acts as a transport mechanism of weather systems between the eastern and western portions of northern Oregon and southern Washington.

3.2.1.3 Regulatory Framework and Pollutants of Concern

National Ambient Air Quality Standards (NAAQS) have been established to assess whether regional air pollution levels pose potential impacts to public health and welfare. Currently, there are six "criteria" air pollutants for which national standards have been established: carbon monoxide (CO), nitrogen dioxide (NO_2), ground-level ozone (O_3), sulfur dioxide (SO_2), particulate matter less than 10 micrometers in size (PM_{10}), and lead (Pb). In addition to these six pollutants, Oregon maintains a Total Suspended Particulate Matter (TSP) standard. Relevant federal and state ambient air quality standards (AAQS) are listed in Table 3.2-1.

Within the project area, the ODEQ implements federal and state air quality legislation and develops state standards. The State Implementation Plan (SIP), the primary enforcement tool of clean air regulations, translates air quality standards into enforceable emission limits. Other mechanisms in place to control air emissions include control strategies, developed for nonattainment areas to reduce the pollutant levels to meet the standards by a certain date, and Transportation Control Measures (TCMs). The project lies in the metropolitan Portland region, which is in a Prevention of Significant Deterioration (PSD) Class II area, and is currently in attainment for all criteria pollutants. Although

not currently enforced, new $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter) and O_3 standards may affect the regulatory status of the project area in the future.

Table 3.2-1
National And State Ambient Air Quality Standards

Pollutant	Averaging Time	Oregon Standards	National Standards	
			Primary	Secondary
Ozone	8-hour	0.08 ppm (157 $\mu g/m^3$)	0.08 ppm (157 $\mu g/m^3$)	None
Carbon monoxide	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Same
	1-hour	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	Same
Nitrogen dioxide	Annual average	0.053 ppm (100 $\mu g/m^3$)	0.053 ppm (100 $\mu g/m^3$)	Same
Sulfur dioxide	Annual average	0.02 ppm	80 $\mu g/m^3$ (0.03 ppm)	None
	24-hour	0.10 ppm	365 $\mu g/m^3$ (0.14 ppm)	None
	3-hour	1,300 $\mu g/m^3$ (0.5 ppm)	None	1,300 $\mu g/m^3$ (0.5 ppm)
	1-hour	None	None	None
PM_{10}	Annual	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$	Annual	15 $\mu g/m^3$	15 $\mu g/m^3$	None
	24-hour	65 $\mu g/m^3$	65 $\mu g/m^3$	None
TSP	Annual	60 $\mu g/m^3$	None	None
	24-hour	150 $\mu g/m^3$	None	None
Lead	Quarterly	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

Source: ODEQ, OAR Chapter 340, Division 31
$\mu g/m^3$ = Micrograms per cubic meter.
mg/m^3 = Milligrams per cubic meter.
ppm = Parts per million.

Until recently, the Portland area was classified by EPA as a "nonattainment status" area for ground level ozone and carbon monoxide, meaning that the area has historically violated EPA standards for CO (9 ppm during any given eight-hour period) and ozone (0.12 ppm in a one-hour period). CO and ozone levels are considered to be in compliance with the standard if they do not exceed the standard more than once per year on average. Programs and regulations implemented to control air pollutant

emissions have been effective, and air quality in the area has improved. In April 1997, EPA redesigned the area from "nonattainment status" to "maintenance status."

Oregon has regulations designed to ensure that transportation plans and regionally significant transportation projects are consistent with (or "in conformance with") the SIP. The regulations require Metropolitan Planning Organizations (e.g., Metro) to prepare transportation plans identifying transportation projects that are likely to be funded and built. Emissions from all of the included projects cannot exceed emission budgets contained in the SIPs, and cannot cause or contribute to a violation of the NAAQS, or delay attainment in a nonattainment area. Individual projects can increase emissions as long as overall emissions decrease. Metro performs a conformity analysis each time it updates an approved (conforming) Regional Transportation Plan (RTP) or Transportation Implementation Plan (TIP). To demonstrate conformity, a project must be included in a conforming RTP and TIP. There are two parts to demonstrating conformity for transportation projects. The first requirement is that estimated pollutant emissions remain below the emissions budget for on-road mobile sources to ensure compliance with ambient air quality standards for ozone, based on the projects included in the RTP and TIP. The second requirement for CO non-attainment or maintenance areas is that no individual project may cause a violation of the NAAQS, or an increase in the frequency or severity of an existing violation. Thus, for CO nonattainment and maintenance areas, an analysis of localized CO impacts (hot spots) is required.

As part of the environmental review process for new or improved roadways, or facilities that will generate additional traffic, Oregon also requires an indirect source construction permit under OAR Chapter 340, Part 20. A project must obtain a permit if increases in traffic volumes or the number of parking spaces exceed specific limits. Changes to the allowed limits are currently under review. Under the expected revisions, an indirect source construction permit will be needed for parking lots exceeding 1,000 spaces. The commuter rail project would include construction of four park & ride facilities, for a total of less than 900 spaces. Therefore, the project is not expected to be subject to the new indirect source regulations.

3.2.1.4 Existing Pollutant Levels

Based on available regional data, the proposed commuter rail project corridor is in attainment of all ambient air quality standards. There are no monitors located along the route. ODEQ maintains a network of air quality monitoring stations throughout the Portland area. In general, these stations are located in areas where the agency believes there are air quality problems, or areas that are designated non-attainment. A summary of monitored pollutant concentrations is provided in Table 3.2-2.

Table 3.2-2
Summary of Monitored Pollutant Concentrations
for the Portland Region*

Pollutant	Averaging Time	1998	Station
Ozone	8-hour	0.081 ppm**	Carus (Canby)
Carbon monoxide	8-hour	4.8 ppm**	82nd & Division
	1-hour	8.4 ppm**	4th & Alder
Nitrogen dioxide	Annual average	No monitoring	None
	1-hour	0.091 ppm **	SE Lafayette
Sulfur dioxide***	Annual average	.004 ppm **	5532 NW Doane
	24-hour	0.012 ppm **	5532 NW Doane
	3-hour	0.035 ppm **	5532 NW Doane
	1-hour	No monitoring	None
PM_{10}	Annual	28.9 $\mu g/m^3$ **	Transcom Terminal
	24-hour	19 $\mu g/ m^3$ *	Hall Blvd (Metzger)
TSP	Annual	25 $\mu g/m^3$ **	SE Lafayette
	24-hour	98 $\mu g/m^3$ **	SE Lafayette
Lead	Calendar Quarter	0.05 $\mu g/m^3$ **	I-5 at Failing

Source: *1998 Oregon Air Quality Data Summaries* (DEQ, Air Quality Division).
* Values reported for monitoring station(s) most representative of project site.
** Reported value is a maximum for the region.
*** SO_2 values from last monitored year (1995).
$\mu g/m^3$ = Micrograms per cubic meter.
mg/m^3 = Milligrams per cubic meter.
ppm = Parts per million.

3.2.2 Potential Impacts

There are three potential sources of air pollution associated with the Commuter Rail, TSM and No Build Alternatives: construction, diesel engine use, and vehicular traffic. Construction impacts would be associated with the commuter rail project only. They are temporary, and are expected to be minimal. The most significant construction impacts are usually caused by earth moving activities. Diesel engine use on the existing rail line would be increased due to the commuter rail project. Vehicular traffic would be reduced due to both the Commuter Rail and TSM Alternatives, but slight modifications in traffic patterns can create local "hot-spots", which are assessed below.

3.2.2.1 Methodology

Diesel Engines

Although specific rail cars have not yet been identified for use in this project, two available manufacturer designs were evaluated for emissions. Emissions for these engines are derived from engine operation hours and EPA emission factors. The emissions from these sources are not included in the state's transportation emission budget, as they are not included in the RTP. They will, however, be included in future state emission inventories used in the maintenance plans. If the emissions from this source are below general conformity applicability levels (40 CFR 93.153(b)(2)), the source is presumed to meet conformity criteria and no further analysis will be required.

Vehicular Traffic

As stated in the *Transportation Analysis Report* (DKS Associates, 3/31/00), the Regional Transportation Plan (RTP) is currently being updated. Metro is performing an analysis for conformity determination of all transportation projects included in the RTP to address long-term regional impacts. Metro evaluates the total emissions associated with all these projects and determines if they are within the emissions budget for on-road mobile sources to ensure compliance with ambient air quality standards for ozone and CO included in the air quality SIP. If they are within the budget, no regional adverse air quality impacts would occur as a result of the planned projects.

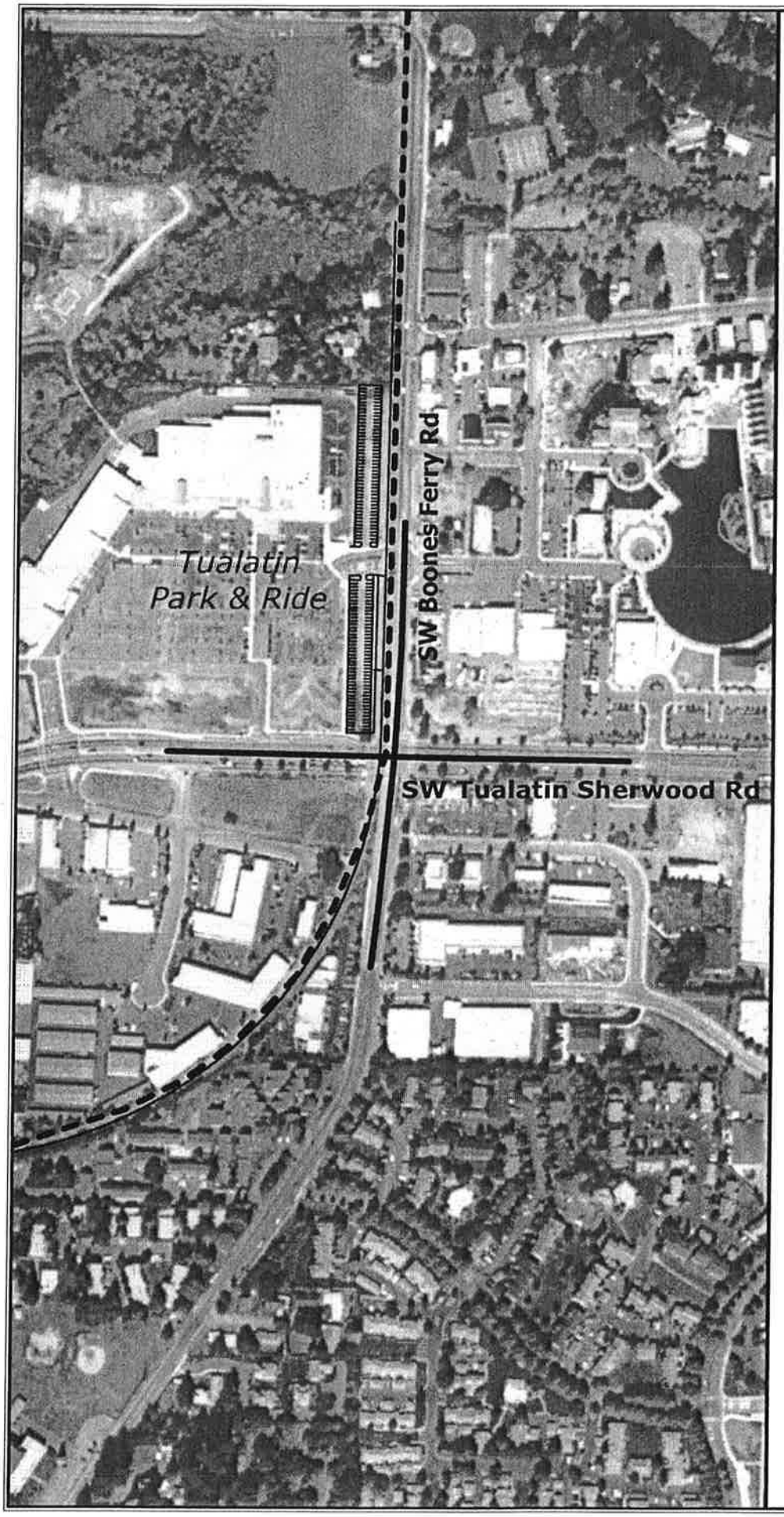
In addition to the Metro analysis, project area emission estimates are made based on VMT. Estimates are made for each alternative and each analysis year. Emission factors for CO, NO_x, and hydrocarbons (grams per vehicle mile) are determined using the MOBILE5b (EPA, 1996) emissions model. The model incorporates guidance from ODEQ on appropriate model input assumptions. Emission factors are based on average vehicle speeds, regional vehicle registration mixes and annual mileage accumulation rates, the effects of vehicle inspection and maintenance programs, and regional ambient conditions. Emissions for other pollutants are expected to be proportional to VMT (i.e., independent of vehicle speed). Project area vehicular emissions are compared for each alternative.

CO Hot Spot Analysis

A local CO hot spot analysis is used to identify when traffic patterns, idle times, queue lengths, and vehicle CO emission rates might lead to elevated CO levels, possibly exceeding the AAQS.

Vehicular CO emission factors (grams per vehicle mile) and idle emission rates (grams per hour) were obtained using MOBILE5b. Emission factors and idle emission rates were calculated for the base (existing) year (2000), implementation year (2004), an intermediate year (2010), and the design year (2020).

Intersections for the CO analysis were selected using traffic data from Section 3.1, Traffic and Transportation. Three intersections are predicted to have level of service (LOS) of D or worse for any alternative or year. The geometry and traffic patterns for each of these intersections is different, therefore all three were analyzed for hot spots. Predicted CO levels within the project study area were obtained using the EPA approved CAL3QHC air dispersion model. Roadway configuration and receptor sites are shown in Figures 3.2-1 through 3.2-3.



Washington County

Wilsonville to Beaverton Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corporation

N

Scale in Feet
100 0 500

Modeled Intersection
Existing Rail Line

Figure 3.2-1

Air Quality
CO "Hot Spot" Analysis

SW Tualatin Sherwood Rd -
SW Boones Ferry Rd
Intersection

Print Date: May 2000
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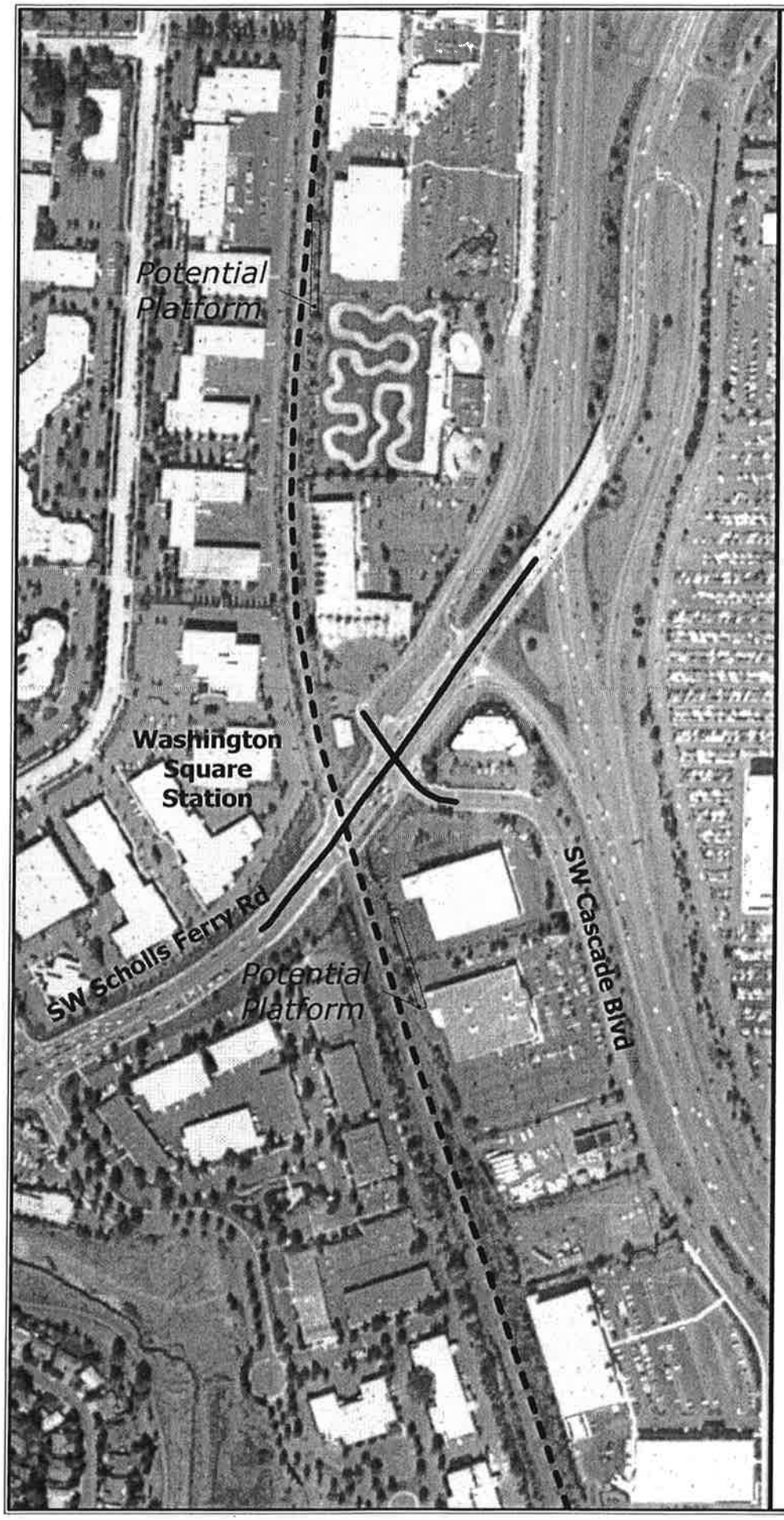

Washington County

Wilsonville to Beaverton Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corporation

N

Scale in Feet
100 0 500

Modeled Intersection
Existing Rail Line

Figure 3.2-2

Air Quality
CO "Hot Spot" Analysis

SW Scholls Ferry Rd -
SW Cascade Blvd
Intersection

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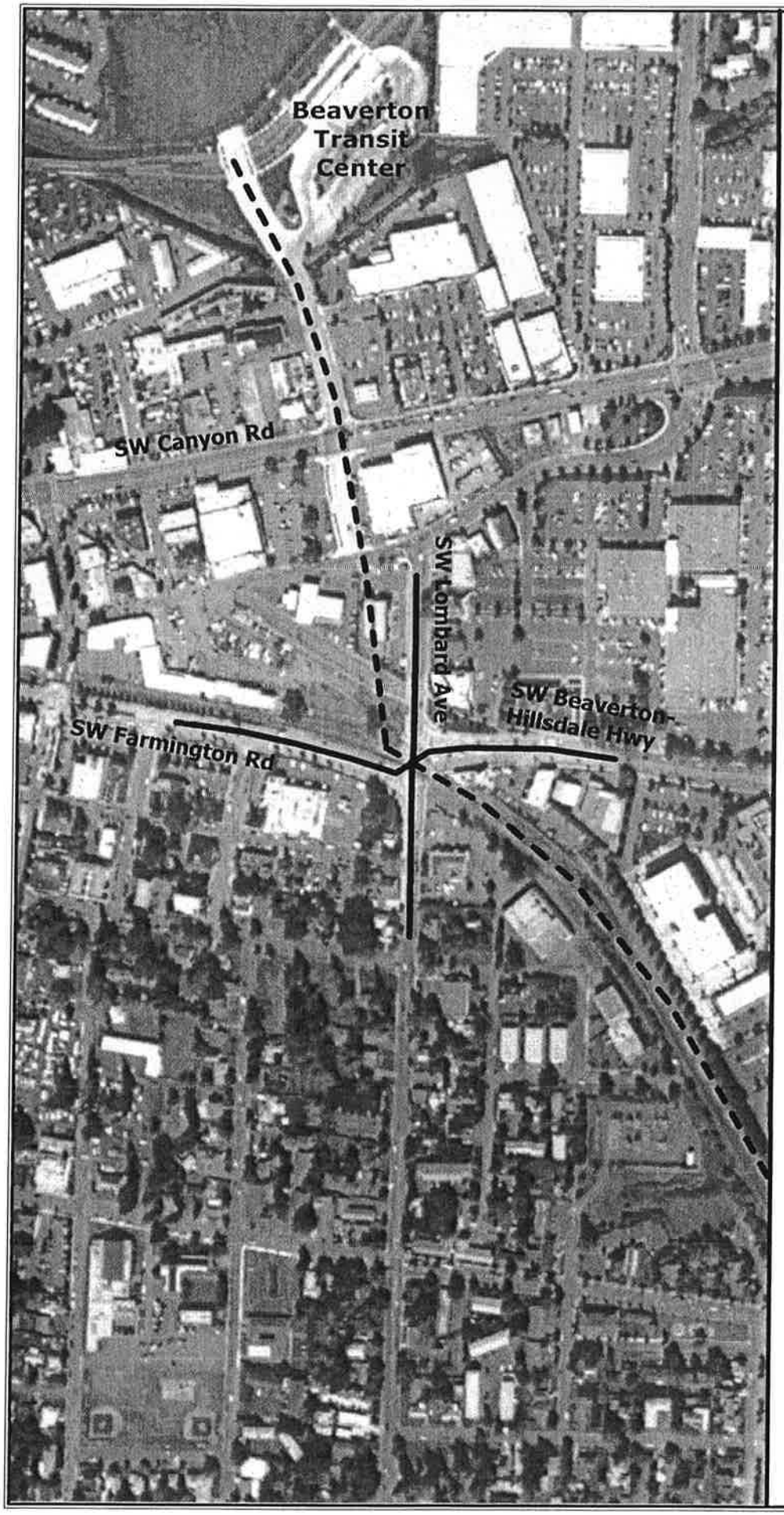

Washington County

Wilsonville to Beaverton Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corporation

N

Scale in Feet
100 0 500

Modeled Intersection
Existing Rail Line

Figure 3.2-3

Air Quality
CO "Hot Spot" Analysis

SW Farmington Rd -
SW Lombard Ave
Intersection

Print Date: May 2000
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Maintenance Activities

Activities that may produce air pollutant emissions include cleaning, painting, welding, and equipment repair. Normal maintenance activities are expected to be minimal, and are not included in the emission inventory.

3.2.2.2 No Build Alternative

Regional Emissions

An increase in vehicle miles traveled (VMT) between the base year (2000) and the design year (2020) is expected due to growth. Emissions on a per-vehicle basis, however, are expected to decrease due to improvements in emission technology and fuel and testing programs.

As discussed below in Section 3.2.2.4, the Commuter Rail Alternative is included in the list of planned projects identified in the RTP currently being prepared for the Portland area. Emissions are expected to be within the SIP emission budget, with no long-term adverse regional air quality impacts.

The *Transportation Analysis Report* shows VMT decreases for the TSM and Commuter Rail Alternatives over the No Build Alternative. The TSM Alternative would reduce Year 2020 VMT by 2,100 miles and the Commuter Rail Alternative by 17,400 miles over the No Build Alternative. These are decreases of less than 0.25 percent and, therefore, the No Build Alternative would result in only slightly higher emissions of criteria pollutants. No long-term adverse regional air quality impacts would result from the No Build Alternative.

Local Emissions (Hot Spots)

Three intersections were analyzed for CO concentrations, with up to 20 locations evaluated at each intersection (see Figures 3.2-1 through 3.2-3). Traffic conditions for the base year (2000) and the design year (2020) were analyzed. The results are shown in Table 3.2-3. Both 1-hour and 8-hour CO concentrations were estimated for the analysis; however, only 8-hour CO concentrations are shown since they are of the greatest concern. All 1-hour impacts are expected to be well below their respective standard. (Modeling analysis details are provided in the *Air Quality Technical Report* for this project.)

As shown in Table 3.2-3, the No Build Alternative would result in CO concentrations at the specified roadway intersections that are all below the 8-hour AAQS of 9.0 ppm for both the base year (2000) and the design year (2020). For the No Build Alternative, the highest maximum predicted 8-hour impact for year 2000 occurs at the Farmington/Lombard intersection. The predicted maximum 8-hour impact at this intersection increases to 7.5 ppm for the design year 2020, but is still below the AAQS. Maximum predicted impacts at the other two analyzed intersections for the No Build Alternative show no changes or decreases for the year 2020, most likely due to emission factor reductions.

Table 3.2-3
Predicated Eight-Hour CO Concentrations Near Selected Intersections: Unmitigated Condition

Intersection	Concentration (ppm)							
	Base Year 2000		Implementation Year 2004		Intermediate Year 2010		Design Year 2020	
	No Build	Commuter Rail	No Build	Commuter Rail	No Build	Commuter Rail	No Build	Commuter Rail
Tualatin-Sherwood/ Boones Ferry	6.1	6.1	5.4	5.5	5.3	5.4	5.8	5.8
Scholls Ferry/ Cascade	5.8	5.5	5.2	5.2	5.1	5.3	5.8	5.3
Farmington/ Lombard	6.9	7.2	6.8	7.1	7.0	7.2	7.5	7.7

Source: URS Corporation, Air Quality Technical Report, 2000.
ppm = parts per million

3.2.2.3 TSM Alternative

Regional Emissions

In the overall study area, the TSM Alternative would result in slightly higher VMT than the Commuter Rail Alternative and slightly lower VMT than the No Build Alternative. The TSM Alternative would result in only a minimal increase in criteria pollutant emissions over that for the Commuter Rail Alternative. This increase would not be expected to cause the emissions budget for the region to be exceeded (see Section 3.2.1.4).

Local Emissions (Hot Spots)

Based on the traffic analysis, the TSM Alternative would result in traffic configurations somewhere between the No Build and Commuter Rail Alternatives. Because these alternatives do not show any CO concentrations above 9 ppm (as shown in Table 3.2-3), the TSM Alternative is also expected to have CO concentrations that would not result in the violation of the AAQS. No specific intersection data was available for the TSM alternative, but any increases in CO concentrations due to increased bus service would be insignificant and would not result in predicted exceedances of the CO standard. It is expected that maximum impacts would fall somewhere between the No Build and Commuter Rail Alternatives.

3.2.2.4 Commuter Rail Alternative

Regional Emissions

The Commuter Rail Alternative is included in the list of planned projects identified in the RTP currently being prepared for the Portland Area. Metro is in the process of performing the conformity analysis for the RTP. This analysis is expected to determine that the regional pollutant emissions for all planned projects in the RTP, including the Commuter Rail Alternative, will fall below the emissions budget contained in the SIP. Therefore, no long-term adverse regional air quality impacts would result. Approval of the RTP is expected in the summer of 2000. Criteria pollutant emissions are expected to decrease due to the Commuter Rail Alternative.

Diesel Engine Emissions

The railcar specifications have not yet been selected for the commuter rail project. Two typical designs were evaluated for emission estimates; the Adtranz DMUs, and the RDC Bud Cars. Operating assumptions include 16 trains/day and 30 minute travel time each way. The DMUs meet federal emission standards for locomotives (40 CFR 89, Tier 3 for project year 2006). (Calculation details are provided in the Air Quality Technical Report for this project.) Diesel engine emission estimates are provided in Table 3.2-4. These estimates are based on conservative assumptions of engine specifications and operations.

Table 3.2-4
Diesel Engine Emissions

Pollutant	Emissions (tons/year)	
	Adtranz DMUs	RDC Bud Card
NO_x	21	74
CO	18	16
SO_2	6	5
PM_{10}	3	5
VOC	7	7

Source: URS Corporation, Air Quality Technical Report, 2000.

Local Impacts (Hot Spots)

As shown in Table 3.2.3, CO concentrations are projected to meet the 8-hour AAQS of 9 ppm for the Commuter Rail Alternative at all three intersections. The Farmington/Lombard intersection shows the highest maximum predicted impacts for both year 2000 and 2020. As discussed above in Section 3.2.2.2, this is due mainly to the intersection geometry. The Scholls Ferry/Cascade intersection shows a decrease in the maximum predicted impacts for the Commuter Rail Alternative scenario for both year 2000 and 2020. The Tualatin-Sherwood/Boones Ferry intersection shows no change in maximum impact levels as compared to the No Build Alternative.

In order to improve projected traffic flow at these three worst-case intersections, "mitigated" scenarios were developed (for the Commuter Rail Alternative only). Based on the traffic data, mitigated scenarios for the Commuter Rail Alternative were necessary for years 2010 and 2020. Mitigation includes the addition of turning lanes and/or modified signal timing. Results of the CO hot spot analyses for these mitigated intersections are shown in Table 3.2-5. All maximum predicted concentrations are within the AAQS.

Table 3.2-5
Predicted Eight-Hour CO Concentrations Near
Selected Intersections: Commuter Rail Mitigated Condition

Intersection	Concentration (ppm)	
	Intermediate Year 2010	Design Year 2020
Tualatin-Sherwood/Boones Ferry	5.8	5.7
Scholls Ferry/Cascade	6.3	5.8
Farmington/Lombard	7.1	7.0

Source: URS Corporation, Air Quality Technical Report, 2000
ppm = parts per million

Conformity with the SIP

As noted above, the RTP currently being prepared includes the commuter rail project. Metro expects that this RTP will conform with the SIP. In addition, neither the regional or local emissions are predicted to cause or contribute to the violation of any AAQS. Therefore, the project would conform with the SIP.

3.2.3 Cumulative Effects

The forecast traffic volumes used to analyze the air quality impacts of the Commuter Rail Alternative include traffic from all sources. Background concentrations representing the cumulative impact of all other sources of pollution in the area are also added into the predicted local concentrations for CO at intersections. Because of these inclusive analysis methodologies, the potential air quality effects reported in this analysis represent "cumulative" air quality effects. The project would not contribute to cumulative air quality effects in the region. Because vehicle miles traveled are reduced under the commuter rail project, there would be some improvement in cumulative regional air quality due to reduced vehicular traffic.

Diesel combustion emissions are not expected to contribute cumulatively, with other nearby sources, to cause any significant impacts or deterioration of local air quality. Additional growth and traffic increases in the region are not expected to be significant due to this project.

3.2.4 Mitigation Measures

3.2.4.1 Diesel Engines

Standard operation and maintenance practices will be employed to keep diesel engines running properly and at acceptable emission levels.

3.2.4.2 Vehicular Traffic

No mitigation measures are required for mitigating long-term air quality impacts from vehicles. In-place maintenance programs within Washington County should ensure acceptable vehicle emission levels.

3.3 NOISE AND VIBRATION

3.3.1 Affected Environment

Noise and vibration effects of the proposed project and alternatives are discussed separately in this section.

3.3.1.1 Noise

Noise is typically a key issue for commuter rail studies because of public concern for its potential effect on the local noise environment. Noise from commuter rail operations result primarily from two sources: (1) the mechanical energy associated with traction power which is converted to noise energy in the form of a sound wave that propagates away from the train, and (2) noise generated by the interaction of steel wheels on steel tracks that also propagates away from the train. Community noise may also be associated with transit stations, park and ride lots, and rail vehicle maintenance facilities. Train noise is not generally a constraint when its intensity is near or below the ambient noise levels that are characteristic of existing transportation corridors and urbanized environments. Noise may be

more of a concern in rural areas that typically have quieter ambient noise environments such as portions of the Commuter Rail Alternative route.

Noise Terminology and Descriptors

The units of noise measurements are decibels (dB) that are expressed as the logarithmic ratio of a measured quantity to a standardized reference quantity. Because community noise is related primarily to human concerns, the noise that is measured/predicted is modified ("weighted") by a filter known as the A filter. This reduces the effects of low and very high-pitched sounds to which human hearing is not as sensitive. The resulting units are called A-weighted decibels (dBA), and are used to express sound levels. Noise is the common term used to describe "unwanted sound". The terms noise and sound are used interchangeably in this assessment.

Certain noise descriptors are preferred for use in describing community noise environments. These descriptors are based upon noise energy and are called the Equivalent Noise Level (L_{eq}), and the Day Night Level (DNL or L_{dn}). Both descriptors are approved by various regulatory agencies for noise-related land use planning. The units for each of these descriptors are dBA. The most recent methodology recommended for assessing commuter rail noise effects (Federal Transit Administration, 1995) uses L_{dn} as the noise descriptor of choice. While the L_{dn} descriptor may also describe noise from motor-vehicle traffic, most state highway agencies (e.g., ODOT) and the FHWA commonly describe traffic noise by its highest hourly value during a 24-hour period. This descriptor is the peak-noise-hour L_{eq}.

A different descriptor has been traditionally used to quantify and describe train noise. This descriptor is called the Maximum Noise Level (L_{max}), which indicates the maximum sound level reached during a noise event such as a train pass-by. The L_{max} values are not directly comparable to the acoustical-energy-based descriptors L_{eq} or L_{dn}. These energy-based descriptors account for the varying sound levels during a measurement period, not just the maximum sound level. They also account for the duration of a noise event and for the number of events that occur during a prescribed period. Additionally, L_{dn} accounts for the increased annoyance resulting from noise occurring during the nighttime hours (10:00 p.m. - 7:00 a.m.) by adding a 10 dBA penalty for noise occurring during this period.

The use of L_{dn} as a noise descriptor for railroad activity and peak-noise-hour L_{eq} for bus activity, as recommended by the Federal Transit Administration (FTA), is generally consistent with the State of Oregon guidelines related to noise-compatible land use planning.

Regulatory Setting

There are a number of laws and guidelines at the federal level that direct the consideration of ground transportation noise impacts. These include:

- National Environmental Policy Act (42 U.S.C. 4321, et. seq.) (PL-91-190) (40 C.F.R. 1506.5);
- Noise Control Act of 1972 (42 U.S.C. 4910);
- Federal Railroad Administration Guidelines (Final Draft, Report No. 293630-1, Contract DTFR53-94-A-00056; FRA, 1996);
- Federal Transit Administration Guidelines (DOT-T-95-16, April 1995);

- EPA Railroad Noise Emission Standards (40 C.F.R. Part 201) and FRA Railroad Noise Emission Compliance Regulations (49 C.F.R. Part 210);
- FHWA Noise Abatement Procedures (23 C.F.R. Part 772);
- HUD Environmental Standards (24 C.F.R. Part 51); and
- OSHA Occupational Noise Exposure; Hearing Conversation Amendment (FR 48 (46), 9738--9785 (1983);

The State of Oregon Administrative Rules, Chapter 340, Division 35 – Department of Environmental Quality, specifically "Noise Control Regulations for Industry and Commerce, 340-35-035, subsections (1) through (6)" contain regulations that generally address "New Industrial and Commercial Noise Sources". While the regulations exempt various noise sources from local control (e.g., federally preempted sources such as railroads operating in interstate commerce that comply with federal noise regulations; operation of emergency equipment and warning devices; and tire and motor-vehicles that otherwise comply with noise standards applicable to such vehicles), these noise sources must still be included in the baseline ambient noise measurements for a project. Also exempt from the Oregon noise regulations are sounds that originate on construction sites and sounds created in construction or maintenance of capital equipment. Additionally, the Oregon Department of Transportation (ODOT) has Noise Abatement Criteria guidelines, and procedures for regulating, assessing, and reducing noise levels associated with motor vehicles.

Existing Noise Environment

The proposed commuter rail would be a single-track layout that would pass through diverse land uses and populations, ranging from unpopulated or sparsely populated rural areas to more densely populated urban areas. In the absence of a substantial discrete noise source, the ambient noise typically correlates well with population density and intensity of land use. However, the intensity of existing ambient noise along the proposed route is dominated by current operations on the existing rail line over most of the route. Noise associated with typical urban activity (e.g., traffic, manufacturing) also contributes to the overall environmental noise level in the more urbanized areas of Wilsonville, Tualatin, and Beaverton. Similar land uses and population densities abut the proposed TSM Alternative routes in the project area. The existing ambient noise levels adjacent to these routes are primarily dominated by traffic noise.

The existing noise environment was measured during a four-day period from April 10, 2000 through April 13, 2000. This mid-week measurement period is consistent with FTA Guidelines. The ambient noise survey had a TSM component and a commuter rail component. The survey also serves as a baseline for the No Project Alternative.

The TSM noise survey consisted of 10 attended short-term L_{eq} measurements at representative locations along the TSM Alternative routes. "Attended" means that there were trained persons operating the sound level meter and observing/noting conditions. "Short-term" measurements are of one hour or less duration. The measured L_{eq} noise levels were 69 to 72 dBA in proximity to the highway, and 62 to 66 dBA at up to 100 feet from the edge-of-shoulder. This measurement data is summarized in Table 3.3-1. The modeled range of ambient environmental noise levels along the proposed TSM Alternative routes is 65 to 75 dBA L_{dn}.

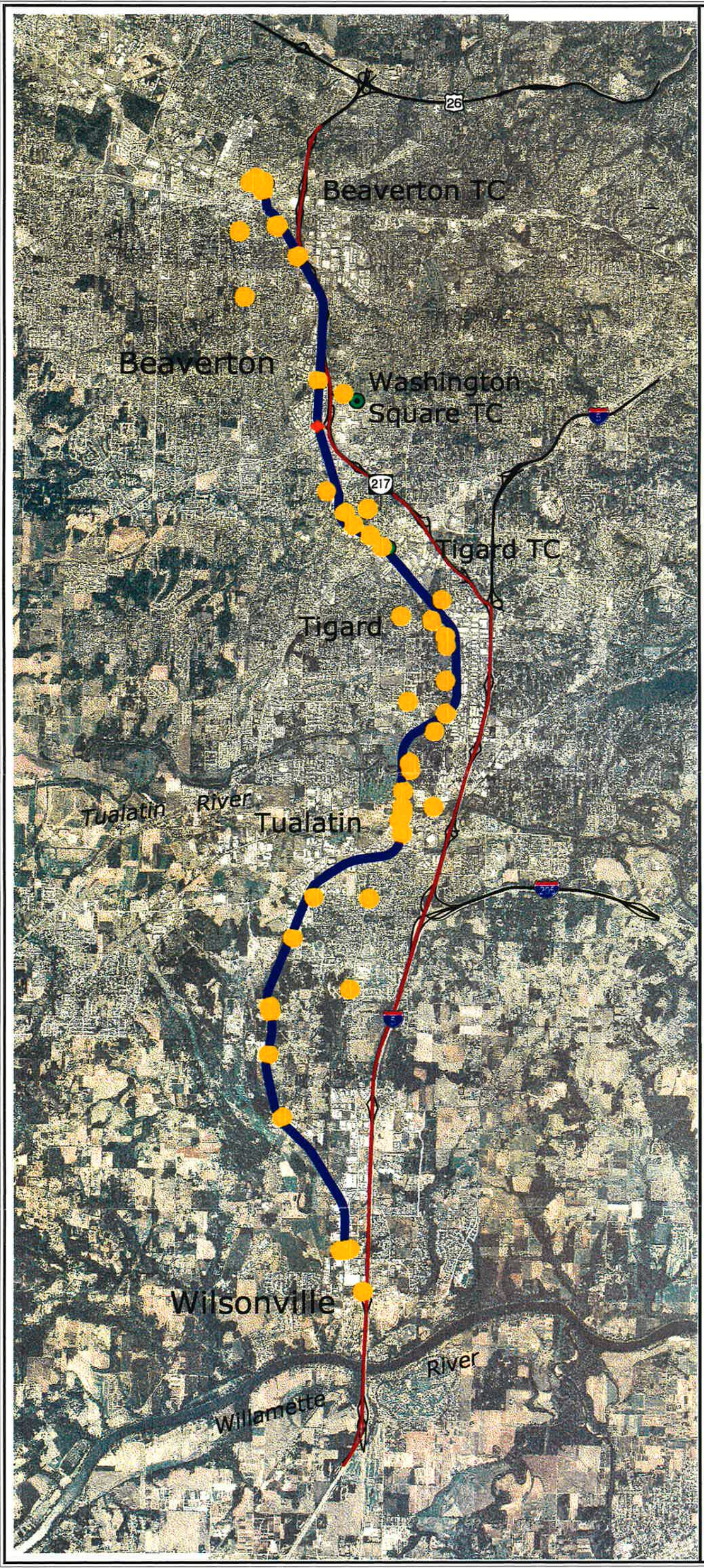
The commuter rail noise survey consisted of two types of measurements: short-term and long-term (18 to 24 hours duration). The locations and data summaries of these two types of measurements are

designated on figures and tables in this assessment with ST-x and LT-x, respectively. All measurement locations are shown on Figure 3.3-1.

Short-term ambient measurements for the Commuter Rail Alternative were conducted at 35 locations. Thirty three of these were attended with two unattended. "Unattended" means that the noise monitor instruments were preprogrammed to collect noise data during an extended period, and the field survey staff were not present during most of the measurement period. The two unattended measurements were the result of vandalism to an instrument at one of the long-term monitor locations where only two hours of valid noise data could be recovered.

The L_{eq} noise level data from the short-term measurements were analyzed to determine if various receptors could be classified into groups with similar ambient L_{dn} noise environments. Several locations with similar land uses had similar noise levels when comparing the short-term data samples. For example, approximately one-third of the locations had short-term midday L_{eq} noise levels around 45 dBA and about one-half of the locations had L_{eq} BA levels in the 50s. However, the similarity of short-term noise environments did not correlate with the measured L_{dn} at or near many of the locations. It is believed that for most locations along the commuter rail alignment the sporadic freight train activity (and in some cases additional sporadic local heavy-truck and industrial activity) results in the inconsistent correlation between short-term L_{eq} and the measured L_{dn}. Thus, the long-term measured data from 17 locations was used as the primary basis for grouping of land uses with similar levels of environmental noise. Analysis of the noise and location data (e.g., distance from the railroad tracks) resulted in three groups with each having ambient L_{dn} noise environments in the 50s, 60 to 67, and 68 to 74 dBA range, respectfully. Only two of the locations had ambient dBA L_{dn} in the 50s. Most of the other locations had noise environments in the mid 60s to low 70s dBA L_{dn}. This is the typical existing ambient L_{dn} along the commuter rail route. The long-term measurement data are summarized in Table 3.3-2.

During 10 additional short-term measurements, the noise from various freight trains was measured and operating characteristics noted. These data were used as an informational supplement to the long-term monitor data and the FTA train noise computer model. These data are summarized in Table 3.3-1. The short-term field notes and the long-term noise monitor data summaries are provided in the *Noise Technical Report* on which this section is based.



Washington County

Wilsonville to Beaverton Commuter Rail

BRW, Inc.
A Division of URS Corporation

URS Corporation

N

Scale in Miles
1 0 1 2

- Receptor Location
- Potential Commuter Rail Station
- Transit Center
- Proposed Alignment
- Freeways

Figure 3.3-1

Noise and Vibration Receptor Locations

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Table 3.3-1
Short Term Noise Measurements

		Measurement Period			Measurement Results, dBA						
Measurement Number	Measurement Location	Date (mo/day/yr)	Start Time (hr:min)	Duration (min)	Predominate Noise Source	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
ST-1	Residence Woody End, Tualatin	4/11/00	10:00	10	Birds, distant traffic, distant back-up alarms	44	53	39	41	43	46
ST-2	Residence Cambridge Dr., Tigard	4/11/00	10:35	10	Birds, distant lawnmower	45	55	42	43	45	47
ST-3	Residence Durham Rd., Tigard	4/11/00	11:00	10	Traffic	56	66	49	51	55	59
ST-4	Residence Ashford St., Tigard	4/11/00	11:30	10	Distant traffic, birds	47	53	44	45	46	49
ST-5	Bonita Villa Apartments, Tigard	4/11/00	12:00	7	Traffic, dog barking	64	80	46	48	50	57
ST-6	Marciene Aparts. Bonita Rd. Tigard	4/11/00	12:20	11	Traffic	58	68	46	49	56	60
ST-7	Apartments, Fanno Creek Dr., Tigard	4/11/00	12:50	12	Birds, distant aircraft and traffic	46	58	41	42	44	49
ST-8	Residence, Cherry Dr., Tigard	4/11/00	14:35	10	Birds, distant traffic	43	53	40	40	42	45
ST-9	Beaverton Transit Center	4/12/00	9:30	20	18 Buses, 6 trains/RR x'ing bell	61	80	44	46	53	64
ST-11	Center Plaza Aparts., Beaverton	4/12/00	10:20	10	Traffic, 1 Commuter train/RR x'ing bell	51	63	44	45	48	54
ST-12	S. Property fence of Center Square Aparts., Beaverton	4/12/00	10:40	10	Birds, light traffic, distant RR whistle, RR x'ing bell	50	61	43	44	47	53
ST-13	Royal Manor Apartments, Lombard Ave., Beaverton	4/12/00	11:03	17	Traffic (autos/buses), 3 Commuter trains/RR x'ing bell	62	75	49	53	59	66

		Measurement Period			Measurement Results, dBA						
Measurement Number	Measurement Location	Date (mo/day/yr)	Start Time (hr:min)	Duration (min)	Predominate Noise Source	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
ST-16	Courtyard Marriott Hotel, Nimbus Ave. Beaverton	4/12/00	12:35	13	Traffic, 3 aircarft	54	66	50	51	52	57
ST-18	Residential, Commercial St., Tigard	4/12/00	14:45	10	Traffic (10 autos, 1 school bus), 3 aircraft, birds	56	73	39	42	46	59
ST-19	Off Main St., Tigard	4/12/00	15:23	10	Traffic	58	66	53	55	57	60
ST-21a	3rd St/ Filbert Ave., Beaverton	4/12/00	16:30	10	Distant traffic, 2 distant aircraft, dog barking (30secs)	51	62	48	49	51	52
ST-21b	3rd St/ Filbert Ave., Beaverton	4/13/00	13:30	7	Distant traffic, 2 local cars, rain	56	72	52	53	54	56
LT-5a	ST-21	4/11/00	16:00	60	Distant traffic, sub-station hum, rail	58	87		48	49	
LT-5b	ST-21	4/11/00	17:00	60	Distant traffic, sub-station hum	50	66		47	49	
ST-24	Residence, Lee Ave., Beaverton	4/13/00	11:58	11	Traffic, rail (very slow moving trains)	66	91	56	57	59	63
ST-53	Residence, Grahams Ferry Rd., Sherwood	4/10/00	14:00	15	Distant traffic and aircraft, truck backup alarm, powerline buzz	50	63	40	42	46	53
ST-54	NW corner womens prison, Sherwood	4/10/00	16:10	15	Industrial, freight train, aircraft	51	66	43	45	49	53
ST-55	Residence, 11330 SW Tonquin Loop, Tonquin	4/10/00	16:55	10	Industrial, birds, distant traffic and banging	52	72	35	37	42	48
ST-56	Residence, Nootka St., Tonquin	4/11/00	10:15	15	Industrial	45	59	38	40	42	47

		Measurement Period			Measurement Results, dBA						
Measurement Number	Measurement Location	Date (mo/day/yr)	Start Time (hr:min)	Duration (min)	Predominate Noise Source	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
ST-57	Future Residential, Marilyn Rd., Tualatin	4/11/00	11:10	10	Distant construction noise, loud banging, birds	47	59	42	44	46	49
ST-58	Residence 110th Pl., Tualatin	4/11/00	12:05	10	Birds	45	50	43	44	45	46
ST-59	Alternate station site, Wilsonville	4/11/00	14:02	10	Electric saw, distant traffic	65	69	60	62	66	67
ST-60	Tualatin Cmty. Park, skateboard area	4/12/00	10:00	15	Traffic, skateboards	63	79	51	57	61	66
ST-61	Tualatin Cmty. Park, bleechers	4/12/00	10:25	15	Traffic, RR maintenance @300'	60	70	55	57	59	62
ST-62	Tualatin Cmty. Park, N. baseball field	4/12/00	11:15	3	Industrial, distant aircraft	47	54	44	45	46	48
ST-62b	Tualatin Cmty. Park, N. baseball field	4/12/00	11:10	3	Industrial, RR pile driver @400ft	70	74	58	64	70	72
ST-63	Residence, Kingfisher Way, Tualatin	4/12/00	12:00	10	Industrial, distant aircraft, birds	46	58	42	43	44	47
ST-68	Church of Christ, Boones Ferry Rd, Tualatin	4/13/00	10:30	10	Traffic	70	81	61	64	69	72
ST-69	Willow Brooke House, Boones Ferry Rd., Tualatin	4/13/00	11:05	10	Traffic	62	70	55	59	61	64
ST-70	Historical House 18815 Boones Ferry Rd., Tualatin	4/13/00	11:25	15	Traffic	71					

Source: URS Corporation, Noise Technical Report, 2000

Table 3.3-2
Long Term Noise Measurements

Long-Term Measurement Number	Start Date	Long-Term Monitor Location	24 Hour L_{eq}	24 Hour L_{dn}	24 Hour Average L_{90}	24 Hour Average L_{50}	Distance to tracks (ft)	Site comments
LT-1	4/10/00	Residence Lee Ave., Beaverton	65	71	59	61	35	Level grade unobstructed
LT-2	4/10/00	Apartments, Dakota St., Tigard	63	65	52	54	590	Open space to visible tracks raised 20ft on grass bank
LT-3	4/10/00	Residence Scott Court, Tigard	63	65	47	49	30	Tracks 15-20ft below grade
LT-4	4/10/00	Commercial St./ Lincoln Ave., Tigard	66	68	50	53	40	Measurement made on telegraph pole residence @70ft, flat unobstructed
LT-6	4/11/00	Apartments, Bonita Firs, Tigard	49	55	44	46	650	Wooded area between residence and tracks
LT-7	4/11/00	Residence Durham Rd., Tigard	69	69	51	53	25	Flat, unobstructed
LT-8	4/11/00	Residence Woody End, Tualatin	49	53	41	43	460	Tracks just visible through trees, tracks level, ground in-between lower
LT-9*	4/12/00	Courtyard Marriott Hotel, Nimbus Ave. Beaverton	66	70	52	54	50	Tracks 20ft above grade, visible unobstructed
LT-10*	4/12/00	Residence Ashford St., Tigard	60	65	52	56	640	Wooded area between residence and tracks
LT-11*	4/12/00	Apartments, Bonita Rd., Tigard	60	62	54	58	540	Tracks visible, flat
LT-51	4/10/00	Jack Property, Wilsonville	67	72			200	100ft from potential park & ride, 300ft from potential station
LT-52	4/10/00	Trailer Park, Boberg Rd., Wilsonville	64	68			800	100ft from potential park & ride
LT-53	4/10/00	Residence, Grahams Ferry Rd., Sherwood	60	64			130	5ft berm with light vegetation blocking tracks
LT-54	4/11/00	Residence Nootka St., Tonquin	68	73			85	Flat, unobstructed

Long-Term Measurement Number	Start Date	Long-Term Monitor Location	24 Hour L_{eq}	24 Hour L_{dn}	24 Hour Average L_{90}	24 Hour Average L_{50}	Distance to tracks (ft)	Site comments
LT-55	4/11/00	Residence 110th Place, Tualatin	64	64			90	Flat with rail in shallow cut
LT-56	4/11/00	Residence 104th Court, Tualatin	62	65			350	Flat, busy road between tracks and meter
LT-57**	4/12/00	Residence Kingfisher Way, Tualatin	64	65			500	Monitor upslope on wooded bank

Source: URS Corporation, Noise Technical Report, 2000

* Includes 5 hours of estimated data.
**Includes 1 hour of estimated data.

3.3.1.2 Vibration

Vibration Terminology and Descriptors

Ground-borne vibration is a small, rapidly fluctuating motion transmitted through the ground. Ground-borne vibration diminishes (or "attenuates") fairly rapidly over distance. Some soil types transmit vibration quite efficiently; other types (primarily "sandy" soils) do not. There are several basic measurement units commonly used to describe the intensity of ground vibration. The descriptor used by FTA is the velocity decibel, abbreviated VdB. The velocity parameter best correlates with human perception of vibration. Thus, the response of humans, buildings, and sensitive equipment to vibration is described in this section in terms of the root-mean square (RMS) velocity level in VdB units. As a point of reference, the average person can just barely perceive vibration velocity levels below 70 VdB (typically in the vertical direction). For a comparison of common ground-borne vibration levels, see Figure 7-3 in the FTA manual (1995).

Where vibration is intermittent (e.g., a commuter rail train pass-by), human annoyance from ground vibration is somewhat dependent on the number of vibration events that occur during a typical 24-hour period. The FTA manual presents two categories of criteria addressing infrequent and frequent events, respectively. "Frequent events" are defined as more than 70 vibration events per day and "infrequent events" are defined as less than 70 vibration events per day. Because this project is planned to have only 16 commuter rail trips per day, the vibration impact assessment for this project is based on the "infrequent events" criteria.

Some land use activities are more sensitive to vibration than others. For example, certain research and fabrication facilities, TV and recording studios, and concert halls are more vibration-sensitive than residences and buildings where people normally sleep, which in-turn are more sensitive than institutional land uses with primarily daytime use. The FTA Vibration Impact Criteria assigns sensitive land uses to the following three categories:

- **Vibration Category 1: High Sensitivity** - Buildings where low ambient vibration is essential for the interior operations within the building. Vibration levels may be below the level of human perception.
- **Vibration Category 2: Residential** - Residences and buildings where people normally sleep. This includes private dwellings, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance. Also includes some special uses such as an auditorium or theater.
- **Vibration Category 3: Institutional** - Land uses with primarily daytime use including schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment. Industrial buildings that contain a small amount of office space are not included in this category and are not considered sensitive uses.

Existing Vibration Environment

Ambient vibration levels were not measured as part of this study. However, an existing, active rail line would be used to carry the project's commuter rail trains. These commuter trains are smaller and lighter than the heavy freight trains currently traversing the existing rail line. Thus, the level of ground vibration that the commuter rail trains would generate would be substantially less than the vibration levels generated by the current rail operations. After a final route is selected for the commuter rail's northerly extension into the Beaverton Transit Center, critical vibration-sensitive

locations would be evaluated for ambient vibration levels prior to preparation of the final engineering design for the project.

Many roads and two freeways also serve the project area. The heavy trucks using these roads cause a minimal amount of ground-borne vibration to propagate beyond the pavement toward adjacent land uses. Busses and medium-sized trucks generally do not cause vibration that goes beyond the pavement or shoulder of the highway.

3.3.2 Potential Impacts

The Federal Transit Administration (FTA) has developed criteria for assessing potential noise and vibration impacts related to rail transit projects. The criteria contained in the Transit Noise and Vibration Impact Assessment Manual (DOT-T-95-16; FTA, 1995) are based on community reaction to transit-related noise and vibration and the potential for adverse effects on sensitive activities and processes. The criteria identify intensities of noise and ground vibration that may be considered significant and thus, require consideration of mitigation and abatement measures. The FTA methodology and criteria were used to assess potential noise and vibration impacts resulting from the project.

3.3.2.1 Noise

Land Use Categories and Impact Criteria

The number of dwelling units or persons who may be adversely affected by project noise is determined by the relative project and ambient noise levels and the physical location of noise sources with respect to the densities of close-by populations. The FTA Guidelines utilize the same three categories of land use identified by the Federal Highway Administration (FHWA) that could be potentially affected by project noise. These are Category 1, defined as tracts of land or use where quiet is an essential element of its intended purpose. There are few Category 1 uses in the United States and none in the project area. Category 2, defined as residences and buildings where people normally sleep. This is the most predominant noise-sensitive land use in the vicinity of the project alternatives. Category 3, Institutional land use with primarily daytime and evening use. Includes schools, libraries, and churches, historical sites, parks, and recreational facilities. A few of these uses are in the vicinity of the project alternatives. The FTA Guidelines also define two levels of adverse effect, called "impact" and "severe impact".

City Bus and Commuter Rail Alternative Noise Characteristics

Noise from city buses and commuter rail trains, train maintenance yards, and park & ride facilities was modeled using the FTA computer program. This program contains noise emission data for each of these sources under various intensities of operating activity. The model utilizes input data such as type of vehicle, operating speed, rate of operation, time of operations, and the distance between noise source and sensitive receptor to predict a resultant noise level at the receptor location.

The TSM Alternative proposes to utilize standard city buses for the enhanced commuter service with 15 minute headways during the same hours of operation as the Commuter Rail Alternative. Speeds would generally be in the range of 45 mph between stops and 20 mph and lower near stops. Using the 45 mph speed and 5 busses per hour for a conservative analysis, the peak-bus-noise-hour was modeled. The TSM operations would produce a peak-noise-hour L_{eq} of 60 dBA at a distance of 15 feet from the road and 49 dBA at a distance of 100 feet from the road.

The noise emission from the Commuter Rail Alternative was also modeled using the FTA program. Commuter rail operations using 30-minute headways, with trains operating between 4:30 a.m. and 9:00 a.m. and between 3:30 p.m. and 8:00 p.m. were assumed. Average train speeds are expected to be 60 mph between stations and about 30 mph and less near stations. Sixty mph was used for the modeling analysis. A self-powered, two-vehicle, Diesel-Multiple-Unit (DMU) train is one option being considered for the Commuter Rail Alternative. Although DMU commuter rail trains are usually quieter than conventional locomotives, standard locomotive noise emission was initially used for the noise impact modeling. A decrease in train noise impact of one or two decibels would be an appropriate adjustment, as necessary. The Commuter Rail Alternative noise level was modeled for various distances, ranging from 30 feet to 200 feet from the tracks, without obstructions such as buildings or topography, using the headway and speed assumptions described above. Also, combinations of trains and parking facility, trains and park & ride lot, and trains plus maintenance yard were modeled. The model output indicates that the train operations would produce 65, 61, 57, and 52 dBA L_{dn} at respective distances of 30, 50, 100, and 200 feet from the tracks. A train plus a park & ride or parking garage produces 58 dBA L_{dn} at a distance of 100 feet. A train plus maintenance yard produces 59 dBA L_{dn} at a distance of 100 feet.

The noise criterion levels established by relevant guidelines for use in determination of noise-sensitive land use compatibility and impact significance are listed below.

- Federal Highway Administration (FHWA) uses "approaching a peak-noise-hour sound level of 67 dBA L_{eq}" as an upper limit of traffic noise exposure for noise-sensitive land uses including residential use. (FHWA policy defines 66 dBA L_{eq} and ODOT policy defines 65 dBA L_{eq} as "approaching" 67 dBA L_{eq}). The ODOT considers a 10 dBA project-related increase in baseline noise level as significant.
- The Oregon Department of Environmental Quality considers a 10 dBA project-related increase in L_{50} baseline noise level as significant. (The L_{50} descriptor is similar to the L_{eq} for relatively constant traffic noise.)
- Federal Transit Administration noise impact criteria that is contained in the FTA manual is based on change in noise exposure using a sliding scale. For very quiet environments the criterion level of "impact" is ten decibels above existing noise levels. For quiet noise environments of 45 dBA L_{dn} the rail project noise level that is considered to produce impact is 52 dBA L_{dn}. As existing ambient noise levels increase, the project's allowable noise contribution decreases. For moderate noise environments of 55 dBA L_{dn} the project noise level considered to cause impact is 56 dBA L_{dn}. For an existing environment of 69 dBA L_{dn} the project level that would cause impact is 64 dBA L_{dn}. The complete listing of impact criteria appears in Table 3-1 of the FTA manual and is presented graphically in Figure 3-2 of the FTA manual.

The conversion of dBA L_{dn} noise levels to distances for purposes of the impact analysis does not account for additional noise level reductions due to intervening topography or soft ground, atmospheric sound absorption, noise barriers, or buildings.

No Build Alternative

Based on available information regarding normal growth of population, intensity of land use, increase in motor-vehicle traffic, and operating characteristics of the existing railroad line, the No Build Alternative would not result in noise impacts.

TSM Alternative

As modeled, the TSM operations would produce a peak-noise-hour L_{eq} of 60 dBA at a distance of 15 feet from the road and 49 dBA at a distance of 100 feet from the road. These noise levels are substantially below the typical 6:00 a.m. existing L_{eq} of 69 dBA measured alongside the highway and 60 dBA L_{eq} measured at 100 feet from the highway. The net increase in traffic noise level (peak-noise-hour or L_{dn}) would be only fractions of a decibel and certainly imperceptible. Thus, the TSM Alternative would not result in noise impacts.

Commuter Rail Alternative

The noise levels from train and related operations were modeled as previously discussed. The project noise levels at appropriate distances from the centerline of the rail corridor alignment or facility and the existing ambient noise levels for the land use Category were compared to the FTA impact criteria. Based on this comparison, there were two locations (LT-7 and ST-13) where the modeled commuter rail noise level resulted in an impact by one decibel. Project noise was modeled on a more detailed basis to account for the slightly reduced (by 1 dBA) noise level from the DMU commuter-train consist compared to a standard locomotive. Using this more precise modeling, the marginal impacts at these two locations would not occur. However, the precise track alignment near location ST-13 on Lombard Avenue is not presently determined. Impacts would not occur if the track was 50 feet from the apartment building. If the track was 30 feet from the building, there would be impacts to this one Category 2 land use. There are no other impacts to Category 2 or Category 3 land uses from the Commuter Rail Alternative.

3.3.2.2 Vibration

Vibration Assessment Methods and Criteria

Potential vibration impacts for the Washington County commuter rail project were determined using two methods: the Vibration Screening Procedure and the General Vibration Assessment methods contained in the Transit Noise and Vibration Impact Assessment (FTA 1995). The State of Oregon statutes do not contain provisions regulating vibration.

The ground-borne vibration from busses is generally imperceptible beyond the shoulder of the highway and will not be analyzed further. Ground vibration from all railroad trains is generated by the wheel/rail interface, and is influenced by wheel/rail roughness, rail vehicle suspension, train speed, track construction, location of switches and crossovers, and the geologic strata underlying the track. The vibration levels likely to be generated by the project are based on data contained in Figure 10-1 of the FTA manual "Generalized Ground Surface Vibration Curves". Vibration from a passing train moves through the geologic strata into building foundations, causing the building to vibrate. The main concerns are annoyance to building occupants and interference with vibration-sensitive operations/equipment. Any damage, including cosmetic damage to buildings from commuter rail ground vibration is highly unlikely.

The FTA vibration propagation data provide an estimate of vibration levels as a function of distance from the tracks. The FTA Screening Procedure distance criteria for different land use types are shown in Table 3.3-3.

Table 3.3-3
Screening Procedure Distance Criteria

Type of Project	Critical Distance	from Track to	Structure
	Category 1	**Category 2**	**Category 3**
Bus Projects	Within 100 feet	Within 50 feet	---------
Commuter Rail Transit	Within 600 feet	Within 200 feet	Within 120 feet

Source: FTA, 1995

For this project the potentially affected land use would be in Category 2. There are very few Category 3 uses in the vicinity of the rail line and no known Category 1 uses that would be affected by the project.

For potentially affected sensitive land uses located within the Screening Procedure criteria distance, FTA's more detailed, second tier General Vibration Assessment was performed. In this analysis, adjustments to the impact criteria (level vs. distance) are used to account for motor-vehicle or train type, speed, soil type, and building/foundation type.

Further adjustments of the criterion distances may be made based on proposed vibration abatement or mitigation measures. However, these additional adjustments were not made for purposes of impact assessment but would be evaluated as part of the mitigation analysis if necessary.

The FTA impact criteria for Infrequent Events are 65 VdB for Category 1, 80 VdB for Category 2, and 83 VdB for Category 3 land use (FTA manual, Table 8-1).

No Build Alternative

The only source of future vibration levels under this alternative would be existing and similar future activity, such as freight train movements along the existing railroad tracks, and traffic on the existing roads and freeways in the project area. Accounting for existing and future traffic volumes, there are no vibration impacts associated with this alternative.

TSM Alternative

This alternative's effect is similar to the No Build Alternative. Future vibration levels under this alternative would be from local construction, existing activity levels, such as railroad train movements along the existing railroad tracks, and traffic movements, including additional busses, on the existing roads and freeways in the project area. Vibration from busses is very low and rarely extends beyond the edge of the pavement or road shoulder. Thus, accounting for existing and future traffic volumes there are no vibration impacts associated with this alternative.

Commuter Rail Alternative

Based on information provided by the Portland and Western Railroad, the operator of the existing rail line, there are approximately 8 to 10 freight trains using the tracks on a typical day. According to the FTA guidelines this existing activity level would almost qualify the route as a "moderately-used rail

corridor" that has "more than about 10 trains per day...". However, as a conservative approach to this impact assessment, the existing tracks were treated as an "infrequently-used rail corridor" with "...at most one or two trains per day" and the standard vibration criteria were applied. Impacts are based on the potential for exceedance of the FTA Vibration Impact Criteria as represented by the General Vibration Assessment criterion distances. The criterion distances from the railroad track for each land use category were calculated using the procedures presented in the FTA Manual and the assumptions listed below.

Project specific assumptions for the General Vibration Assessment were:

- **Speed**. Average train speeds are 60 miles per hour between stations and about 30 miles per hour (mph) and less near stations. Sixty mph was used for the analysis.
- **Soil type**. The vibration propagation characteristics used in this analysis are based on the data presented in the FTA manual and the soil types expected along the project route. Based on these data, the characteristic vibration propagation for "non-efficient" soils was used.
- **Building/foundation type**. Wood frame construction of from one to five floors was used as a worst case condition for all categories of sensitive receptors.
- **Abatement and Mitigation Measures**. No adjustments for special features/procedures were used.
- **General.** Self-powered commuter rail DMU vehicles with "soft" primary suspension. Continuously welded track in good condition. Wheels in good condition. Track at grade with adjacent land use. Crossovers and other special trackwork would be used to avoid increased ground vibration where necessary.

The calculated FTA General Vibration Assessment distance criteria after adjustment (without abatement or mitigation) are shown in Table 3.3-4.

Table 3.3-4
General Assessment Distance Criteria

Type of Project	Critical Distance	From Track to	Structure
	Category 1	**Category 2**	**Category 3**
Commuter Rail Transit	Within 200 feet	Within 28 feet	Within 16 feet

Source: FTA, 1995

Aerial photographs, zoning and land use maps, and digital Graphical Information System maps of the project area were reviewed. Because there are no Category 1 uses within 200 feet of the tracks or Category 3 uses within 16 feet, existing, potentially impacted receptors included only Category 2 land uses. Based on the impact analysis, it was determined that no sensitive land use is within the respective criteria distances presented in Table 3.3-4. Thus, no adverse vibration impacts would result.

3.3.3 Cumulative Effects

The cumulative effect of existing noise plus noise from project alternatives was considered in the analyses. No other cumulative noise effects are likely or expected to occur as a result of the project.

No cumulative vibration effects are likely or expected to occur as a result of the project plus other foreseeable projects in the study corridor.

3.3.4 Mitigation Measures

3.3.4.1 Noise

No Build Alternative

There are no noise impacts from the No Build Alternative; thus no mitigation measures are required.

TSM Alternative

There are no noise impacts from the TSM Alternative; thus no mitigation measures are required.

Commuter Rail Alternative

Other than the potential noise impact at Location ST-13, there are no impacts from the Commuter Rail Alternative. If the distance between the railroad tracks and the building is maintained at 50 feet or more, there would be no noise impact and thus, no mitigation measures would be required. Impact may occur if project design requires less distance between the building and the track. In this case, noise control technologies are available to reduce project noise levels as necessary. Mitigation measures such as a trackside noise barrier wall or retrofit of the structure with acoustically upgraded building elements such as acoustically-rated windows and doors could be incorporated into the project design.

3.3.4.2 Vibration

There are no vibration impacts under the No Build, TSM, or Commuter Rail Alternatives, therefore, no mitigations are required.

3.4 LAND USE AND PLANNING POLICY

This section describes the land uses in the project corridor and the planning policies that apply to the project. The potential land use impacts of the No Build, TSM, and Commuter Rail Alternatives are identified.

3.4.1 Affected Environment

3.4.1.1 Existing Land Uses and Zoning

As shown in Figure 3.4-1, the project corridor would generally parallel the west side of I-5 and Highway 217, extending from the City of Wilsonville on the south to downtown Beaverton on the north. The Commuter Rail Alternative would use the established rail corridor alignment that links the cities of Wilsonville, Tualatin, Tigard, and Beaverton. The TSM Alternative would generally follow nearby arterial streets and connect the same destinations that would be served by the commuter rail stations. However, the TSM route would be more circuitous than the commuter rail route.

The project area lies within the Urban Growth Boundary (UGB), therefore, land uses along the project corridor are primarily industrial, commercial, and office. More diversified land uses, including residential and civic uses, occur where the rail corridor would enter the downtown areas of Tualatin, Tigard, and Beaverton.

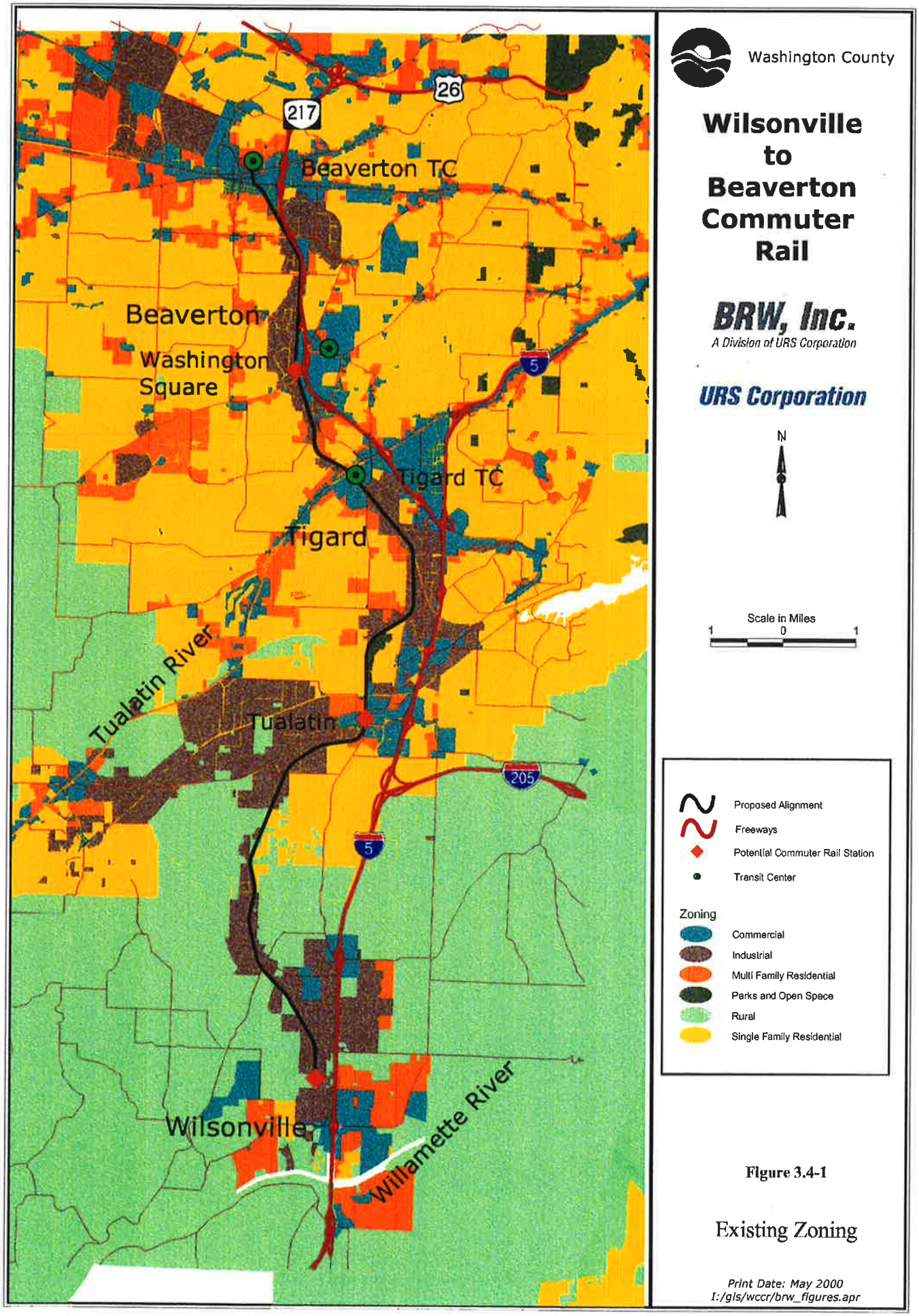

Figure 3.4-1

Existing Zoning

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The rail corridor would extend outside of the UGB where a "Rural Reserve" area separates the City of Wilsonville from the larger Regional UGB. Land uses abutting the rail corridor in this segment are industrial in nature, as reflected in Washington County's "Rural Industrial" plan designation. No station would be located outside the UGB. The following narrative briefly describes existing land uses and zoning in the corridor and in the vicinity of proposed stations. (See Figure 3.4-2, which shows a 2040 land use map for the project corridor.)

City of Wilsonville

Existing land uses in the City of Wilsonville extending west of I-5 to the proposed rail corridor include industrial, distribution, and office/warehouse development. Lands abutting the rail corridor are designated Industrial on the *Wilsonville Comprehensive Plan Map* and are zoned Planned Development Industrial (PDI) or RA-1 (an industrial holding zone). The rail corridor right-of-way is identified as Secondary Open Space on the *Comprehensive Plan Map.*

The Wilsonville Station would be located north of Barber Road and between a proposed Boeckman Road and Wilsonville Road interchange, on either the east or west side of the existing alignment. (See Figure 3.4-3, Wilsonville Station Location.) In addition to the station platform, a park & ride with approximately 400 spaces and a maintenance facility would be provided on one of the two properties. Another site located on the north side of Boeckman Road and west of the rail corridor may be considered as an alternative station and park & ride location. This site is zoned PDI and lies outside of the Wilsonville Road transportation impact area. The property on the east side of the existing alignment is zoned PDI; the property on the west side is zoned RA-1.

City of Tualatin

The proposed rail corridor would enter the City of Tualatin's jurisdiction in the western industrial area, an area containing concentrations of heavy industrial, warehouse, distribution and office uses. The character of land uses in this area has been transitioning from industrial to a broader mix of downtown uses (retail, service, housing and civic) over the past ten years. Existing zoning adjacent to the proposed rail corridor also changes in the downtown area, from Industrial (ML) to Central Commercial (CC).

The commuter rail station in downtown Tualatin is proposed to be located on ODOT right-of-way that extends north of the intersection of Tualatin-Sherwood Road and Boones Ferry Road to Nyberg Road. (See Figure 3.4-4, Tualatin Station Location.) A new commercial center is located adjacent to the proposed station. A post office, Kaiser facility, high-density housing, and the downtown Tualatin Commons development are all located in close proximity to the proposed station.

City of Tigard

Extending north through the City of Durham, the proposed rail corridor is bounded by the South Tigard employment area on the east and the Fanno Creek Greenway on the west until crossing Hall Boulevard and entering into downtown Tigard. Lands abutting the rail right-of-way south of downtown are generally zoned Industrial Park (I-P) and existing uses include industrial, distribution and office uses.

Land uses in the downtown area include retail, service, civic and housing uses. Development along Main Street in the downtown area includes compact, storefront uses and a well-connected pedestrian

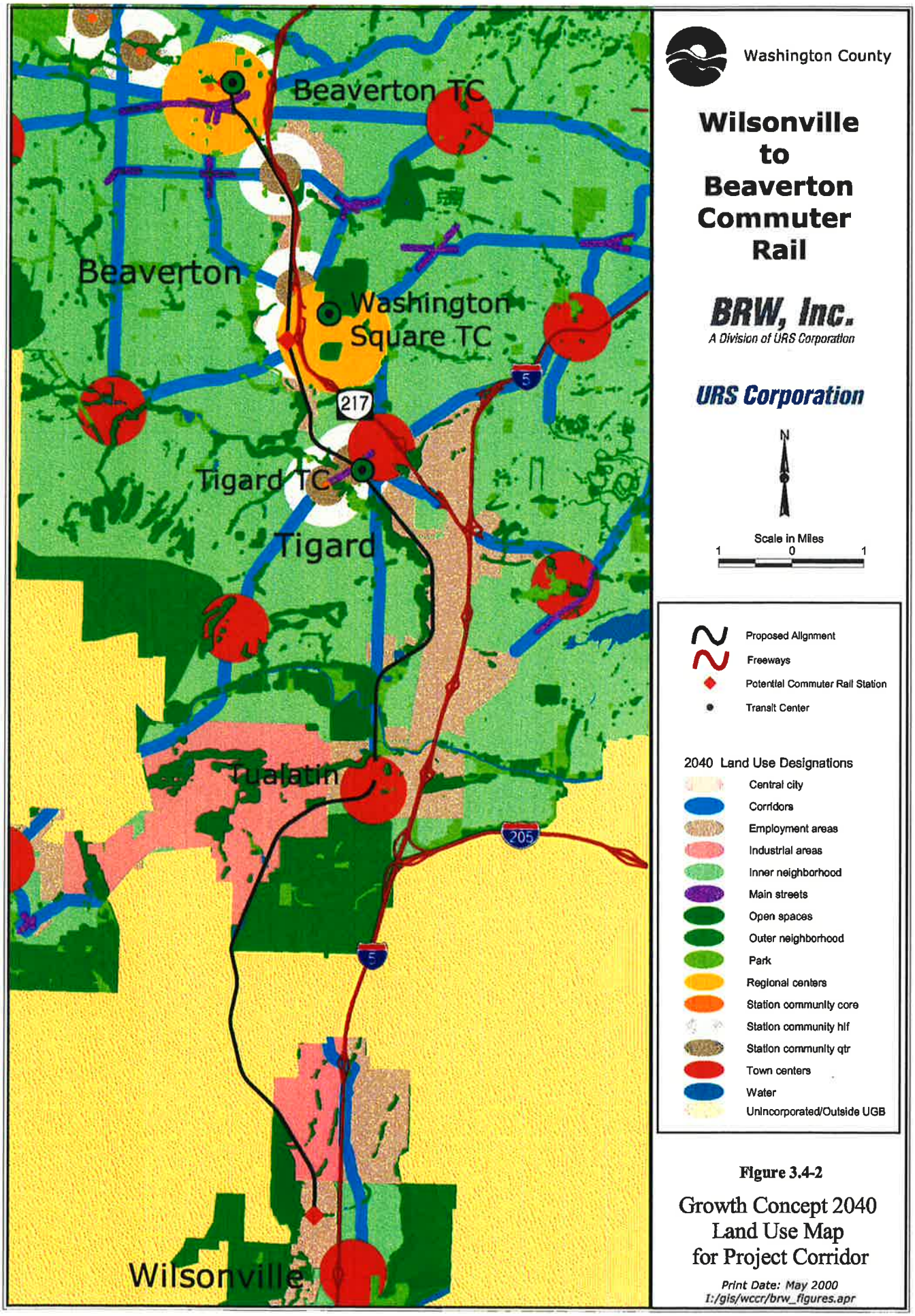

Figure 3.4-2

Growth Concept 2040 Land Use Map for Project Corridor

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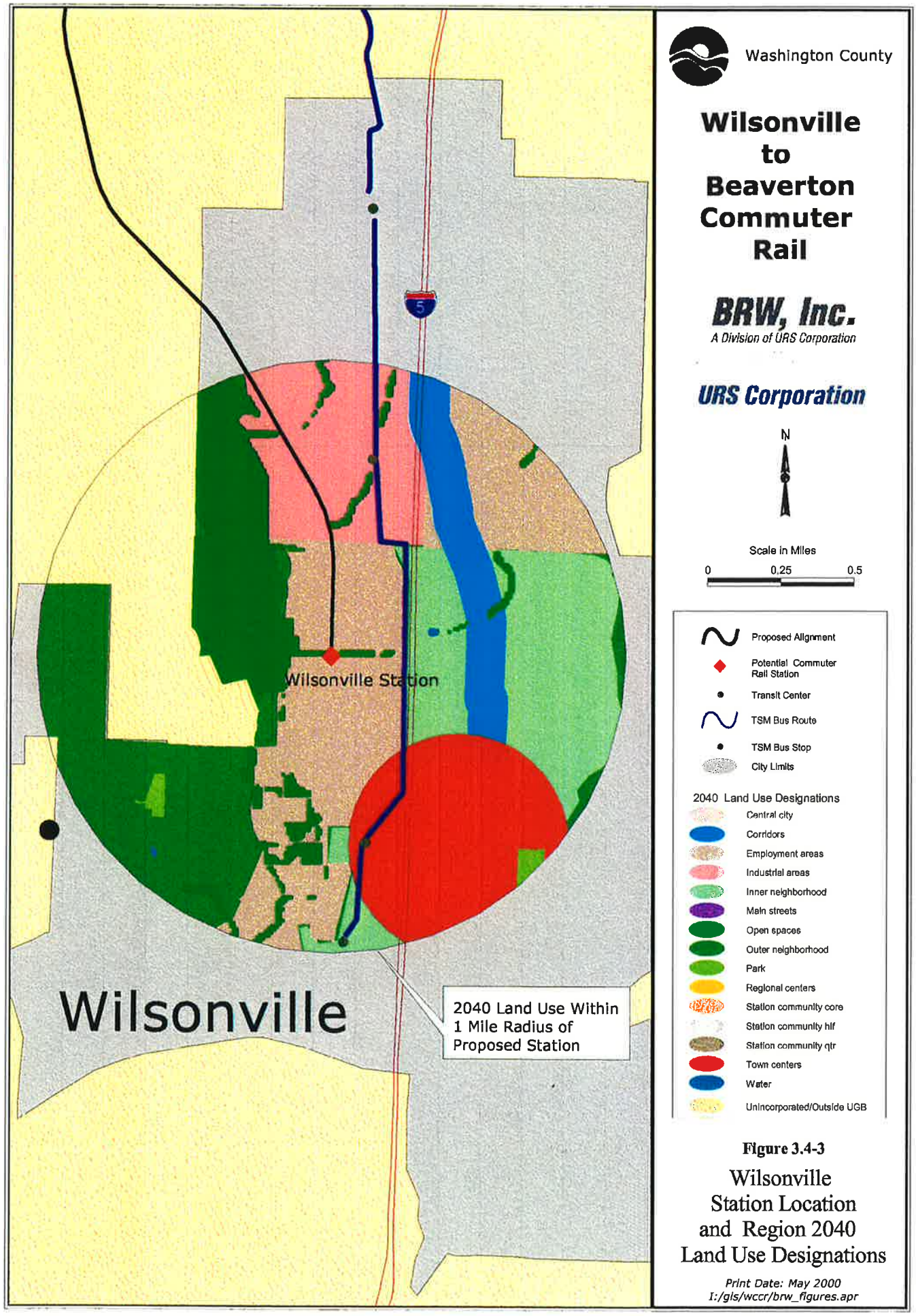

Figure 3.4-3

Wilsonville Station Location and Region 2040 Land Use Designations

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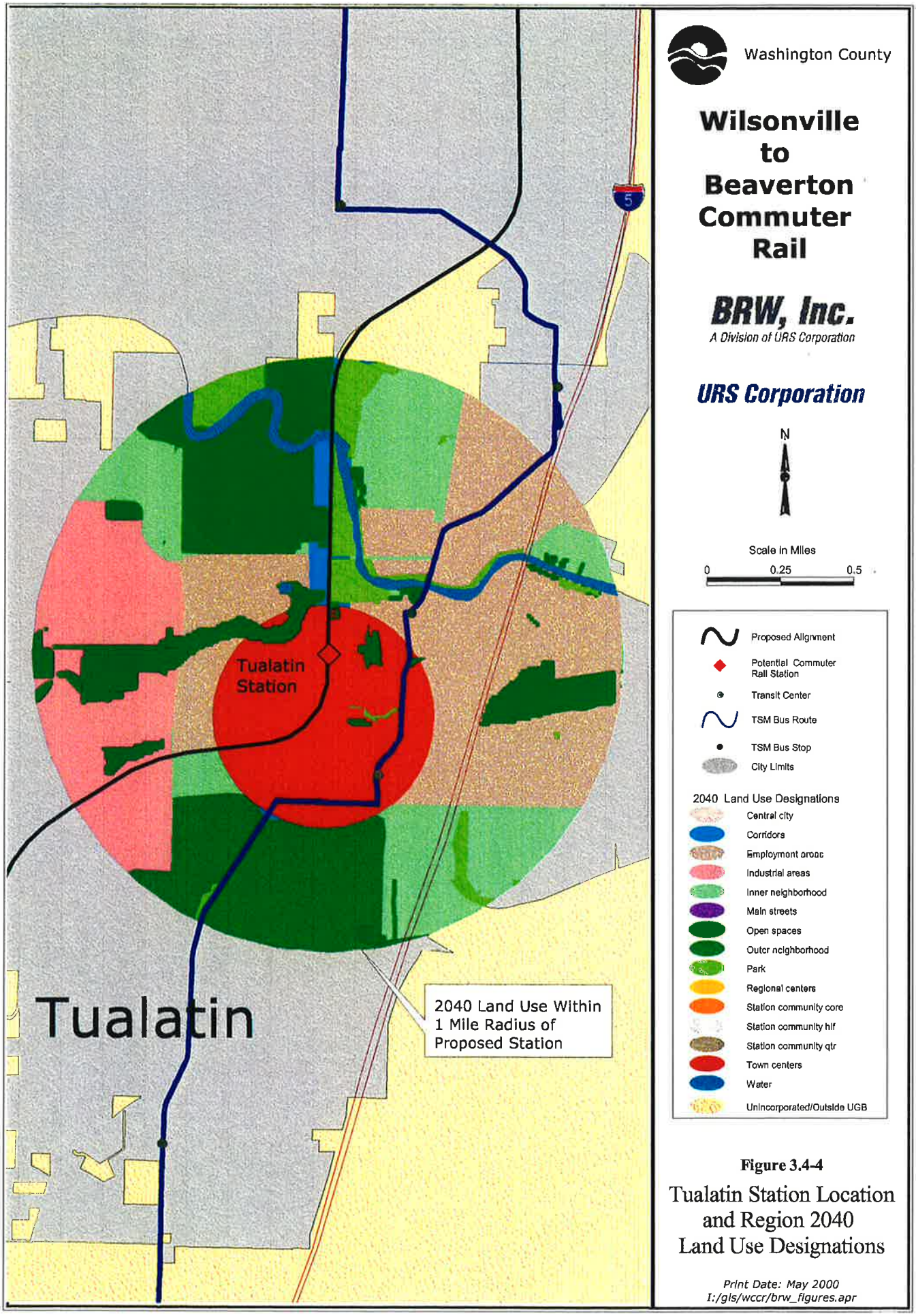

Figure 3.4-4

Tualatin Station Location and Region 2040 Land Use Designations

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system. The transit center is located in the downtown area abutting the rail corridor and does not include a park & ride.

The downtown Tigard area is included in the Central Business District (CBD) zone. This zone permits and encourages a wide mix of land uses, including retail, service, office, institutional, and higher density residential uses. Development of a commuter rail station and small park & ride (150 spaces) adjacent to the Transit Center would be permitted under existing zoning. (See Figure 3.4-5, Tigard Station Location.)

Washington Square

Extending north of downtown, the proposed rail corridor would cross additional industrial and wetlands areas before reaching the Washington Square area. The area has several larger commercial uses and existing zoning is General Commercial (GC). The Washington Square Regional Mall and office towers are located to the east side of Highway 217. At present, Greenburg Road, Scholls Ferry Road, and Hall Boulevard provide the only overpass crossings of Highway 217 in the vicinity of the proposed station.

An interim commuter rail station is proposed to be located near Scholls Ferry Road, the jurisdictional boundary between the cities of Tigard and Beaverton. (See Figure 3.4-6, Potential Washington Square Station Location.) Approximately 200 park & ride spaces would be provided through shared use agreements with nearby commercial businesses. On a longer term basis, the commuter rail station and park & ride could be consolidated with a joint development/redevelopment project and a potential new overpass over Highway 217, in accordance with the vision outlined in the *Washington Square Regional Center Plan.*

City of Beaverton

Extending north of Scholls Ferry Road, the proposed commuter rail corridor would parallel Highway 217 until entering downtown Beaverton and terminating near the Beaverton Central LRT Station at the Beaverton Transit Center. Land uses in this segment include the Nimbus Avenue employment center (primarily office uses) to the west of the corridor, and general commercial and light industrial uses.

As described above, an interim commuter rail station to serve the Washington Square Regional Center area would be located either in Tigard or Beaverton in the vicinity of Scholls Ferry Road (Figure 3.4-6, Washington Square Station Location). Land uses along the segment of Cascade Boulevard within Beaverton include retail stores, an outdoor recreational/entertainment facility, and Cascade Plaza commercial center. This area is zoned for General Commercial (GC) use.

Land uses in downtown Beaverton include retail, service, civic, institutional, and residential uses. Two light rail stations and the Beaverton Transit Center are also located in the downtown area. The Commuter Rail Alternative would include construction of approximately 2,000 lineal feet of track extending north from Farmington Road to the Beaverton Transit Center. The track would be constructed in conjunction with a City project to realign and extend Lombard Avenue. The terminus would include a commuter rail station platform within convenient walking distance of the light rail station platform and the Transit Center. No park & ride facilities are proposed at this station. (See Figure 3.4-7, Beaverton Station Location.)

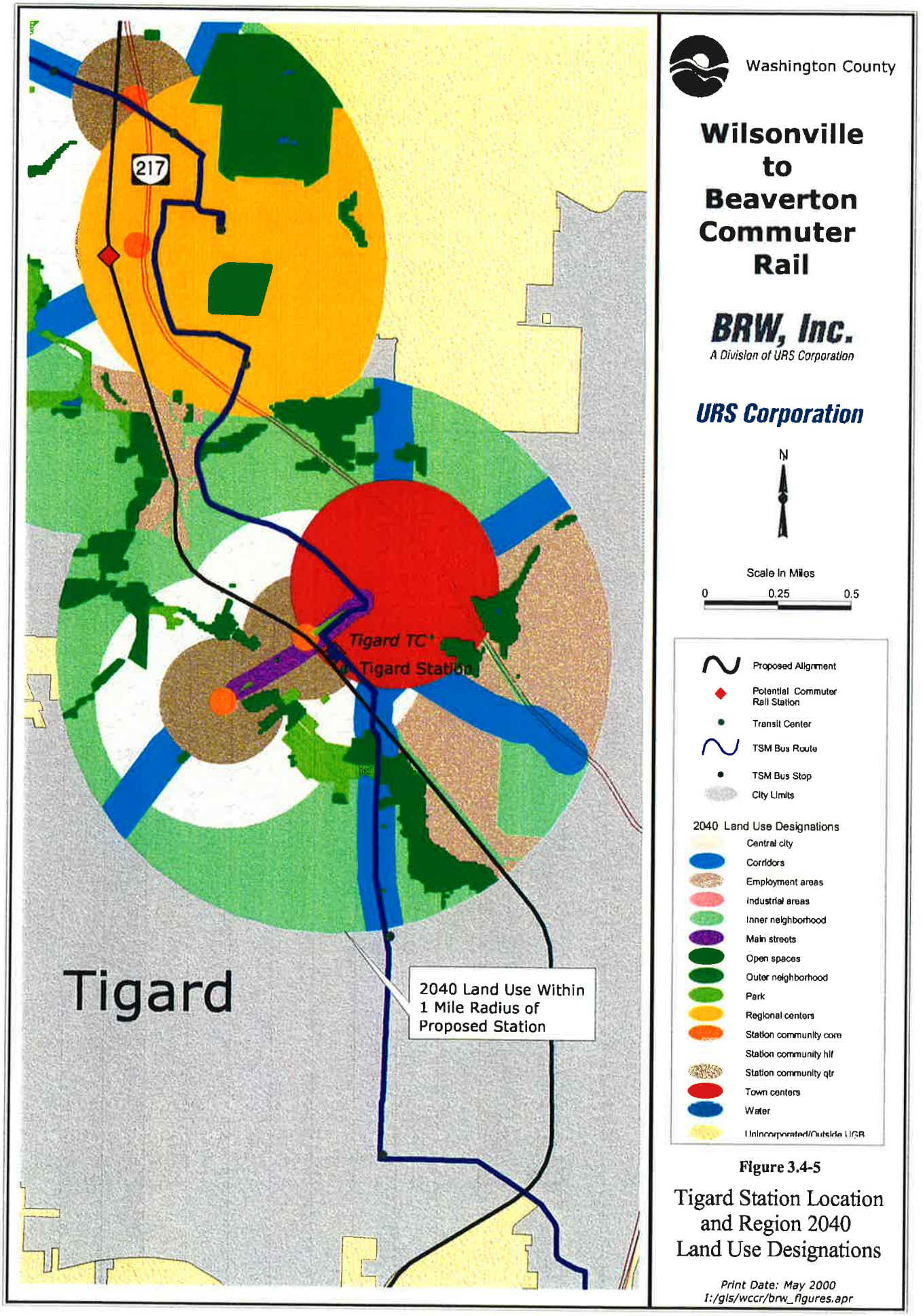

Figure 3.4-5

Tigard Station Location and Region 2040 Land Use Designations

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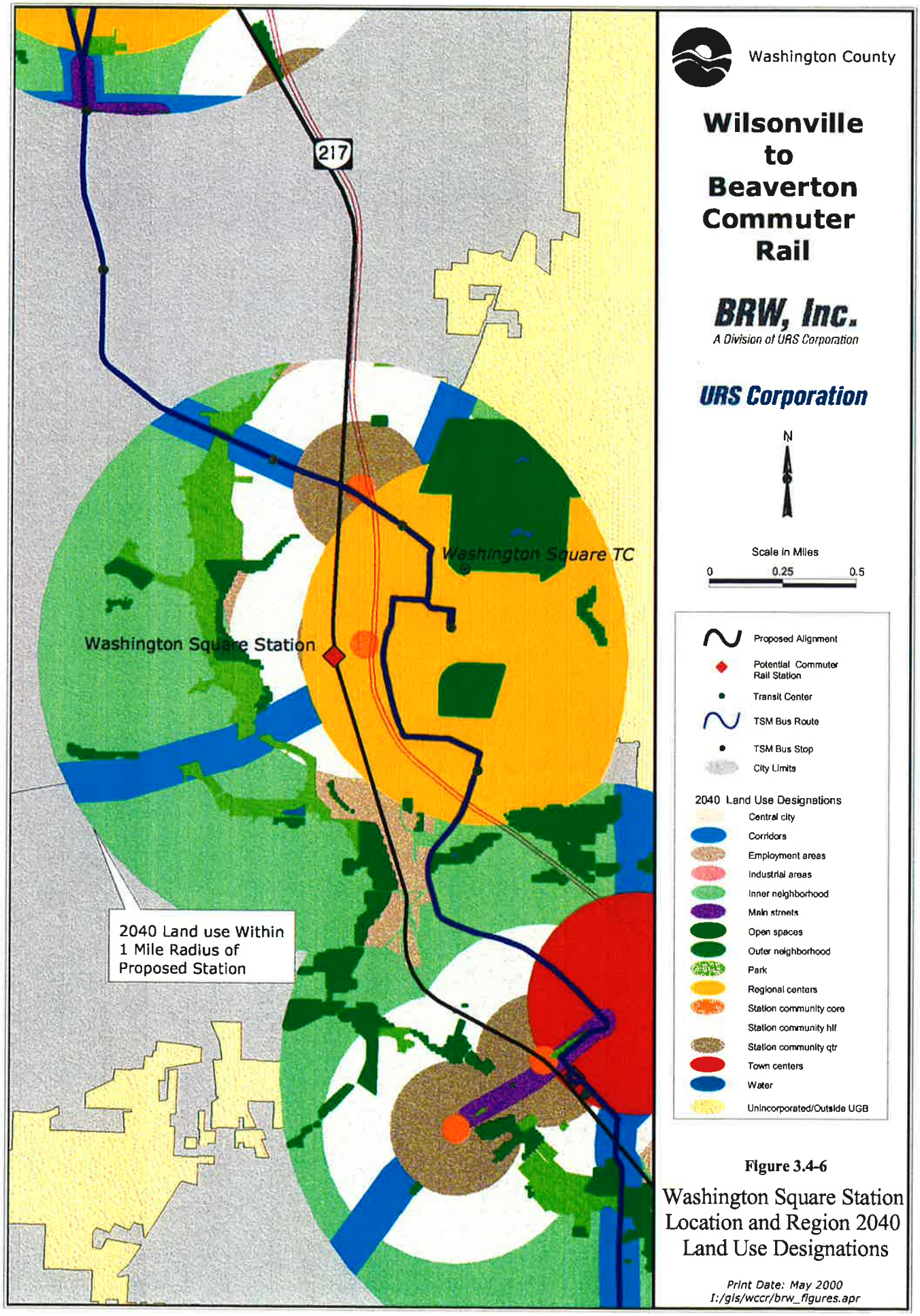

Figure 3.4-6

Washington Square Station Location and Region 2040 Land Use Designations

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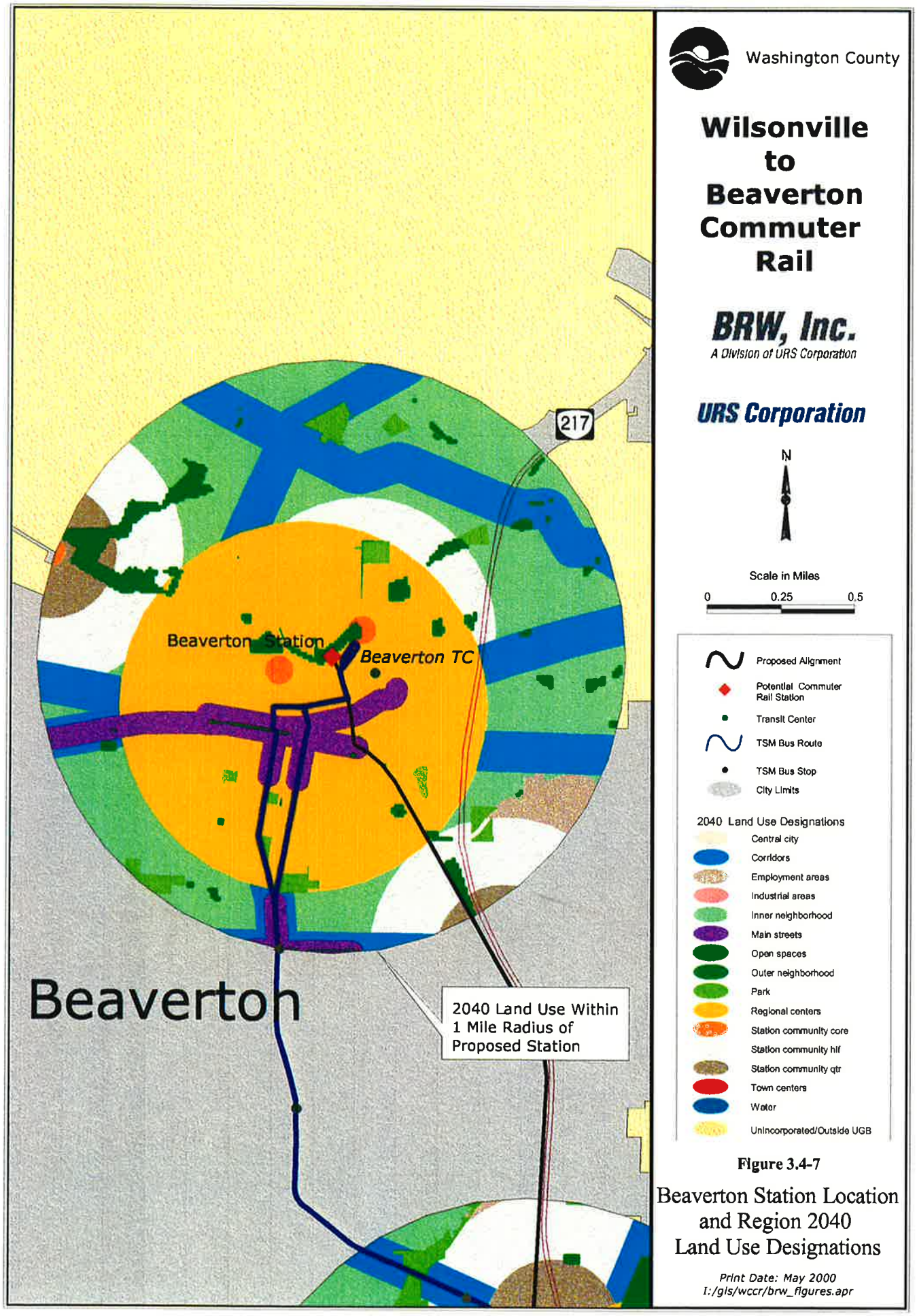

Figure 3.4-7

Beaverton Station Location and Region 2040 Land Use Designations

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3.4.1.2 State, Regional and Local Plans

Oregon Statewide Planning Goals

In an effort to maintain the livability of the State of Oregon, protect natural resources, and promote orderly and efficient development, the Oregon Legislature enacted Senate Bill 100 in 1973, requiring all cities and counties to adopt and implement comprehensive land use plans in compliance with statewide goals and guidelines. Of the statewide goals, Goal 14 (Urbanization) and Goal 12 (Transportation) most directly influence the proposed project.

Goal 14 (Urbanization) uses the tool of an Urban Growth Boundary (UGB) to identify and separate urban land from rural and resource land to facilitate orderly and efficient growth. Goal 12 (Transportation) is focused on the development of a balanced, safe, convenient, and economic transportation system to support local, regional, and state land use plans. The Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule (TPR) in 1991 to provide more specific direction on implementation of Goal 12 and to strengthen the connection between land use and transportation. The TPR requires that local jurisdictions adopt policies encouraging efficient transportation and that Metro plan for a reduction in vehicle miles traveled (VMT) per capita of ten percent over 20 years, and a total of 15 percent over 30 years.

Regional Plans

Comprehensive plans for jurisdictions within the Portland region have been largely developed in response to the statewide goals rather than regional growth management goals. In 1992, voters approved a home-rule charter for Metro identifying specific agency and directing Metro to develop a *Regional Framework Plan* that integrates land use, transportation, and other regional planning mandates. The *2040 Growth Concept* is the result of the charter-required required *Regional Framework Plan.* The *Growth Concept* is the designation of a hierarchy of mixed-use urban centers inside the UGB. Creating higher density centers of employment and housing with compact development and a walkable environment is intended to create vital, attractive neighborhoods and communities, and enhance transportation options. The *Growth Concept* defines interrelated types of centers to create higher density areas of employment and housing. Within the project corridor, downtown Beaverton and the Washington Square area are designated as "Regional Centers," and downtown Wilsonville, Tualatin and Tigard are designated as "Town Centers."

In December of 1999, Metro updated the *Regional Transportation Plan (RTP),* which recognizes the diversity of transportation needs throughout the Portland metropolitan region and links land use and transportation policies. The proposed commuter rail corridor extending from Wilsonville to Beaverton is included in Figure 1.16, Regional Public Transportation System, of the *1999 RTP*.

Local Plans

City of Wilsonville - The *Wilsonville Comprehensive Plan* was adopted in 1980 and the City is currently updating its plans and ordinances and creating a Transportation Master Plan. The *Draft Wilsonville Transportation Master Plan* calls for the development and operation of a multi-modal transportation system and for improvements to transportation facilities.

The *Draft Transportation Master Plan* includes a discussion of the proposed commuter rail service from Wilsonville to Beaverton. The plan notes that the commuter rail station in Wilsonville would be a convenient route terminus for commuters heading to jobs in Wilsonville but also would attract commuters at its origin by being in proximity to the city's residential areas.

As shown in Figure 3.4-3, the Region *2040 Growth Concept* generally identifies the Wilsonville "Town Center" as located east of I-5. The project corridor located to the west of I-5, extending north of Wilsonville Road, is generally designated as an "Employment Area" and an "Industrial Area."

The Wilsonville City Council has adopted a *Public Facilities Strategy* to address transportation deficiencies at the Wilsonville Road interchange with I-5. The strategy is applicable to new development between Wilsonville Road and Boeckman Road; and, in effect, rations available transportation capacity at the interchange. New development to the north of Boeckman Road is not subject to the *Public Facilities Strategy.*

City of Tualatin - The City of Tualatin's *Development Code (Code)* contains a Transportation Chapter that calls for the development of transit systems to serve the residential and employment populations, improve transit within Tualatin, and link the city with adjacent communities.

The Code states that if light rail service is developed to Tualatin, it should utilize one of the existing railroad lines and have a light rail station located as close to downtown as possible. The City will update the Transportation Chapter to comply with the *1999 Regional Transportation Plan*, including the designation of the commuter rail corridor through Tualatin and the station location in the downtown area.

As shown in Figure 3.4-4, the Region *2040 Growth Concept* generally identifies the Tualatin "Town Center" at the junction of Boones Ferry Road and Tualatin-Sherwood Road as one of the largest "Industrial Areas" for the region.

City of Tigard - The *Tigard Comprehensive Plan* includes general policies encouraging public transportation and expanding transit access.

Under the plan policy addressing the railroad (8.5.1), an implementing strategy states that the city shall coordinate with the railroads to combine the tracks within the downtown area.

As shown in Figure 3.4-5, the Region *2040 Growth Concept* generally identifies the Tigard "Town Center" at the junction of Hall Boulevard and Highway 99W, encompassing the traditional downtown area. The rail corridor bisects the downtown area and is included in the CBD zoning district.

The Region *2040 Growth Concept* generally identifies the Washington Square "Regional Center" surrounding the node of the Washington Square Mall as a major regional retail center. Washington Square is also the focus of the *Washington Square Regional Center Plan,* which includes numerous references to the importance of commuter rail to serve the employment area located west of Highway 217 and the larger regional center area. This project has been included in the *1999 Regional Transportation Plan.*

The City of Tigard expects to adopt an updated local *Transportation System Plan (TSP)* in the summer of 2000. The draft *TSP* includes the commuter rail corridor, identifies potential stations in the Downtown and Washington Square areas, and supports a new overcrossing to Highway 217 to improve local circulation and connect the major employment and commercial areas.

City of Beaverton - The *Beaverton Comprehensive Plan* was acknowledged by LCDC in 1981 and has been updated to include policies and objectives that address the *Transportation Planning Rule* and the Region *2040 Growth Concept*. The update of the *City of Beaverton Transportation System Plan (TSP)* began in 1996 and Beaverton, along with Tigard, Washington County and other partners, identified commuter rail as a critical element in the *Washington Square Regional Center Plan*. The regional center area to the north of Scholls Ferry Road is within the City of Beaverton's jurisdiction, and a substantial employment base is located west of the proposed commuter rail corridor along Nimbus Avenue. Commuter rail is identified as a critical element in achieving the intensity of development envisioned in the *Washington Square Regional Center Plan*.

3.4.2 Potential Impacts

3.4.2.1 No Build Alternative

Under the No Build Alternative, land uses and zoning in the project corridor would be guided by adopted local comprehensive plans. Development within the Washington Square Regional Center area probably would occur at a slower rate under the No Build Alternative because the transition to a higher intensity regional center is dependent on a connected, multi-modal transportation system.

The existing transportation system, including the transit system, would remain unchanged under the No Build Alternative except for modifications that are already programmed. The No Build Alternative would require no changes to existing land uses or zoning in the project corridor. The No Build Alternative would provide no leverage for intensification of land uses and zoning in the designated Regional Centers and Town Centers and would not provide a multi-modal transportation connection of the Regional Centers and Town Centers.

The No Build Alternative would not conflict with state, regional, or local plans and policies. Local comprehensive plans have been acknowledged with the assumption that planned uses and densities can be supported by the planned transportation system. The proposed commuter rail corridor was not assumed to be a part of the planned transportation system when local plans were acknowledged.

3.4.2.2 TSM Alternative

Under the TSM Alternative, land uses and zoning in the project corridor would be guided by adopted local comprehensive plans. The TSM Alternative could provide minor leverage for intensification of land uses and zoning in the designated Regional Centers and Town Centers by expanding transportation options and linking designated centers. The TSM Alternative could provide minor leverage for intensification of land uses and zoning in the designated Regional Centers and Town Centers by expanding transportation options and linking designated centers. The TSM Alternative would include transit stops and expanded park & ride capacity at the same locations proposed for the Commuter Rail Alternative. In addition to stopping near the five proposed commuter rail station locations, the new bus line would stop at 13 other locations to take advantage of transfer locations with other Tri-Met and SMART routes, existing park & ride locations, and significant destinations.

The TSM Alternative would be consistent with and supportive of state, regional, or local plans and policies that call for expanded transit in the corridor, transit linkages of the designated Regional Centers and Town Centers, and transit service to major employment and activity centers. The TSM Alternative would connect better bus service with Transit Centers in Tigard and Beaverton, and MAX light rail. These important connections would leverage the investment and service coverage of the existing transit facilities.

The TSM Alternative would operate within the public right-of-way, and the transit service and bus stops would be permitted under existing zoning. The proposed transit priority improvements at intersections and proposed park & rides could require local land use approvals, but no significant land use or zoning impacts would be anticipated.

The TSM Alternative would operate in a mixed traffic environment. Even with bus priority treatment at intersections, travel times for the TSM Alternative would increase with projected increases in congestion throughout the region.

3.4.2.3 Commuter Rail Alternative

The Commuter Rail Alternative has been included as an element of the regional transportation system in the *1999 Regional Transportation Plan.* Additionally, the Region *2040 Growth Concept* emphasizes the importance of multi-modal and high-capacity transit links between designated Regional Centers and Town Centers. The existing freight rail corridor presents a unique opportunity to use an existing right-of-way to connect the Tualatin Town Center, the Tigard Town Center, the Washington Square Regional Center, and the Beaverton Regional Center. The Wilsonville Town Center is located on the opposite side of I-5 from the rail corridor, and therefore would not be directly connected. However, the station in Wilsonville would serve a regionally significant employment area and would be connected to the Town Center via bus.

The link of the commuter rail corridor with other transit facilities also supports a range of state, regional and local policies and plans. In particular, the commuter rail station in Tigard would provide a direct connection between the Tigard Transit Center and MAX light rail and the Beaverton Transit Center. The proposed station locations also provide the opportunity to connect with employee shuttles in the Washington Square, Tualatin and Wilsonville areas to expand the access to the Commuter Rail Alternative for major employers.

The Commuter Rail Alternative could leverage private investments leading to intensification of land uses and zoning in the designated Regional Centers and Town Centers by expanding transportation access and linking designated centers. The Commuter Rail Alternative would likely encourage development within the Washington Square Regional Center area at a faster rate than under the No Build Alternative. Commuter rail is identified as an important component of the connected, multi-modal transportation system that is needed to support the transition of the Washington Square area to a higher intensity regional center, as defined in the Regional Center Plan.

The Commuter Rail Alternative would operate within the existing railroad right-of-way, and the addition of commuter rail service would be permitted under existing zoning. The proposed stations and park & ride lots could require local land use approvals, but are permitted under local zoning regulations.

Because the Commuter Rail Alternative would operate within a separated right-of-way, travel times for this alternative would become more competitive over time because congestion is expected to increase on the roadway system.

3.4.3 Cumulative Effects

3.4.3.1 No Build Alternative

The No Build Alternative would not result in significant cumulative land use effects. As noted earlier, the *Washington Square Regional Center Plan* is based on significant improvements in the transportation system, including commuter rail service. Developers in the area would likely be reluctant to implement the higher intensity development proposed in the *Regional Center Plan* if the No Build Alternative were selected.

3.4.3.2 TSM Alternative

The TSM Alternative would not result in significant cumulative land use effects. While this Alternative would expand transit service in the corridor, it would be relatively slow and circuitous. Therefore, the TSM Alternative would not be expected to adequately support new development in proximity to bus stops.

3.4.3.3 Commuter Rail Alternative

The Commuter Rail Alternative would not result in significant cumulative land use effects. As noted earlier, the Commuter Rail Alternative would likely support faster implementation of the *Washington Square Regional Center Plan* through encouraging a higher density mix of uses while requiring a smaller investment in other transportation infrastructure. In addition, the Commuter Rail Alternative could support new development in proximity to the commuter rail stations. It is anticipated that the availability of commuter rail service would support the overall land use patterns and densities as envisioned in the local and regional plans.

Park & ride locations may need to change as land uses change and intensify. For example, the park & ride location in Tualatin is constrained by the small parcel size and the City of Tualatin is concerned about potential spillover parking into the downtown area. If parcel consolidation and redevelopment occurs to the north or south of the proposed station location, it could make sense to look at relocation of the station and park & ride as part of a joint development project in the future.

In downtown Tigard, there may be opportunities for longer-term development of a parking structure to serve a range of users, including a park & ride for commuter rail, city employees, downtown businesses, and the transit center. The location of the commuter rail station should be in close proximity to the transit center. However, there may be opportunities for some expansion and/or relocation of the park & ride on a long-term basis.

The proposed Washington Square Station should be considered an interim location. Options should be retained to relocate the station and park & ride as opportunities evolve for joint development and/or an improved connection to Washington Square.

The potential benefits and cumulative effects of the Commuter Rail Alternative would be greatly enhanced with parallel investments in infrastructure such as nearby sidewalks and bike facilities, and expanded employee shuttles.

3.4.4 Mitigation Measures

No significant land use, policy, or zoning impacts have been identified for any of the three alternatives. Therefore, no specific land use mitigation measures are proposed for the No Build,

TSM, or Commuter Rail alternatives. Project representatives will work closely with the affected jurisdictions to design stations and park & rides that comply with local plans and design and development standards.

3.5 BIOLOGY

3.5.1 Affected Environment

The project study area consists of a mosaic of urban, urbanizing, agricultural, and resource extraction land uses. As a consequence, the terrestrial and wetland areas that support natural habitat are relatively small, fragmented, and subject to ongoing disturbances such as farming, grazing, recreational use, dumping, mowing, and invasion by non-native species. Aquatic habitat in the stream corridors in the study area has been degraded by urban and agricultural uses, especially from removal of the riparian vegetation that formerly provided shade, instream woody debris, and a source of food for fish. Streams, ponds, and wetlands are subject to nonpoint and point source pollution. Fanno Creek and the Tualatin River experience water quality and flooding problems, and exhibit elevated levels of nutrients and temperatures. Overall, the terrestrial and aquatic habitats and species found in the study area are typical of the urban and urbanizing metropolitan Portland area.

3.5.1.1 Vegetation

Patches of native forest, scrub-shrub, and meadow vegetation occur throughout the project study area. Upland forest areas are dominated by Douglas-fir (*Pseudotsuga menziesii*), red alder (*Alnus rubra*), and bigleaf maple (*Acer macrophyllum*). Understory and shrub layer vegetation in upland forests tends to include extensive areas of non-native Himalayan blackberry (*Rubus discolor*); but in some relatively undisturbed areas, the shrub and understory includes dominants such as swordfern (*Polystichum munitum*), low Oregon grape (*Mahonia nervosa*), and snowberry (*Symphoricarpos albus*). Dominants in forested wetlands, which occur in strips along streams and in other depressions, include black cottonwood (*Populus balsamifera*), Oregon ash (*Fraxinus latifolia*), willows (*Salix* spp.), red alder, redosier dogwood (*Cornus stolonifera*), and non-native reed canary grass (*Phalaris arundinacea*). Shrubby upland areas tend to be dominated by Himalayan blackberry and/or Scot's broom (Cytisus scoparius). Wetland shrub communities include areas with non-native hawthorns (*Crataegus mollis* and *C. monogyna*), willows, and typically, an understory of reed canary grass. Upland meadows are dominated by a mixture of non-native pasture grasses and broad-leaves plants such as tall fescue (*Festuca arundinacea*), velvetgrass (*Holcus lanatus*), orchardgrass (*Dactylus glomerata*), bentgrass (*Agrostis* spp.), thistle (*Cirsium* spp.), dandelion (*Taraxacum officinale*), spotted cat's ear (*Hypochaeris radicata*), Queen Anne's lace (*Daucus carota*), and vetches (*Vicia* spp.). Wetland meadow areas or emergent wetlands tend to be dominated by reed canary grass and other non-native pasture grasses.

There are three areas and seven creek crossings that support somewhat natural vegetation communities that are within the direct zone of impact of the proposed project. The remaining impact areas are urbanized in some way, or support very little vegetation. There are two proposed park & rides at the southern terminus of the route in Wilsonville. Their locations are shown in Figure 3.5-1. The proposed lot on the east side of the rail line is an ungrazed old field area that includes a linear ditch or wetland that bisects the site from east to west. This site is a mixture of meadow and scrub-shrub vegetation that is being slowly invaded by trees. The dominant species are Himalayan blackberry, tall fescue, and orchard grass. Cottonwoods are scattered throughout the site, as are Scouler's willows (*Salix scouleriana*), red alder, Douglas fir, cherry (*Prunus*), Oregon ash, and Scot's broom. Other common plants included Nootka rose (*Rosa nutkana*), spotted cat's ear, plaitain

(*Plantago lanceolata*), Queen Anne's lace, St. John's wort (*Hypericum perforatum*), non-native hawthorns, bentgrass, and vetch. If left unmowed, this area would likely become a mixture of forest and shrubland.

The proposed park & ride located to the west of the rail line is a scrub-shrub area that includes areas of upland and wetland. The dominant species in this site are non-native hawthorns, which form a dense thicket over most of the area. This area may have been left unmowed for longer than the field to the east. Other species observed in this shrubland include Oregon ash, Oregon white oak (*Quercus garryana*), cottonwood, and Himalayan blackberry. This site appears to be grazed, and in the northeast corner Himalayan blackberry thickets were recently cleared.

The only other area of somewhat natural vegetation that would be eliminated by the rail line is the Tonquin siding area, shown in Figure 3.5-3. This siding area included patches of woody vegetation on the north and south ends. The remainder of the siding area is developed or open fields. The patch of woody vegetation on the north end was removed very recently, apparently to prepare the site for development. The woody vegetation on the south side consists of an old filbert orchard that is heavily grazed by livestock. The ground cover is bare in patches from livestock trampling, and consists mostly of pioneer species such as cress (*Cardamine oligosperma*), geranium (*Geranium*), wild strawberry (*Fragaria vesca*), clover (*Trifolium*), Indian plum (*Oemleria cerasiformis*), starwort (*Stellaria*), small-leaved montia (*Montia parvifolia*), and miner's lettuce (*Montia perfoliata*).

There are seven creek crossings that would be either constructed or replaced by the proposed project. From south to north, these crossings are:

- An unnamed drainage at MP 40.70 (Figure 3.5-2): wood trestle to be replaced with a box culvert, riparian vegetation is reed canary grass
- Hedges Creek at MP 38.70 (Figure 3.5-4): wood trestle to be replaced with concrete ballast deck trestle, vegetation is dominated by Oregon ash, willows, Douglas spiraea, reed canary grass, *Glyceria*, and in the open water, pond lilies (*Nuphar polysepalum*)
- Hedges Creek at MP 37.80 (Figure 3.5-5): wood trestle to be replaced with concrete ballast deck trestle, here the creek widens into a pond, which supports submerged and floating-leaved vegetation such as pond lily, shorelines are mowed and unmowed mostly non-native grasses and broad-leaved plants
- Fanno Creek at MP 34.70 (Figure 3.5-8): wood trestle in the stream to be replaced with concrete ballast deck trestle; the vegetation is a canopy of cottonwood, willow and ash, and an understory of reed canary grass and Himalayan blackberry
- Ash Creek at MP 31.2 (Figure 3.5-12): wood trestle to be replaced with concrete ballast deck trestle, vegetation consists of reed canary grass, Himalayan blackberry, and scattered willows and cottonwoods in the stream corridor
- Fanno Creek at MP 29.00 (Figure 3.5-14): wood trestle to be replaced with concrete ballast deck trestle, vegetation consists of reed canary grass
- Beaverton Creek at MP 27.50 (Figure 3.5-15): construct new bridge for rail line, vegetation consists of mostly reed canary grass and woody species such as willows, redosier dogwood, and Douglas spiraea (*Spiraea douglasii*)

No threatened or endangered plant species are known to occur within two miles of the rail corridor. The Oregon natural heritage program (ONHP) database revealed records of five rare plant species for which there are known occurrences within five miles of the rail corridor. These species are: white

rock larkspur (*Delphinium leucophaeum*, Oregon Endangered and Federal Species of Concern), tall bugbane (*Cimicifuga elata*, Oregon Candidate and Federal Species of Concern), Howellia (*Howellia aquatilus*, Federally Threatened), Howell's montia (*Montia howellii*, Oregon Candidate and Federal Species of Concern), and Oregon sullivantia (*Sullivantia oregana,* Oregon Candidate and Federal Species of Concern). The general range of one additional listed plant species, Nelson's checker mallow (*Sidalcea nelsonii*, Oregon and Federally Threatened), also includes the study area.

The white rock larkspur is found on dry bluffs, fields, and rocky ledges with shallow soils and is often associated with shrubs such as ocean spray (*Holodiscus bicolor*), mock orange (*Philadelphus lewisii*), snowberry, poison oak (*Rhus triloba*), and Oregon white oak (Meinke, undated). This type of habitat does not exist anywhere within the impact zone of the proposed rail line.

Tall bugbane occurs in a variety of wet habitats, but is most frequent on steep, wet, densely vegetated north-facing slopes in mature mixed forests (Garrard, 1993). The slope habitat does not exist in the impact zone of the proposed rail line. The only wetland habitats that could conceivably support tall bugbane are the southern terminus park & ride areas, and both are so highly disturbed and invaded that it is very unlikely that the species occurs there.

Nelson's checker mallow is most often found in areas with gravelly, well-drained soils, often in remnant patches of native grasslands and at the edges of wooded areas (Meinke, undated). This habitat does not exist in the impact zone of the proposed project.

Howellia is an aquatic plant that is restricted to permanent and temporary ponds (Meinke, undated). There is pond habitat within the impact zone of the proposed rail line in the two Hedges Creek crossing areas.

Oregon sullivantia is found on shaded cliffs, ledges, or among boulders in perpetually wet areas. No such habitat is present within the impact zone of the proposed rail line.

3.5.1.2 Wetlands

For the purposes of this section, wetlands were considered to be in the project area if any part of the wetland fell within 100 feet in each direction from the proposed new rail corridor, rail stations, maintenance facilities, and park & rides. Wetland areas were identified using spatial data provided through the Local Wetland Inventory (LWI) and National Wetland Inventory (NWI). The NWI was compiled from aerial interpretation and is not inclusive of all wetlands. The LWI, which involves a field reconnaissance with sample points, is more inclusive. If a discrepancy existed between the LWI and NWI for the locations of mapped wetlands, the LWI was assumed to be more accurate. A field reconnaissance was performed to investigate a potential wetland that was not included in an LWI in Durham and three potential wetland areas mapped by NWI in Tualatin. Formal wetland delineations were not performed.

Twenty-one potential wetland areas were identified by LWI or NWI within the project area (Table 3.5-1, Figure 3.5-1 through Figure 3.5-15). All wetlands along the proposed commuter rail were classified by LWI or NWI as palustrine emergent, palustrine scrub-shrub, palustrine forested, or riverine. Most of the wetlands are located along the shorelines of streams, rivers, ponds, or lakes, although some are located within open areas or channelized ditches. The following vegetation, hydrology, and functions information was obtained from the Wilsonville (1998), Tualatin (1995), Tigard (1994), and Beaverton (1998) LWIs.

Table 3.5-1
Potential Wetland Impacts[1]

Wetland ID	Name/Location	Approx. MP	Approx. Size (acres)	Type	Proposed Construction Activity	Anticipated Impacted (acres)	Source
A	Coffee Lake, south	42.0	75.0	Emergent/ open water	Park & Ride Construction	0.4	LWI
B	Utility Vault Meadow	42.0	4.7	Emergent/ Forested	Park & Ride Construction	0	LWI
C	Ditch west of Utility Vault Road	42.0	0.9	Emergent/ Scrub-Shrub/ Forested	Park & Ride Construction/ Rail Station Construction	0.5	LWI
D	Ditch east of Utility Vault Road	42.0	0.7	Emergent	Park & Ride Construction/ Maintenance Facility/ Rail Station Construction	0.5	LWI
E	Coffee Lake, north	41.3	54.1	Emergent	TBD	N/A	LWI
F	NIKE Canyon	41.3	2.0	Emergent/ Scrub-Shrub	TBD	N/A	LWI
G	South of Industrial Way/108th to UGB	38.6	13.5	Open Water/ Emergent/ Scrub-Shrub/ Forested	Bridge Construction	0.02	LWI
H	Northwest of Industrial Way	37.8	5.4	Open Water/ Emergent	Bridge Construction	0.01	LWI
I	SW Tualatin Sherwood South	36.2	0.5	Emergent	Park & Ride Construction/ Rail Station Construction	0.1	NWI/ Site visit
J	SW Tualatin Sherwood North	36.1	7.8	Emergent	Park & Ride Construction/ Rail Station Construction	0.1	NWI/ Site visit
K	Hedges Creek: Pascuzzi Pond to Boones Ferry	36.0	61.2	Emergent/ Open Water/ Forested	TBD	N/A	LWI
L	Hedges Creek: Tualatin Road to Tualatin River	36.0	1.5	Forested	TBD	N/A	LWI
M	Tualatin River	35.4	N/A	Emergent/ Forested	TBD	N/A	NWI
N	NW of the Tualatin River/ RXR (Oregon Electric)	35.4	1.1	Forested	TBD	N/A	LWI

Wetland ID	Name/Location	Approx. MP	Approx. Size (acres)	Type	Proposed Construction Activity	Anticipated Impacted (acres)	Source
O	NE of the Tualatin River	35.4	13.0	Emergent	TBD	N/A	LWI/ site visit
P	Lower Fanno Creek, South of Durham Road	34.7	2.5	Forested	Bridge Construction	0	LWI
Q	Fanno Creek: SW Tigard Street to N. Dakota Street	31.3	3.0	Emergent/ Forested	Bridge Construction	0	LWI
R	Fanno Creek: SW Scholl's Ferry to N. Dakota Street	31.3	14.1	Emergent	Bridge Construction	0	LWI
S	Ash Creek West of SW Greenburg Road	31.3	0.2	Emergent	Bridge Construction	0	LWI
T	Fanno Creek Greenway off Belaire Drive (South)	29.6	0.76	Emergent/ Forested	Track Construction	0.04	LWI
U	Fanno Creek Greenway off Belaire Drive (North)	29.0	4.3	Emergent/ Forested	Track Construction	0.6	LWI

TOTAL ACREAGE OF ANTICIPATED IMPACTED WETLANDS: 2.3 acres

[1] The information in this table is preliminary and is subject to revision.

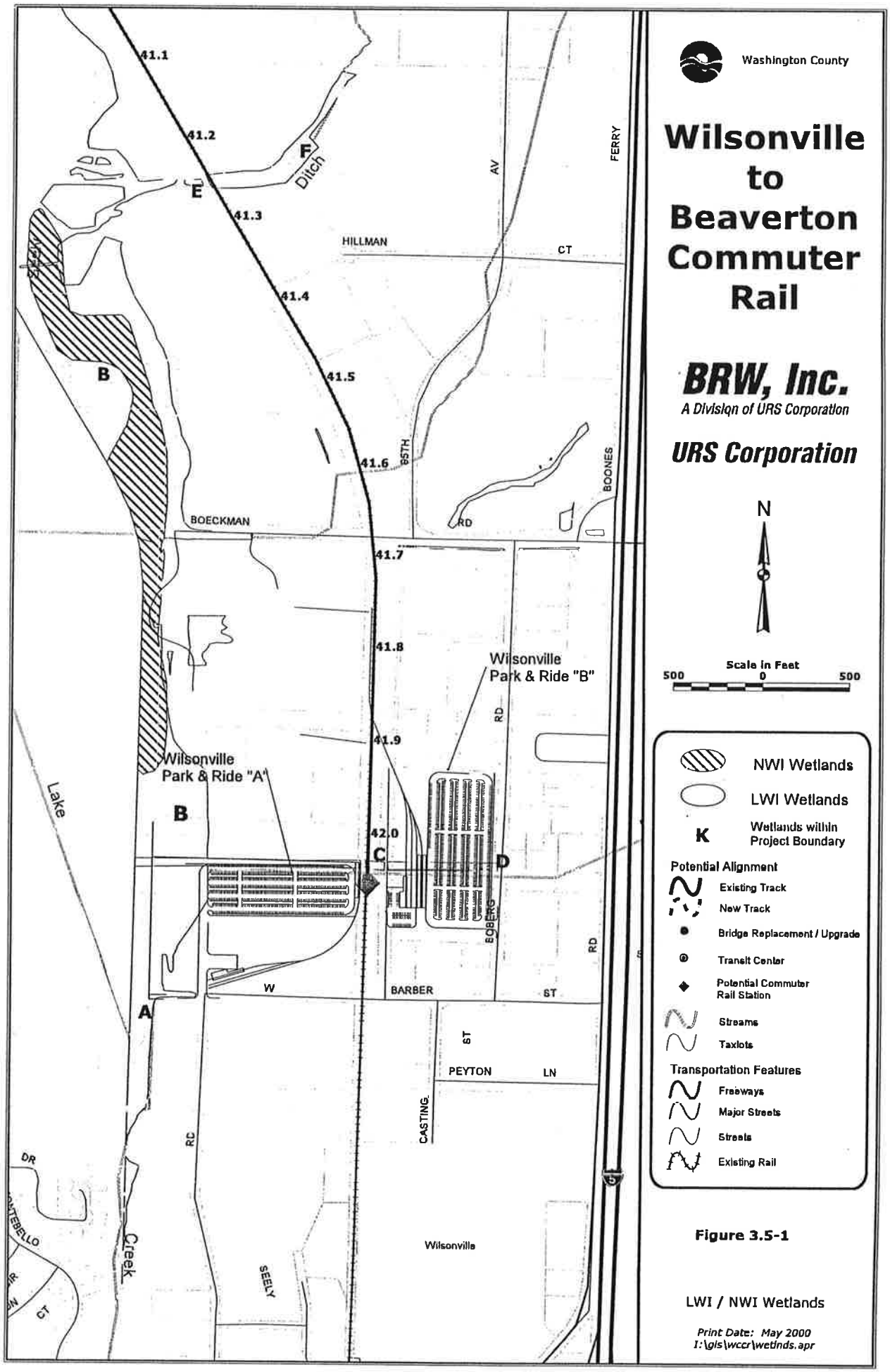

Figure 3.5-1

LWI / NWI Wetlands

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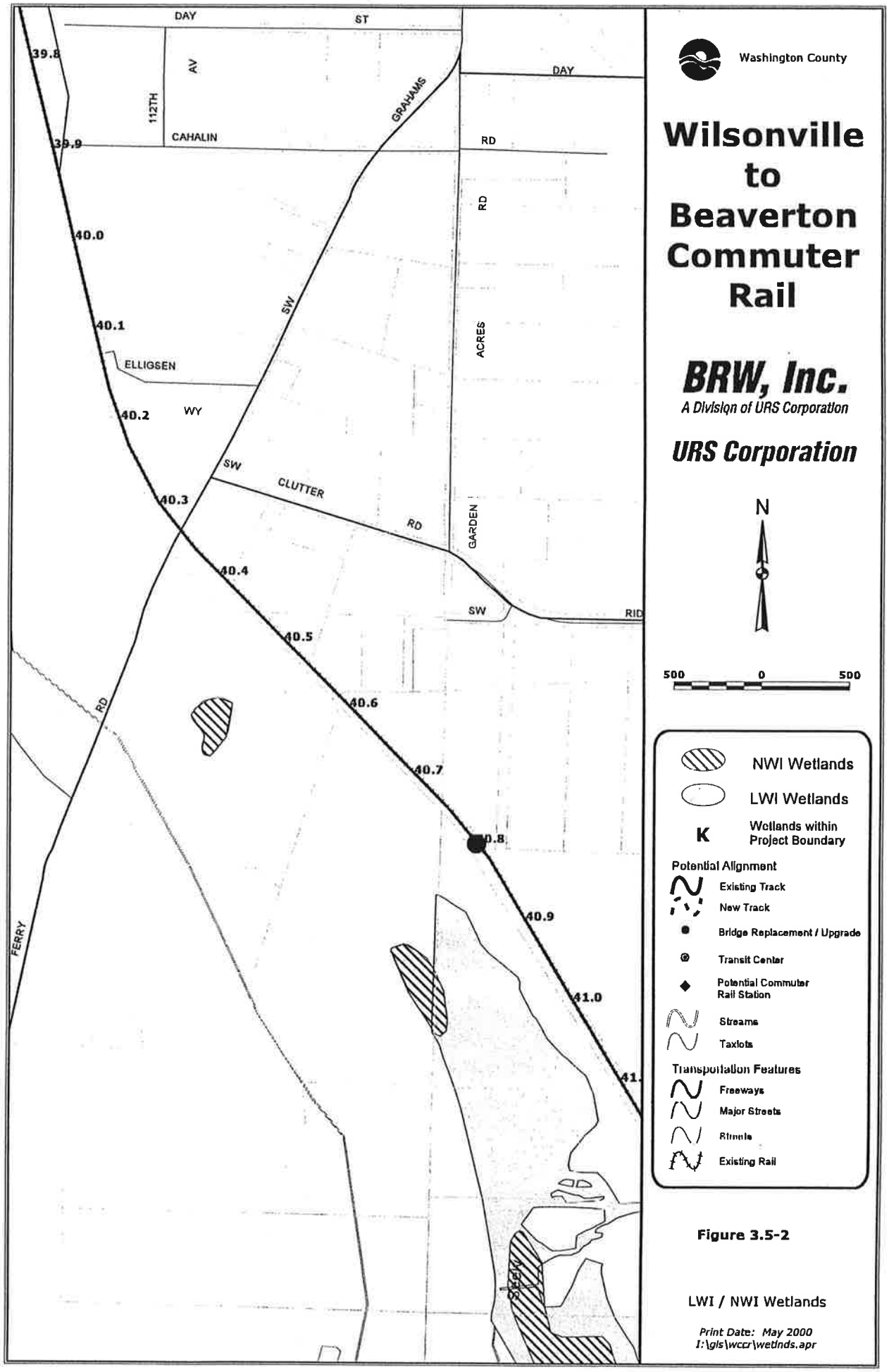

Figure 3.5-2

LWI / NWI Wetlands

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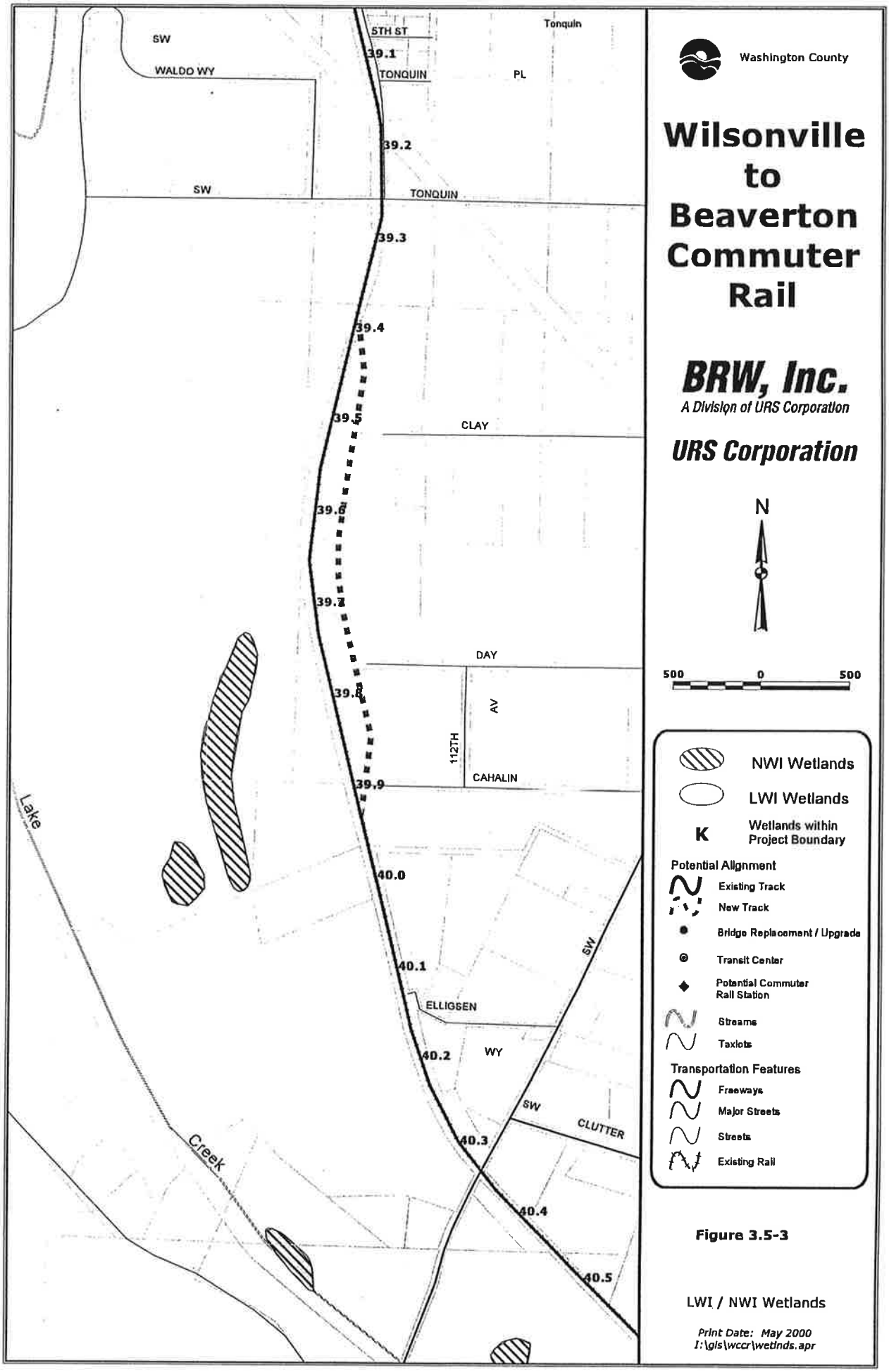

Figure 3.5-3

LWI / NWI Wetlands

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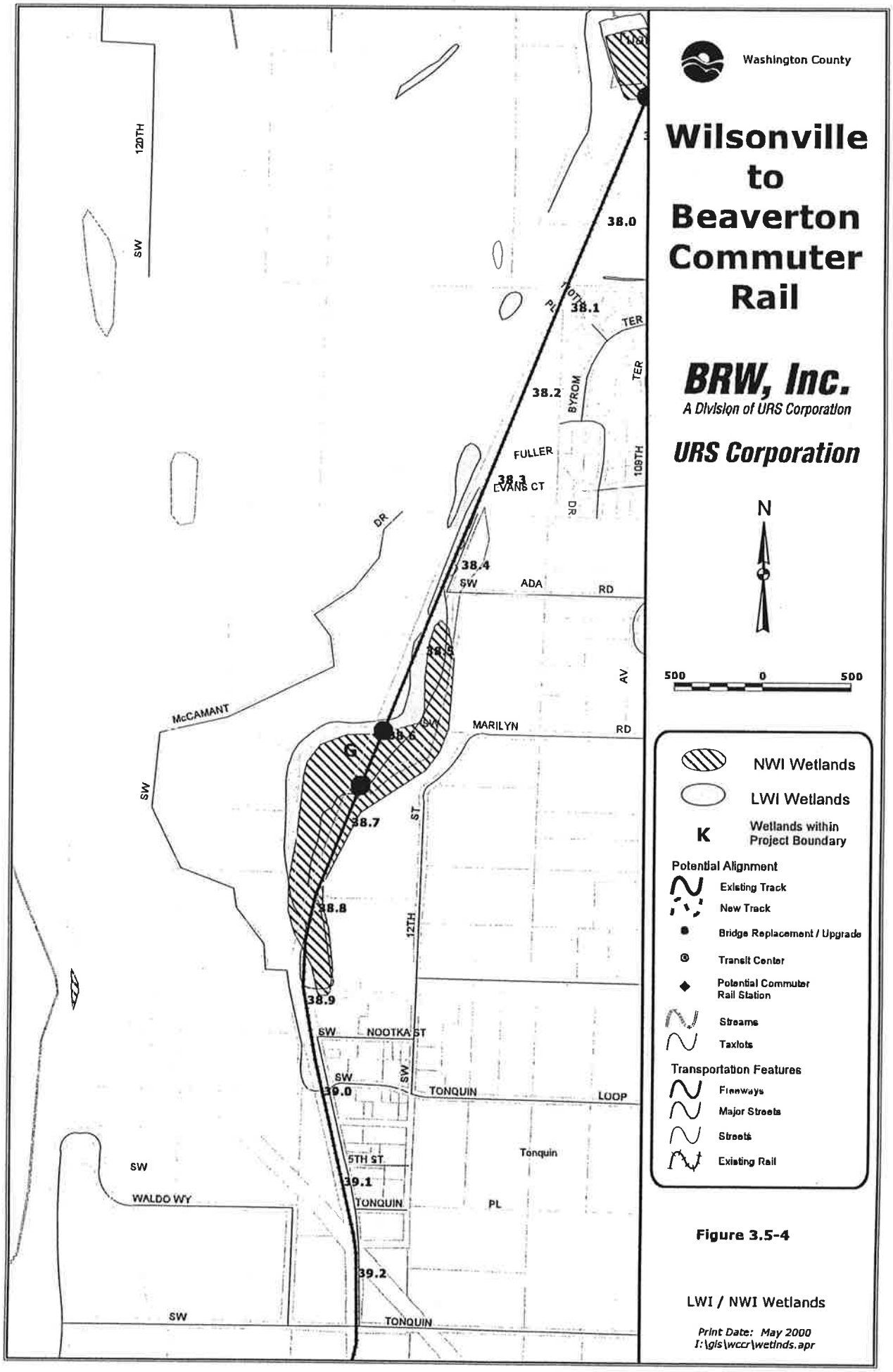
Washington County
Wilsonville to Beaverton Commuter Rail
BRW, Inc.
A Division of URS Corporation
URS Corporation
N
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NWI Wetlands
LWI Wetlands
K Wetlands within Project Boundary
Potential Alignment
Existing Track
New Track
Bridge Replacement / Upgrade
Transit Center
Potential Commuter Rail Station
Streams
Taxlots
Transportation Features
Freeways
Major Streets
Streets
Existing Rail
Figure 3.5-4
LWI / NWI Wetlands
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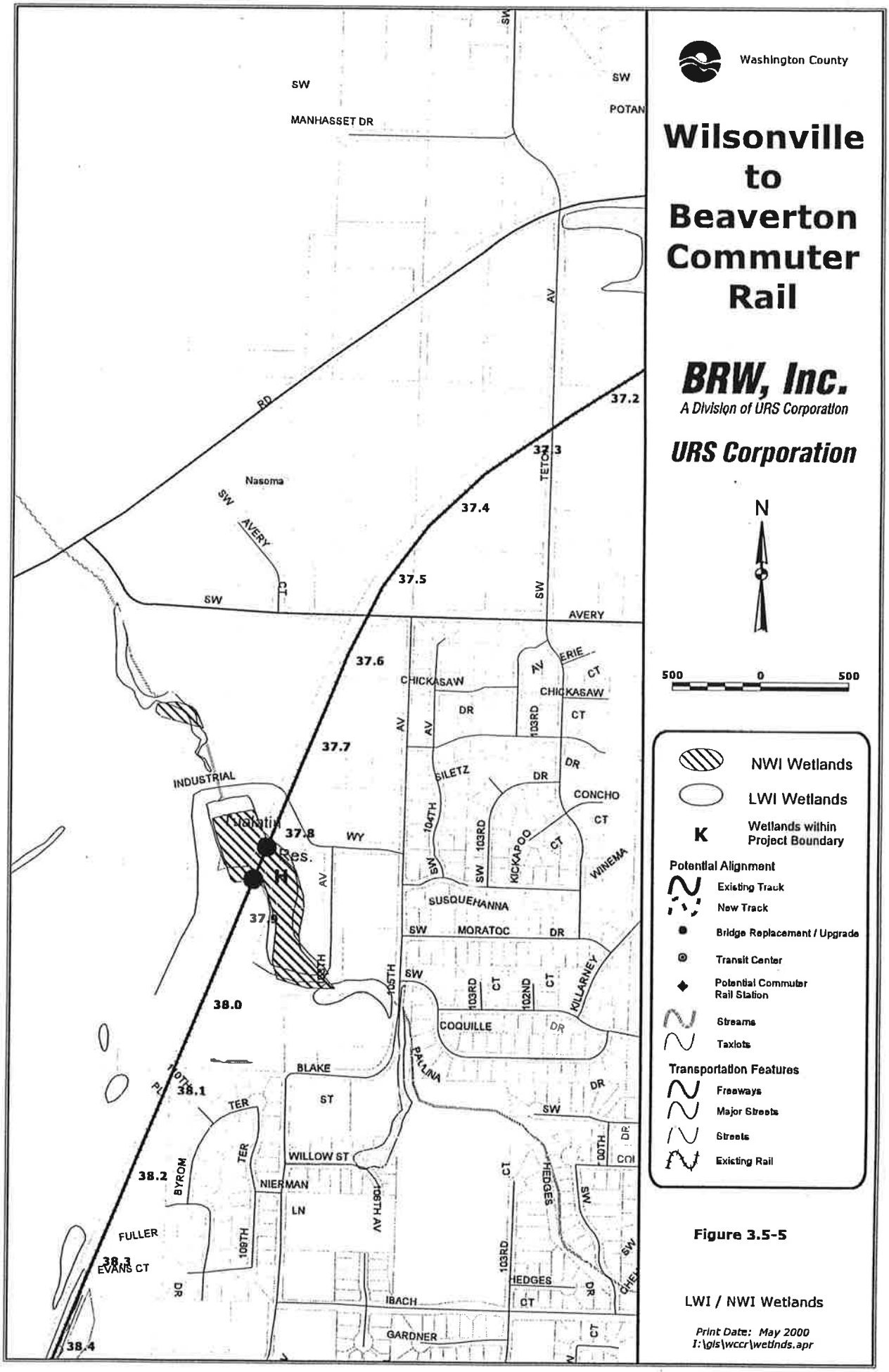
120TH
SW
38.0
PL
TER
38.1
BYROM
38.2
FULLER
EVANS CT
38.3
DR
ADA
RD
38.4
McCAMANT
MARILYN
38.6
38.7
ST
12TH
38.8
38.9
NOOTKA ST
39.0
TONQUIN
LOOP
Tonquin
5TH ST
39.1
WALDO WY
PL
39.2


Washington County
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NWI Wetlands
LWI Wetlands
K Wetlands within Project Boundary
Potential Alignment
Existing Track
New Track
Bridge Replacement / Upgrade
Transit Center
Potential Commuter Rail Station
Streams
Taxlots
Transportation Features
Freeways
Major Streets
Streets
Existing Rail
Figure 3.5-5
LWI / NWI Wetlands
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I:\gis\wccr\wetlnds.apr
SW MANHASSET DR
SW POTAN
AV
RD
37.2
37.3
TETON
Nasoma
SW AVERY CT
37.4
37.5
SW AVERY
37.6
CHICKASAW
AV ERIE CT
CHICKASAW DR
103RD CT
AV
AV
37.7
INDUSTRIAL
SILETZ DR
CONCHO CT
104TH SW
103RD SW
KICKAPOO CT
WINEMA
37.8
WY
AV
SUSQUEHANNA
SW MORATOC DR
37.9
105TH
105TH SW
103RD CT
102ND CT
KILLARNEY
38.0
COQUILLE DR
PALATINE
BLAKE ST
38.1
TER
SW DR
WILLOW ST
38.2
BYRON TER
NIERMAN LN
106TH AV
HEDGES CT
FULLER
106TH
38.3
EVANS CT
DR
103RD
HEDGES DR
IBACH CT
38.4
GARDNER

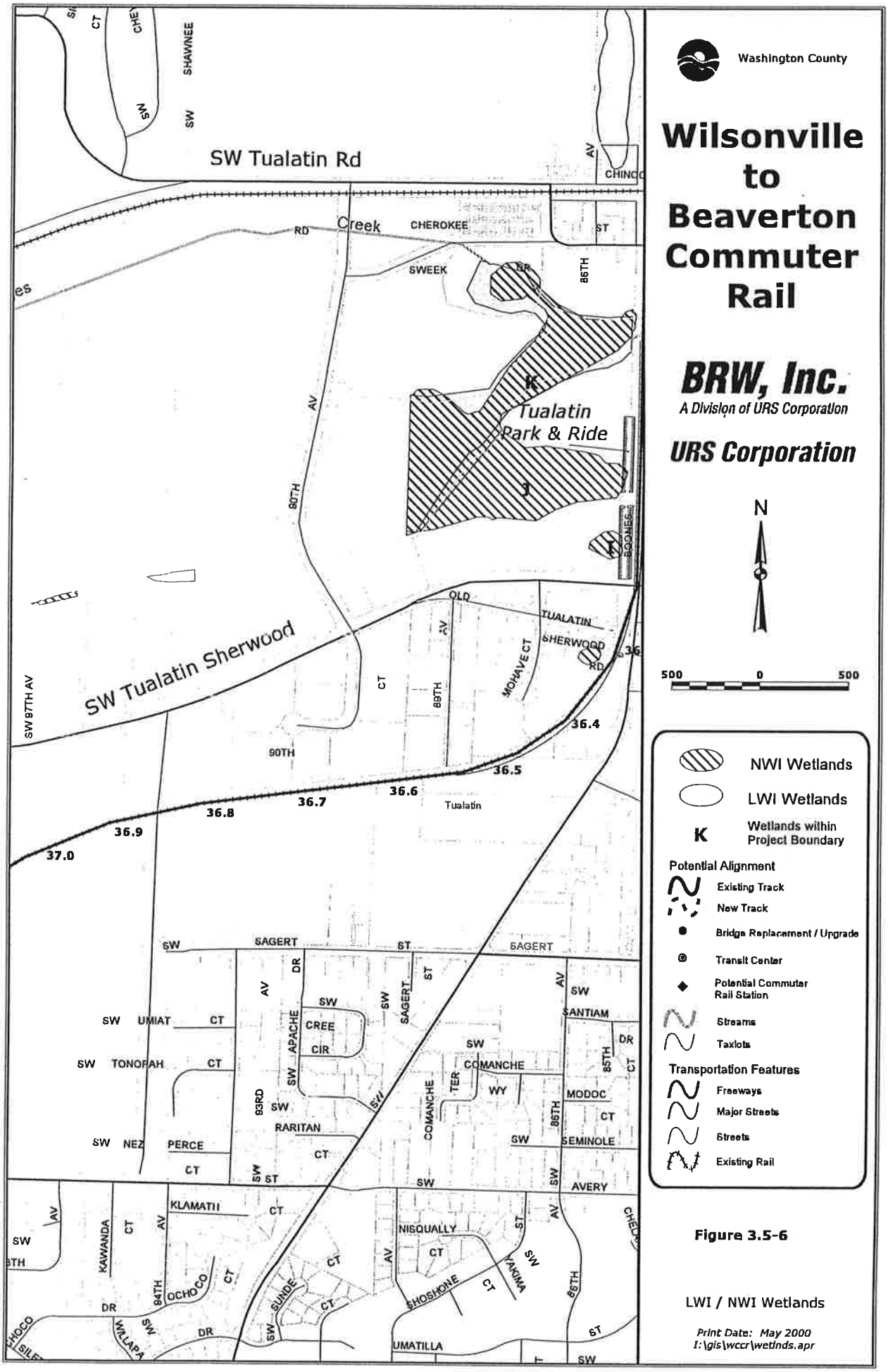

Figure 3.5-6

LWI / NWI Wetlands

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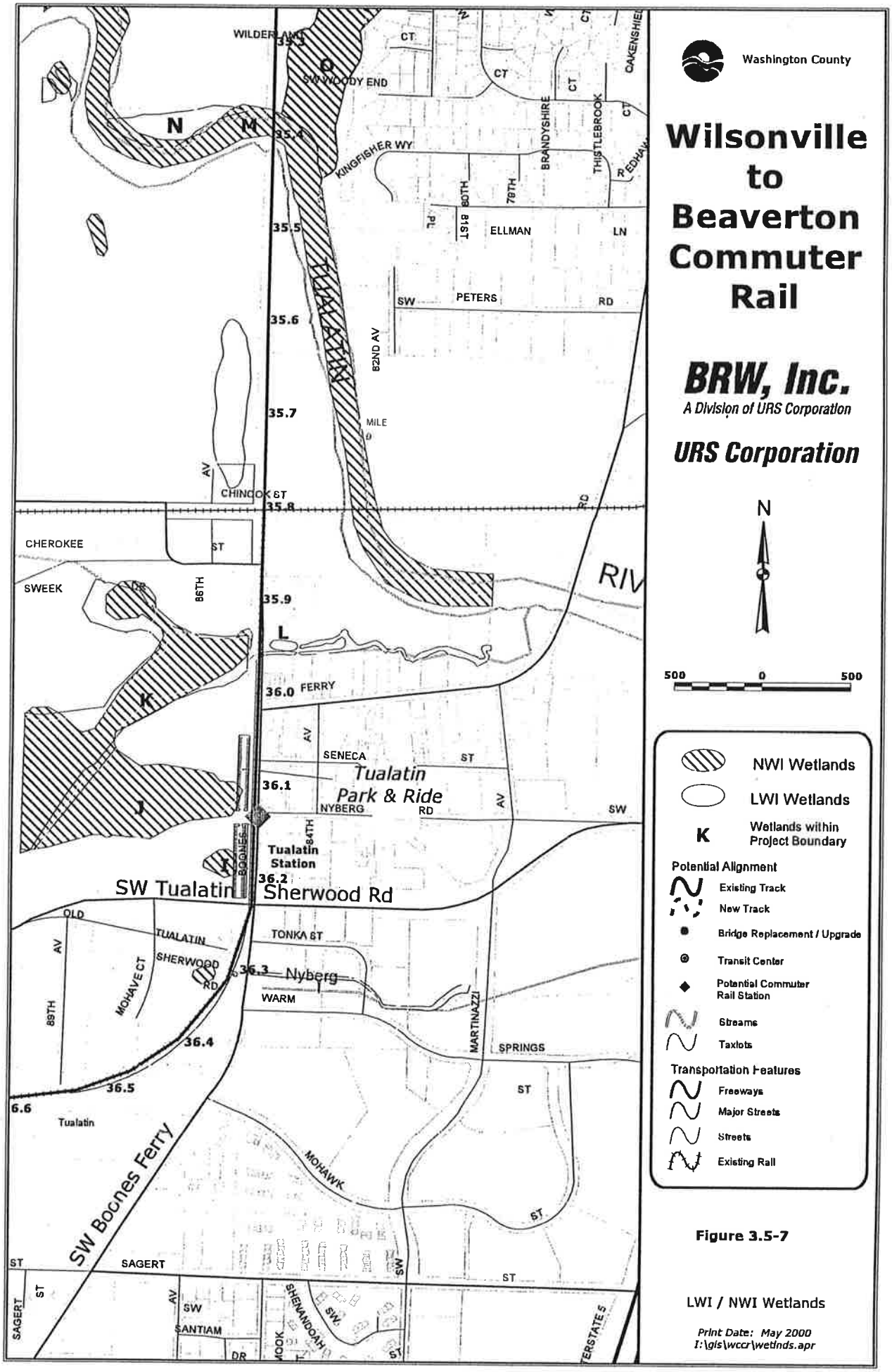

Figure 3.5-7

LWI / NWI Wetlands

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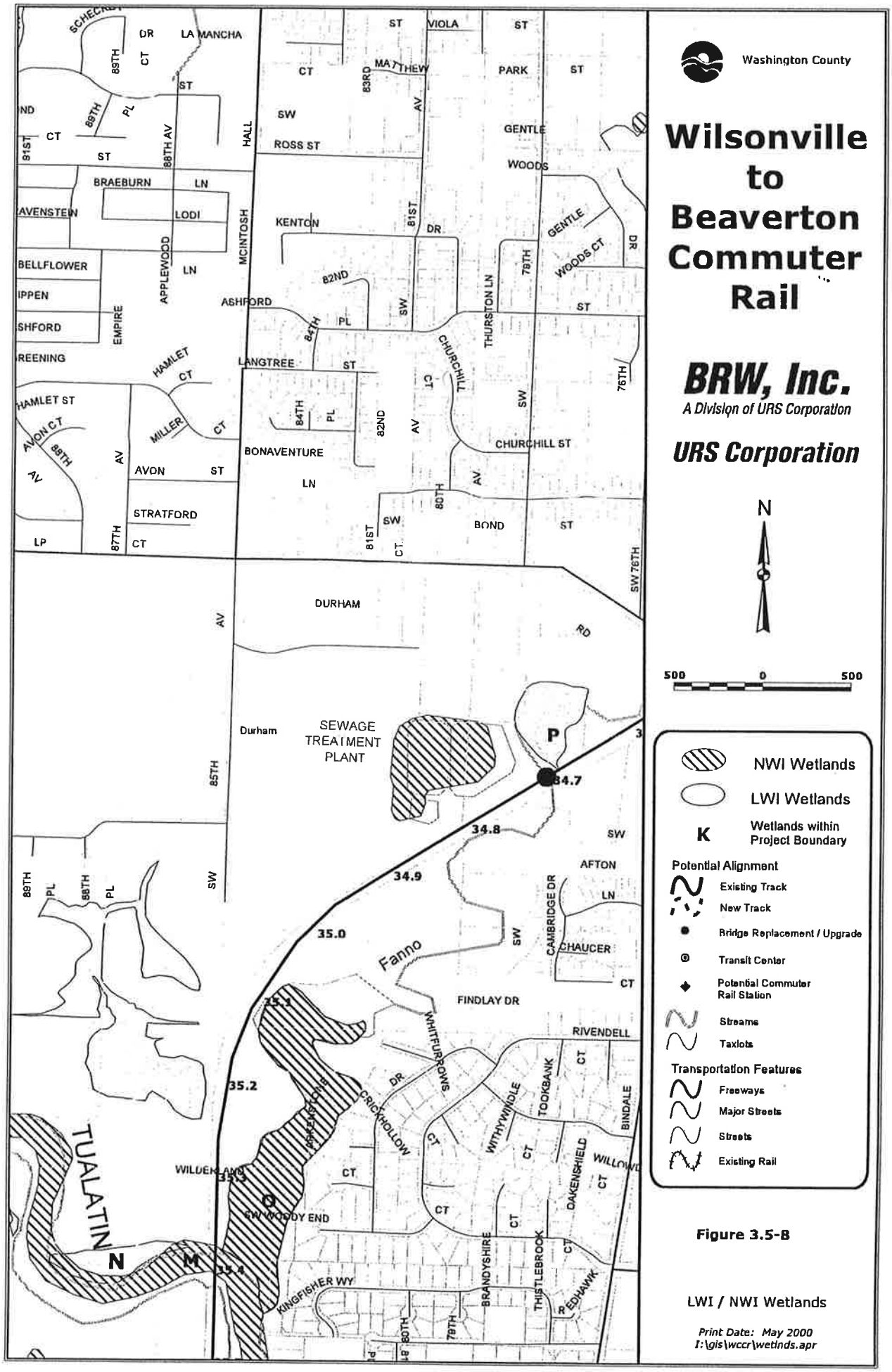
Washington County
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NWI Wetlands
LWI Wetlands
K Wetlands within Project Boundary
Potential Alignment
Existing Track
New Track
Bridge Replacement / Upgrade
Transit Center
Potential Commuter Rail Station
Streams
Taxlots
Transportation Features
Freeways
Major Streets
Streets
Existing Rail
Figure 3.5-8
LWI / NWI Wetlands
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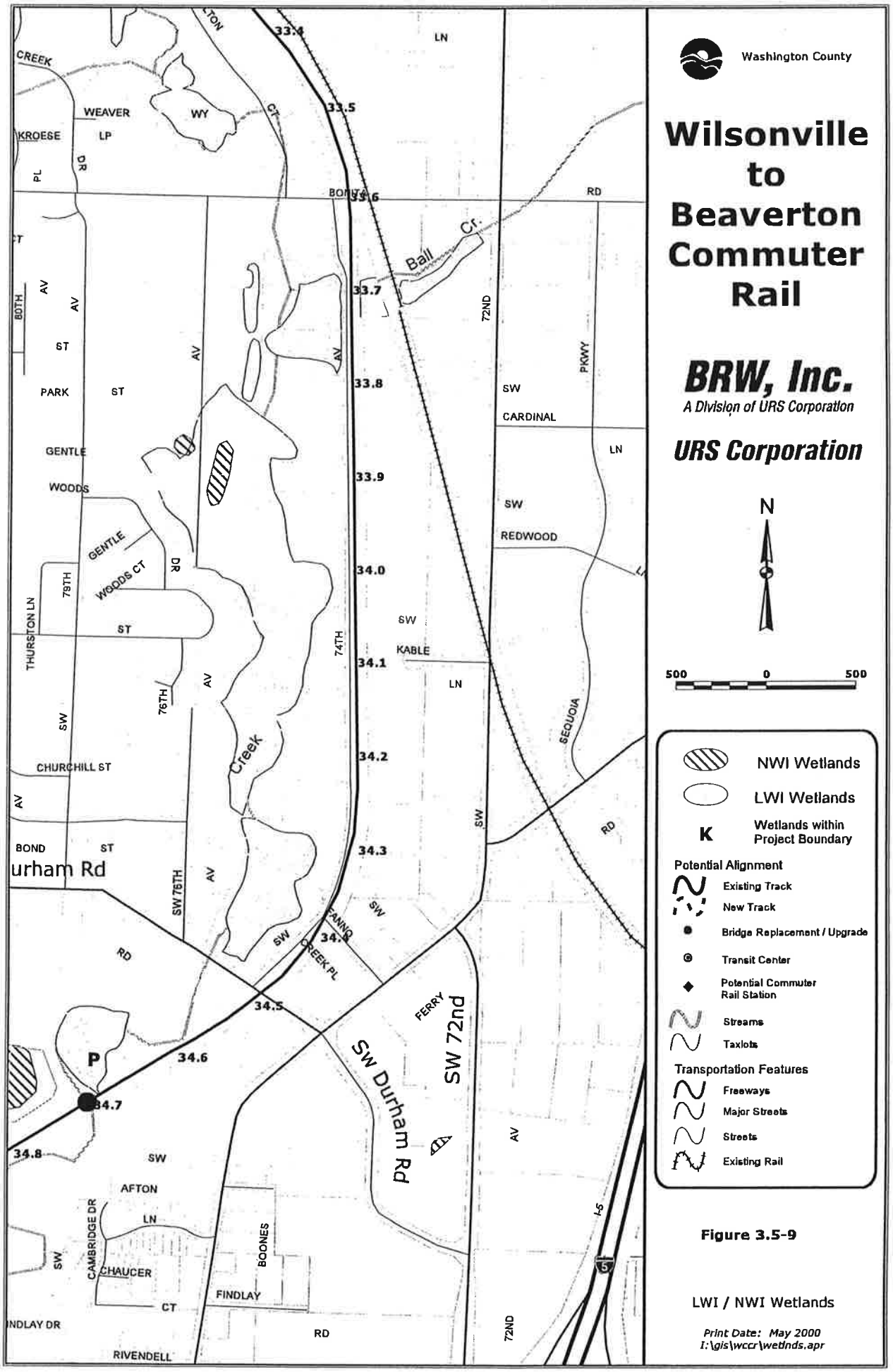
SCHECKLA DR
LA MANCHA
89TH CT
ST
ND
89TH PL
81ST CT
ST
88TH AV
HALL
BRAEBURN LN
AVENSTEIN
LODI
BELLFLOWER
IPPEN
SHFORD
REENING
APPLEWOOD LN
MCINTOSH
EMPIRE
HAMLET CT
HAMLET ST
AVON CT
88TH AV
MILLER CT
AVON ST
STRATFORD
87TH CT
LP
ST VIOLA ST
CT
83RD MATTHEW PARK ST
SW
ROSS ST
AV
GENTLE
WOODS
KENTON
81ST DR
GENTLE WOODS CT DR
82ND
ASHFORD
84TH PL
SW
78TH
THURSTON LN
ST
LANGTREE ST
CHURCHILL CT
76TH
84TH PL
82ND AV
BONAVENTURE
LN
CHURCHILL ST
SW
80TH AV
81ST SW
CT
BOND ST
SW 76TH
DURHAM RD
AV
Durham
SEWAGE TREATMENT PLANT
85TH
P
34.7
34.8
SW
AFTON
34.9
89TH PL
88TH PL
SW
35.0
Fanno
CAMBRIDGE DR
LN
CHAUCER
CT
FINDLAY DR
35.1
WHITFURROWS DR
RIVENDELL
CT
35.2
CRICKHOLLOW
WITHYWINDLE CT
TOOKBANK CT
BINDALE
OAKENSHIELD CT
WILLOW
TUALATIN
WILDER LN
35.3
CT
O
SW WOODY END
N
M
35.4
KINGFISHER WY
BRANDYSHIRE
THISTLEBROOK CT
REDHAWK
80TH
78TH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NWI Wetlands
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Transit Center
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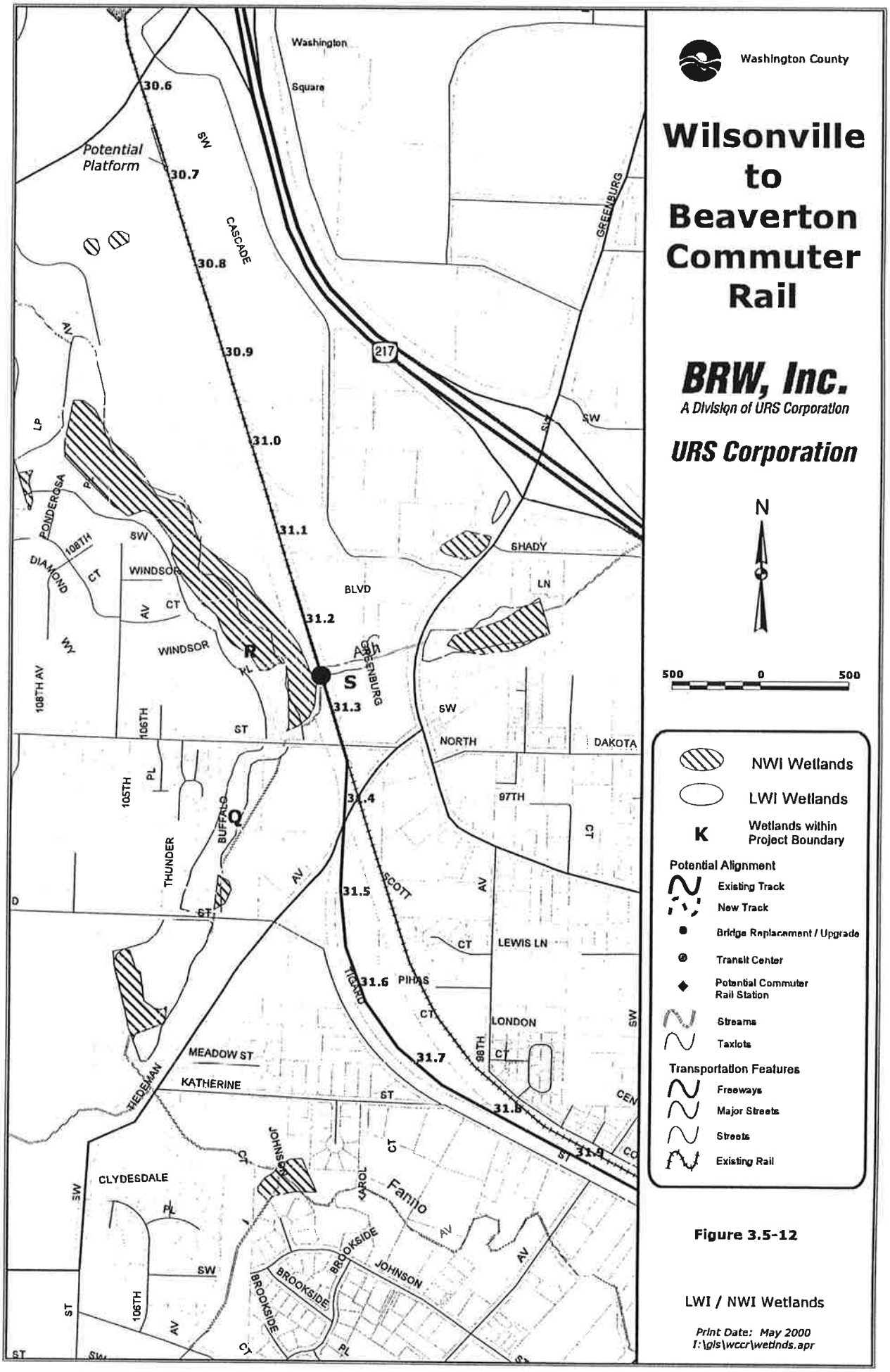
Streams
Taxlots
Transportation Features
Freeways
Major Streets
Streets
Existing Rail
Figure 3.5-9
LWI / NWI Wetlands
Print Date: May 2000
I:\gis\wccr\wetlnds.apr
Bull Cr.
Creek
SW Durham Rd
SW 72nd
33.4
33.5
33.6
33.7
33.8
33.9
34.0
34.1
34.2
34.3
34.4
34.5
34.6
34.7
34.8
P
WEAVER
KROESE
BOND ST
PARK ST
GENTLE WOODS
WOODS CT
CHURCHILL ST
CREEK PL
CARDINAL
REDWOOD
KABLE
SEQUOIA
AFTON
CHAUCER
FINDLAY
RIVENDELL
CAMBRIDGE DR
BOONES
72ND
74TH
76TH
79TH
SW 76TH
THURSTON LN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Potential Alignment
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Bridge Replacement / Upgrade
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SHADY
BLVD
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WINDSOR
POINDEROSA
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105TH
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NORTH DAKOTA
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BUFFALO
THUNDER
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TIGARD
LEWIS LN
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98TH
MEADOW ST
KATHERINE
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Figure 3.5-12
LWI / NWI Wetlands
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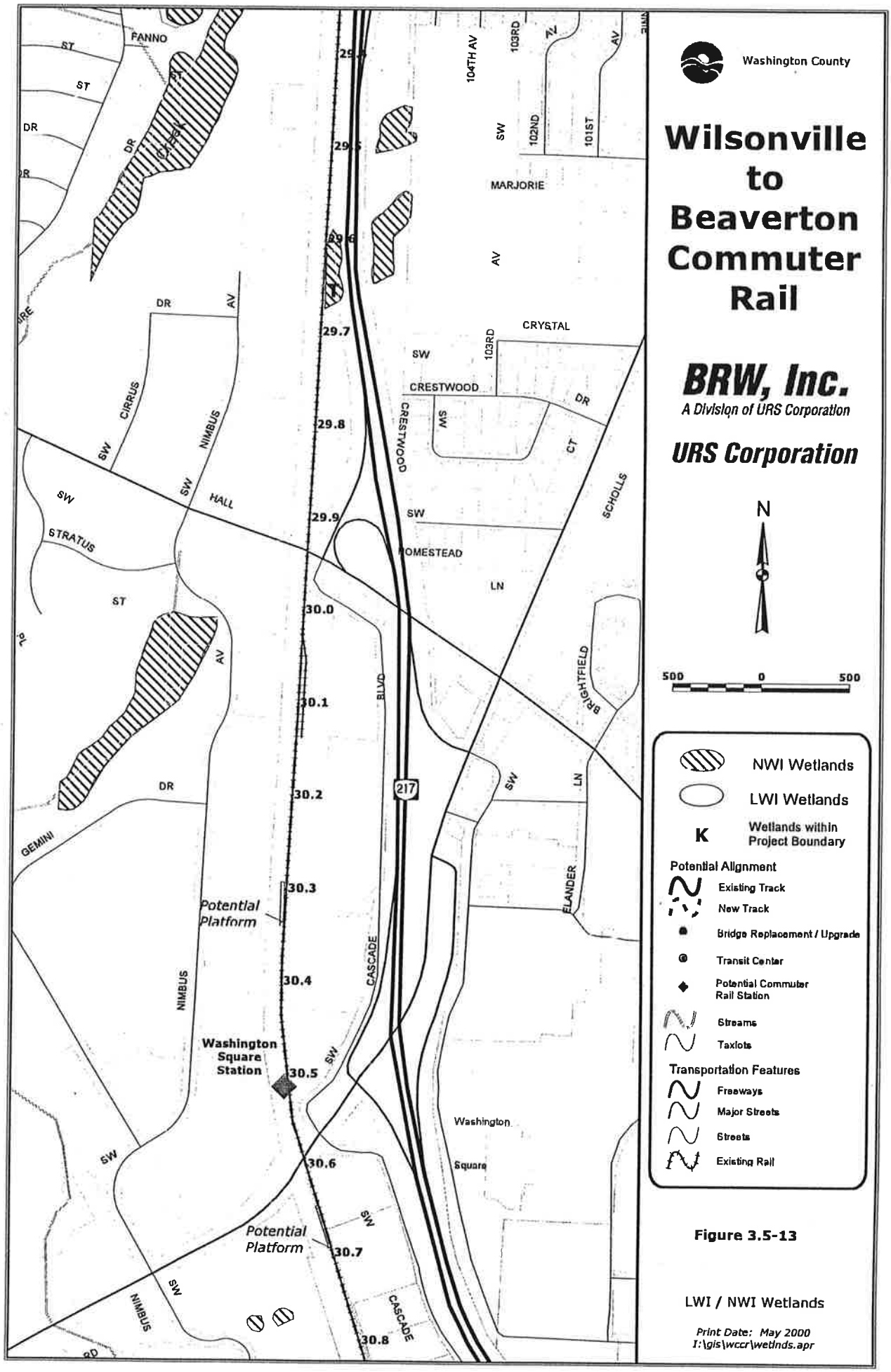

Figure 3.5-13

LWI / NWI Wetlands

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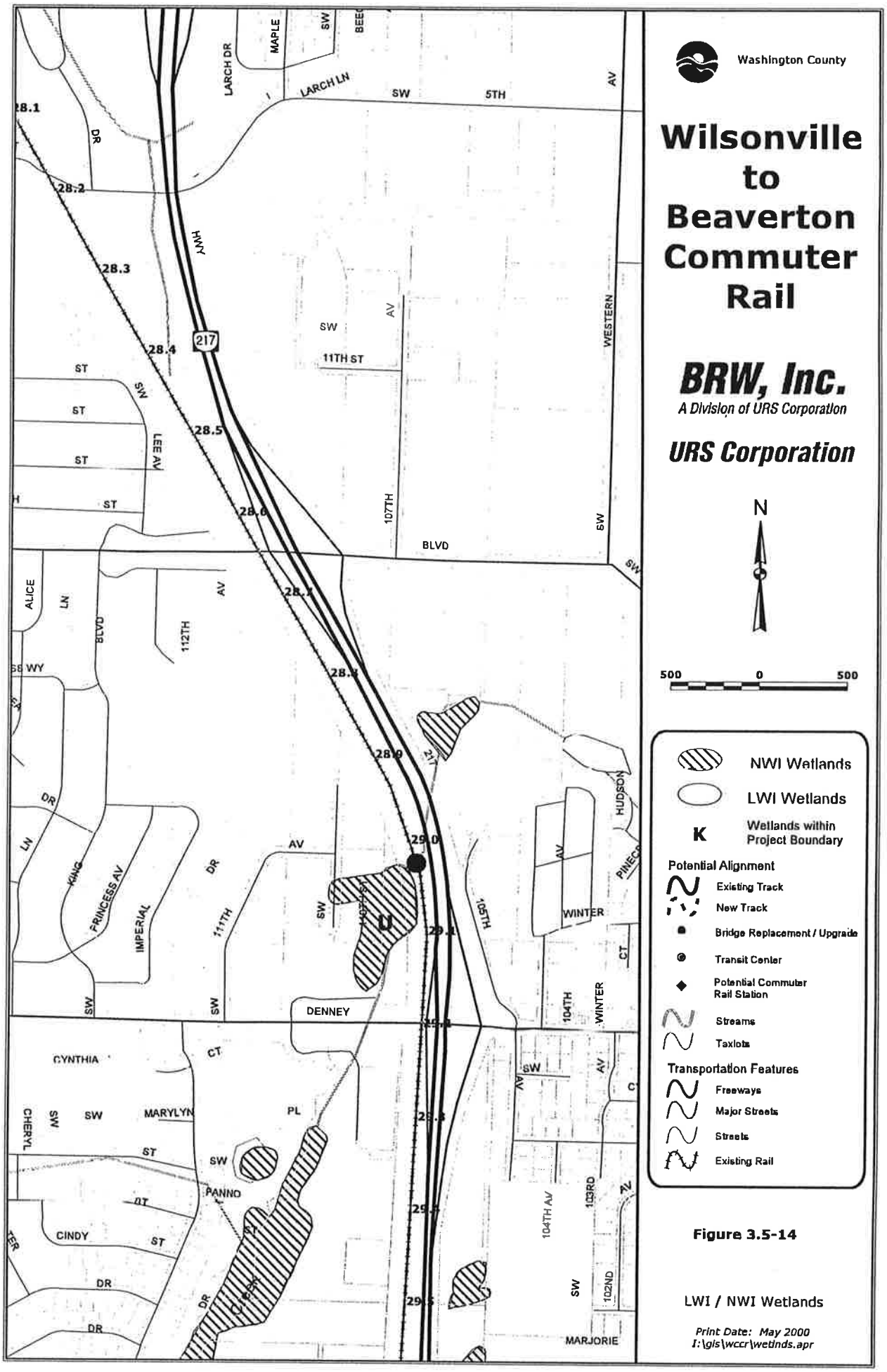
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Major Streets
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Figure 3.5-14
LWI / NWI Wetlands
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104TH
CYNTHIA
MARYLYN
CHERYL
PANNO
CINDY
104TH AV
103RD
102ND
MARJORIE
FRINCESS AV
IMPERIAL
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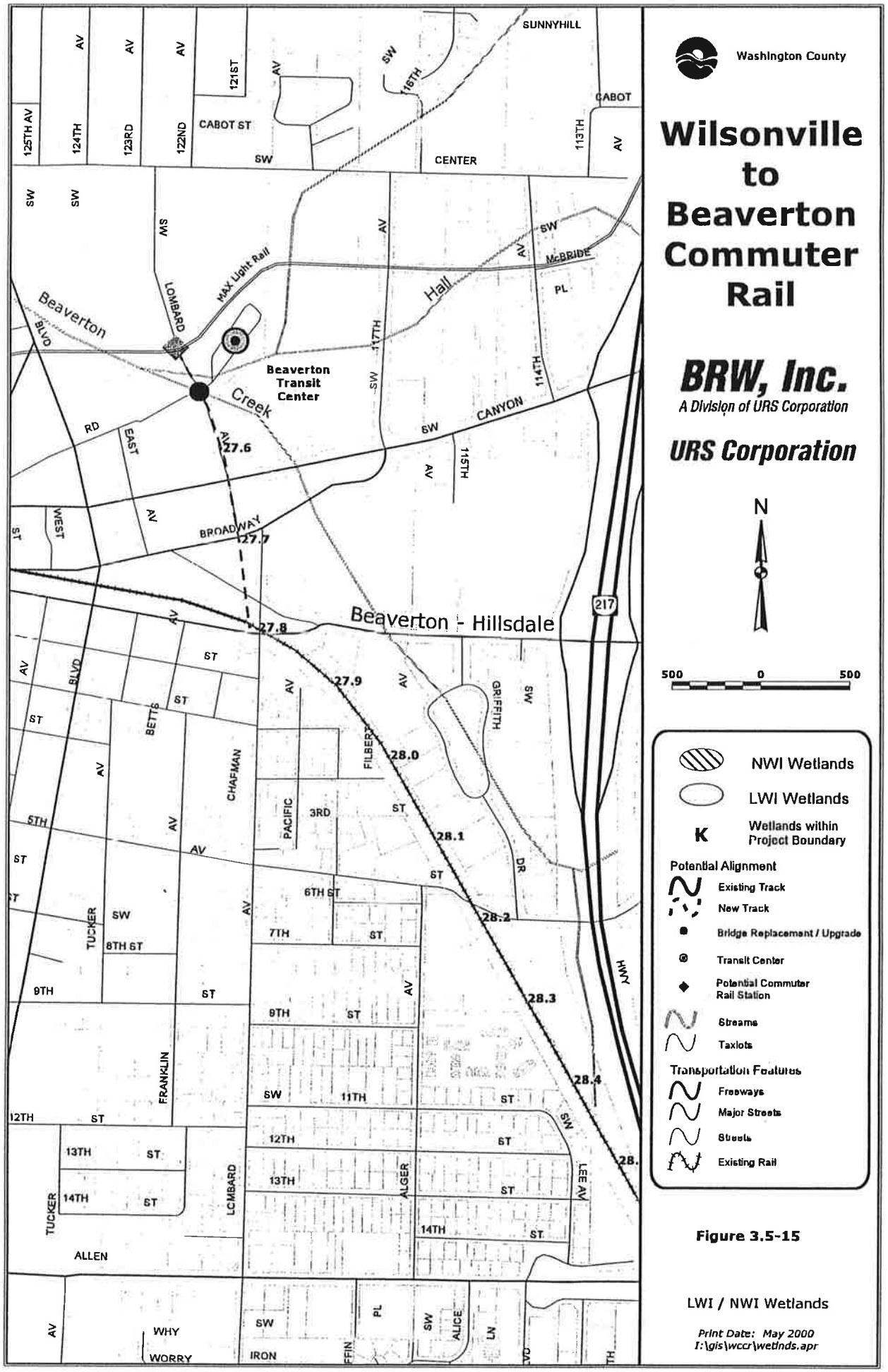

Figure 3.5-15

LWI / NWI Wetlands

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Vegetation

The dominant vegetation within these wetland areas consists of the following species:

Herbaceous Species:

Phalaris arundinacea, Alopecurus pratensis, Solanum dulcamara, Juncus effusus, Nuphar polysepalum, Glyceria sp., Lotus corniculatus, Impatiens capensis, and Equisetum arvense

Saplings/Shrub Species:

Populus trichocarpa, Salix lasiandra, Fraxinus latifolia, Rubus discolor, Spiraea douglasii, Salix piperi, Cornus stolonifera, Salix sitchensis, Salix sp., Physocarpus capitatus, and Rosa pisocarpa

Tree Species:

Fraxinus latifolia, Alnus rubra, Salix lasiandra, Crataegus douglasii, Populus trichocarpa, and Crataegus monogyna

Soils

The project area is located on hydric soils throughout much of the area from Tualatin to Beaverton. As the corridor passes over higher elevations through Washington County and Wilsonville, hydric soils are more intermittent (Connors, 1999).

Hydrology

The hydrologic sources of these wetlands are mostly perennial streams, including Fanno Creek, Ash Creek, Tualatin River, Hedges Creek, and Coffee Lake Creek. Stormwater runoff, groundwater, seeps, and precipitation also contribute to the hydrology of some of these wetland areas.

Functions

The majority of these wetlands provide habitat for wildlife, water quality benefits, hydrologic control, and educational and recreational opportunities.

3.5.1.3 Wildlife

The wildlife inhabiting the project area are limited to those species tolerant of urban and agricultural disturbance and whose life requisites are provided by the types of habitats described above. Typical reptiles and amphibians in the remaining meadow, shrub, and forest habitats include the garter snake (*Thamnopsis* spp.), racer (*Coluber constrictor*), Pacific chorus frog (*Pseudacris regilla*), northwestern salamander (*Ambystoma gracile*), and long-toed salamander (*A. macrodactylum*). Many native bird species have adapted to urban and agricultural areas. Common birds in the habitats in the study area include the American crow (Corvus brachyrhynchos), American goldfinch (*Carduelis tristis*), American robin (*Turdus migratorius*), barn owl (*Tyto alba*), barn swallow (*Hirundo rustica*), Bewick's wren (*Thryomanes bewickii*), black-capped chickadee (*Parus atricapillus*), bushtit (*Psaltriparius minimus*), Canada goose (*Branta canadensis*), cedar waxwing (*Bombycilla cedrorum*), chestnut-backed chickadee (*Parus rufescens*), downy woodpecker (*Picoides pubescens*), European starling (*Sturnus vulgaris*), great blue heron (*Ardea herodias*), great horned owl (*Bubo virginianus*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), mallard (*Anas platyrhynchos*), northern flicker (*Colaptes auratus*), red-tailed hawk (*Buteo jamaicensis*), rock dove (*Columba livia*), scrub jay (*Aphelocoma coerulescens*), song sparrow (*Melospiza melodia*), Steller's

jay (*Cyanocitta stelleri*), Vaux' swift (*Chaetura vauxi*), violet-green swallow (*Tachycineta thalassina*), and wood duck (*Aix sponsa*). Common mammals of the project area include small mammals such as deer mice (*Peromyscus*), shrews (*Sorex*), voles (*Microtus*), Douglas squirrel (*Tamasciurus douglasii*), fox squirrel (*Sciurus niger*, introduced), and rats (*Rattus*); and larger mammals such as the Virginia opossum (*Didelphis virginiana*), black-tailed deer (*Odocoileus hemoinus*), coyote (*Canis latrans*), eastern cottontail (*Sylvilagus floridanus*), moles (*Scapanus*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). All of these species are typical of urban and urbanizing areas of metropolitan Portland. Aquatic mammals found in local rivers and streams include the beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), and introduced nutria (*Myocastor coypus*). None of these species are considered sensitive or rare, and none are listed by Oregon or the U.S. (Listed species can be found in Appendix B.)

There is a pair of bald eagles (*Haliaeetus leucocephalus*, Threatened in the U.S., may be delisted in June 2000) nesting on Ross Island in downtown Portland. It is possible that the home range of this pair may extend to the Tualatin River and/or Fanno Creek. Another listed (threatened) wildlife species that occurs occasionally in the Portland area is the Aleutian Canada goose (*Branta canadensis leucopareia*). Aleutian Canada geese migrate through and occasionally stop for periods of time during the winter in the Portland area, usually in the vicinity of the Columbia River, Sauvie Island, and Vancouver Lake. It is very unlikely that Aleutians would utilize the study area as they tend to forage in large grass seed fields and pasture areas.

The Oregon Natural Heritage Program database (letter dated February 28, 2000) had records of five sensitive wildlife species within 5 miles of the project area: red-legged frog (Rana aurora), Pacific western big-eared bat (Plecotus townsendii townsendii), western painted turtle (Chrysemys picta), northwestern pond turtle (Clemmys marmorata), and the Oregon megomphix snail (Megomphix hemphilli).

The red-legged frog breeds in permanent or temporary ponds, but metamorphosed juveniles and adults forage away from water in moist woods with predominately native ground cover. Potentially suitable pond habitat for the early life requirements of this species exists within the impact zone at the southern and northern crossings of Hedges Creek. The ONHP record of this species is two miles from the project area.

The Pacific western big-eared bat (ONHP) record was a museum specimen, apparently from the downtown Tigard area, but the date and habitat where the bat was collected is unknown. A variety of bat species are known to roost in buildings and under bridges in the Portland area. It is unknown whether the railroad trestles along the route are used by roosting bats. A follow-on field survey showed no signs of bat roosting on the alignment.

The two turtle species occupy permanent ponds, and there are several ponds within the impact zone of the proposed project. There are pond areas that could be suitable habitat for turtles at the southern and northern crossings of Hedges Creek.

The megomphix snail was found in relatively undisturbed, mature forest with some residual old growth trees. No such habitat lies within the impact zone of the proposed project.

3.5.1.4 Fish and Aquatic Resources

The portions of the Tualatin River, Fanno Creek, and their tributaries within the project area are low-gradient, meandering streams that have been highly altered by clearing, agriculture, and urbanization. Fanno Creek and the Tualatin River are designated as a water quality limited streams, and more detailed information is provided in Section 3.6, Water Quality. As a consequence, the habitat quality for native anadromous fish – salmon and trout – is degraded. Native fish species that historically occurred in the Fanno Creek drainage include the cutthroat trout (*Oncorhynchus clarki*), sculpins (*Cottus* spp.), redside shiner (*Richardsonius balteatus*), largescale sucker (*Catostomus macrocheilus*), western brook lamprey (*Lampetra richardsoni*), northern pikeminnow (*Ptychocheilus oregonensis*), and peamouth (*Mylocheilus caurinus*). In addition, in 1989, a dead Steelhead Trout (*Oncorhynchus mykiss*) was found in the upper reaches of Fanno Creek (Smyth, 1991), although there are no official historic or current records to verify that a population of Steelhead exists in Fanno Creek (Smyth, 1991; Sykes, 2000 pers. comm.). A Biological Assessment of Steelhead/Chinook in the Tualatin River and Fanno Creek Basins has been conducted.

Currently, a variety of non-native warmwater fish also inhabit Fanno Creek, including the brown bullhead (*Ictalurus nebulosus*), carp (*Cyprinus carpio*), crappie (*Pomoxis* spp.), bluegill (*Lepomus macrochirus*), largemouth bass (*Micropterus salmoides*), mosquito fish (*Gambusia affinis*), and possibly smallmouth bass (*Micropterus dolomieui*) (Smyth, 1991).

Two threatened salmonid Evolutionarily Significant Units (ESUs) may at least occasionally occur in the project vicinity in the Tualatin River and Fanno Creek. According to correspondence from the National Marine Fisheries Service (NMFS) dated March 7, 2000, the Upper Willamette Chinook Salmon (*Oncorhynchus tshawytscha*) and Upper Willamette River Steelhead (*Oncorhynchus mykiss*), both listed as threatened under the Endangered Species Act (ESA), may occur. In addition, the Southwestern Washington/Columbia River ESU of the cutthroat trout (*Oncorhynchus clarki clarki*) is proposed for listing, but this ESU does not include the Willamette and Tualatin Rivers. The Chinook salmon were listed on March 24, 1999 (64 FR 14308) and the Steelhead were listed on March 25, 1999 (64 FR 14517). Critical habitat was designated for both species on February 15, 2000 (65 FR 7764), and includes all accessible river reaches in the Willamette River and tributaries above Willamette Falls, plus the river reaches of the Willamette River and Columbia River downstream of Willamette Falls. Critical habitat includes the water, substrate, and riparian area. Cutthroat trout and at least one Steelhead have been observed in Fanno Creek historically. Whether the cutthroat trout in the Tualatin River include sea-run individuals is unknown at this time (Kostow pers. comm. 2000). The presence of Chinook is less likely, since they prefer larger river systems. It is possible that any of these three species could occur in the vicinity of the trestles that are proposed for replacement by this project. A Biological Assessment for the species has been conducted.

Environmental team members met with National Marine Fisheries Service (NMFS) staff to review stream crossing upgrades (trestle replacements) that are being proposed for certain locations along the commuter rail alignment. The EA states that the proposed should span the banks of the streams. Upon further evaluation of site topography, this does not appear feasible at the Fanno Creek, Tualatin Reservoir, and Ash Creek crossings.

Additional site visits have been conducted to qualitatively assess the hydraulic capacities of the specific crossings and provide feedback to project engineers regarding recommendations for trestle replacement alternatives. Recommendations are being developed for staging areas that minimize impacts to properly functioning habitat for listed species. This information is intended for current

planning level reviews and will be further refined during the permitting phase of the project. The Biological Assessment will provide narrative descriptions of the potential impacts and subsequent conservation measures to reach a determination of "not likely to adversely affect" the continued existence of the listed species. Copies of correspondence from the ONHP, NMFS, and U.S. Fish and Wildlife Service are in Appendix B.

3.5.2 Potential Impacts

3.5.2.1 Vegetation

No Build Alternative

Under the No Build Alternative, no change from current trends in loss or alteration of vegetation would occur.

TSM Alternative

Under this alternative, vegetation would be permanently lost at the selected park & ride in Wilsonville. The impacted area would be approximately 8.7 acres for the potential lot on the east side, or approximately 6.2 acres for the alternate lot on the west side. The highly disturbed nature of these areas makes it very unlikely that any rare or sensitive plants would be affected and the type of vegetation at these sites is common throughout the Portland metropolitan area.

Commuter Rail Alternative

The approximately 18.5 acres of shrub and meadow vegetation at the two southern park & rides and along the Tonquin siding would be permanently lost as a result of this project. These losses would not affect any rare plants or communities. Areas adjacent to the rail right-of-way would continue to be maintained as they are now, which includes periodic herbicide application and physical clearing of woody vegetation that intrudes into the right-of-way.

3.5.2.2 Wetlands

Excavation or filling of a wetland is considered a direct long-term impact. Other potential activities representing indirect impacts include the following:

- Erosion of soils during construction (indirect, short-term)
- Alteration of wetland hydrology (indirect, long-term)
- Loss of ecological functions and values (indirect, long-term)

Impacts to wetlands are estimates based on the most current site plans available and on assumptions about how far the construction limits would extend. Engineering drawings have not yet been completed for the project; therefore, actual impacts may differ from these estimates.

No Build Alternative

No wetlands would be impacted under the No Build Alternative.

TSM Alternative

Impacts from construction of the TSM Alternative are described in Section 3.15.5. There would be no impacts to wetlands from the operation of the TSM Alternative.

Commuter Rail Alternative

Indirect, long-term impacts may include alterations of wetland hydrology and the loss of some ecological functions and values. There may also be minor indirect long-term impacts to wetlands near the new parking facilities as a result of stormwater runoff. Indirect, short-term impacts may include soil erosion during construction. Other possible impacts are identified in Section 3.15.5.

3.5.3 Cumulative Effects

Wetlands have been altered throughout the Tualatin basin since the area was settled. The impacts to wetlands from the proposed project are minimal when compared to the impacts that have already been sustained. Wetland impacts continue to occur through ongoing development. Although each small wetland impact may not negatively affect the overall wetland functions and values in the area, if development projects continue to impact wetlands, together they may cause significant wetland impacts.

3.5.4 Mitigation Measures

A fill-removal permit would have to be obtained from the Oregon Division of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps) for fill activities in jurisdictional areas.

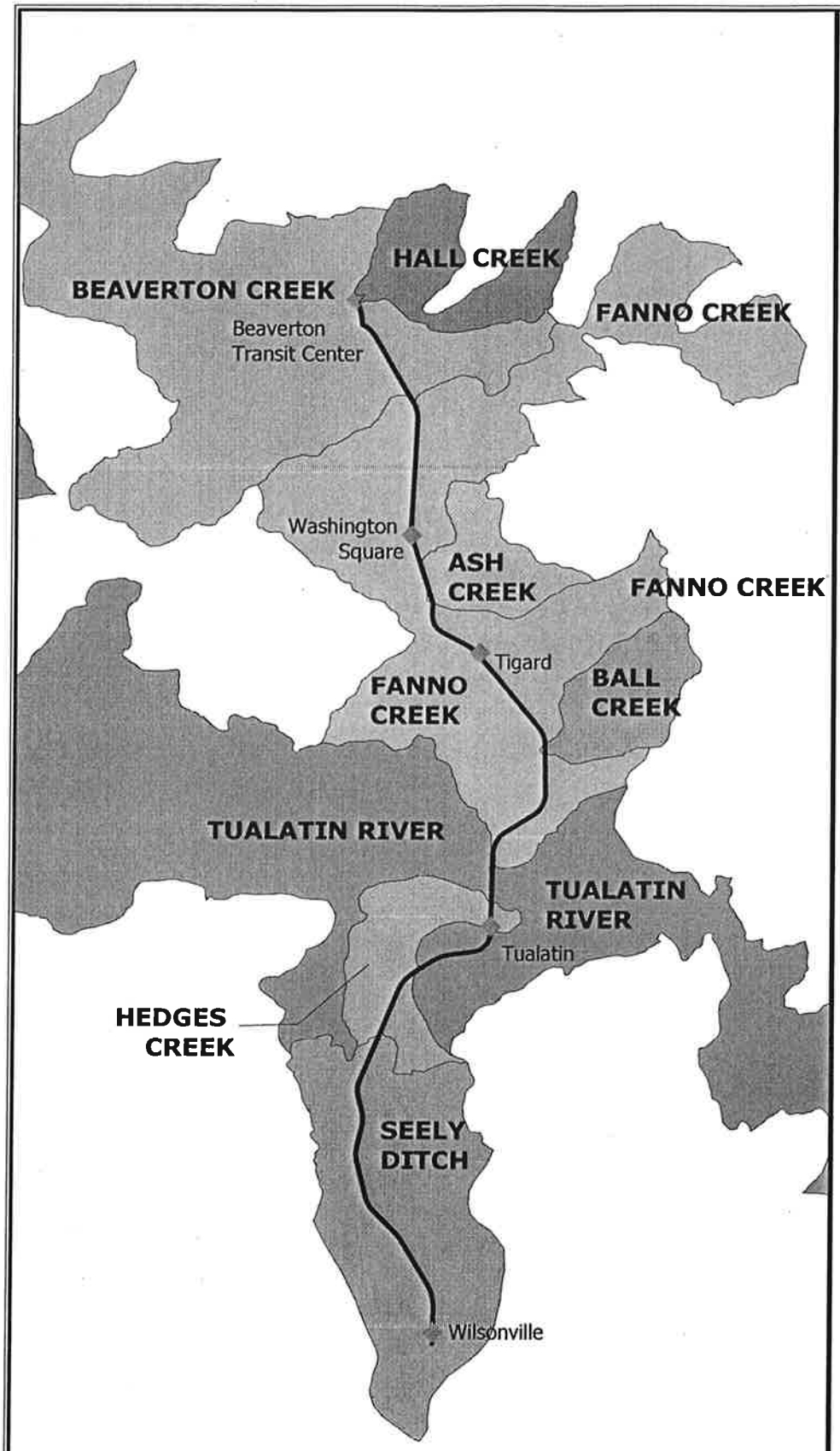
A wetland mitigation plan will be required to compensate for the loss of wetlands, as required by the DSL and Corps. Mitigation options include credit purchase from the Unified Sewerage Agency's Fernhill Wetland Mitigation Bank. No filling of wetlands would occur until a permit was obtained and a mitigation plan approved.

3.6 WATER QUALITY

3.6.1 Affected Environment

The commuter rail alignment lies primarily within the Tualatin River watershed with the exception of the southernmost 3.9 miles, which are located in a drainage basin that flows to the Middle Willamette River watershed. The Tualatin River watershed has been subdivided into 33 drainage subbasins. From south to north, the proposed commuter rail route passes through the following six Tualatin River subbasins: Hedges Creek, Tualatin River, Fanno Creek, Ash Creek, Beaverton Creek, and Hall Creek (see Figure 3.6-1). The southernmost portion of the route runs through the Seely Ditch subbasin, which drains south to the Middle Willamette River watershed. The nearest sole source aquifer is in Bandon, a distance of about 300 miles.

The beneficial uses for these waterbodies are wide ranging and are listed in the Oregon Administrative Rules (OAR), Chapter 340, Division 41. A summary of the listed beneficial uses is provided in Table 3.6-1. With respect to the Tualatin River watershed, the proposed commuter rail route is located in the downstream portion of the watershed. Although several of the beneficial uses are not likely to exist in the downstream portion of the watershed (e.g., public domestic water supply), DEQ still applies the relevant standards for all of these listed beneficial uses throughout the basin. Most of the creeks along the route have been placed on DEQ's 1998 303(d) list of "water quality limited" waterbodies for failing to meet water quality standards to maintain beneficial uses. A summary of the 303(d) listings is provided in Table 3.6-2.



Washington County

Wilsonville to Beaverton Commuter Rail

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Scale in Miles

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Potential Rail Alignment

Potential Rail Station

Figure 3.6-1

Metro Watersheds and Potential Rail Alignment

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Table 3.6-1
Beneficial Uses of Receiving Waters

Beneficial Use	*Tualatin River*	Middle Willamette River
Public Domestic Water Supply	X	X
Private Domestic Water Supply	X	X
Industrial Water Supply	X	X
Irrigation	X	X
Livestock Watering	X	X
Anadromous Fish Passage (ESA)	X	X
Salmonid Fish Rearing (ESA)	X	X
Salmonid Fish Spawning (ESA)	X	
Resident Fish & Aquatic Life	X	X
Wildlife & Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power	X	X
Commercial Navigation & Transportation		X

Source: OAR, Chapter 340, Division 41.

Table 3.6-2
303(d) List of Water Quality Limited Waterbodies

	Bacteria	Dissolved Oxygen	Biological Criteria	Temperature	Toxics	Chlorophyll a
Hall Creek	X	X				
Beaverton Creek	X	X	X	X		
Fanno Creek	X	X		X	X	X
Ash Creek	X	X	X	X		
Ball Creek						
Tualatin River	X			X		
Hedges Creek	X	X	X	X		
Seely Ditch						
Middle Willamette	X		X	X	X	

Source: DEQ, 1998

In addition, the Tualatin River was previously listed as "water quality limited" with respect to the parameters of ammonia and phosphorus. In 1992 and 1994, total maximum daily loads (TMDLs) were approved by the Environmental Protection Agency (EPA) for these parameters respectively. Therefore, in terms of ammonia and phosphorus discharges, TMDL compliance for new development is assumed to be achieved if all Unified Sewerage Agency (USA) standards and requirements are adhered to, as these requirements were negotiated and approved as part of the TMDL. Additional TMDLs will be developed by DEQ in the future for each of the above water bodies and their associated listed parameters.

3.6.2 Potential Impacts

Potential impacts to water quality could occur from construction activities, post-development elements of the project, and operations and maintenance associated with the project. Potential impacts from construction activities are described in Section 3.16.6. Impacts from the two other categories of activities are described below. There would be no impacts to sole source aquifers from any of the alternatives.

3.6.2.1 No Build Alternative

Under the No Build Alternative there would be no changes in current impacts to water quality, as the No Build Alternative assumes no changes in transit service other than those that are currently programmed.

3.6.2.2 TSM Alternative

Potential Post-Development Impacts

New impervious area would be constructed at the two proposed parking facilities as listed in Table 3.6-3. Potential water quality impacts associated with new impervious areas include increased runoff volumes to receiving streams, and increased pollutant loads to receiving streams. Increased runoff volumes can contribute to the acceleration of erosion and downcutting in open waterway systems. Increased pollutant loads can have negative impacts to aquatic species in downstream systems.

Table 3.6-3
New Impervious Areas

Affected Watershed	Proposed Parking Facility	Approximate Increase in Impervious Surface
Seely Ditch	Wilsonville	7.1 to 8.3 acres depending upon the location option selected
Fanno Creek	Tigard	1.0 acres

Source: Dames & Moore, 2000

Potential Operational Impacts

Operational impacts to water quality would be associated with the proposed addition of a limited-stop bus line on roads roughly paralleling the commuter light rail alternative alignment from Wilsonville to Beaverton. Impacts would be associated with pollutants from bus vehicle miles traveled (e.g., emissions from exhaust, spills, leaks, and wear and tear of bus parts such as tires and brake pads). However, these impacts would likely be more than offset by a reduction in auto vehicle miles traveled due to increased use of the bus.

3.6.2.3 Commuter Rail Alternative

Potential Post-Development Impacts

New impervious area would be constructed at the four proposed rail stations and the one maintenance/storage facility listed in Table 3.6-4. Impervious area estimates include parking spaces, roof tops, sidewalks, sheltered waiting areas, and station platforms. Potential water quality impacts associated with new impervious areas include increased runoff volumes to receiving streams, and increased pollutant loads to receiving streams. Increased runoff volumes can contribute to the

acceleration of erosion and downcutting in open waterway systems. Increased pollutant loads can have negative impacts to aquatic species in downstream systems.

Table 3.6-4
Estimated Increase in Impervious Surface Associated with Rail Stations

Affected Watershed	Proposed Park & ride Stations	Approximate Increase in Impervious Surface
Seely Ditch	• Wilsonville Park & Ride	7.1 to 8.3 acres depending upon the location selected for the station
	• Maintenance/Storage Facility	2.0 acres
Hedges Creek	• Tualatin Park & Ride	1.3 acres
Fanno Creek	• Tigard Park & Ride	1.0 acre
	• Washington Square Park & Ride	0.1 acre
	Total:	**11.5 to 12.7 acres**

Source: URS, 2000

Potential Operational Impacts

Maintenance and operational leakage of lubricants are potential sources of water quality pollutants along the proposed route. In addition, fugitive trace metal particles may be produced by the interaction of the wheels and track.

Based on the above information, the water quality impacts of the project are expected to be limited. The only direct impacts to receiving streams would be the temporary impacts associated with the construction of four bridge crossings and the removal of trestles. Most of the indirect impacts to water quality would be addressed through compliance with erosion control and stormwater quality standards for new development, as described in Section 3.6.4, Mitigation Measures.

3.6.3 Cumulative Effects

The proposed project would result in an increase in the quantity of stormwater and associated pollutants as shown in Table 3.6-5. These impacts would also be offset by an estimated reduction in vehicle miles traveled of 17,400 per year beginning in 2020. There are three types of water quality impacts related to vehicle miles traveled: atmospheric emissions from exhaust (i.e., metals); spills, leaks, and dumping of automotive fluids (i.e., oil and grease and metals); and wear and tear of automotive parts (i.e., metals).

Table 3.6-5
Estimated Increase in Pollutant Loads Due to New Impervious Areas

Affected Watershed	Source of Impact	Approx. Magnitude of Increased Runoff and Associated Pollutant Loads in the Watershed (without mitigation)
Seely Ditch	Wilsonville Rail Station and Storage/Maintenance Facility	0.41%
Hedges Creek	Tualatin Rail Station	0.31%
Fanno Creek	Tigard Rail Station Washington Square Station	0.02%

Source: URS, 2000

3.6.4 Mitigation Measures

All development within USA's jurisdiction must obtain a service provider letter from USA or its designated city, which specifies the conditions and applicant requirements for water quality protection. The Agency must also issue a stormwater connection permit. New development and other activities that create new impervious surfaces or increase the amount of stormwater runoff or pollution leaving the site are required to construct or fund permanent water quality facilities to reduce contaminants entering the storm and surface water system. The stormwater quality facilities are required to be designed to remove 65 percent of the total phosphorous from the runoff from 100 percent of the newly constructed impervious surfaces for a specified design storm. The phosphorous removal efficiency is specifically tied to USA design requirements for the implementation of best management practices. Required best management practices could include pretreatment manholes, vegetated (but not grass) swales, extended dry basins, extended wet basins, constructed water quality wetlands, and/or other BMPs approved by USA.

Some portions of the project are located outside USA's jurisdiction and within the jurisdiction of the City of Wilsonville. The City of Wilsonville is currently in the process of completing an update to their stormwater master plan. They expect to have the plan adopted by the summer of 2000. In the current draft master plan the city is leaning towards adoption of USA stormwater quality standards for new development. Therefore, it is expected that standards similar to USA's, as described above, would also apply to the Wilsonville portions of the proposed project.

3.7 ENVIRONMENTAL HAZARDS

This section summarizes the environmental hazards findings of the Phase I Environmental Site Assessments (Phase I ESAs) conducted as part of the NEPA process. A Phase I ESA was completed for each of the proposed rail stations, including the Merlo Station. However, a Phase I ESA was not conducted for the Beaverton Transit Center as this is an existing facility. In addition, a desktop study was conducted for the entire rail corridor, including the Merlo extension and the connection to the Beaverton Transit Center. Complete Phase I ESA reports and the corridor study analysis are not included in this report.

Additionally, an assessment of the paint on the Tualatin River Railroad Bridge over the Tualatin River in Tualatin, Oregon was performed to confirm if lead was contained in the existing paint (see Section 3.7.1.3). The complete letter report is included in Appendix C.

3.7.1 Affected Environment

3.7.1.1 Regulatory Framework

The U.S. Environmental Protection Agency (EPA) is responsible for enforcement and implementation of federal laws and regulations pertaining to releases of hazardous substances into the environment. The primary laws governing releases of hazardous substances are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986. These laws and associated regulations include specific requirements for investigation and remediation of sites where hazardous substances have been released. The federal regulations are codified primarily in Title 40 of the Code of Federal Regulations (CFR).

EPA has authorized the Oregon Department of Environmental Quality (DEQ) to enforce and implement these federal laws at the state level. Oregon laws and regulations incorporate federal regulations and, in some cases, are more stringent than federal regulations. State regulations pertaining to releases of hazardous substances into the environment are contained in Chapter 340 of the Oregon Administrative Rules (OAR). The DEQ also implements the Federal Water Pollution Control Act and other federal water quality legislation, as well as underground storage tank (UST) regulations. OAR Chapter 340 also contains these state regulations.

3.7.1.2 Methodology

The information in this section is based on data gathered during completion of the Phase I ESAs and desktop study of the corridor. The Phase I ESAs were conducted in accordance with ASTM Standard E 1527-97. The desktop study consisted of reviewing a database search for the entire corridor using ASTM search radii. Environmental Database Resources, Inc. (EDR), of Southport, Connecticut reviewed the pertinent EPA and agency documents and lists to generate the database. In addition, readily available DEQ database information for sites of concern was also reviewed. The lead-based paint assessment consisted of the collection and analysis of paint chip samples collected from the Tualatin River Railroad Bridge.

3.7.1.3 Areas of Concern for Hazardous Materials

Based on information collected during the Phase I ESAs, areas of concern for hazardous materials were identified in association with the two alternate Wilsonville Station sites, Tigard Station, and the Tualatin River Railroad Bridge. In addition, assessment of the database searches for the Phase I ESAs associated with the rail stations at Washington Square, Tualatin, and Wilsonville (east side site only) did not reveal off-site sources of contamination. Several houses were noted within the area of the Wilsonville Station. There is the potential for heating oil USTs to be present in association with these residences. These sites and the contaminants of concern are summarized in Table 3.7-1. Complete ESA reports for all sites are available for review at the offices of Washington County Department of Land Use and Transportation in Hillsboro, Oregon.

However, assessment of the database searches conducted for the Tigard Station Phase I ESA and the corridor study identified several off-site sources of contamination that have the potential to have impacted the soils and groundwater beneath the Tigard Station and/or portions of the rail line right-of-way. Additionally, an assessment of the lead-based paint on the Tualatin River Railroad Bridge identified the concentrations of lead in the paint as a hazardous material. This assessment is discussed below.

The following is a brief discussion of each site identified that has the potential to impact the subject property, including the contaminants of concern, and the proximity to the Tigard Rail Station and/or the rail line. In addition, the potential for a release from these sites to have impacted the soil and/or groundwater beneath the rail station and/or rail line is also discussed. It should be noted that the corridor study area does not consist of a sole source aquifer, but several aquifer units. The sites are discussed in order from south to north.

Site: *Wilsonville Station*
Address: *Wilsonville, Oregon*

One or more residences currently exist at the subject property. There is the potential that heating oil is or at one time was used on the subject property as a source of fuel for heating the observed

residences. However, access to these residences was not available, thus it was not possible to assess the properties for the presence of heating oil USTs (HOTs). There is a moderate potential for HOTs, if present, to have leaked heating fuel to the subsurface.

Site: *Rail Line Right-of-Way*
Address: *Wilsonville to Beaverton, Oregon*

Railroads have traditionally used herbicides to keep plants from overgrowing the railroad tracks. This practice has been ongoing for the better part of this century. Application media may have included diesel fuel. There is the potential for herbicide residues and diesel fuel to be present in the soils beneath the railroad tracks. The degree to which these soils have been impacted, if at all, is unknown and is considered a moderate risk.

Site: *Tualatin River Railroad Bridge*
Address: *Tualatin, Oregon*

URS Corporation conducted a lead-based paint assessment at the site on March 10, 2000. Paint chip samples were collected from the steel bridge structure and submitted for analysis. A visual inspection of the paint on the structure found the paint to be in good condition with minor areas of corrosion or rust of the steel substrate. At these locations the paint was showing signs of flaking.

Analytical results indicate the concentration of lead in the paint is 110,000 mg/kg (milligrams per kilogram) or 11 percent. The potential for the release of lead-based paint to the environment or the exposure to lead from this site is moderate if the paint is not disturbed. However, if the structure is modified or repairs are made to the bridge (including painting), the potential for the release of lead to the environment or to impact human health is high.

Site: *Pacific Fireplace Furnishings, Inc.*
Address: *20210 SW Teton Avenue, Tualatin*
EDR I.D.: *213*

During a site visit conducted in March 1994, DEQ officials discovered three empty abandoned 55-gallon drums that had contained hazardous wastes. One of the drums was labeled Pacific Fireplace Furnishings, Inc. However, this company had filed bankruptcy and was no longer in existence. No further investigations have been conducted. This site is located adjacent to the rail line. The potential for a release from this site, particularly solvents, or the likelihood of impacted soils and/or groundwater beneath the site is moderate to high.

Site: *Western Foundry Co.*
Address: *8200 SW Hunziker Road, Tigard*
EDR I.D.: *149*

This site is located less than 1/8 mile northeast and upgradient of the rail line. Western Foundry operates a coke and natural gas-fired cupola for iron production and two electric arc furnaces for steel production. From the mid 1970s to 1989, five to ten gallons per minute of scrubber water from the cupola were discharged to a settling tank that drained to adjacent Redrock Creek. Sediment and soil samples collected onsite and in the creek indicated elevated levels of cadmium, chromium, lead, and oil. Additional investigation has not taken place. The rail line crosses the Redrock Creek less than 1/8 mile downstream from this site. There is a moderate to high potential for a release from this site to have impacted the sediments in Redrock Creek beneath the rail line.

Site: *Southern Pacific RR Right-Of-Way*
Address: *West of 8900 SW Commercial Street, Tigard*
EDR I.D.: *Orphan Site*

The right-of-way adjacent to the former Farmcraft Facility listed above has been identified as having been impacted by releases of pesticides. Discussions with the DEQ on the former Farmcraft facility, described below, confirmed that the soils and groundwater beneath the rail line have been impacted by pesticides. At this time, the extent of contamination has not been determined.

Site: *Farmcraft Facility (Former)*
Address: *8900 SW Commercial Street, Tigard*
EDR I.D.: *143*

The former Farmcraft facility formulated, repackaged, and distributed pesticides in both dust and liquid forms. The site reportedly ceased operations in the 1980s and was used as an office/warehouse. A site assessment conducted in 1992 indicated that the pesticides Aldrin, DDT, p,p'-, Dieldrin, Endosulfan, Heptachlor, and Toxaphene were present in the soils and/or groundwater.

Discussions with the Department of Environmental Quality representatives indicate that impacted groundwater has migrated offsite and that offsite surface soils have also been impacted by historical spills. The extent of this release has not been determined, however, the DEQ stated that it was likely that impacted groundwater from this site was present beneath both the rail line and the proposed Tigard Station.

Site: *Tyco Manufacturing Facility (Former)*
Address: *4655 SW Hall Boulevard, Beaverton*
EDR I.D.: *111*

Mattel formerly operated a toy manufacturing facility at the site. Water samples collected from the onsite water supply well were tested for Trichloroethylene (TCE) in March 1998. TCE was detected at concentrations up to 1,670 micrograms per liter (µg/L). Subsequent investigations have located several possible onsite and offsite sources. TCE has migrated into the fractured basalt bedrock aquifer underlying the site and subsequently migrated offsite. The extent of TCE impacted groundwater migration offsite is unknown. The potential for TCE impacted groundwater to be present beneath the rail line located approximately ¼ mile west is high.

Site: *Hall Boulevard Texaco (Nick's Family Auto Service)*
Address: *4655 SW Hall Boulevard, Beaverton*
EDR I.D.: *54*

A service station has operated at this site since the 1950s. In May 1997 gasoline vapors were noted in adjacent office buildings and gasoline observed in the sewer lines running between the service station and office buildings. Subsequent investigations indicated that the source of the gasoline was the service station. Free product was observed on the groundwater. A water treatment system was installed by DEQ to collect water in nearby sumps and sewer lines to treat water entering these lines prior to being discharged to the stormwater system. The extent of groundwater contamination has not been reported. The site is located less than 1/8 mile south of the rail line. Because the extent of contamination associated with the release and migration along sewer lines has not been assessed, the potential for a release to impact the soils and groundwater beneath the rail line is moderate to high.

Table 3.7-1
Sites of Concern for Environmental Hazards

EDR Map ID	State ID	Address	Contaminants	Media	Condition
Orphan	34-87-0032	Aloha Chevron 185th & Tualatin Valley Highway, Aloha	Misc. Gasoline	S, GW, FV, FP	• Gasoline odors reported in onsite buildings. • Groundwater and soils impacted and impacted groundwater has migrated offsite to the north and south. • Soil samples collected in 1994 indicate that soil and groundwater beneath the rail line adjacent to this site are likely to be impacted by petroleum hydrocarbons.
54	2103	Hall Boulevard Texaco (Nick's Family Auto Service) 4655 SW Hall Boulevard, Beaverton	Gasoline Benzene	S, GW	• Gasoline odors reported in adjacent office buildings 5/97 • Gasoline noted in sewer line beneath Hall Blvd. • Contaminated soil and free-product gasoline on groundwater discovered during investigation. • DEQ installed a treatment system for sumps (6/98). • Groundwater investigation is on going. • Offsite migration has occurred.
111	2195	Tyco Manufacturing Facility (Former) 8585 SW Hall Boulevard, Beaverton	TCE	S, GW	• Potential spilling, discharging and/or dumping of TCE in the 1950s and 1960s. • Water samples were collected from the facility's water supply well (3/98). TCE found at levels up to 1,670 ppb. • Mattel has implemented a preliminary site investigation to determine the sources for TCE. • Solvents found in fractured basalt aquifer at depth. Extent unknown. • Solvents present beneath the rail line.
143	1223	Farmcraft Facility (Former) 8900 SW Commercial St, Tigard	Pesticides (Aldrin, DDT, Dieldrin, Endosulfan, Heptachlor, Toxaphene)	S, GW	• The former Farmcraft facility formulated, repackaged and distributed pesticides in both dust and liquid forms. • Soil and groundwater testing has identified organochlorine pesticides in site soils and organochlorine pesticides as well as volatile organic compounds and petroleum hydrocarbons. • Impacted groundwater has migrated offsite to the west beneath the rail line and beyond. Soils to the west of the site are also impacted. The extent of offsite migration is unknown but believed to go beyond the rail line right-of-way. • Voluntary RI/FS Agreement entered 11/25/97. Strategy to complete RI in development.

Table 3.7-1
Sites of Concern for Environmental Hazards (Continued)

Map ID	State ID	Address	Contaminants	Media	Condition
orphan	1597	Southern Pacific RR Right-Of-Way West of 8900 SW Commercial St, Tigard	Pesticides (Aldrin, DDT, Dieldrin)	S	• Releases onto the rail line are associated with the Farmcraft Facility. The extent of the release is unknown.
149	185	Western Foundry Co. 8200 SW Hunziker Road, Tigard	Cadmium, chromium, lead, oil & grease, PCBs	S, SW, Sed.	• The Western Foundry operates an iron and steel foundry at this location. Until 1989 process water from the scrubbers were discharged to Redrock Creek. • Soil and sediment samples collected from the site and creek bed contained elevated levels of metals and oil and grease. • PCBs were detected in soil samples adjacent to an onsite transformer. • DEQ has recommended additional investigation at the site, however, none has been completed to date.
213	1005	Pacific Fireplace Furnishings, Inc. 20210 SW Teton Ave, Tualatin	Unknown	U	• 3 abandoned 55-gallon drums that once contained hazardous wastes discovered (3/84). • Company no longer in existence. • Site screening recommended (EV) 2/94.

Notes:

S = Soil Contamination
GW = Groundwater Contamination
SW = Surface Water Contamination
Sed. = Sediment Contamination
FV = Flammable Vapors Detected
FP = Free Phase Product Detected

3.7.2 Potential Impacts

A significant hazardous materials impact would occur if the Proposed Project leads to exposure of the public or construction workers to hazardous materials concentrations that exceed the DEQ standards for such exposure. The potential for exposure at each of the areas of concern is discussed below.

3.7.2.1 No Build Alternative

For the No Build Alternative a decrease in exposure risk is associated with the reduced exposure to the contaminants of concern discussed above during construction activities. The risk to the public and construction workers associated with this option is low.

3.7.2.2 TSM Alternative

There would be a decrease in exposure risk associated with this alternative as compared to the Commuter Rail Alternative due to reduced exposure by workers to the contaminants of concern during construction activities. In addition, there is very little risk associated with environmental hazards for this option as it only involves routing buses on existing roads through existing bus stops. There is also a minimal reduction in risk to the public associated with this alternative.

3.7.2.3 Commuter Rail Alternative

Wilsonville Station

The presence of HOTs at this proposed station in association with the onsite residence(s) could not be confirmed. If construction activities are not scheduled in the vicinity of these houses, the potential for worker and public exposure is low. However, if these houses are scheduled for demolition, further assessment is recommended. This would include evaluating whether HOTs are present and if they are, whether a release has occurred. In addition, these HOTs should be properly decommissioned and impacted soils excavated as necessary.

Rail Line Right-of-Way

The presence of herbicides and diesel fuels in the soils beneath the railroad tracks has not been confirmed. However, given the historical use of such chemicals by the railroad companies, the potential for these chemicals to be present is moderate. For areas where modifications to the rail line are not scheduled, the potential for public and worker exposure is low.

For areas where rail line modifications are scheduled, soil samples should be collected for herbicide and diesel fuel analysis prior to any excavation activities. If elevated concentrations of these constituents are detected, additional assessment is recommended in order to determine the extent of the release. Once this assessment has been completed, appropriate measures should be taken to remove or isolate the impacted media where construction is anticipated and/or public contact is anticipated. Design of remodeled rail line should focus on avoiding contact with the impacted media. If this proves impossible, impacted media removed during construction activities will have to be appropriately disposed. In addition, worker exposure to impacted media should be minimized.

Tualatin River Railroad Bridge

There is a moderate potential for release of lead-based paint to the environment or for exposure to lead from this site, if the paint is not disturbed. However, if the structure is modified or repairs are

made to the bridge (including painting), the potential for the release of lead to the environment or to impact human health is high. If modifications are scheduled for the bridge that will impact the painted areas, it will be necessary to develop specifications for the removal of the lead-based paint prior to the activities. The specifications should include procedures describing the process to remove and dispose of the lead-containing paint, while protecting human health and the environment.

Pacific Fireplace Furnishings, Inc.

There is a moderate to high potential for a release from this site to have impacted surface and subsurface soils and/or groundwater beneath the rail line. Excavation activities could potentially expose workers to impacted groundwater. If modifications are scheduled for this portion of the rail line, a site assessment should be conducted prior to construction activities to delineate the extent of contamination present. It will be necessary to properly dispose of any impacted soils or groundwater during construction activities. If rail line modifications are not scheduled for this section of line, the potential for public or worker exposure to impacted soils and groundwater from this site is low.

Western Foundry Co.

There is a moderate to high potential for a release from this site to have impacted sediments in Redrock Creek beneath the rail line. Excavation activities could potentially expose workers to impacted sediments. If modifications are scheduled for this portion of the rail line, a site assessment should be conducted prior to construction activities to delineate the extent of contamination present. It will be necessary to properly dispose of any impacted sediments during construction activities. If rail line modifications are not scheduled for this section of line, the potential for public or worker exposure to impacted sediments from this site is low.

Farmcraft Facility (Former) and Southern Pacific RR Right-Of-Way

Both surface and subsurface soils and/or groundwater beneath the rail line and the proposed Tigard Station are likely to have been impacted by pesticides released at the former Farmcraft facility. The extent of the release at this site is currently unknown. Prior to construction activities, the extent of pesticides should be assessed. It will be necessary to properly dispose of any impacted soils or groundwater during construction activities. Once this assessment has been completed, appropriate measures should be taken to remove or isolate the impacted soils where construction is anticipated and/or public contact is anticipated. Design of the Tigard Station should focus on avoiding contact with the impacted groundwater. If this proves impossible, groundwater removed during construction activities will have to be appropriately disposed. In addition, worker exposure to impacted groundwater should be minimized.

Tyco Manufacturing Facility (Former)

There is a high potential for a release from this site to have impacted groundwater beneath the rail line. However, the impacted groundwater is likely to be present in the fractured basalt bedrock beneath the site. The potential for public or worker exposure to impacted groundwater from this site is low.

Hall Boulevard Texaco (Nick's Family Auto Service)

There is a moderate to high potential for a release from this site to have impacted groundwater beneath the rail line. Excavation activities could potentially expose workers to impacted groundwater. If modifications are scheduled for this portion of the rail line, a site assessment should

be conducted prior to construction activities to delineate the extent of contamination present. It will be necessary to properly dispose of any impacted soils or groundwater during construction activities. If rail line modifications are not scheduled for this section of line, the potential for public or worker exposure to impacted soils and groundwater from this site is low.

3.7.3 Cumulative Effects

The area in the vicinity of the Tigard Station is the primary location where concerns exist in association with the presence of hazardous materials. However, if construction activities are scheduled in the vicinity of the sites discussed above, these areas will also be of concern. Development of the Tigard Station would contribute incrementally to the demand for contaminated soil disposal sites that could be needed for development of the potential area of concern. The cumulative development of this project is not expected to impair the ability of regulatory agencies and developers to adequately address the potential contamination that may be found at this site.

Development of the proposed project, in combination with development of the area above, could increase the number of construction workers that would be exposed to hazardous materials. The exposure to construction workers can be minimized with proper training and use of appropriate protective equipment. Over time, however, development of this area could decrease the likclihood of exposure to the general public to hazardous materials, since any contamination in this area would be remediated. All removal and disposal shall be in accordance with applicable state and federal regulations.

3.7.4 Mitigation Measures

The project will ensure that construction methods minimize, and essentially prevent, the mixing and potential cross-contamination of soil and groundwater at different depths.

If groundwater is generated as a part of construction, the construction contractor will prepare a standard construction dewatering permit and groundwater handling plan prior to construction commencing, and manage accordingly. This plan will address proper handling and disposal of contaminated groundwater, including potential treatment.

If impacted soil is generated as part of construction, the construction contractor will prepare a soil mitigation plan prior to construction and manage it accordingly. The plan will address proper handling and disposal of contaminated soil.

The project will also ensure that prior to construction, modifications, repairs or maintenance (including the repainting) of the Tualatin River Railroad Bridge, the lead-containing paint is properly removed and disposed. If the paint is to be removed, specifications should be prepared describing the process to remove and dispose of the lead-containing paint while protecting human health and the environment.

3.8 HISTORIC AND CULTURAL RESOURCES

3.8.1 Affected Environment

Although evidence of early occupation in northwestern Oregon is relatively scarce, human use of the region likely dates to the Paleo-Indian period of about 11,500 years ago. Early sites that have been identified in the Lower Columbia River drainage area and Willamette Valley appear to reflect a

hunting emphasis, which characterized the ancestral cultures of the southern Northwest Coast prior to about 6000 B.C. By 6000 B.C., however, diverging developmental trends become apparent (Pettigrew 1990:518).

Early sites in the Willamette Valley area are even rarer than on the Lower Columbia, with few sites dated earlier than 5000-6000 B.C. After this time, however, the prehistoric record is fairly well dated. This evidence suggests that the basic settlement patterns documented for ethnographic inhabitants were in place by about 1280 B.C.

At the time of Euroamerican contact, early in the nineteenth century, the Tualatin Valley and nearby areas were occupied by the Tualatin, the northernmost division of the Kalapuyans. The Kalapuyans were an inland people, occupying the greater portion of the Willamette Valley. The first recorded contact between Kalapuyans and Euroamericans occurred in 1812, when a party of Pacific Fur Company traders entered the Willamette Valley. From this time and into the 1840s, contact with traders was relatively constant. By the early 1830s, settlers and missionaries also began appearing in the valley. It was also at about this time, 1830 to 1833, that the epidemics of malaria swept the Willamette and Lower Columbia areas. Efforts to negotiate treaties with surviving Kalapuyans began in 1851 and were ratified in 1855. In 1856, the few remaining Kalapuyans were taken to the Grand Ronde Reservation, where they were consolidated with survivors from other interior western Oregon groups (Zenk 1990:551).

Oregon City, located at the falls of the Willamette a few miles upstream from Portland, became Oregon's largest city by 1850 and was the capitol of the Oregon Territory from 1849 to 1852. Within a few years, however, Oregon City was overshadowed by Portland (Schwantes 1996:112). As settlers spread outward from core areas like Portland and Oregon City, small towns and villages began to appear as commercial focal points and way points for overland transport of agricultural goods. Soon, towns such as Tualatin, Tigard, Wilsonville, and others appeared, often at the sites of ferries, bridges, or other landmarks. Increasing settlement and agricultural development in the Tualatin Valley created a need to transport wheat grown in the area to the Oregon City mills.

By the turn of the twentieth century, logging and lumbering were firmly established as major elements of the area's economy. These advances led to further development, followed in the advent of electric interurban commuter trains. These included the Oregon Electric, with a stop in Tualatin in 1906, and Southern Pacific's Red Electric, with a stop at nearby Galbraith Station in 1912. Real estate development soon followed, and small rural enclaves slowly evolved into suburban communities on the edge the expanding Portland metropolis.

3.8.1.1 History of the Oregon Electric Railroad (OER)

Barstow & Chambers, a New York railroad construction firm, organized the OER as the Willamette Valley Traction Company in 1905. Construction began in Salem on December 21, 1905. The OER passenger service began from Portland to Salem on January 1, 1908. In 1910, the Spokane, Portland and Seattle Railroad (S. P. & S.) acquired the OER line. Later the S. P. & S. merged with Great Northern and Northern Pacific railroads, however, the line continued to be operated as the OER.

The OER provided a fast, efficient, commuter rail service between the city of Portland and the numerous small towns throughout the greater Willamette Valley region. In Washington County, the OER spurred new suburban development, and opened the western half of the county to logging.

The OER was constructed at a time of rapid growth for interurban electric rail. The initial success of the OER led the Southern Pacific (SP) Railroad to purchase the Portland, Eugene and Eastern Railroad with the plan to convert their existing right-of-way to electric rail. Electrification of these lines began in 1912, with limited service beginning in January of 1914. The SP electrics, commonly called the "Red Electrics" eventually ran from Portland to Corvallis. Electrification to Eugene was never completed. Even though the towns along both the OER and SP routes did not have a large enough population to support two railways, it was not this direct competition that eventually killed the interurban lines. It was competition with the automobile and bus lines that caused SP to end passenger service in 1929, and the OER in 1933.

Except for the abandonment of a short section of track in Eugene, the OER line remained unchanged until the formation of Burlington Northern in 1970. The Oregon Electric Railway remained as a company, and contracts were still signed in the name of the Oregon Electric, but locomotives and equipment started being converted to Burlington Northern's Green and White. The OER line has been under the management and use of Burlington Northern since the late 1940s.

3.8.1.2 Garden Home to Wilsonville Segment

This segment of the line is on the main line that ran from Portland to Eugene. The Garden Home Station was at the north end, followed by Nesmith, Metzger, Greenburg, Tigard, Bonita, Durham, Tualatin, Nasoma, Tonquin, Mulloy, and Wilsonville. Of these stations, only the Tonquin Substation is extant. This portion of the OER line, being close to Portland, is part of the most developed portion of the line. Railway stations were much closer together in the Portland area than in areas in the Valley, as shown in the OER route map in Figure 3.8-1. The volume of traffic never warranted more than four or five runs through Eugene daily, while 12 or more trains operated each way from Portland to as far south as Tualatin.

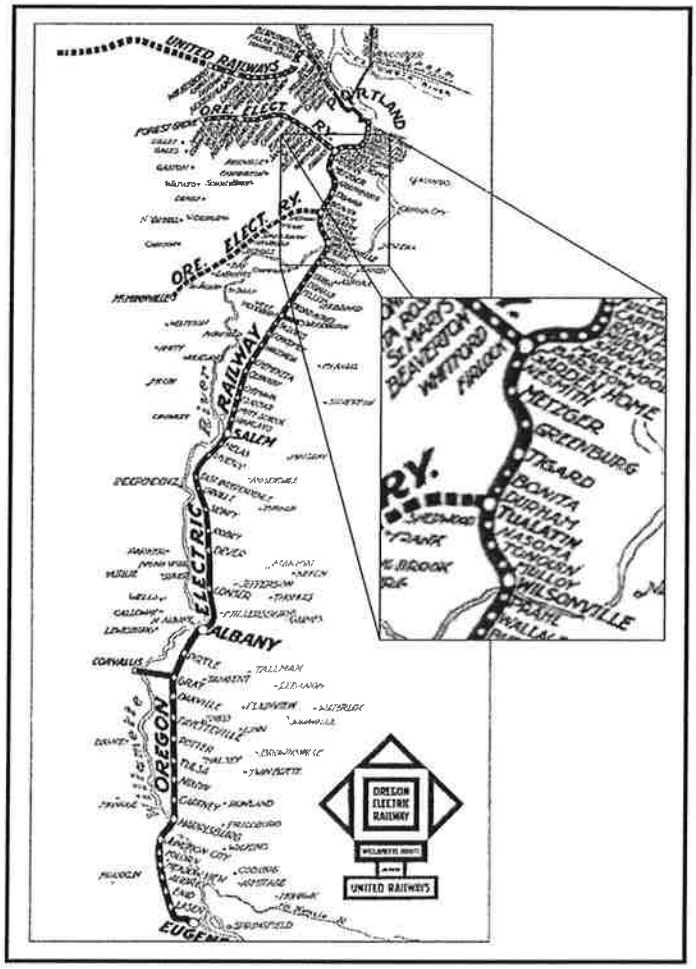

Figure 3.8-1
OER Route Map
(the study area is highlighted)

In 1941, the tracks from Garden Home into Portland were abandoned by the OER, and in 1942 the railroad received operating rights over the Southern Pacific tracks between Tigard and Beaverton. This allowed the OER to eliminate the tracks through Garden Home.

3.8.1.3 Existing Historic and Cultural Resources

The Advisory Council for Historic Preservation has established criteria for determining whether a property is eligible for listing in the National Register of Historic Places. The criteria are as follows:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> **A.** That are associated with events that have made a significant contribution to the broad patterns of our history; or
> **B.** That are associated with the lives of significant persons in or past; or
> **C.** That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic

values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

An inventory of known historic and cultural resources for all project alternatives was completed. The inventory included a field investigation, and reviews of an ODOT memorandum (5/12/98), the *Washington County Cultural Resources Inventory (1982-84)*, and the *Clackamas Cultural Resource Survey (1984)*. The Oregon State Historic Preservation Office was also contacted for additional information associated with the project area and repositories including Oregon Historical Society were researched for local historical information. Resources have been identified within the railroad right-of-way and adjacent to the right-of-way. The following sections discuss the cultural resources that have been identified within the project Area of Potential Effect (APE). The locations of these resources are shown in Figure 3.8-2.

Two historic resources were identified within the APE: the Oregon Electric Railroad (OER) and the Sweek House (Table 3.8-1). The OER line is significant under criterion A, for its association with the development of the towns along its route from Portland to Eugene. In the Garden Home to Wilsonville segment, towns such as Tualatin and Tigard underwent rapid growth during the early years of railroad operation. The line was the largest interurban railroad in Oregon during the early Twentieth Century. The Beaverton to Hillsboro segment of the OER was determined eligible for National Register under criterion A on September 3, 1992. Figure 3.8-3 is a photograph of the OER line.

Table 3.8-1
Historic and Cultural Resources Determined Eligible for the National Register of Historic Places

Resource Name	Resource Address	National Register Status	National Register Criteria			
			A	B	C	D
Oregon Electric Railroad Line	Wilsonville at Mile Post 43.05 to Mile Post 27.8	Eligible	X			
Sweek House	18815 SW Boones Ferry Road	Listed			X	

3.8.1.4 Historic Features Along the OER Route

There are a number of features along the OER route that contribute to the significance of the OER line as a linear resource. One substation, bridges, and trestles are the types of features noted along the Wilsonville to Garden Home section of the OER line.

The Tonquin Substation

Five substations were built on the OER line to feed the middle sections of the line, while the ends of the line were fed from substations belonging to the local power companies in Portland and Salem. The substations were built of reinforced concrete, with corrugated galvanized iron roofing supported by steel beams. Waiting rooms and ticket offices were located in each substation, with the attendant

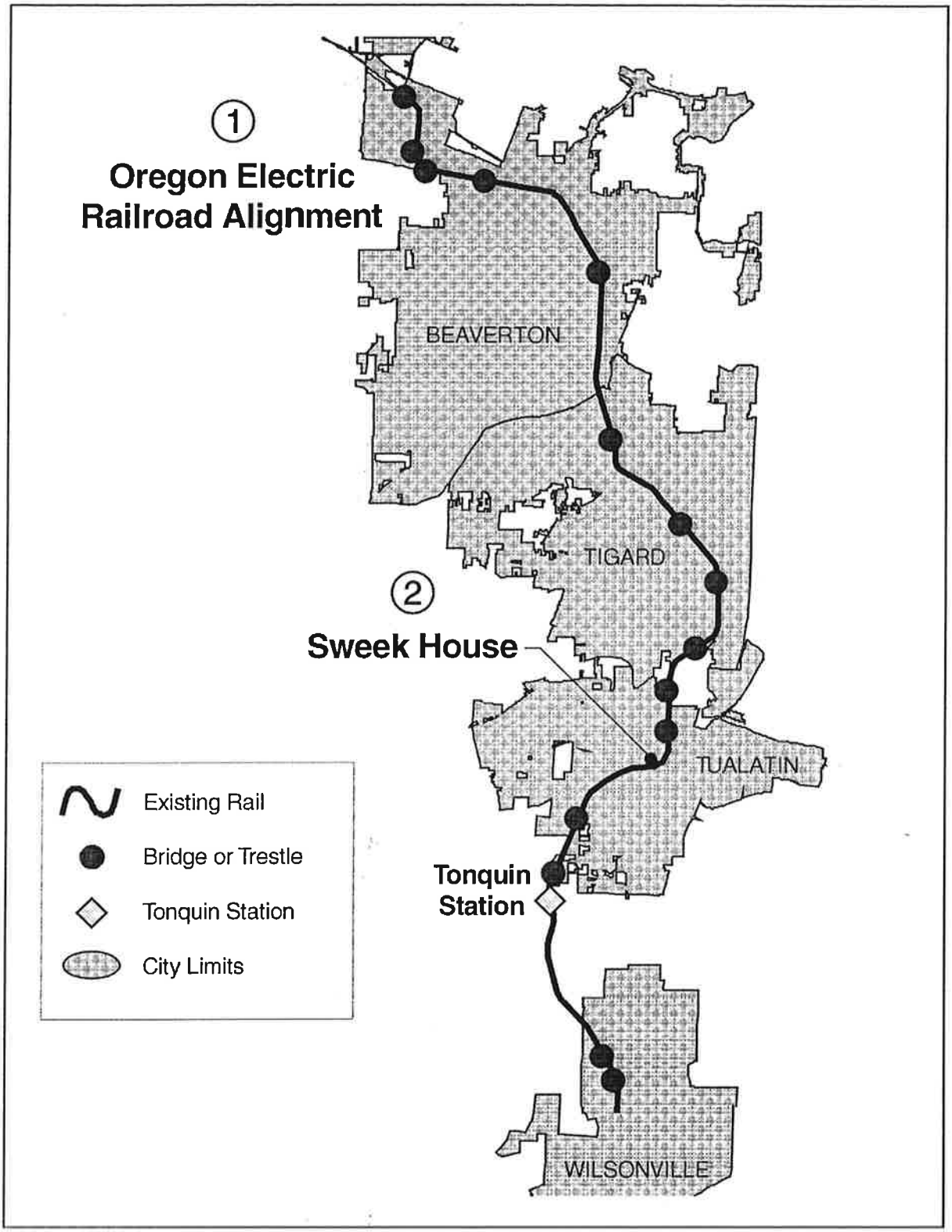

Figure 3.8-2
Location of Historic and Cultural Resources

Figure 3.8-3 Oregon Electric Railroad Line

Figure 3.8-4 The Tonquin Substation (view to northwest)

acting as electrician, station agent, and telegraph operator. Each substation was divided into a high-tension compartment and an operating room. Of the remaining substations, only the Tonquin Substation is within this portion of the OER. The Tonquin Substation, along the OER line, is shown in Figure 3.8-4.

Trestles and Bridges

There are a number of trestles and bridges associated with the OER line within the Wilsonville to Beaverton segment. The trestles include three types: timber pile trestle open deck (TPTOD); timber pile trestle ballast deck (TPTBD); and concrete box girder (CBG). Figure 3.8-2 shows the locations of the trestles along the OER line. Figures 3.8-5, 3.8-6 and 3.8-7, taken at Ash Street, Durham and Hedges Creek, show representative examples of these trestle types.

Pile trestles were not considered to be of historic significance by the original ODOT technical advisory committee for the historic bridges study in the mid-1980s, due to the continual replacement of original fabric in open timber structures, and the fact that they generally do not represent any particular engineering challenge. The trestles in the Garden Home to Wilsonville segment have been repaired and replaced as general maintenance was required.

The Sweek House

The Sweek House is located at 18815 SW Boones Ferry Road, outside Tualatin, and is a Classical Revival Style building, constructed in 1858. It has previously been listed on the National Register and is significant under criterion C for its early date of construction and style. The Sweek House is shown in Figure 3.8-8.

3.8.2 Potential Impacts

Archaeological investigations of the proposed Washington County commuter rail line corridor were initiated by ODOT in the spring of 1998. At that time, a record search and literature review was conducted for the corridor. This review revealed that while few archaeological surveys have been conducted in the vicinity of the corridor, one archaeological site is present within one mile of the Tonquin siding. Reported but undocumented sites are present within one mile of the Washington Square and Tigard Stations, and prehistoric isolates are located within one mile of the Wilsonville Station. None of these resources, however, would be affected by project activities (Kachadoorian 1998a).

Numerous archaeological resources, however, have been documented in the vicinity of the proposed Tualatin Station and Park & Ride. Five archaeological surveys have been conducted within one mile of the project area, and all resulted in the identification of archaeological properties. Fourteen archaeological sites and three reported but undocumented sites are located within one mile of the proposed station, several of which may be present within the area of the proposed Tualatin facilities (Kachadoorian 1998b). One of these, designated 35WN17, is a large prehistoric site located northwest of the intersection of Upper Boones Ferry and SW Boones Ferry roads. This site is located approximately 500 feet west of the project APE. Testing conducted in 1988 indicated that the site was heavily disturbed and consisted of a low-density artifact scatter limited to the plow zone. The site was recommended as not eligible for listing on the National Register of Historic Places in 1995, although this recommendation was not formally presented to the State Historic Preservation Office (Kachadoorian 1998b).

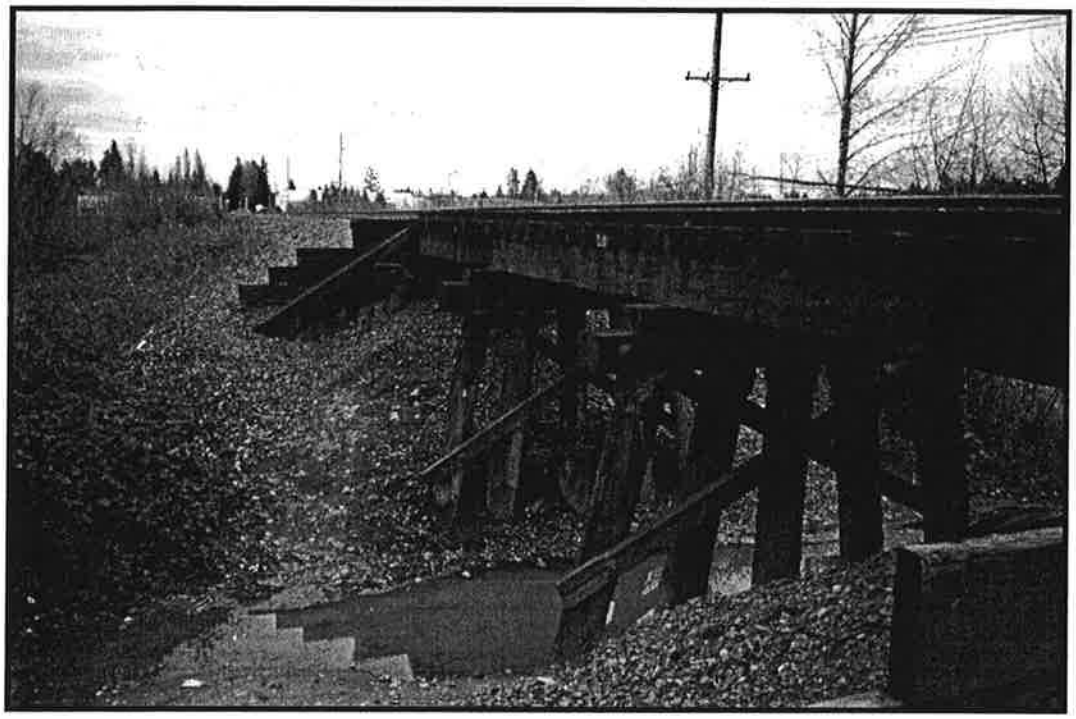

Figure 3.8-5 - Ash Street Trestle, looking South (Timber Pile Trestle open Deck)

Figure 3.8-6 - Durham Trestle, East Side (Timber Pile Trestle Ballast Deck)

Figure 3.8-7 - Hedges Creek Trestle, Tonquin Area (Concrete Box Girder)

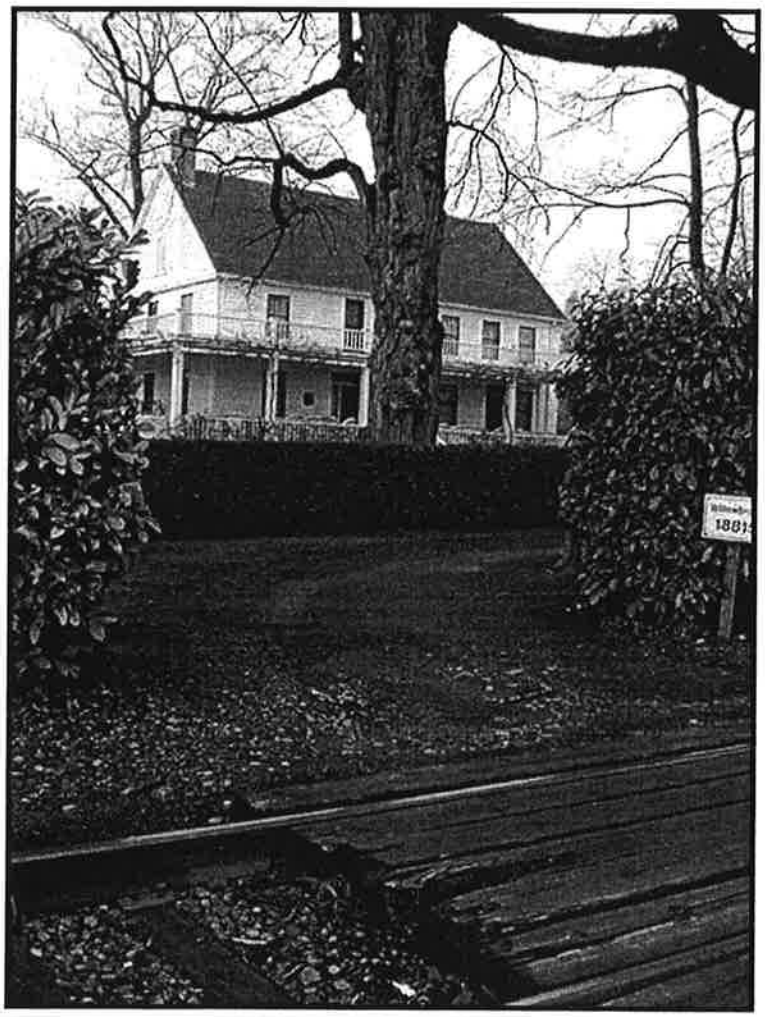

Figure 3.8-8 -
The Sweek House
and OER Line

A concentration of historic debris has also been noted on the northeastern edge of 35WN117, also outside of the project APE, possibly related to early homesteading activities in this area. This area lies within the original Donation Land Claim of John and Maria Sweek, established in 1853. A cabin on the site was built one year earlier than this by a previous homesteader. Remains of other outbuildings related to these activities may be present in the vicinity of the present Sweek home. Finally, a historic irrigation ditch has also been reported near the location of the Sweek home (Kachadoorian 1998b).

Additional field investigation was conducted in conjunction with the current study, focusing on proposed station locations, new sidings, and park & ride locations. With the exception of these facilities, all project activities will take place within the current railroad right-of-way.

As noted in the original and amended ODOT reports (Kachadoorian 1998a, 1998b), considerable development has occurred along the project corridor, particularly in the northern portions. As a result, few areas of exposed soils are available for examination. One area, a vacant lot, was identified in the vicinity of the Beaverton Transit Center. Pedestrian examination of this lot indicated heavy disturbance, including grading. No historic or prehistoric materials were observed during this examination.

Undeveloped lands are also present in the two potential locations of the proposed Wilsonville Station and Park & Ride, Tualatin Park & Ride, and Tualatin Station. These areas were also subject to pedestrian survey, although extremely dense brush and access limitations restricted close examination of the Wilsonville Park & Rides. The Tualatin facilities in particular were examined with care due to the documented historic activities that occurred in its vicinity. Considerable disturbance is apparent in these areas, however, as grading and filling appear to have been conducted in conjunction with road construction and adjacent development. No cultural materials were observed in these areas.

Several areas of proposed new sidings were also closely examined. These largely occur in developed areas, and the grade in the area is often characterized by cutting or filling. As a result, archaeological resources are unlikely to be encountered. One proposed siding, in the Tonquin vicinity, is located in an undeveloped area. Considerable disturbance is apparent, however, as the area has been recently clear-cut. No cultural materials were observed in these areas.

3.8.2.1 No Build Alternative

Archaeological Resources

No impacts are anticipated under the No Build Alternative.

Historic Resources

There are no impacts anticipated to historic resources with the No Build Alternative.

3.8.2.2 TSM Alternative

Archaeological Resources

No archaeological resources have been identified within the proposed project area. As a result, construction of bus facilities would probably have no effect on identified resources.

Dense brush and restricted access prohibited careful examination of proposed facilities in the Wilsonville area. Additional pedestrian survey is recommended for this area following brush removal but prior to actual construction activities.

Historic Resources

There are no impacts anticipated to historic resources with the TSM Alternative.

3.8.2.3 Commuter Rail Alternative

Archaeological Resources

No archaeological resources have been identified within the proposed project area. Additional investigation, however, would be required to confirm the absence of archaeological resources in the location of the Tualatin Station and Park & Ride. As noted above, this location was the site of significant historic activities dating to as early as the 1850s, and historic materials have been noted in the general vicinity. Furthermore, one prehistoric site (35WN17) has been documented in the near vicinity. While historic or prehistoric materials were not observed along the right-of-way, or within the proposed construction areas, the presence or absence of subsurface materials has not been examined. In concurrence with the original and amended ODOT reports (Kachadoorian 1889a, 1998b), a limited testing program is recommended prior to beginning construction of these facilities.

In addition, as noted above, dense brush and restricted access prohibited careful examination of proposed facilities in the Wilsonville area. An additional pedestrian survey is recommended for these areas following brush removal, but prior to actual construction activities.

Historic Resources

1) Under the Commuter Rail Alternative, two resources were identified and evaluated for project effects. (See Table 3.8-2.) The Oregon Electric Railroad has been determined eligible for the National Register of Historic Places. There would be an effect, but no adverse effect, on the Oregon Electric Railroad.

   The project would retain the original alignment and use for commuter rail, which would be similar to its historic use. Routine maintenance would take place within the existing ODOT right-of-way, with the exception of the new track at Lombard Avenue. There has been routine maintenance along the railroad line since its construction in 1908.

2) There would be no effect on the Sweek House, listed on the National Register of Historic Places. The hedges in front of the house would be trimmed as part of the maintenance of the commuter rail operations to allow for increased visibility at the driveway access to the house that crosses the railroad right-of-way.

Table 3.8-2
Evaluation of Effect on Eligible Historic Resources

Historic Resource	National Register Status	No Effect	No Adverse Effect	Adverse Effect
OER Line	Eligible		X	
Sweek House	Listed	X		

Source: Dames and Moore, 2000

3.8.3 Cumulative Effects

3.8.3.1 Archaeological Resources

No archaeological resources have been identified within the project corridor; as a result, no cumulative or indirect impacts are anticipated. Given the extent of development in the Tualatin Valley and adjacent areas, few intact archaeological resources have been documented. As a result, the presence of buried deposits in the project area would likely be significant and mitigation measures would be necessary to address the issue of cumulative or indirect impacts.

3.8.3.2 Historic Resources

There would be no cumulative or indirect impacts to historic, cultural, and archaeological resources that are listed in or eligible for the National Register that have been identified for any of the project alternatives.

3.8.4 Mitigation Measures

3.8.4.1 No Build Alternative

Archaeological Resources

No mitigation would be necessary under the No Build Alternative.

Historic Resources

No mitigation would be necessary under the No Build Alternative.

3.8.4.2 TSM Alternative

Archaeological Resources

No archaeological resources have been identified within the project corridor; as a result, no mitigation would be anticipated. Additional investigation has been recommended for selected portions of the project area, however, and these may result in the identification of archaeological deposits. If buried deposits are identified in the project area, significance evaluation and mitigation measures would be necessary, including avoidance, monitoring, or data recovery excavations. Work would be stopped and a qualified archaeologist called in to examine the site.

Historic Resources

No mitigation would be necessary under the TSM Alternative.

3.8.4.3 Commuter Rail Alternative

Archaeological Resources

No archaeological resources have been identified within the project corridor; as a result, no mitigation is anticipated. However, additional investigation has been recommended for selected portions of the project area, and this may result in the identification of archaeological deposits. If buried deposits are identified in the project area, evaluation and mitigation measures could be necessary. Such measures could include avoidance, monitoring, or data recovery excavations.

Historic Resources

The project would have an effect, but not a substantial or adverse, effect on the Oregon Electric Railroad. Under federal law, constructive use occurs when the protected activities, features, or attributes of a resource are substantially diminished or impaired (23CFR771.135). The Oregon State Historic Preservation Office has reviewed the project's documentation on the Oregon Electric Railroad. After reviewing the project impacts, the SHPO office has indicated concurrence with a determination of "No Adverse Effect" on the railroad (see letter in Appendix D). Final documentation will be prepared and forwarded to the SHPO for their final review and approval, but it is expected that implementation of commuter rail would have no impact on, or result in constructive use of, these properties.

The long-term maintenance of the commuter rail line would be similar to what has historically taken place along the Oregon Electric Railroad line. The SHPO has requested that recordation be done prior to alteration of corridor elements such as trestles.

3.9 SAFETY AND SECURITY

3.9.1 Affected Environment

3.9.1.1 City of Wilsonville

The City of Wilsonville is located in the western most portion of Clackamas County, Oregon. The City is experiencing rapid growth in population and employment. The Clackamas County Sheriffs office provides police protection with crime statistics reported separately for Wilsonville. Tualatin Valley Fire and Rescue provide fire protection in Wilsonville.

3.9.1.2 City of Tualatin

The City of Tualatin is an incorporated municipality located in Washington County, Oregon. The City of Tualatin Police provides police protection. Tualatin Valley Fire and Rescue provide fire protection.

3.9.1.3 City of Tigard

The City of Tigard is an incorporated municipality that is located in Washington County, Oregon. The City of Tigard provides police protection and Tualatin Valley Fire and Rescue provide fire protection.

3.9.1.4 City of Beaverton

The City of Beaverton is an incorporated municipality located in Washington County, Oregon. The City of Beaverton provides police protection and Tualatin Fire and Rescue provide fire protection.

3.9.1.5 Rail Crossings

There are a number of public and private road crossings of the Portland & Western and Union Pacific railroad. The location and type of crossings are shown in Appendix E.

3.9.2 Potential Impacts

3.9.2.1 No Build Alternative

Under the No Build Alternative there would be no increase in safety and/or security issues.

3.9.2.2 TSM Alternative

The TSM Alternative would not lead to an increase in safety or security issues in any of the areas served by this alternative. Increased use of the existing Tri-Met park & ride lots is expected to have a minimal impact on safety and security issues.

3.9.2.3 Commuter Rail Alternative

City of Wilsonville

The proposed commuter rail project would require the construction of a 400-vehicle park & ride lot at the southern terminus of the project. It is also a potential location for a small maintenance facility. This park & ride would be constructed in an area that is industrial in its use. It would be sited between the proposed Boeckman Road and Wilsonville Road interchange on either the east or west side of the existing alignment. Introduction of a large park & ride to this area could lead to an increase in "crimes of opportunity" such as automobile theft and theft from automobiles. The proposed project could also lead to an increase in automobile and pedestrian accidents due to increased traffic volumes and the introduction of pedestrians to this area. There is an existing track crossing at Boeckman Road. Introduction of commuter rail would only increase frequency of use and operating speeds would be low, therefore, it is doubtful that there would be an increase in automobile and train accidents.

City of Tualatin

The proposed commuter rail project would require the construction of a 120(+)-vehicle park & ride. This facility would be located north of Tualatin-Sherwood Highway, on excess right-of-way. It would be directly adjacent to an existing parking lot that serves a supermarket. As a result, it would not be introducing a new use to this area.

City of Tigard

The proposed commuter rail project would construct a 150-vehicle park & ride in Tigard. It would be located in the existing rail road right-of-way, east of Main Street, and would be connected to the adjacent Tigard Transit Center. The proposed project would also consolidate two mainline tracks and several sidings into one mainline track and one siding track. This would improve the existing crossing at Main Street.

The proposed project would construct a station at Washington Square Mall. Currently there are two sites under consideration. Both sites would use existing but underutilized parking lots associated with commercial activities.

Construction of a new park & ride at the Tigard Transit Center would introduce additional pedestrian crossing of the railroad alignment. The proposed location is south of the proposed rail and the transit center is north of the proposed alignment. As a result it would be necessary to construct a pedestrian connection between the station and the transit center. Although there is existing freight service on the

railroad, introduction of commuter rail service would lead to increased frequency of use. This could lead to potential conflicts with pedestrians, automobiles, and trains.

Use of an existing commercial parking area would not present a change in use and would not be expected to contribute to an increased impact on safety or security.

City of Beaverton

The proposed commuter rail project would have its northern terminus at the existing Beaverton Transit Center. No park & ride lot is planned at this location. However, the rail crossing from Lombard Avenue into the BTC presents some safety concerns.

The commuter rail project is considering two potential sites for the Washington Square Station (see also City of Tigard). The existing Linens and Things store is located north of Scholls Ferry Road in Beaverton. The proposed project would utilize the existing parking lot at this location. If a station were constructed at this location it would be on the opposite side of the tracks from the Nimbus Business Center, which is a primary destination for commuters. Existing pedestrian connections between the proposed station location and the Nimbus Center are inadequate. Commuters whose destination is at the Nimbus Business Center may be required to cross the rail alignment to the south at the existing crossing with Scholls Ferry Road.

Rail Crossings

There are a number of public and private crossing of the existing railroad alignment. Introduction of commuter rail service would significantly increase rail use of these crossings. The increase in use would go from less than ten per day to more than thirty per day (including commuter and freight operations). Most, if not all, of the public road crossings are signalized and/or gated with adequate sight distances. None of the private crossings are signalized or gated. Most of the private crossings have adequate sight distances from the crossings, with the exception of two crossings. These two crossings are located directly north of the Tualatin Station and provide access to a residence known as the "Sweek House". At the present time there are two hedgerows that are parallel to the rail alignment. These hedgerows are in the existing railroad right-of-way. These hedgerows significantly impair sight distances at these two private crossings.

3.9.3 Cumulative Effects

Implementation of the proposed commuter rail project would lead to increased automobile use in and around proposed park & ride locations. As a result of the increased traffic, there could be a proportional increase in automobile-related accidents and crime.

3.9.4 Mitigation Measures

Safety and security impacts associated with the proposed commuter rail project could be mitigated. Increases in automobile related crime and human safety and security issues could be addressed with design elements. The operator of the proposed commuter rail system should work with the local police to ensure that adequate security is provided at all park & ride locations. Potential pedestrian conflicts could be mitigated by providing commuters with grade-separated or signalized and gated crossings.

The commuter rail project is proposing a number of improvements to public road crossings. These improvements are listed in Appendix F. In general these improvements consist of replacement of

crossing panels, improvements in the signal system, and installation of gates at specific locations. Impacts to private crossings could be mitigated by development of a plan for regular maintenance of the right-of-way, which would assure adequate sight distances at these crossings.

3.10 ENVIRONMENTAL JUSTICE CONSIDERATIONS

This section addresses this project's compliance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. It identifies low-income and minority populations in the project corridor, assesses whether adverse human health or environmental impacts would result from each of the alternatives, and summarizes the project's public outreach program in relation to environmental justice issues. Executive Order 12898 applies only to projects that will use federal funds. It is anticipated that Section 5309 "New Start" funds will be sought from the FTA to pay for a portion of the capital costs of this project.

3.10.1 Affected Populations

The Council on Environmental Quality's (CEQ) guidelines, *Environmental Justice: Guidance Under the National Environmental Policy Act*, state that agencies should determine the composition of minority populations, low-income populations, and Indian tribes present in the area affected by a proposed action. Areas must be identified where either a minority population represents 50 percent or more of the total population, or where the percentage of a minority population is meaningfully greater than its representation in the general population or other appropriate unit of geographic analysis. For this analysis, the minority population in the 16 census tracts that are directly adjacent to or near the proposed commuter rail alignment was compared to that of the four-county (Multnomah, Clackamas, Washington, and Clark) Portland metropolitan region. The CEQ's guidance defines minorities as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black, or Hispanic. The number of people in each of these groups, as well as the census category "other," were combined to calculate the percentage of minorities. Table 3.10-1 shows the percentage of minority residents in each tract near the alignment for Census Year 1990.

A review of the column showing percent of all minorities indicates that seven of the 16 census tracts had a percentage that was higher than that in the four-county region. In particular, census tracts 311, 312 and 313 had 18.3, 18.0 and 15.8 percent minorities, respectively, as compared to 10.5 percent for the four-county region. These census tracts are in Beaverton. Columns showing the percentage of specific minority groups suggest that Asians and Hispanics are most likely to be represented in these figures, with a relatively low percentage of Blacks, American Indians and "Other". Alternatively, several of the census tracts had roughly half the percentage of minorities that comprise the four-county region. For the project corridor taken as a whole, the percentage of total minorities is 10.6 percent, which is nearly identical to the 10.5 percent for the four-county region. There is some variation tract by tract in the percent of minority population present.

Census data from 1990 were also used to identify low-income populations near the rail alignment. The percentage of the population in each census tract with a 1989 income below the federal poverty level is shown in Table 3.10-1. For the corridor as a whole, the percentage of persons with incomes below the federal poverty level is 7.2 percent, lower than the 9.9 percent for the four-county region. Again, however, the census tracts with the highest percentage of minorities, tracts 311, 312 and 313, also exhibit a higher percentage of people living below the poverty level than for the corridor as a whole.

Table 3.10-1
Poverty Rates and Racial Composition by Census Tract, 1990

Census Tract	Total Persons	% Below Poverty Level	% Black	% Am. Indian Eskimo, Aleut	% Asian, Pacific Islander	% Other Race	% Hispanic Origin	% All Minorities
313	5,595	10.4%	1.8%	0.7%	8.0%	1.4%	3.9%	15.8%
312	6,020	12.7%	0.9%	0.5%	10.6%	0.2%	4.8%	18.0%
311	2,309	16.3%	1.1%	1.3%	5.6%	3.2%	7.1%	18.3%
304.01	3,885	5.2%	0.5%	0.6%	3.5%	1.7%	3.0%	9.6%
310.05	5,019	5.4%	0.8%	0.7%	6.9%	1.9%	3.9%	14.4%
305.01	4,684	7.0%	0.1%	0.4%	2.9%	0.5%	2.2%	6.3%
310.06	5,690	7.0%	1.5%	0.3%	6.7%	1.4%	3.4%	13.5%
309	3,873	7.3%	1.3%	0.5%	4.8%	1.2%	3.4%	11.4%
319.03	7,199	3.7%	0.6%	0.9%	4.7%	0.8%	2.0%	9.1%
307	1,264	11.2%	1.1%	1.0%	3.6%	1.8%	2.6%	10.1%
308.01	4,962	4.8%	0.7%	0.4%	2.1%	0.7%	3.3%	7.3%
308.02	7,180	3.0%	0.4%	0.4%	1.9%	0.2%	1.1%	4.3%
320	8,866	6.8%	0.7%	0.6%	2.0%	1.3%	2.8%	7.6%
321.02	6,608	2.1%	0.2%	0.3%	2.1%	0.6%	2.0%	5.3%
227.01	7,429	5.3%	0.8%	1.0%	1.0%	0.2%	3.4%	7.4%
Corridor	80,583	7.2%	0.8%	0.6%	4.5%	1.1%	3.3%	10.6%
4-County Region	**1,412,344**	**9.9%**	**2.9%**	**0.9%**	**3.6%**	**1.3%**	**3.2%**	**10.5%**

Source: C90STF1A and C90STF3A Database, U.S. Census, 1990.

3.10.2 Potential Impacts

The Executive Order and CEQ guidance state that public agencies are to consider whether human health effects, in terms of risks and rates, would be significant or above accepted norms if a proposed action were undertaken. The following discussion considers this guidance in reviewing the potential impacts of the two alternatives and the proposed project.

3.10.2.1 No Build Alternative

Minority and low-income populations may experience decreased transit accessibility and air quality under the No Build Alternative.

3.10.2.2 TSM Alternative

As described in the Alternatives to the Proposed Project, Chapter 2.0, the TSM Alternative would improve bus travel times in the corridor by treating certain congested intersections with bus priority elements. A limited-stop bus line would also be added on roads roughly paralleling the proposed rail alignment. These changes would have no foreseeable adverse environmental effects. To the extent that implementation of this alternative would reduce VMT in the corridor, there would be a positive impact on air quality. This would benefit minority residents as much as the general population of the metro area. The operation of the TSM Alternative would improve transit service in the corridor by improving connectivity with other Tri-Met and SMART routes. It would also increase access to the regional LRT system. The TSM Alternative would have a positive impact for the transit-dependent population.

3.10.2.3 Commuter Rail Alternative

The proposed project is not expected to produce adverse environmental impacts. No significant adverse health effects would be related to operation or maintenance of the commuter rail. The project would not result in exposure of residents to hazardous materials, nor would the proposed project result in the displacement of any residents. The project would decrease VMT and therefore it would have a positive impact on air quality. This would benefit minority residents as much as the general population of the Portland metropolitan area. Persons below the poverty level who are transit-dependent may benefit from increased mobility due to the project. The commuter rail project would improve transit service in the surrounding neighborhoods by linking them to the regional light rail system at the Beaverton Transit Center.

3.10.3 Cumulative Effects

The proposed project would not create any disproportionate significant impacts to minority or low-income persons when considered in addition to other anticipated projects. (See Section 1.5, Related Projects, for a description of other anticipated projects.)

3.10.4 Mitigation Measures

The proposed project would not result in disproportionate significant adverse impacts to minority or low-income persons; therefore, no mitigation measures are necessary.

3.10.5 Public Outreach

An important component of Executive Order 12898 is assuring that all portions of the population have a meaningful opportunity to participate in the development of federal projects regardless of race, color, national origin, or income. The Order states that agencies should acknowledge and seek to overcome linguistic, institutional, geographic, and other barriers to meaningful participation, and should incorporate active outreach to affected groups.

Chapter 5.0, Public Involvement, contains a detailed description of the public outreach activities that were conducted by Washington County. In summary, the project was described in newspaper advertisements, in press releases sent to all Washington County media, and in subsequent news articles in local papers. Approximately 1,500 flyers were mailed or hand delivered to major employers, city halls, libraries and chambers of commerce along the corridor and personal telephone calls were made to key stakeholders to inform them of public meetings. Presentations were made to about 15 civic groups, and two rounds of five public meetings each were held at strategic locations in the corridor. In all, nearly 200 people attended the public meetings to offer comments on the proposed project and alternatives and to identify potential issues. A comment form was also distributed at the public meetings.

These outreach activities provided ample notice and opportunity to become involved to the affected neighborhoods, communities and residents along the commuter rail alignment. Further detail on these activities and meetings can be found in Chapter 5.0, Public Involvement.

3.11 ENERGY

3.11.1 Affected Environment

Oregon's primary source of energy is imported petroleum, which represents almost half of all energy used in the state. The second largest source of energy is electricity, followed by wood and natural gas. Geothermal, wind, and solar power sources represent a very small percentage of the total energy used. More than half of the electrical supply in the Northwest is from hydropower. Other sources of electricity include coal, natural gas, nuclear, and biomass. Gasoline powered vehicles make up the majority of the vehicle miles traveled (VMT) in the Portland metropolitan area. Automobiles compose more than half of the total VMT and a little less than half of the daily energy consumed for all motor vehicles.

3.11.2 Potential Impacts

3.11.2.1 No Build Alternative

The No Build Alternative would result in no reduction of VMT and no reduction in petroleum consumption. Most trips within the corridor would be made by automobile or bus, and VMT and energy consumption would increase. While energy for constructing and operating the rail project would not be consumed under the No Build Alternative, not building the rail line would have implications for the road network, which would have to accommodate more VMT and would require additional energy for unforeseen road improvements. Therefore, the No Build Alternative would not be consistent with energy policies, because it would result in continued reliance on more energy-intensive transportation systems.

The No Build Alternative is estimated to consume approximately 423,065 gallons of gasoline daily based on the 2020 average weekday VMT for the corridor.

3.11.2.2 TSM Alternative

As part of the TSM Alternative, a limited service bus line would be implemented. The additional bus service would travel approximately 4.87 miles per gallons of diesel. One bus traveling the 32.5-mile long corridor round trip between Beaverton and Wilsonville would consume approximately 6.7 gallons of diesel per bus per round trip. The limited stop bus line would operate at 15-minute headways, resulting in 32 roundtrips daily between 6:00 a.m. and 9:00 a.m. and 3:00 p.m. and 6:00 p.m. The thirty-two roundtrips would result in the consumption of about 213.6 gallons of diesel daily.

Some park & rides for the TSM alternative would use existing Tri-Met shared-use park & rides. Two new facilities would be constructed and consume approximately 1.71×10^9 British Thermal Units (BTUs) daily.

3.11.2.3 Commuter Rail Alternative

There are no specific federal, state, or local regulatory standards for energy usage that apply to the project. The Commuter Rail Alternative would be consistent with the state and regional goal to increase the use of fuel-efficient transportation modes. These policies are discussed in Chapter 1.0, Purpose of and Need For the Proposed Action.

Operating commuter rail would consume approximately 0.8 gallons of diesel per rail car per mile. A two-car train traveling the 15.3 miles round trip between Beaverton and Wilsonville would consume approximately 12.25 gallons per train per round trip. Sixteen round trips would be made daily, consuming 195.8 gallons per train daily.

Several park & rides would be constructed, and the energy required would be approximately 1.94 x 10^9 BTU . A vehicle maintenance facility would be constructed and operated as a part of the project; this facility would consume 0.040 x 10^9 BTU daily.[1]

In 2020, gasoline and diesel vehicles in the study area would consume approximately 423,065 gallons of gasoline daily under the No Build Alternative, approximately 422,940 gallons under the TSM Alternative, and approximately 422,035 gallons of gasoline under the proposed Commuter Rail Alternative.

3.11.3 Cumulative Effects

Construction and operation of commuter rail would not have any additional significant impacts on energy consumption when considering the 2020 buildout of the Highway 217/I-5 corridor. The proposed rail line is projected to reduce VMT and the reliance on single occupancy vehicles within the corridor. The proposed project would reduce overall energy consumption and reduce the cumulative energy impacts of development. Table 3.11-1 compares the energy consumed under each alternative.

Table 3.11-1
Comparison of Energy Consumed by Alternative

	No Build	TSM	Commuter Rail
Mode of Travel			
Automobile[1]	423,065 gallon/mile	422,940 gallon/mile	422,035 gallon/mile
Limited Service Bus[2]	NA	213.6 gallon/day	NA
Commuter Train[2]	NA	NA	195.8 gallon/day
Facility			
Park & Ride lots[3]	0.75 x 10^9 BTU	1.71 x 10^9 BTU	1.94 x 10^9 BTU

[1] Measured in gallons of gasoline per mile (includes passenger vehicles, buses, and motor trucks)
[2] Measured in gallons of diesel per day
[3] Measured in BTU (British Thermal Units)

3.11.4 Mitigation Measures

Operation of the proposed project would reduce energy consumption for the total transportation system under the Commuter Rail Alternative as compared to the No Build and TSM Alternatives. Therefore, no mitigation measures are required.

Notes:
1. The methodology and data for the energy use of the park & ride lots and the maintenance facility were obtained from the *South/North Energy Impact Results Report* (Metro, November 1998).

3.12 LAND ACQUISITION

3.12.1 Affected Environment

3.12.1.1 Residential, Commercial and Industrial Structures

There are no residential, commercial or industrial structures within the existing rail corridor from Wilsonville to the intersection of Farmington Road and Lombard Avenue. A new section of rail alignment would have to be built in order to extend the line to the proposed northern terminus at Beaverton Transit Center (BTC). There are commercial structures and parking lots located within the rail corridor along this segment. There are also bus bays at the Beaverton Transit Center that are potentially within the area of operation of the commuter rail.

The City of Beaverton has a planned project to realign Lombard Avenue. The City's project will require the removal of the Wells Fargo Bank building, which is located at the corner of Broadway and Lombard Avenue (see Section 1.5, Related Projects).

3.12.1.2 Rights-of-Way

The proposed commuter rail project is intended to make use of existing rail facilities between Wilsonville and Beaverton, Oregon. The length of the corridor is approximately 15.3 miles. At the present time, the line is used by the Portland and Western Railroad (PWRR), which conducts short-line freight operations in the corridor. Ownership of the rail corridor is separated into three segments. The Oregon Department of Transportation (ODOT) owns the right-of-way from Wilsonville north to Tiedeman Avenue in Tigard. The track and equipment in the ODOT portion of the corridor is owned by Union Pacific Railroad (UPRR) and leased to PWRR. The remainder of the corridor from Tiedeman Avenue to the Farmington Road crossing, along with the track and equipment, is owned by the UPRR. Figure 3.12-1 shows ownership along the existing rail corridor.

The terminus at Beaverton Transit Center would require construction of 2,000 feet of new alignment on Lombard Avenue. Beaverton Transit Center is controlled and operated by Tri-Met. The right-of-way on Lombard Avenue is controlled and maintained by the City of Beaverton.

The I-5 and Highway 217 corridors are owned by ODOT. Local arterial and collector streets fall under the jurisdiction of ODOT, Washington County, and/or the local jurisdictions in which they are located.

3.12.2 Potential Impacts

3.12.2.1 No Build Alternative

Residential, Commercial and Industrial Structures

There would be no displacement of residential, commercial or commercial structures, or of parking spaces under the No Build Alternative. No bus bays would be displaced at BTC.

Rights-of-Way

The median of Lombard Avenue would not be used for commuter rail and would be available for other uses in the future. It would not be necessary to acquire any additional right-of-way other than what would be required for the planned realignment of Lombard Avenue.

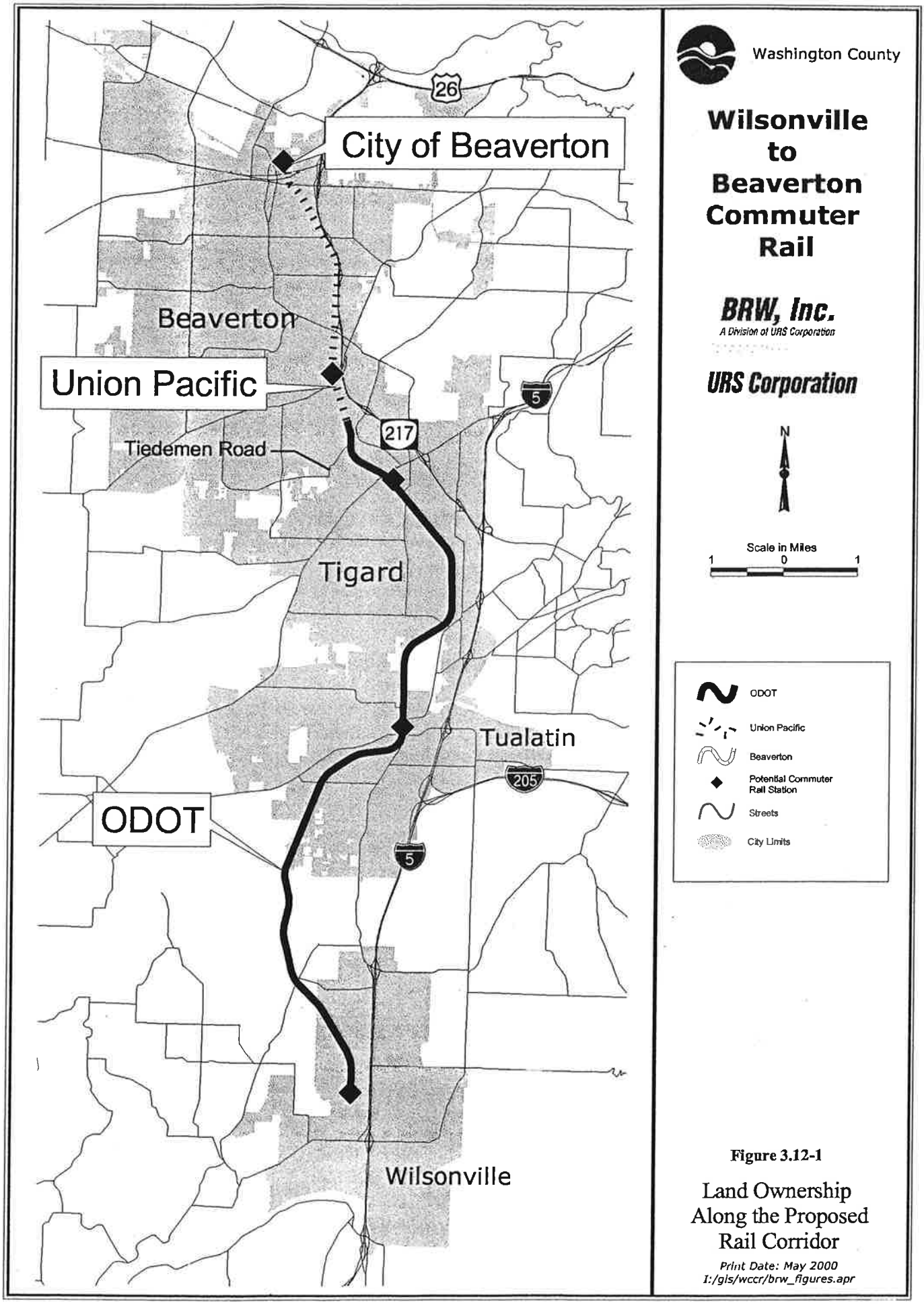

Figure 3.12-1

Land Ownership Along the Proposed Rail Corridor

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Table 3.12-1
Lombard Avenue Alignment Impacts

Characteristics	Lombard Avenue Design Options		
	1-Median Straight Alignment	3- Median Curved Alignment	4-East Alignment
Number of blocked driveways	0	0	2
Number of businesses to be relocated	6	5 to 7	5 to 7
Street Access	No frontage takes	No frontage takes	Takes frontage access along east side of Lombard
Right-of-way acquisition (acres)	1.94	1.60	1.21
Parking impacts	Replaces 90-degree parking stalls at N.W. corner of Lombard and Canyon with parallel parking	Impacts parking at auto parts store	Impacts parking at tire store and auto parts store
Bus bay relocation	5	5	7
Bus operations within and access to BTC	M	M	L

Source: BRW, Inc., 2000

The six businesses that would be displaced under the Median Straight Alignment include: Pizza Schmizza, Manila Imports, Dutch Store Imported, Da Sing Seafood Market, Active Water Sports, and NAPA Auto Parts. The first four of these six businesses would also be displaced under the Median Curved Alignment and the East Alignment; Active Water Sports and NAPA Auto Parts would not be affected. In addition, the Wells Fargo Bank would be taken by the City of Beaverton's Lombard Avenue Realignment project.

Rights-of-Way

It would be necessary to acquire land for rights-of-way under all three design alternatives for the new track segment in Beaverton. This right-of-way would be in addition to the right-of-way required for the City of Beaverton's Lombard realignment project. Table 3.12-1 shows the amount of land acquisition that would be required, which varies from between about one to two acres. All other track improvements and consolidations would occur within the existing rail right-of-way.

With the exception of the Wilsonville and Washington Square Park & Rides, all potential park & ride locations would occur within the existing rail right-of-way. The Wilsonville Park & Ride would require the purchase of approximately three acres of property. There are three potential parcels that are being considered; all are vacant and privately owned. All three parcels are directly adjacent to the rail corridor. The Washington Square Park & Ride would utilize existing but underutilized parking. This parking is associated with commercial activities in the vicinity of Washington Square. Shared use of this parking would require the project to enter into a lease agreement with the property owner(s).

3.12.3 Cumulative Effects

Residential and Commercial Structures

It is possible that future expansion of the commuter rail line could create additional displacement of residential or commercial structures. This could occur, for instance, if new stations were added or proposed park & ride areas were expanded. This impact cannot be predicted or quantified at this time, however. The potential displacement of other structures, from cumulative development in the project area, is not anticipated.

Rights-of-Way

It is unlikely that future expansion of the commuter rail line would create the need for land acquisition for additional right-of-way. Similarly, cumulative development in the project area would not necessarily require land acquisition in the future.

3.12.4 Mitigation Measures

The Commuter Rail project will be required to compensate property owners for any additional right-of-way that would be required as a result of this project. The acquisition of additional right-of-way is associated with the new alignment along Lombard Avenue in Beaverton. This right of way would be in addition to the right-of-way purchased by the City of Beaverton for its Lombard Avenue project. Depending on which Lombard Avenue alignment is chosen, the commuter rail project will also be required to assist displaced businesses find comparable and suitable relocation space. At this time there is suitable commercial lease space in the immediate vicinity. All property purchase and relocation will be in accordance with FTA's established policies and procedures and the uniform Relocation Assistance Act.

3.13 SOCIAL AND ECONOMIC EFFECTS

3.13.1 Affected Environment

3.13.1.1 Washington County Economic Conditions

Between 1990 and 1997, the population of the Portland Metropolitan area increased by 14 percent. During this same period, the population of Washington County increased by 24 percent. Most of this growth has been focused along the Interstate 5 and Highway 217 corridor, and along the newly opened Westside MAX. From 1990 to 1997, the population of Wilsonville increased by 54 percent, the City of Tualatin by 39 percent, the City of Tigard by 25 percent and the City of Beaverton by 24 percent. In 1999, the population of Wilsonville was 12,985; Tualatin's population was 21,345; Tigard's was 37,670; and Beaverton's was 68,010.

Current population projections for the metropolitan area show these past growth patterns continuing into the future. Between 1997 and 2017 the population of Washington County is expected to increase by 47 percent. The 1997 to 2017 population projections for Wilsonville show the population increasing by 125 percent, Tualatin by 17 percent, Tigard by 17 percent, and Beaverton by 29 percent.

Washington County's rapid population growth is exceeded only by its economic growth. Between 1980 and 1990 Washington County had a 51 percent increase in employment. This trend has continued throughout most of the 1990s. Between 1990 and 1996 the Portland metropolitan area showed a 21 percent growth in employment; during that same period, Washington County had an

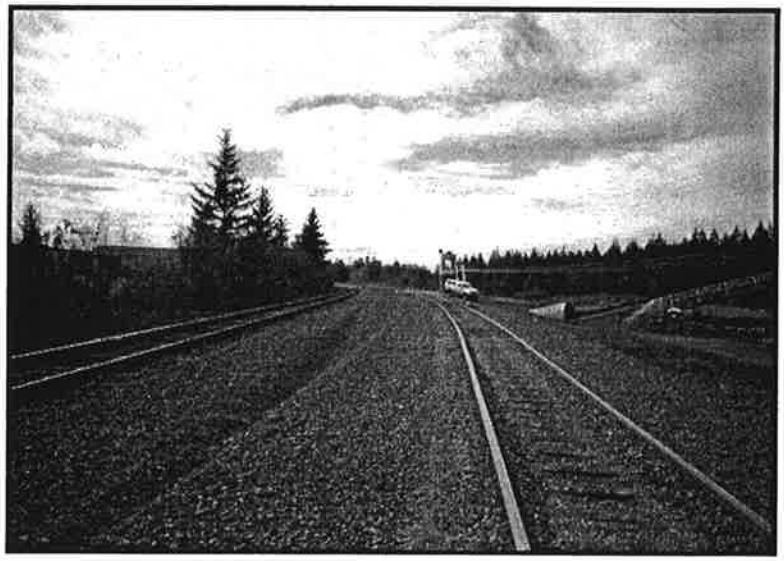


Figure 3.14-4
Proposed Tonquin Siding site, view South

Figure 3.14-5
Tualatin Reservoir Bridge, view West

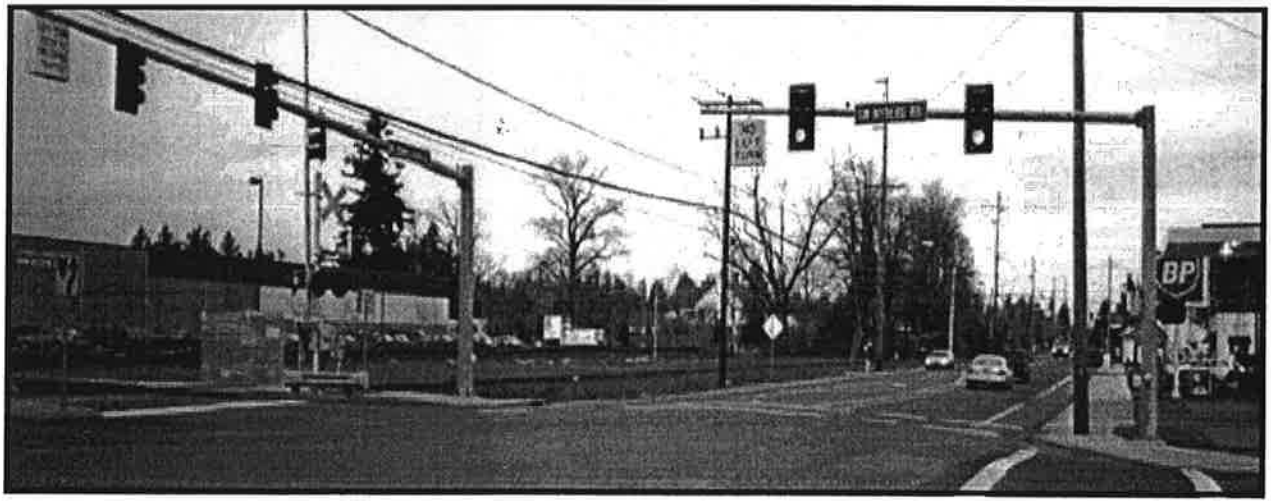


Figure 3.14-6 - Tualatin Station and Park & Ride site, view North

Figure 3.14-7 - View of rail crossing the Tualatin River, from an adjacent neighborhood

Figure 3.14-8 - View of rail South of Durham Road

Figure 3.14-9
Tigard Park & Ride site, view to the East

Figure 3.14-10
Tigard Park & Ride site, view from Transit Center

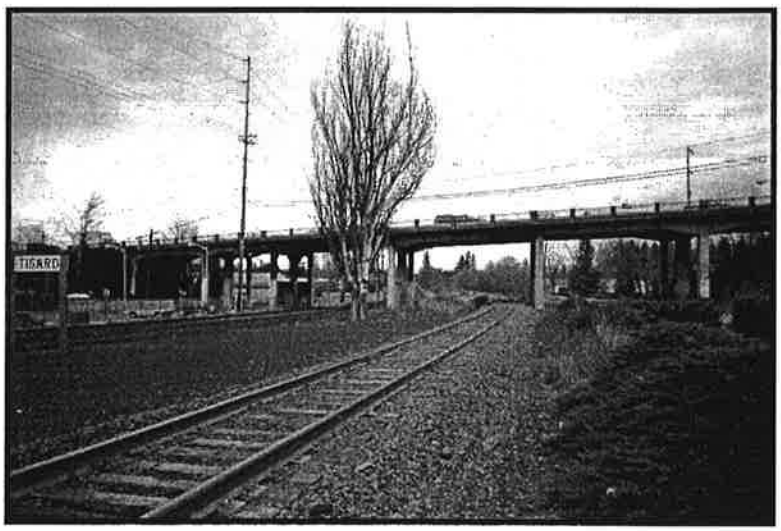


Figure 3.14-11
View West from Main Street, Tigard

As Highway 217 travels through Tigard, mature trees still dominate the landscape, guiding the traveler's view forward along the highway, instead of out towards the surrounding development.

Washington Square

In the Washington Square area, the commercial buildings on the east side of the tracks face away from the rail corridor and toward the auto traffic on Highway 217. In addition, there is a vegetative barrier between the buildings and the right-of-way (see Figure 3.14-12). Trees and hedges form a buffer between the tracks and the office/industrial buildings in the Nimbus Business Park. In most locations, the service entrances and garbage areas are located next to the tracks.

From the commercial sites east of the rail, the view and sound of Highway 217 dominate the landscape (see Figure 3.14-13). From the mall above, the rail corridor is visible only because it is so well defined by its vegetative borders (see Figure 3.14-14).

South of Beaverton

Between Washington Square and Canyon Road, most properties are separated from the rail by tall trees or shrubs, and occasional grade separation (see Figure 3.14-15). Therefore, there is little visual connection between the rail and adjacent properties. Land uses surrounding the line are primarily commercial and institutional, with some light industrial.

Beaverton

Tri-Met's Beaverton Transit Center can be seen from Lombard Street, and vice versa (see Figure 3.14-16). Buildings on Lombard and Beaverton Hillsdale Highway are primarily medium-density commercial. The visual character of the area is that of an uneven mix of one- to two-story buildings, wide busy streets, and an unremarkable form (see Figure 3.14-17). A creek passes south of the transit center, providing a visual break from the surrounding hardscape, as well as the presence of wildlife.

Highway 217 ends at the interchange with US 26, and is on an elevated structure in the Beaverton area. Travelers on the highway look out over commercial development that surrounds the interchanges.

From the Train

Passengers riding the proposed commuter rail line would experience scenic views, which are now rarely accessed. Leaving Wilsonville, the train would pass through business parks and light industrial areas. In the area between Wilsonville and Tualatin, the trackway traverses rural, luxuriantly vegetated land, which has fewer deliberately grown barriers between the trackway and private land. Passengers would see a landscape from the train that is difficult to access by other means. At the stations, passengers would briefly see development in Tualatin and downtown Tigard before the train enters a buffered corridor. Once the train leaves the Tigard Station area, the tracks are bordered by a vegetative buffer, which continues to the station area in Washington Square. As the tracks approach Highway 217, passengers would see cars on Highway 217, business park development to the west, and the grassy swales surrounding the tracks. As the train travels north, the tall hedges and trees along the corridor would block most views. Then people would see urban development in Beaverton, including commercial and residential areas. Once in Beaverton, the views from the train would be similar to those experienced by light rail or bus passengers.

Figure 3.14-12
Rail line behind Levitz lot in Washington Square Station area, view North

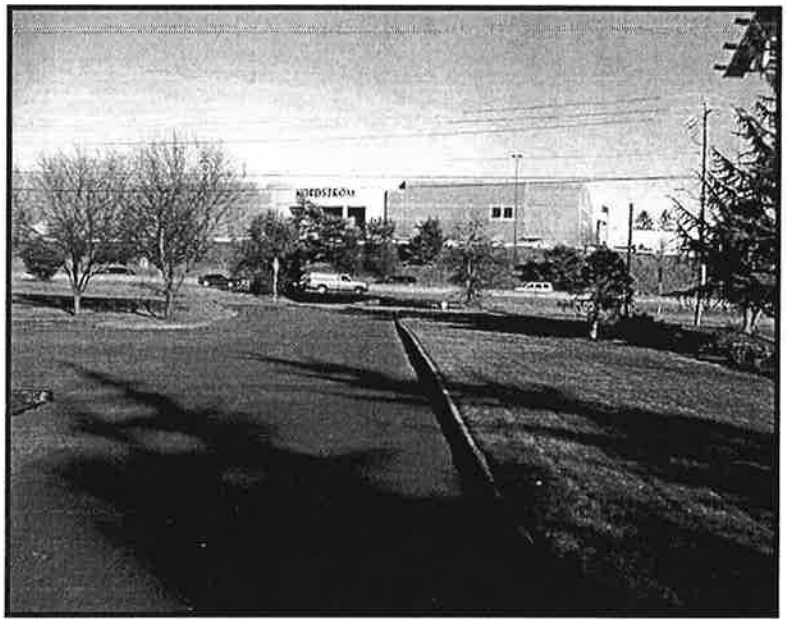


Figure 3.14-13
Highway 217 and Washington Square Mall view East from Levitz lot

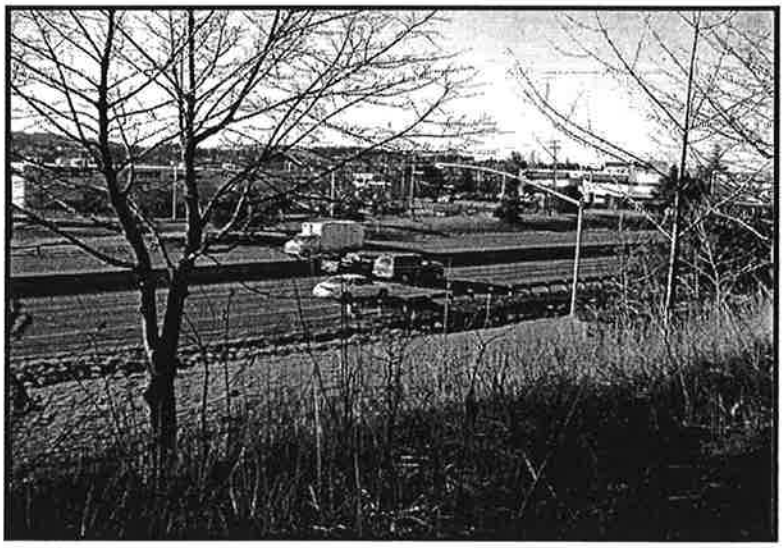


Figure 3.14-14
Highway 217, view North-west from Washington Square Mall

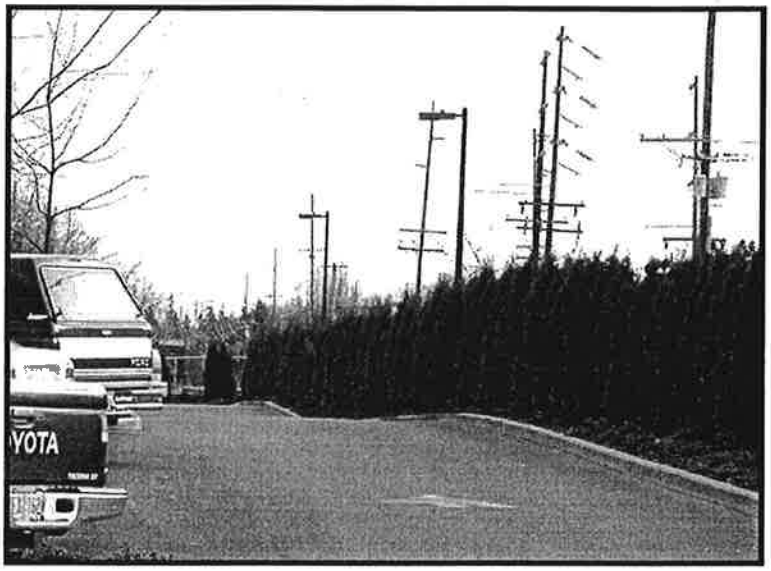


Figure 3.14-15
Vegetative barrier between rail corridor and Beaverton City Hall parking lot

Figure 3.14-16
Lombard Avenue, view South

Figure 3.14-17
Beaverton Transit Center from Lombard Avenue, view North

3.14.2 Potential Impacts

Analysis of long-term impacts of the alternatives is based on a year 2015 assessment. It considers the alternative's consequences on the visual and aesthetic environment. Consequences to visual elements include increased exposure, heightened awareness and sensitivity, and displacement or addition of elements.

3.14.2.1 No Build Alternative

For the No Build Alternative, no changes are programmed along the rail corridor, except for continued maintenance for the current freight operation. Programmed improvements of the Highway 217/I-5 corridor include Phase I of ODOT's I-5 Interchange at Highway 217 project, which will involve the construction of a new bridge structure and additional traffic lanes. Continued use of the current operating system would not change the visual experience of the corridor.

3.14.2.2 TSM Alternative

The TSM alternative, which includes relatively minor roadway and transit improvements, would have very little visual impact on the corridor. Buses already travel on most of the roads designated for the express bus, which would have relatively few stops. The only visual changes along these streets would be sidewalk reconstruction to improve pedestrian safety, comfort, and accessibility. Several lanes and sidewalks at certain intersections would be realigned to provide the right-of-way necessary for transit priority treatment. A number of stops would receive shelters, but their presence on a sidewalk does not constitute an impact.

3.14.2.3 Commuter Rail Alternative

Wilsonville

Neither the station nor the park & ride would block scenic views of hills to the west, which are visible at the entrance to the Utility Vault facility. The proposed station and park & ride sites are zoned for industrial land uses, and thus would eventually be developed. The proposed project would have no additional visual impact other than that of potential future development.

Wilsonville to Tualatin

Structural improvements to the bridge over the Tualatin Reservoir could change the view in the immediate area, by replacing a harmonious element with one that has a different scale, color, and form. Visibility of the element would not change, but sensitivity to changes in form or material would be high, due to the picturesque quality of the existing view.

Tonquin

Changes to the site would be minimal, and entirely at grade level. There would be no significant changes to the views to or from the site.

Tualatin

Adding a station and park & ride would change the appearance of the site, but the character would be similar to that of the adjacent parking lot. Visibility of the rail facility would be increased, but the viewer's sensitivity to the change would be low due to the matching context of development.

Tigard

Addition of a rail station and park & ride would change the feel and aesthetic appearance of the site, as well as the view from Main Street and the Transit Center. Several hundred vehicles would replace existing vegetation. Viewer exposure to the park & ride from the transit center and Main Street would be high.

Washington Square

Removal of some vegetation to construct the Washington Square Station would increase the visibility of the rail corridor at that location.

Beaverton

A newly constructed station at Beaverton Transit Center could enhance the transit center's environment by creating a western edge to the center. The scale and exposure of the center would increase for travelers on Lombard Avenue. Any of the Lombard Avenue design alternatives would change the appearance of the street, and could improve its aesthetic qualities by adding sidewalks and bringing the street up to city standards. They would not displace any views or aesthetic elements. Resource displacement would be low.

3.14.3 Cumulative Effects

Throughout the majority of the corridor, proposed changes to the existing rail line, such as bridge and intersection upgrades, would not impact the aesthetic qualities and views of the area. It is at station and park & ride sites, as well as major bridge reconstruction, where visual elements would be added or removed, and visual exposure to the rail line could be increased. Station sites in Tualatin and Tigard are not currently planned for development and are, therefore, the most impacted by station development.

Planned redevelopment of the Washington Square area could involve not only new and more complex development around the station area, but also new bridges over the highway with access to a commuter rail station. There is a great potential for change at this site, but its form and impact on existing views are unknown at this time.

3.14.4 Mitigation Measures

Given the types of impacts identified in the study area, the goals for mitigation of the visual impacts created by the proposed commuter rail should include the following:

- buffer and screen impacts from sensitive areas
- use the new rail facilities to integrate the site into the existing neighborhood or streetscape
- prevent or reduce the loss of visual resources.

Tualatin Reservoir

Structural improvements to the bridge crossing the Tualatin Reservoir should be designed to minimize disruption of the bridge's place in its harmonious setting. This could be accomplished by careful selection of materials, thought design of the supporting structure, and a design that enhances the aesthetic environment of the reservoir. During the final design of the structure, refinements to match the scale and character of the existing bridge would be considered.

Tualatin

The station could strengthen the built edge of the street by reflecting the older buildings directly across Boones Ferry Road from the station site. Landscaping and station design enhancing the streetscape next to the station and visually narrowing the street in this section of Boones Ferry could be used (see Figure 3.14-18).

Tigard

A design that includes landscaping, sidewalks, and a strong edge to the street could improve the visual appearance of the site. The station could be used to better connect the Transit Center visually with Main Street, instead of adding another barrier by merely inserting a field of vehicles (see Figure 3.14-19).

Beaverton

The final design of the station should reflect its relation to the Beaverton Transit Center and visually connect the two.

3.15 CONSTRUCTION IMPACTS AND MITIGATIONS

The proposed project would involve construction activities in the following areas:

New Track - A 2,000-foot segment of new track would be built from the intersection of Lombard Avenue and Farmington Road to the BTC. The project also calls for double tracking between Lombard Avenue and the Bonita crossover, and sidings would be added in Wilsonville.

New Stations - Five new rail stations would be constructed under the proposed project, in Wilsonville, Tualatin, Tigard, Washington Square and Beaverton. Typically the stations would include a 200-foot platform, a sheltered waiting area, benches, a passenger information system and accommodations for bicycles. Park & ride facilities would be constructed at all but the Beaverton Station.

Maintenance and Storage Facility - A proposed maintenance and storage facility would be built to provide secure storage of three vehicles, cleaning and inspection, light maintenance and operator reporting, and administration. There are two potential locations for this facility: one to the south of the Tigard Commuter Rail Station and the other at the southern terminus of the project.

The potential impacts of these construction activities are described below, and mitigation measures are identified, where necessary.

3.15.1 Traffic and Transportation

Construction is only likely to impact transportation services, access or level of service under the Commuter Rail Alternative. The other two alternatives require no construction. The construction impacts of the Commuter Rail Alternative would result from:

- Construction of new rail track along a realigned Lombard Avenue from just south of Farmington Road to the Beaverton Transit Center.

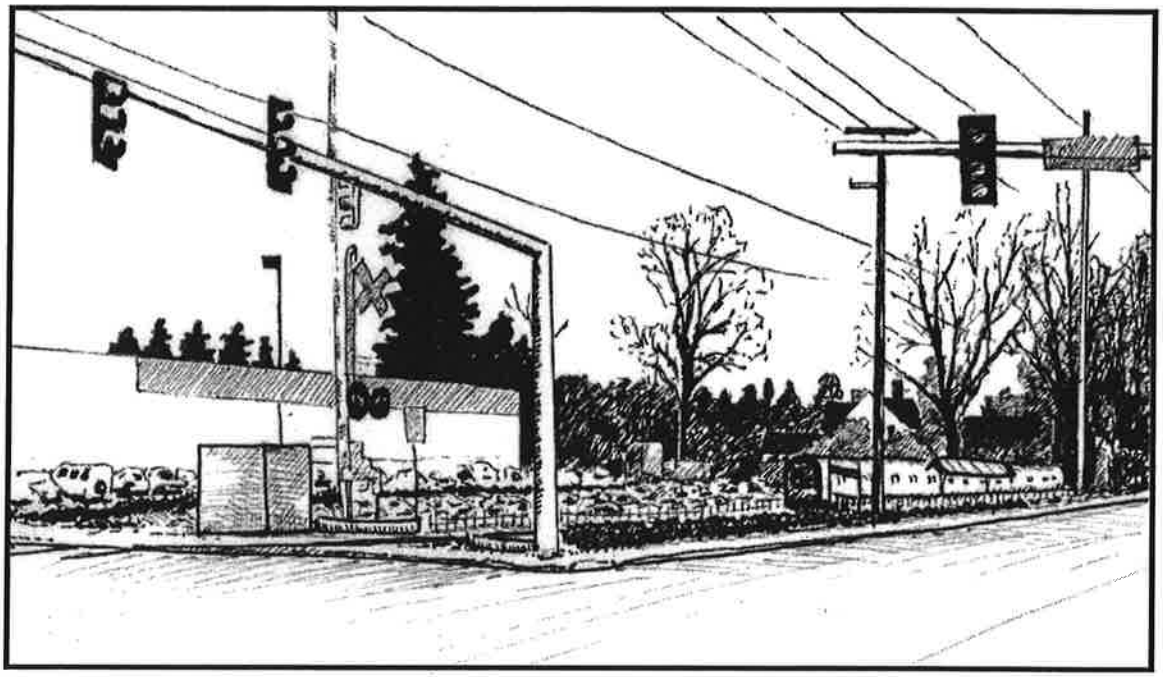


Figure 3.14-18 - Tualatin Station and Park & Ride Illustration

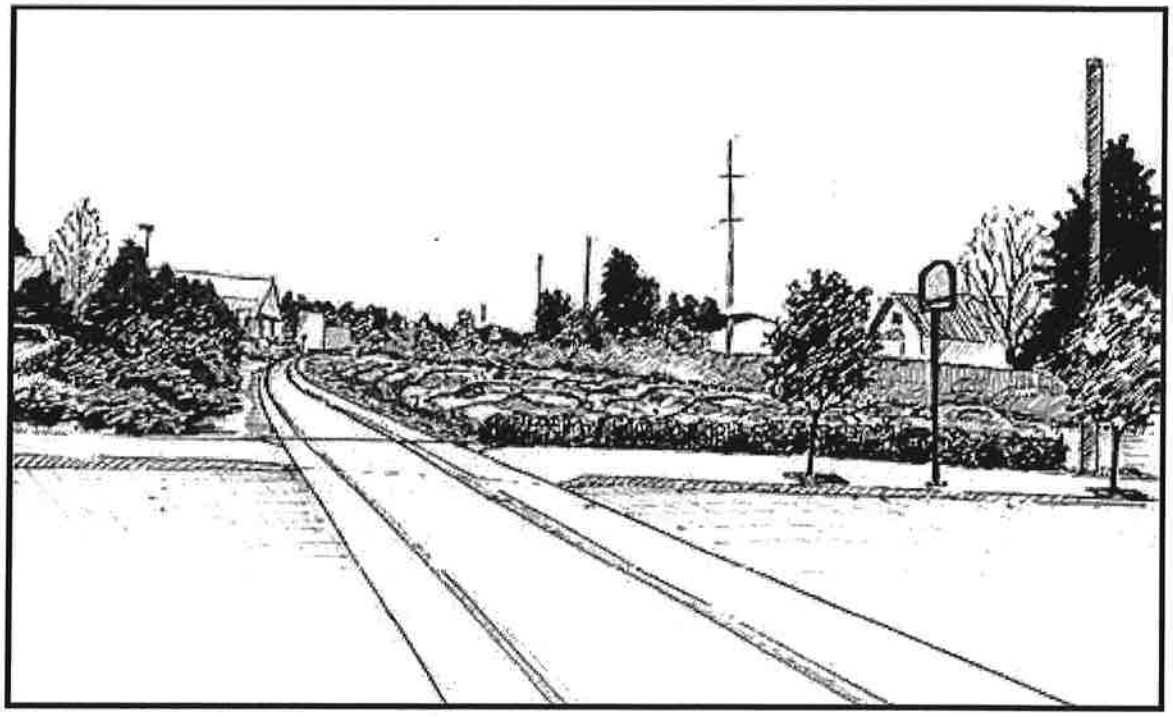


Figure 3.14-19 - Tualatin Station and Park & Ride Illustration

- Upgrade of crossing gates wherever the railroad track crosses roadways at grade (this is planned regardless of whether commuter rail service is initiated.

Transportation services would be affected only if the construction activities require closure or obstruction of roadway lanes, sidewalks or bicycle lanes.

3.15.1.1 Transit

Transit services feeding the Beaverton Transit Center from Lombard Avenue would be affected by the extension of the rail track along Lombard Avenue from Farmington Road to the Beaverton Transit Center. This would include Routes 52, 53S, 54, 57, 58, 76, 78, and 88. The impacts of construction on transit can be partially mitigated by staging construction such that at least a portion of all roadways are open at all times and by working at night as much as possible.

3.15.1.2 Roadway Network

The extension of the rail track along Lombard Avenue from Farmington Road to the Beaverton Transit Center would impact traffic flow on Canyon Road (Highway 8), Farmington Road (Highway 10), Broadway and Lombard Avenue.

The upgrading of the crossing gates would affect traffic on all of the streets where crossings exist. The existing crossing panels need to be replaced with up-to-date grade-crossing panels at the following locations:

- Farmington Rd.
- Lombard Ave.
- Canyon Rd.
- 5th Ave.
- Hall Blvd.
- Scholls Ferry Rd.
- Tiedeman Rd.
- Main St.
- Hall Blvd.
- Bonita Rd.
- Durham Rd.
- Tualatin Rd
- Tualatin-Sherwood Rd.
- Boones Ferry Rd.
- 95th Place
- Teton Ave.
- Avery St.
- Tonquin Rd.
- Grahams Ferry Rd.
- Boeckman Rd.
- Barber St.

The impacts of construction on the roadway network can be minimized by staging construction such that at least a portion of all roadways are open at all times and by working at night as much as possible.

3.15.1.3 Parking

There are not likely to be any parking impacts as a result of construction.

3.15.1.4 Bicycles and Pedestrians

Bicycle and pedestrian circulation are likely to be impacted only if the construction along Lombard Avenue or the upgrading of crossing gates produces a temporary obstruction of bicycle or pedestrian facilities on crossing streets.

3.15.2 Air Quality

Potential air pollutant emissions from the commuter rail project during construction include the following: emissions from workers' vehicles and delivery truck exhaust, heavy equipment exhaust, and fugitive dust. The main construction projects would be the maintenance facilities and park & rides. These are both relatively short-term and small scale projects; emissions from ground disturbance (fugitive dust) would be generated for less than a few months period, and the use of large scale construction equipment is not expected to occur for more than a few weeks. Specific construction equipment use is unknown at this time, but is expected to be minimal. Because they are expected to be very low, construction emissions from the project are not included in the analysis.

Combustion Sources

During construction and operations, all heavy-duty equipment used on site would be maintained to minimize emissions.

Fugitive Dust

Standard operating procedures would be incorporated into project construction in order to reduce potential sources of fugitive dust from the construction sites. As applicable and necessary, these would include:

- Covering piles of fill material as much as feasible
- Maintaining roadways/areas within the site
- Maintaining low vehicle speeds
- Watering surfaces that might produce dust in dry weather

3.15.3 Noise

Construction vibration impacts could result from activities such as pavement breaking, jackhammer use, and pile driving conducted in close proximity to Category 1 structures. However, there are nor Category 1 uses within the project's area of potential effect, thus no vibration impact will occur for Category 1 use. There will be no vibration impact to Category 2 use if the above listed construction activities do not occur adjacent to Category 2 structures or are not conducted during evening and nighttime hours. Category 3 use will not be impacted by construction vibration if activities do not occur adjacent to the structures or construction is scheduled when the building is closed. Avoidance of construction vibration impacts may require use of alternative construction techniques and restriction of hours of vibration-producing construction activity or both. The project is not expected

to generate adverse vibration impacts and no special mitigation measures will be required if the concerns discussed in this section are addressed.

There are no long-term construction impacts; therefore no mitigation is required.

3.15.4 Land Use and Planning Policy

There would be no construction-related impacts on land use or zoning since the project would use an existing right-of-way.

3.15.5 Biology

Short-term impacts may occur as a result of construction access and activity for replacement of trestles and new bridge construction. All areas temporarily cleared for construction would be replanted as part of standard erosion control practices. Construction within any vegetated corridors along streams must be planned and permitted in compliance with Section 3.02 of the Unified Sewerage Agency of Washington County's Storm and Surface Water Rules.

Impacts from construction of the TSM Alternative would involve the construction of additional parking at one of two proposed park & rides in Wilsonville. Impacted wetland acreages were approximated by assuming construction activities would extend 15 feet beyond the mapped edges of the facilities. The construction of additional parking at the proposed westside Wilsonville Park & Ride would fill an estimated 0.9 acres of Wetland A and Wetland C (Table 3.5-1, page 3-61/62). Construction of the proposed eastside Wilsonville Park & Ride would fill an estimated 0.5 acres of Wetland D (Table 3.5-1).

Impacts from construction of the Commuter Rail Alternative would be minimal since the commuter rail would operate on a ROW that currently serves as a heavy freight railroad line throughout the majority of its length. No wetland impacts would occur from track construction along this existing heavy freight railroad line. The proposed construction of an additional track from Dakota Street north to Farmington Road may have a direct, long-term, moderate impact to Wetland T and Wetland U. Assuming construction activities for this secondary track would not extend beyond the railroad ROW, approximately 0.6 acres of wetland could potentially be impacted by filling (Table 3.5-1). However, efforts would be made to minimize or avoid wetland impacts in this area. No wetlands would be impacted by construction of the new alignment at the northern terminus of the rail line near the Beaverton Transit Center.

The proposed rail stations and park & rides that would directly impact wetlands are the Wilsonville Rail Station and the two potential sites for the Wilsonville park & ride lots, and the Tualatin Park & Ride. Impacted wetland acreages were approximated by assuming construction activities would extend 15 feet beyond the mapped edges of the facilities. Construction of the Wilsonville Rail Station and Park & Ride on the west side site would fill an estimated 0.9 acres of Wetland A and Wetland C (Table 3.5-1). Construction of the rail station and park & ride on the east side site would fill an estimated 0.5 acres of Wetland D (Table 3.5-1). Construction of the Tualatin Park & Ride would fill an estimated 0.2 acres of Wetland I and Wetland J (Table 3.5-1). The vegetative loss would contribute to a long-term moderate impact.

Many wetlands would endure short-term or minimal impacts due to bridge upgrades. Replacing existing trestles with concrete ballast deck trestles was assumed to impact approximately 18-foot-wide and 25-foot-long sections of the shoreline on both ends of the bridges. Less than 0.1 acres of

wetland in Wetland G and Wetland H would be impacted by bridge construction (Table 3.5-1). Longer term, however, replacement of the current pile trestle with new bridges would enhance stream and wetland areas, because the piles would be removed from the stream and replaced by structures with no in-stream foundation.

The total area of direct impacts by filling wetlands is estimated to be approximately 2.3 acres.

3.15.6 Water Quality

There would be no construction impacts on water quality from the No Build Alternative.

Potential construction impacts to water quality from the TSM Alternative are associated with dewatering, excavation and grading of two parking facilities (Wilsonville and Tigard). The Wilsonville parking facility would be located in the Seely Ditch watershed and the Tigard parking facility would be located in the Fanno Creek watershed. Construction impacts could include the potential discharge of sediments and other construction related debris to the storm and/or surface drainage system.

Potential construction impacts to water quality are associated with dewatering, excavation and grading of the following elements of the proposed project:

Four Bridge Replacements - Bridge replacements are proposed for two crossings of Fanno Creek: the Ash Creek crossing and the Beaverton Creek crossing. Land disturbance associated with the dewatering, excavation, grading, and fill placement necessary for bridge replacements has the potential to contribute discharges of sediment and other construction related debris to these receiving waters. All new bridges would span the creeks from top-of-bank to top-of-bank, and would not include any instream rail supports.

Removal of Trestles - Removal of trestles is proposed for two crossings of Hedges Creek and the crossing of one unnamed drainage at mile post 40.7 of the proposed alignment. Removal of trestles could have potential positive impacts on water quality associated with the removal of creosote coated trestles. Creosote is a toxic, carcinogenic product used as a wood preservative for outdoor wooden structures such as railroad ties and pilings. Removal of these trestles also has the potential to temporarily disturb stream bed and stream bank sediments, causing elevations of sediment concentrations in these water bodies.

Construction of Four Rail Stations and One Maintenance/Storage Facility - Construction of rail stations would include the disturbance of land in three of the watersheds, as shown below in Table 3.15-1. This disturbance could include the potential discharge of sediments and other construction related debris to the storm and/or surface drainage system. Typical wet weather runoff from construction sites in the region has been shown to contain significantly elevated concentrations of sediments, phosphorus and, in some cases, heavy metals.

Table 3.15-1
Watersheds Potentially Affected by the Construction of
Four Rail Stations and One Maintenance/Storage Facility

Affected Watershed	Proposed Facilities
Seely Ditch	• Wilsonville Park & Ride • Maintenance/Storage Facility
Hedges Creek	• Tualatin Park & Ride
Fanno Creek	• Tigard Park & Ride • Washington Square Park & Ride

Source: URS, 2000

Upgrades to Existing Rails, Including the Addition of New Rails and Track Sidings - Table 3.15-2 shows the proposed amount of replaced and new track for each watershed. Track replacement and construction of new track would result in temporary impacts associated with construction activities. As described above, disturbance of land associated with construction could include the potential discharge of sediments and other construction related debris to the storm and/or surface drainage system. After construction, the replaced and new track would be pervious areas due to the use of rock and pervious subgrade for the ballast.

Table 3.15-2
Watersheds Potentially Affected by the Construction of
New and/or Replaced Rail Track

Affected Watershed	Proposed New Track	Proposed Replaced Track
Seely Ditch	2,884 feet	
Fanno Creek		10,571 feet
Ash Creek		1,328 feet
Beaverton Creek	1,617 feet	5,900 feet

Source: URS, 2000

Construction Mitigation Measures: Construction activities including clearing, grading, excavation, and stockpiling activities that would result in the disturbance of five or more acres are required to obtain a general National Pollutant Discharge Elimination System (NPDES) 1200-C stormwater discharge permit for construction activities from the State of Oregon (DEQ). The permit requires a DEQ approved erosion and sediment control plan (ESCP). The ESCP shall be developed and implemented to prevent the discharge of significant amounts of sediment to surface waters. An acceptable erosion control plan shall include: 1) a site description, 2) a site map, 3) required controls and practices, 4) additional controls and practices. Required controls and practices include the following:

- Gravel, paved, or constructed entrances, exits and parking areas,
- Effective erosion control and sediment control measures for unpaved roads,
- Water-tight trucks for the transport of saturated soils,
- A description of procedures for correct installation or use of all erosion and sediment control measures, and
- A description of procedures for prompt maintenance or repair of erosion and sediment control measures utilized on site.

Minimum additional controls and practices are focused on minimizing the area of exposed soil; protecting exposed areas; diverting flows from exposed areas; maximizing preservation of existing vegetation; revegetating when practicable; reducing sediment laden runoff; preventing spills; conducting regular maintenance of vehicles and machinery; and minimizing exposure of runoff to spills, cleaning, and maintenance activities.

Within USA's jurisdiction, it should be noted that USA acts as the DEQ's agent in issuing 1200-C permits.

3.15.7 Environmental Hazards

Potential impacts involving hazardous materials due to construction activities are described in Section 3.7, Environmental Hazards.

3.15.8 Historic and Cultural Resources

Potential impacts on historic and cultural resources due to construction activities are described in Section 3.8, Historic and Cultural Resources.

3.15.9 Safety and Security

There would be no impacts to safety and security due to construction activities.

3.15.10 Environmental Justice

There would be no impacts to environmental justice due to construction activities.

3.15.11 Energy

Energy consumed during construction would be minimal. Construction would consist of station construction and spot improvement along an existing rail line. In addition, energy consumed during construction would be partially offset by operation of the Commuter Rail system. The proposed project could cause auto and bus VMT to decline by attracting riders away from these modes, thereby saving fuel.

3.15.12 Land Acquisition

Construction of the proposed project would not impede access to any businesses, because most of the alignment would be in an existing right-of-way. Construction of the 2,000-foot segment that would be in the median of a realigned Lombard Avenue, or on the east side of the street, would not create any additional impacts beyond those associated with the reconstruction of Lombard Avenue (see Section 3.12), which is a separate but related project. Construction of the park & ride lots and the maintenance facility would not impede access to any businesses.

3.15.13 Social and Economic Effects

Construction of the project would result in short-term employment and expenditures. It is estimated that the capital costs of the TSM Alternative would be $7 to $10 million. The capital costs of commuter rail are estimated to be between $67 and $73 million. (Capital costs include but are not limited to the costs of construction. For instance, they also include the initial purchase of equipment.) The IMPLAN model, which was used for the Westside light rail project, estimates the number of jobs created by construction expenditures. The labor coefficient in the model estimates that each $1

million of expenditure in construction results in 17 jobs (8.1 direct jobs, 4.4 indirect jobs, and 4.5 induced jobs). Using this coefficient, the capital expenditures for the TSM Alternative would generate between 57 and 81 direct jobs. The Commuter Rail Alternative would generate between 543 and 591 direct jobs. Not all of these jobs would be in construction. Construction spending has not been broken out separately from the overall capital budget for the project alternatives.

3.15.14 Visual and Aesthetic Effects

Construction of the four park & ride lots and the maintenance/storage facility would involve construction equipment and stockpiled materials that might be visible from nearby residences. Since this impact is short-term in nature, it is not considered significant.

3.16 SECONDARY AND INDUCED IMPACTS

This section evaluates the potential secondary and induced impacts that would result from the proposed project. This analysis discusses potential impacts on areas near the proposed commuter rail stations (e.g., neighborhoods and commercial centers) and considers whether the addition of a commuter rail line service induces more growth than would occur without the line.

3.16.1 Secondary and Induced Impacts of the Proposed Project

Commuter rail stations function as transit nodes. Users arrive in mid-trip, either by car, bus, foot, or bike, for the express purpose of boarding a commuter train to complete trips to work. Transit nodes are unlikely to attract businesses that rely on casual shoppers or that sell wares too bulky or numerous to carry by hand. Potential retail developments attracted to commuter rail stations would be coffee kiosks, flower and card stands, or magazine and newspaper vendors. These potential retailers would likely be at freestanding locations at the station or located very close to the stations.

The secondary and induced impacts of the proposed project are expected to be minimal, with no additional development other than that which would occur normally. Commuter rail stations do not function as destination shopping areas, and only minor development is expected around the stations. Neighborhoods and commercial centers around the proposed commuter rail line stations are not expected to develop in any manner that is not already anticipated in Metro's *Region 2040 Framework Plan.*

3.16.1.1 Wilsonville Station

The Wilsonville Station is the southern terminus of the commuter rail line. The station would not be located in a Metro 2040-designated town center. Industrial facilities or areas that will be developed industrially surround the proposed station location area. There would be no secondary or induced impacts from the proposed station in the area.

3.16.1.2 Tualatin Station

The Tualatin Station would be located in downtown Tualatin, in a Metro 2040-designated town center. Various business facilities are currently located in the town center, along with high-density housing. Future development will probably be the result of the existing land uses and 2040 town center designation. It is not expected that the proposed station would result in secondary or induced impacts.

3.16.1.3 Tigard Station

The Tigard Station would be located in a Metro 2040-designated town center adjacent to the Tigard Transit Center. The area has a wide variety of commercial uses and is zoned Central Business District. Many retail and office establishments and high-density housing exist in the area, and future development would probably be due to those uses and not the proposed station. It is not expected that the proposed station would result in secondary or induced impacts.

3.16.1.4 Washington Square Station

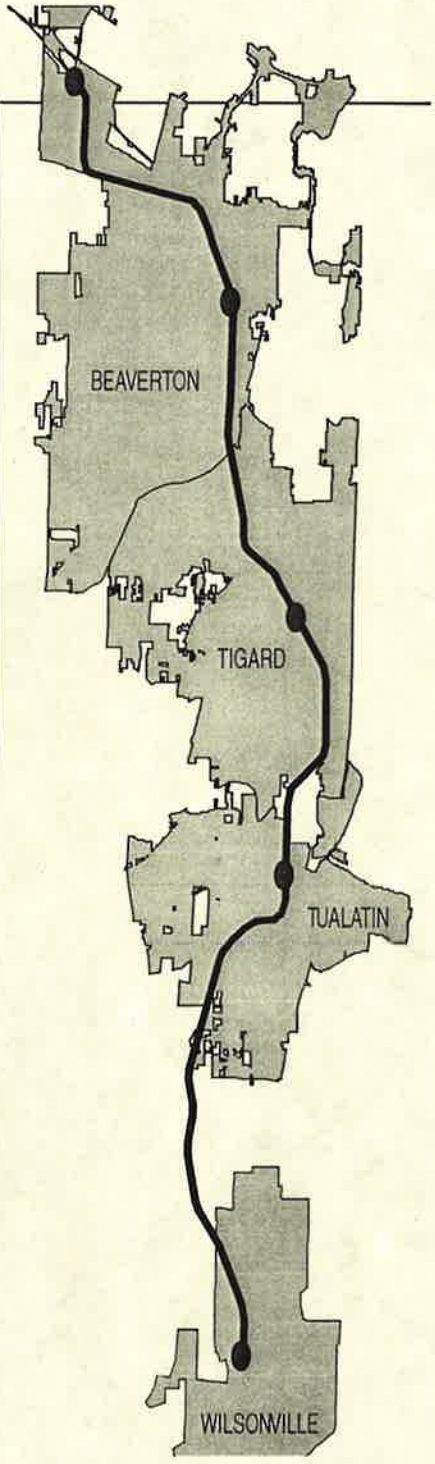
The Washington Square Station is located across the highway from Washington Square, in a Metro 2040-designated regional center. The area has a large regional shopping mall and several office towers. No secondary or induced impacts are expected from the proposed station.

3.16.1.5 Beaverton Station

The northern terminus of the Commuter Rail Line is the Beaverton Station. It is located in downtown Beaverton at the junction of the Beaverton Central LRT Station and Transit Center. The area consists of office, general commercial, and light industrial uses. Downtown Beaverton is a Metro 2040 town center and is considered a mixed-use regional employment and service center. As the downtown area is fairly developed, it is not expected that the proposed station would result in secondary or induced impacts.

Chapter 4

Finance



Wilsonville to Beaverton

Commuter Rail

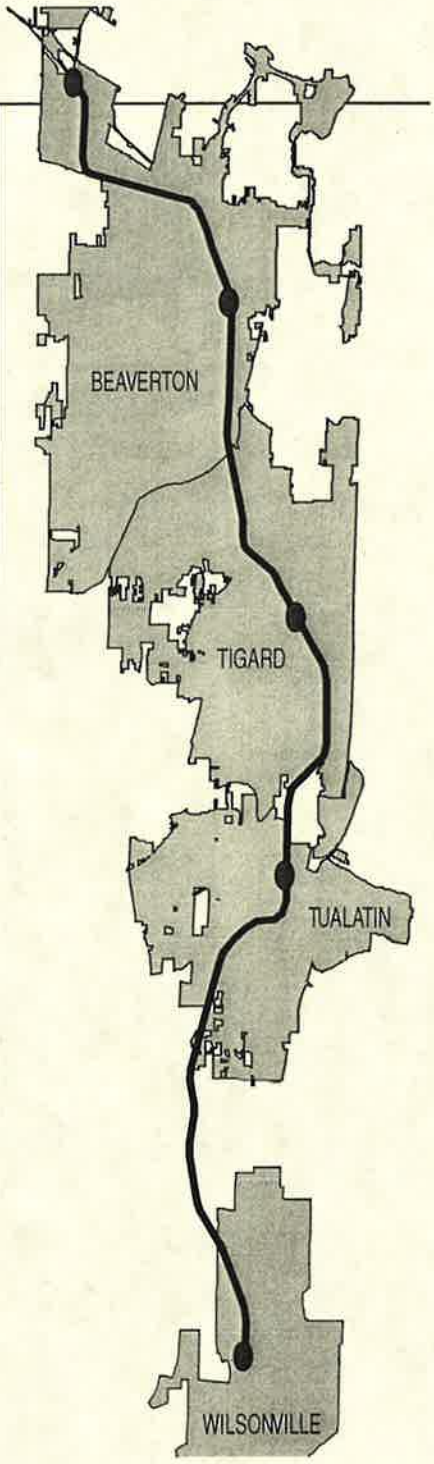
4.0 FINANCE PLAN

A finance plan for constructing and operating the commuter rail project will be developed during Preliminary Engineering (PE). Regarding capital costs, current thinking is that a funding amount up to, but no greater than, $24.9 million would be sought from the Federal Transit Administration (likely Section 5309 "New Start" funds) and the balance from state and local sources. Non-"New Start" options to be considered in PE include local funds from Washington County and cities served by the project, regional Surface Transportation Program (STP) funds, state lottery funds, and state STP and Congestion Management and Air Quality (CMAQ) funds.

Funding options for operations depend on the selection of the operator. Options to be considered in PE include farebox revenues, local funds from Washington County and the cities served by the project, Tri-Met/SMART funds (depending on selection of operator), and a special assessment district.

Chapter 5

Public Involvement



Wilsonville to Beaverton
Commuter Rail

5.0 PUBLIC INVOLVEMENT

5.1 PUBLIC OUTREACH

In order to gather public input for the corridor scoping and alternatives analysis, the following public outreach activities were undertaken:

- Two rounds of public meetings were held at five strategic locations, the first round in November 1999 and the second in February 2000;
- The County made presentations to about 15 civic groups;
- Press releases were sent to all Washington County media, including print, television and radio;
- Editorial board briefings were held with the Oregonian and the Times (Community Newspapers) and news articles on the project appeared subsequently in the Daily Journal of Commerce, the Times and the Oregonian;
- Paid advertisements describing the project and the scheduled public meetings were placed in the Oregonian, both Metro West and Southwest editions, and in five Times newspapers, Beaverton, Tigard, Tualatin, West Linn, and Lake Oswego;
- 1,500 flyers were printed; 700 were mailed first class to identified stakeholders, and 800 were hand delivered to major employers, city halls, libraries, and chambers of commerce along the corridor;
- Personal telephone calls were made to 40 key stakeholders, inviting them to one of the public meetings; and
- The press release was run prominently on Washington County's web page.

5.2 PUBLIC INVOLVEMENT

Round 1, Public Meetings

Between November 22 and December 1, 1999, the project team held five public meetings that drew over 100 citizens. Project team members provided a brief overview of the project history and the alternatives that were under consideration. Following the overview the audience was asked to comment on several issues. A comment form was also distributed. The issues included:

1. The Commuter Rail Alternative, including station locations
2. The Transportation System Management Alternative
3. Other possible alternatives and/or additional comments
4. Information requested for the next round of meetings

Commuter Rail Alternative. Input gathered on comment forms and during each public meeting demonstrated significant support for the Commuter Rail Alternative. For commuter rail to succeed, however, the public would expect it to provide seamless service. Seamless service includes coordination with existing transit services, including a fare system that was valid on all services, and improved feeder bus or shuttle service. Significant support was also expressed for possible expansion of the commuter rail service to other areas (north/south and east/west) and throughout the day.

Station locations were discussed for each city along the route. There was very little support for a northern station at Merlo. What support did exist was based on the assumption of a park & ride at the station and concern over traffic impacts in central Beaverton, which might result from a station at the Beaverton Transit Center (BTC). A northern station at BTC was supported because of the cost

factors. Because of this, they stressed that stations and park & rides should be flexible to meet future needs.

Modal Choice: Several participants felt that this was one of the most critical factors, and pointed out that there are not viable options to the car in this corridor.

Vehicle Miles Traveled: While some noted the significant difference between the Commuter Rail and TSM Alternatives on the reduction of VMT, others noted that total reduction in VMT was still very small in the context of total regional VMT.

Should Commuter Rail Be Evaluated As the Preferred Alternative and Is It Structured Appropriately?

Both verbal and written comments indicated strong support for the preliminary preferred alternative of commuter rail by the Steering Committee. Concerns were for the details of station location and park & ride locations, capacity, and traffic impacts.

Locations: The recommendation for locating the northern terminus at BTC was widely supported. The locations at Nimbus/Washington Square, Tigard, and Tualatin were also well received, with the understanding in Tualatin and Nimbus/Washington Square that there would be flexibility to move the station, if needed, in the future. The location of the station in Wilsonville was by far the primary subject of discussion at that meeting. The group continued to believe that two stations would be necessary for several reasons, including:

- Impacts of a 400-vehicle park & ride to the congested freeway interchanges and road system
- The regional importance of Wilsonville as the southern terminus of the line, and the need for riders from outlying areas to access the station
- The increasing regional importance of Wilsonville for housing, commercial, prison, and other development.

The group stressed that the location at Boeckman Road would be hard to justify without the new Boeckman interchange that has been proposed.

Parking: Participants at each meeting stated that the region has done a poor job of predicting the needed capacity of park & rides. They noted that a number of the park & rides developed recently are already undersized for the demand. Several urged the partners to provide parking for more and/or provide the flexibility to expand in the future.

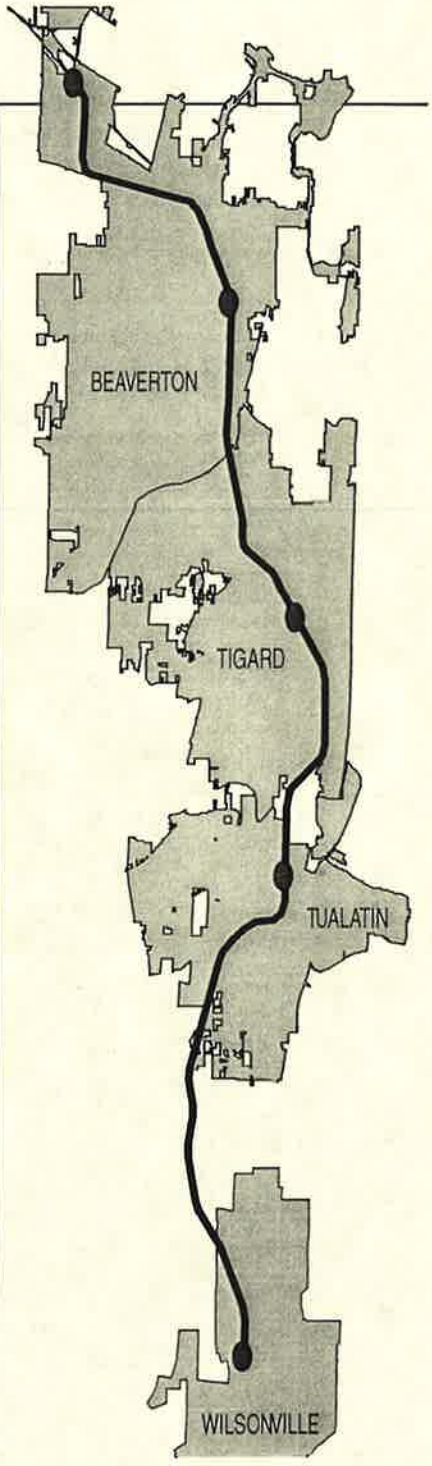
Traffic Impacts: Participants at most sites stressed that the environmental assessment needs to address potential traffic impacts of the park & rides.

Expandability: Many participants, as in the first round of meetings, urged the team to look at a larger service area and service for the full day, seven days a week.

Other Issues: Participants were pleased that the fares would be seamless with Tri-Met. Several stressed that the partners address unsafe crossings. To minimize cost, a few participants asked the team to be sure to explore all train options, including lower-powered traditional push/pull sets.

Chapter 6

Report Preparers



Wilsonville to Beaverton
Commuter Rail

6.0 REPORT PREPARERS

PUBLIC AGENCIES

Federal Transit Administration (FTA). Lead Federal agency for the National Environmental Policy Act (NEPA) review of the project

- Linda Gehrke, Deputy Regional Administrator
- Mitzi McMahan, Community Planner

Washington County. Lead Agency for the local NEPA analysis and applicant for all federal, state, and local permits.

- Kathleen Lehtola, Assistant Director, Land Use & Transportation

Tri-Met. Lead local agency responsible for the Environmental Assessment.

- David Zagel, Planner

Oregon Department of Transportation. Cooperating State agency responsible for reviewing the Environmental Assessment.

- Mark Wigg, Project Manager, Environmental Services
- Ed Immel, State Rail Planner, Rail Division
- Rosalind Keeney, Cultural Resource Specialist

Metro. Cooperating local agency responsible for reviewing the Environmental Assessment.

- Sharon Kelley, Transportation Planning Supervisor
- John Cullerton, Transportation Planning Supervisor
- Randy Parker, Transportation Planner

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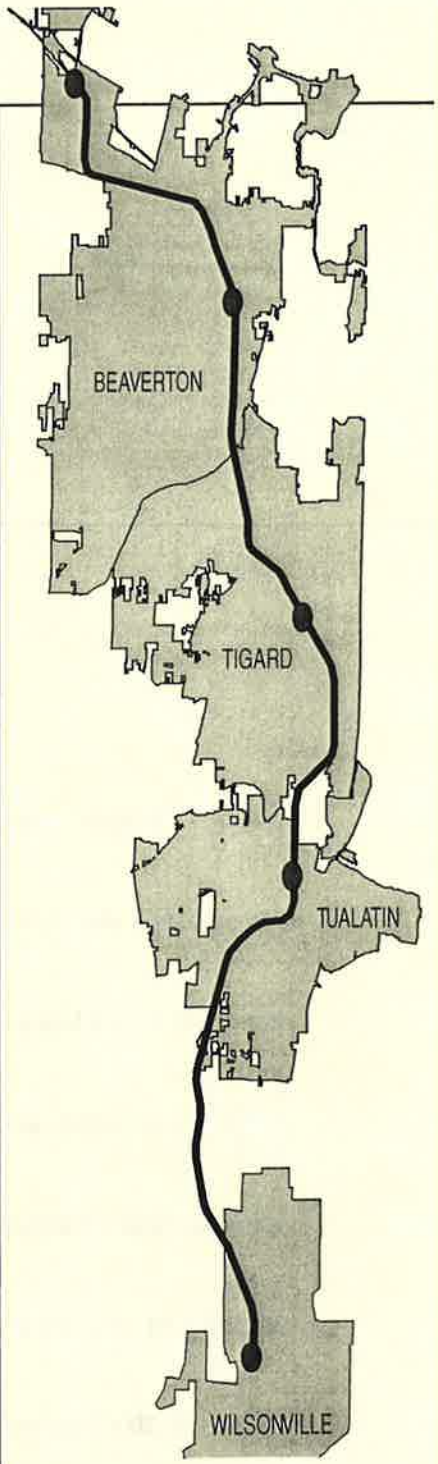
The Larkin Group, Inc. Alternatives Analysis

- Geoff Larkin, Commuter Rail Project Manager, Principal

Chapter 7

References Cited/ Agencies Consulted



Wilsonville to Beaverton Commuter Rail

8.0 LIST OF RECIPIENTS

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Tigard, Oregon 97223

Mayor Lou Ogden
City of Tualatin
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Mr. Ross Roberts
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Portland, Oregon 97232-2736

Commissioner Roy Rogers
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Hillsboro, Oregon 97124

Mr. Thomas Vanderzanden
Clackamas County Planning
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Clackamas, Oregon 97015

Mr. Randy Wooley
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Mr. David Zagel
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Portland, Oregon 97232

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Beaverton, Oregon 97008

Hillsboro Public Library
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Hillsboro, Oregon 97123

Tigard Library
13125 S.W. Hall Blvd.
Tigard, Oregon 97223

Tualatin Library
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Tualatin, Oregon 97062

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Director of Joint Facilities & Passenger Operations
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Omaha, Nebraska 68179

Mr. Robert Melbo
Portland & Western Railroad
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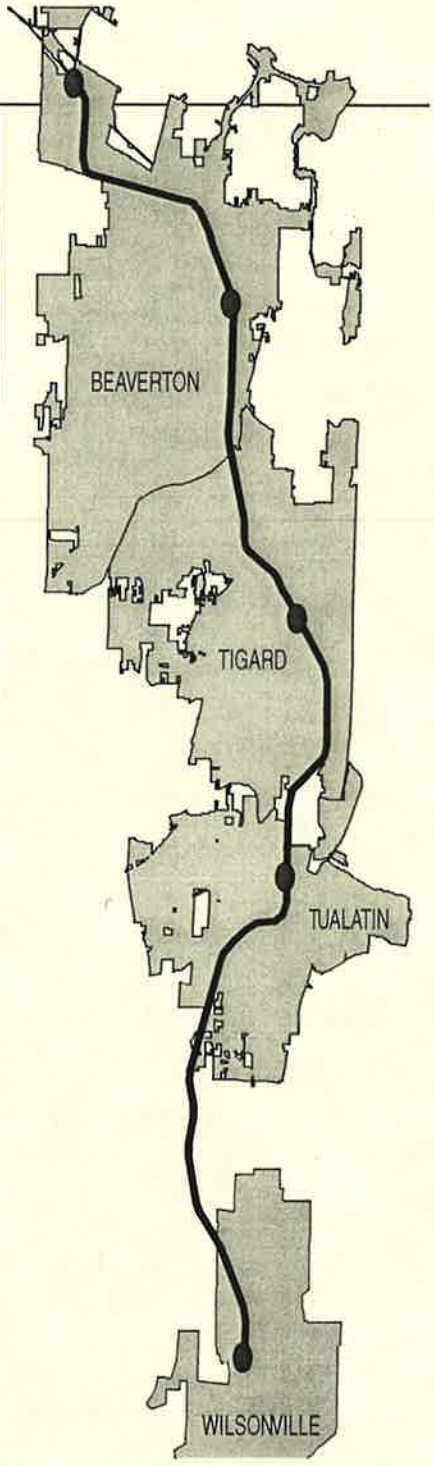
Albany, Oregon 97321

Chapter 9

Summary of Proposed Mitigation Measures



Wilsonville to Beaverton

Commuter Rail

9.0 SUMMARY OF PROPOSED MITIGATION MEASURES

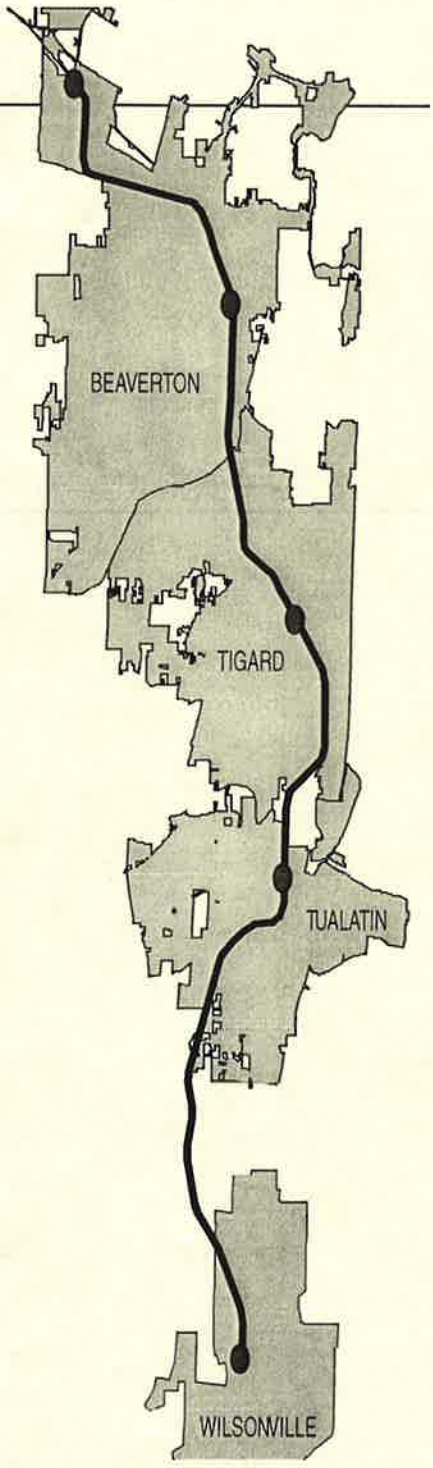
Section	Proposed Mitigation Measures
Traffic and Transportation	
Transit	▪ Consideration of alternate bus routes to southbound Lombard Avenue and the future east-west street south of the Beaverton Transit Center ▪ Expand bus service to proposed stations to accommodate increased demand
Roadway Network	▪ Install rail pre-exempt traffic signal controllers at seven intersections ▪ Modify the traffic signal controller software at 20 intersections to allow for a fixed return phase following rail pre-emption ▪ Provision traffic signal interconnect conduit across all rail crossings ▪ Extension of southbound Upper Boones Ferry Road southbound right turn lane to 275 feet ▪ Provision of train signaling equipment that notifies departing trains of appropriate timing windows of least impact ▪ Coordination with ODOT rail to minimize rail crossing gate impacts from 40-50 seconds rather than 50-60 seconds
Parking	▪ Addition of spaces at stations ▪ Arranged shared-use with adjacent businesses ▪ Parking restrictions for on-street spaces ▪ Increased enforcement of parking restrictions ▪ Installation of parking meters
Bicycles and Pedestrians	▪ Maintain existing bicycle and pedestrian facilities
Air Quality	▪ No mitigation measures are necessary
Noise	▪ No vibration impacts, no mitigation measures are necessary
Land Use and Planning Policy	▪ No specific land use mitigation measures are proposed ▪ Station and park & ride designs will comply with local plans, design and development standards
Biology	▪ Fill-removal permit from the Oregon Division of State Lands and the U.S. Army Corp of Engineers for fill activities ▪ Wetland mitigation plan to compensate for loss of wetlands, including credit purchase from the Unified Sewerage Agency's (USA) Fernhill Wetland Mitigation Bank
Water Quality/ Resources	▪ Obtain a service provider letter from USA or designated city specifying conditions and applicant requirements for water quality protection ▪ Receive stormwater connection permit from USA ▪ Construction or funding of permanent water quality facilities to reduce contaminants entering the storm and surface water system ▪ Follow Best Management Practices or Stormwater Master Plan requirements approved by jurisdictions or USA
Environmental Hazards	▪ Washington County will ensure that construction methods minimize or prevent the mixing or potential cross-contamination of soil or groundwater ▪ A groundwater handling plan and standard construction dewatering permit will be prepared prior to construction to handle any groundwater generated from construction will be handled ▪ A soil mitigation plan will be prepared to address the proper handling and disposal of contaminated soil

Section	Proposed Mitigation Measures
Environmental Hazards (continued)	▪ Washington County will ensure that prior to construction, modifications, repairs, or maintenance of the Tualatin River Railroad Bridge that specifications describing the process for removing and disposing of the lead-containing paint will be prepared and the paint properly removed and disposed
Historic and Cultural Resources	▪ No archaeological resources exist requiring mitigation ▪ If archaeological resources are found, avoidance, monitoring, or data recovery excavations would be required ▪ Minimize short-term construction impacts on the two historic resources
Safety and Security	▪ Strict adherence to design elements meeting ADA standards to alleviate potential automobile crime ▪ Rail operator will work with local police to ensure that adequate security is provided at park & ride locations ▪ Provide grade-separated or signalized and gated crossings to avoid potential pedestrian conflicts ▪ Replacement of crossing panels, improvements in the signal system, and installation of gates at specific locations ▪ Develop plans for regular maintenance of the right-of-way, assuring adequate sight distances at private crossings
Environmental Justice Considerations	▪ No mitigation measures are necessary
Energy	▪ No mitigation measures are necessary
Land Acquisition	▪ Compensate property owners for any additional right-of-way required by project ▪ Assist displaced business to find comparable and suitable location space ▪ Property purchase and relocation will be done in accordance with FTA's established policies and procedures
Social and Economic Effects	▪ No mitigation measures are necessary
Visual and Aesthetic Effects	▪ Buffer and screen impacts from sensitive areas ▪ Use the new rail facilities to integrate site into existing neighborhood or streetscape ▪ Prevent or reduce the loss of visual resources
Construction Impacts and Mitigations	
Traffic and Transportation	▪ Transit impacts partially mitigated by staging construction and working at night ▪ Roadway network impacts mitigated by staging construction and working at night ▪ Replacement of existing crossing gates with up-to-date grade-crossing panels ▪ Bicycle and pedestrian impacts would only be temporary and would not require mitigation
Air Quality	▪ All heavy-duty equipment and diesel engines will be maintained to minimize emissions ▪ Fugitive dirt would be minimized by covering all piles of fill dirt where feasible, maintaining roadways/areas within the site, maintaining low speeds, and watering surfaces that might produce dust ▪ All vehicles used will be in compliance with Washington County emission levels
Noise	▪ No mitigation measures are necessary
Land Use	▪ No mitigation measures are necessary
Biology	▪ Plans and permits in compliance with USA of Washington County's Storm and Surface Water Rules (Section 3.02) required for any construction in vegetated corridors ▪ Construction will minimize or avoid wetland impacts from Dakota Street north to Farmington Road

Section	Proposed Mitigation Measures
Water Quality	▪ National Pollutant Discharge Elimination System (NPDES) 1200-C stormwater discharge permit required for construction activities of five or more acres ▪ Oregon Department of Environmental Quality approved erosion and sediment control plan ▪ Minimizing and protecting areas of exposed soil; diverting soil flow from exposed areas;maximizing preservation of vegetation or revegetating, reducing sediment laden runoff; conducting regular maintenance of vehicles and machinery; preventing spills and minimizing exposure of runoff to spills, cleaning, and maintenance activities.
Environmental Hazards	▪ Washington County will ensure that construction methods minimize or prevent the mixing or potential cross-contamination of soil or groundwater ▪ A groundwater handling plan and standard construction dewatering permit will be prepared prior to construction to handle any groundwater generated from construction will be handled ▪ A soil mitigation plan will be prepared to address the proper handling and disposal of contaminated soil ▪ Washington County will ensure that prior to construction, modifications, repairs, or maintenance of the Tualatin River Railroad Bridge that specifications describing the process for removing and disposing of the lead-containing paint will be prepared and the paint properly removed and disposed
Historic and Cultural Resources	▪ If archaeological resources are found, avoidance, monitoring, or data recovery excavations would be required ▪ Minimize short-term construction impacts on the two historic resources
Safety and Security	▪ No mitigation measures are necessary
Environmental Justice	▪ No mitigation measures are necessary
Energy	▪ Minimal impacts during construction would require no mitigation measures
Land Acquisition	▪ No mitigation measures are necessary
Social and Economic Effects	▪ No mitigation measures are necessary
Visual and Aesthetic Effects	▪ Impacts would be short-term and no mitigation measures are necessary

Appendix A

Traffic and Transportation



Wilsonville to Beaverton
Commuter Rail

LEVEL OF SERVICE
FOR
SIGNALIZED INTERSECTIONS

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption and lost travel time. Specifically, level of service *(LOS)* criteria are stated in terms of average stopped delay per vehicle in a fifteen-minute analysis period. The level of service criteria is represented in letters ranging from LOS A (free-flowing traffic without interruptions) to LOS F (stop and go, bumper to bumper traffic).

LOS A: Describes operations with very low delays, up to 5 seconds per vehicle. Most vehicles arrive during the green phase. Most vehicles do not stop at all.

LOS B: Describes operations with delays greater than 5 and up to 15 seconds per vehicle. More vehicles stop than LOS A, causing higher levels of average delay.

LOS C: Describes operations with delays greater than 15 and up to 25 seconds per vehicle. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D: Describes operations with delays greater than 25 and up to 40 seconds per vehicle. At LOS D the influence of congestion becomes more noticeable. Many vehicles stop and the proportion of vehicles not stopping declines.

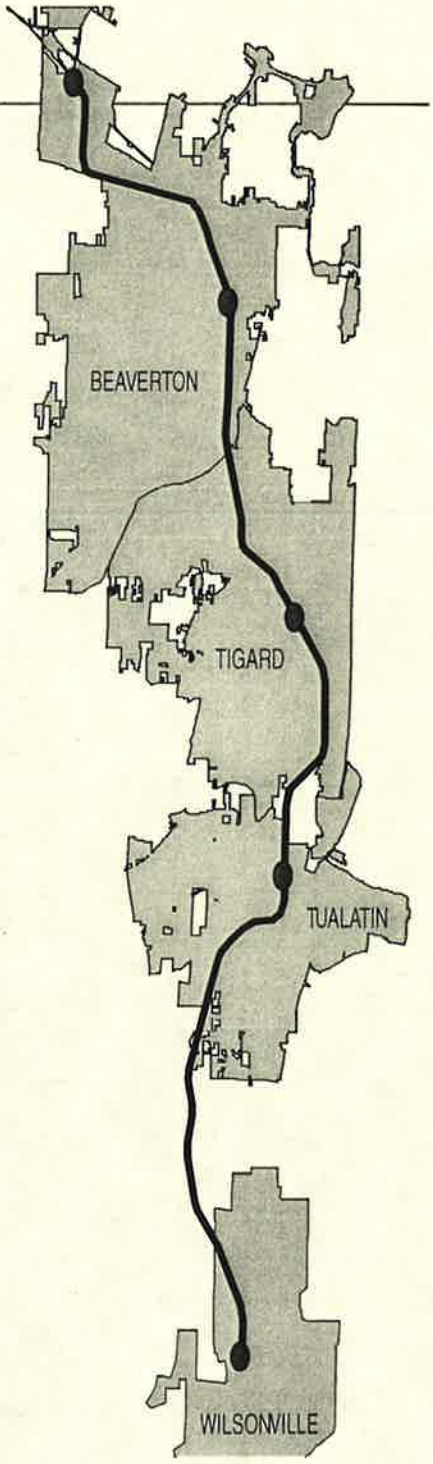
LOS E: Describes operations with delays greater than 40 and up to 60 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay.

LOS F: Describes operations with delays in excess of 60 seconds per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation; that is, when vehicle flow rates exceed the capacity of the intersection

Source: Highway Capacity Manual. Third Edition, Special report 209, Transportation Research Board, National Research Council, Washington D.C. 1997

Appendix B

Biology



Wilsonville to Beaverton
Commuter Rail

Wash Co. 1A

Oregon NATURAL HERITAGE PROGRAM

A Cooperative Project of :

821 SE 14th Avenue
Portland, Oregon 97214-2537
(503) 731-3070
FAX (503) 230-9639

February 28, 2000

Gail Shaloum
URS Corporation
111 SW Columbia, Suite 900
Portland, OR 97201-5814

Dear Ms. Shaloum:

Thank you for requesting information from the Oregon Natural Heritage Program (ONHP). We have conducted a data system search for rare, threatened and endangered plant and animal records for the Proposed Commuter rail project in Washington County.

Twenty-one (21) records were noted within a five-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

Please note that at this time ONHP does not have computerized records available for all anadromous fish in Oregon. I have listed below the species which may be present within the waterways contained in the project area. I have also included their listing by the National Marine Fisheries Service (NMFS). For more information on anadromous fish you may wish to contact NMFS at: 525 NE Oregon Street; Portland, Oregon 97232-2737.

Chinook salmon (Upper Willamette River) *Oncorhynchus tshawytscha* Threatened

This data is confidential and for the specific purposes of your project and is **not to be distributed.**

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Terry Campos
Conservation Information Assistant

encl: invoice

KEY TO PRINTOUT

NAME AND COMMON NAME: The scientific and common name of the species.
EO-CODE (element occurrence code): Unique Heritage Program code for this occurrence. The first 10 characters are the code for the species, and the last 3 are the occurrence number.
COUNTY(S): County name(s)
QUAD NAMES: Name of the USGS topographic quadrangle map(s) where the record is mapped.
PHYSIOGRAPHIC PROVINCE: Code for physiographic province. CR=Coast Range, WV=Willamette Valley, KM=Klamath Mountains, WC=West slope and crest of the Cascades, EC=East slope of the Cascades, BM=Ochoco, Blue and Wallowa Mts., BR=Basin and Range, HP=High Lava Plains, OU=Owyhee uplands, CB=Columbia Basin.
T-R-S: Township, Range and Section, with township first, range second and section third (a space appears between range and section). 004S029E 32 = Township 4S, Range 29E, Section 32. Fractional townships and ranges are further defined in the T-R COMMENTS field.
T-R-S COMMENTS: Comments relating to township, range or section(s), e.g. SE4NE4 or SENE=SE 1/4 of the NE 1/4
LASTOBS: Last reported sighting date, in the form YYYY-MM-DD
FIRSTOBS: First reported sighting date for this occurrence in the form YYYY-MM-DD
LAT: latitude, North
LONG: longitude, West
QUADCODE: Heritage Program code for the USGS topo map
FED STATUS: US Fish and Wildlife Service status. LE=listed endangered, LT=listed threatened, PE or PT=proposed endangered or threatened, C=candidate for listing with enough information available for listing, SOC=species of concern.
STATE STATUS: For animals, Oregon Department of Fish and Wildlife status; LE=listed endangered, PE=proposed endangered, PT=proposed threatened, SC or C=sensitive-critical, SV or V=sensitive-vulnerable, SP or P=sensitive peripheral or naturally rare, SU or U=sensitive-undetermined. For plants, Oregon Department of Agriculture status; LE=listed endangered, LT=listed threatened, C=candidate.
SIZE: in acres, whole numbers. 0=unknown
MINELEV: Minimum elevation, in feet.
MAXELEV: Maximum elevation in feet.
PRECISION: Second (S)=exact location, Minute (M)=location known to nearest 1.5 miles, General (G)=location known to nearest 5 miles.
EO-RANK/COMM: Relative quality of this occurrence (A=best site, B=good population or site, C=fair or small population, D=marginal or destroyed occurrence)
DIRECTIONS: Site name and direction to site
DESCRIPTION: Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.
EO-DATA: Species and population biology - numbers, age, nesting success, vigor, phenology, disease, pollinators, etc.
EOTYPE: For animals, type of occurrence, e.g. roost, nest, etc.
COMMENTS: Miscellaneous comments
ANNUAL OBSERVATIONS: Summary of yearly observations
OWNER: federal, state, private, etc.
MANAGED AREA: BLM district, USFS Forest, Private Preserve, etc.
MANAGE COMM: Comments on how the site is managed.
PROT COMM (Protection Comments): Comments regarding protectibility and threats.
BEST SOURCE: Best source of information for this occurrence.

NAME: RANA AURORA AURORA
COMMON NAME: NORTHERN RED-LEGGED FROG
EO-CODE: AAABH01021*003 LAST OBS: 1990-04-06 FED STATUS: SOC
COUNTY(s): WASHINGTON FIRST OBS: 1990 STATE STATUS: SUSV
QUAD NAMES: LINNTON LAT: 453050N SIZE: 100
PHYSIOGRAPHIC PROV: WV LONG: 1224650W MINELEV (Feet): 350
T-R-S: 001S001W 02 QUADCODE: 4512257 MAXELEV (Feet):
T-R-S COMMENTS: SW4NW4 PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: JOHNSON CREEK; PATH AT END OF TAYLOR ST., OFF LEAHY, PATH TO WEST THEN SOUTH TO FIRE RD AND CROSSING OF JOHNSON CREEK BETWEEN MH #13360 & MH #13362.
DESCRIPTION: RELATIVELY UNDISTURBED MIXED FOREST & STREAM SYSTEM SURROUNDED BY RESIDENTIAL DEVLOPMENT & FREEWAY. ASSOC. W/THUJA PLICATA, ALNUS RUBRA, ACER MACROPHYLLUM, A. CIRCINATUM, LYSICHITUM AMERICANUM, CAREX OBNUPTA, RANUNCULUS REPENS
EO-DATA: 1990: 6 OBSERVED IN 100 ACRES. PROBABLE BREEDING CONCENTRATION. POPULATION IS LIMITED BY SURROUNDING RESIDENCES.
EOTYPE:
COMMENTS: PALUSTRINE EMERGENT WETLANDS OCCUR WITHIN THE JOHNSON CREEK CORRIDOR ADJACENT TO THE CHANNEL. ALTHOUGH THE WETLANDS WERE PROBABLY RELOCATED BY THE INSTALLATION OF THE SEWER, WATER TEMPERATURES REMAIN COOL PROBABLY BECAUSE 1) THEY'RE SHADED BY STEEP NORTH-FACING SLOPES AND REMAINING MATURE FOREST 2) THEY'RE FED BY AT LEAST TWO UNDISTURBED TRIBUTARIES. THESE TRIBUTARIES ARE COOL ENOUGH TO SUPPORT A DISJUNCT POPULATION OF SALMO CLARKI.
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM: THREATS: INSTALLATION OF SEWER & RANA CATESBIANA IN DOWNSTREAM POND.
BEST SOURCE: CORKRAN, CHAR; CHRIS THOMAS; NORTHWEST ECOLOGICAL RESEARCH INSTITUTE.

NAME: ONCORHYNCHUS MYKISS POP 20
COMMON NAME: UPPER WILLAMETTE RIVER STEELHEAD
EO-CODE: AFCHA0209U*016 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): WASHINGTON FIRST OBS: STATE STATUS: SV
MULTNOMAH
QUAD NAMES: LAKE OSWEGO LAT: SIZE:
BEAVERTON
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512246 MAXELEV (Feet):
4512247
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS:
DESCRIPTION:
EO-DATA: WINTER RUN: ODFW DISTRIBUTIION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: SPAWNING & REARING - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF STEELHEAD IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 1999 ODFW GEOGRAPHIC RESOURCES DATA; BENNETT, DON; MASSEY, JAY

NAME: CORYNORHINUS TOWNSENDII TOWNSENDII
COMMON NAME: PACIFIC WESTERN BIG-EARED BAT
EO-CODE: AMACC08015*075 LAST OBS: FED STATUS: SOC
COUNTY(s): WASHINGTON FIRST OBS: STATE STATUS: SC

QUAD NAMES: BEAVERTON
PHYSIOGRAPHIC PROV: WV
T-R-S: 002S001W 02
T-R-S COMMENTS:
EO-RANK/COMM: :
DIRECTIONS: TIGARD
DESCRIPTION:
EO-DATA: MUSEUM COLLECTION HOUSED AT PUGET SOUND MUSEUM OF NATURAL HISTORY (PSMNH), DATE & COLLECTOR NOT SPECIFIED
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: MASER & CROSS. 1981. NOTES ON THE DISTRIBUTION OR OREGON BATS
LAT: 452550N
LONG: 1224630W
QUADCODE: 4512247
SIZE: 0
MINELEV (Feet): 150
MAXELEV (Feet):
PRECISION: G

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*060
COUNTY(s): MULTNOMAH
QUAD NAMES: PORTLAND
PHYSIOGRAPHIC PROV: WV
T-R-S: 001N001E 31
T-R-S COMMENTS: SW4NE4 [TRS NOT GIVEN]
EO-RANK/COMM: :
DIRECTIONS: PORTLAND AUDUBON SOCIETY POND, 5151 NW CORNELL RD.
DESCRIPTION:
EO-DATA: 1991: 1 INDIVIDUAL OBSERVED.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BRUCE, CHARLIE. ODFW.
LAST OBS: 1991-08-09
FIRST OBS: 1991-08-02
LAT: 453141N
LONG: 1224350W
QUADCODE: 4512256
FED STATUS:
STATE STATUS: SC
SIZE:
MINELEV (Feet): 450
MAXELEV (Feet):
PRECISION: S

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*058
COUNTY(s): MARION
QUAD NAMES: WOODBURN
PHYSIOGRAPHIC PROV: WV
T-R-S: 004S001W 12
T-R-S COMMENTS: [TRS NOT GIVEN]
EO-RANK/COMM: :
DIRECTIONS: AURORA AIRPORT ROAD NE, 1.7 MI S ARNDT RD AT EAST END ARBERS RD NE.
DESCRIPTION:
EO-DATA: 1993: 33 INDIVIDUALS OBSERVED; 1991: 16 INDIVIDUALS OBSERVED.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BRUCE, CHARLIE. ODFW.
LAST OBS: 1993-08-19
FIRST OBS: 1991-08-10
LAT: 451417N
LONG: 1224533W
QUADCODE: 4512227
FED STATUS:
STATE STATUS: SC
SIZE:
MINELEV (Feet): 180
MAXELEV (Feet):
PRECISION: M

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*061
LAST OBS: 1965-04-10
FED STATUS:

COUNTY(s): MULTNOMAH
QUAD NAMES: PORTLAND
PHYSIOGRAPHIC PROV: WV
T-R-S: 001S001E 5
T-R-S COMMENTS: NW4 [TRS NOT GIVEN]
EO-RANK/COMM: :
DIRECTIONS: HOYT PARK, FAIRVIEW BOULEVARD.
DESCRIPTION:
EO-DATA: 1965: 1 INDIVIDUAL COLLECTED
EOTYPE:
COMMENTS: OBSERVER: CAVANAGH, R. PORTLAND STATE UNIVERSITY SPECIMEN #002431.
ANNUAL OBSERVATION:
OWNER: CITY
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BRUCE, CHARLIE. ODFW.

FIRST OBS: 1965-04-10
LAT: 453100N
LONG: 1224253W
QUADCODE: 4512256

STATE STATUS: SC
SIZE:
MINELEV (Feet): 770
MAXELEV (Feet):
PRECISION: M

NAME: CLEMMYS MARMORATA MARMORATA
COMMON NAME: NORTHWESTERN POND TURTLE
EO-CODE: ARAAD02031*363
COUNTY(s): WASHINGTON
QUAD NAMES: BEAVERTON
PHYSIOGRAPHIC PROV: WV
T-R-S: 001S001W 27
T-R-S COMMENTS: NW4SE4
EO-RANK/COMM: :
DIRECTIONS: GEMINI POND IN GREENWAY PARK. FROM HIGHWAY 217 TAKE SCHOLLS FERRY RD EXIT TURN RIGHT ONTO NIMBUS, THEN LEFT ONTO GEMINI DRIVE. POND CAN BE ACCESED FROM PARKING LOT OF 4TH BUILDING AFTER TURNING OFF NIMBUS.
DESCRIPTION: POND APPROX 500' X 200' NEAR FANNO CREEK, SHALLOW (>3'). MAY BE A MITIGATION SITE. SPARSE AQUATIC VEGETATION (CURLY-LEAFED POND WEED) SMALL ISLAND IN POND.
EO-DATA: 1996: 1 ADULT MALE
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: CITY
MANAGED AREA:
MANAGE COMM:
PROT COMM: OTHER THAN RIPARIAN CORRIDOR OF CREEK, AREA IS DEVELOPED ON ALL SIDES.
BEST SOURCE: BARCLAY, ELAINE. TUALATIN PARKS & REC. DIST

LAST OBS: 1996-06-10
FIRST OBS: 1996-06-10
LAT: 452715N
LONG: 1224730W
QUADCODE: 4512247

FED STATUS: SOC
STATE STATUS: SC
SIZE:
MINELEV (Feet): 150
MAXELEV (Feet):
PRECISION: M

NAME: CLEMMYS MARMORATA MARMORATA
COMMON NAME: NORTHWESTERN POND TURTLE
EO-CODE: ARAAD02031*255
COUNTY(s): WASHINGTON
QUAD NAMES: BEAVERTON
PHYSIOGRAPHIC PROV: WV
T-R-S: 001S001W 13
T-R-S COMMENTS:
EO-RANK/COMM: :
DIRECTIONS: POND NE ON SCHOLL'S FERRY RD, 0.2 MI SE OF NICHOL RD, MAPPED AT THE OREGON EPISCOPAL SCHOOL POND ALONG FANNO CREEK OFF NICOL RD.
DESCRIPTION: POND
EO-DATA: 1 TURTLE
EOTYPE:
COMMENTS: HOLLAND SITE: OR 465W
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOLLAND, D.C. 1993. A SYNOPSIS OF THE DISTRIBUTION AND CURRENT STATUS OF THE WESTERN POND TURTLE (CLEMMYS

LAST OBS: 1991-08-07
FIRST OBS: 1991-08-07
LAT: 452840N
LONG: 1224525W
QUADCODE: 4512247

FED STATUS: SOC
STATE STATUS: SC
SIZE:
MINELEV (Feet): 220
MAXELEV (Feet):
PRECISION: M

MARMORATA) IN OREGON. UNPUBLISHED REPORT FOR ODF&W.

NAME: MEGOMPHIX HEMPHILLI
COMMON NAME: OREGON MEGOMPHIX (SNAIL)
EO-CODE: IMGASB2020*008 LAST OBS: 1996-06-29 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1996-06-03 STATE STATUS:
QUAD NAMES: LAKE OSWEGO LAT: 452713N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224008W MINELEV (Feet): 340
T-R-S: 001S001E 27 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: SE4NW4NW4SE4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: 5.82 KM E AND 2.25 KM N OF THE SW CORNER OF MULTNOMAH CO AT THE NORTH EDGE OF LEWIS & CLARK COLLEGE.
DESCRIPTION: UNDER BIGLEAF MAPLE LEAF LITTER NEXT TO ROTTEN LOGS; BIGLEAF MAPLE CANOPY WITH RESIDUAL OLD GROWTH HEMLOCK AND YOUNG CEDAR.
EO-DATA: 1996: 5 SHELLS FOUND 06-03; 9 SHELLS AND ONE LIVE SNAIL FOUND ON 06-29.
EOTYPE:
COMMENTS: OBSERVERS: APPLEGARTH
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: APPLEGARTH, JOHN. 1996. WILDLIFE OBSERVATION REPORT.

NAME: CIMICIFUGA ELATA
COMMON NAME: TALL BUGBANE
EO-CODE: PDRAN07030*051 LAST OBS: 1990-07-11 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1990 STATE STATUS: C
QUAD NAMES: LAKE OSWEGO LAT: 452944N SIZE: 1
PHYSIOGRAPHIC PROV: WV LONG: 1224145W MINELEV (Feet): 800
T-R-S: 001S001E 09 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: NE4SW4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: SENTINEL HILL, PORTLAND, JUST EAST OF POWERLINE BELOW INTERSECTION OF FAIRMOUNT BLVD. AND MARQUAM HILL RD.
DESCRIPTION: NORTH FACING SLOPE 2 METERS ABOVE SMALL INTERMITTENT STREAM: ACMA OVERSTORY, WITH ACCI, COCO, SYAL, POMU. THICK CARPET OF IVY COVERING THE GROUND.
EO-DATA: 1 PLANT, IN FLOWER.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM: THREATS: DEVELOPMENT, IVY ENCROACHMENT.
BEST SOURCE: ED ALVERSON, TNC

NAME: CIMICIFUGA ELATA
COMMON NAME: TALL BUGBANE
EO-CODE: PDRAN07030*114 LAST OBS: 1994-05-13 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1994-05-13 STATE STATUS: C
QUAD NAMES: LAKE OSWEGO LAT: 452412N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224015W MINELEV (Feet): 360
T-R-S: 002S001E 15 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: NE4NW4 SEC 15 (NOTE: SECT 45 ON TNC MAP) PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: FROM DOWNTOWN LAKE OSWEGO, PROCEED S, TURN R ON MCVAY; GO ACROSS OSWEGO LAKE OUTLET, UP HILL, TURN L ON CORNWALL, PROCEED JUST >1/4 MI TO INT. W/ LARCH ST (WHICH GOES LEFT). CIEL IS ABOUT 100 FT S OF LARCH ST INTERSECTION, ABOUT 15 FT E OF CORNWALL ST SHOULDER.
DESCRIPTION: PSME, ACMA, ALRU/COCOC, ACCI, SARA/POMU, HYTE. ADDL ASSOCIATES: VACCINIUM PARVIFLORUM, OEMLERIA CERASIFORMIS, ATHYRIUM FILIX-FEMINA, RUBUS URSINUS, GERANIUM ROBERTIANUM, ADIANTUM PEDATUM, TRILLIUM OVATUM. LOWER SLOPE, FILTERED LIGHT, MOIST LOCATION. SUBSTRATE UNKNOWN, PROBABLY SILTY CLAY LOAM.

EO-DATA: 1-10 MATURE PLANTS IN BUD STAGE IN <1 M2 AREA
EOTYPE:
COMMENTS: 1994 SIGHTING REPORT; RICHARD BRAINERD & BRUCE NEWHOUSE (SALIX ASSOC), REPORTERS
ANNUAL OBSERVATION:
OWNER: UNKNOWN
MANAGED AREA:
MANAGE COMM:
PROT COMM: POTENTIALLY PROTECTED AS CITY OF L.O. GOAL 5 RESOURCE SITE #TG-6. ROADSIDE SPRAYING IS POTENTIAL THREAT.
BEST SOURCE: BRAINERD, RICHARD; BRUCE NEWHOUSE

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*018 LAST OBS: 1990-05-30 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1989 STATE STATUS: LE
QUAD NAMES: CANBY LAT: 451820N SIZE: 3
PHYSIOGRAPHIC PROV: WV LONG: 1224038W MINELEV (Feet): 275
T-R-S: 003S001E 15 QUADCODE: 4512236 MAXELEV (Feet):
T-R-S COMMENTS: SW4SW4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: PETE'S MOUNTAIN ROAD. FROM WEST LINN HEAD SOUTH ON PETE'S MOUNTAIN ROAD TO PEACH CORE RD. THE SITE IS ON THE SOUTH SIDE OF THE ROAD APPROXIMATELY 50-100 METERS FROM THE JUNCTION OF PETE'S MTN. ROAD AND PEACH CORE ROAD
DESCRIPTION: MODERATELY SHALLOW SOILED SITE WITH OAK SAVANNA. LARGE OLD OAKS. 10-20% SLOPE, FACING SW.
EO-DATA: 200-1000 PLANTS, ONE OF THE LARGEST POPULATIONS. PLANTS NOT YET IN FLOWER, BUT ABOUT TO BLOOM.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: MACDONALD, CATHY; ED ALVERSON

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*009 LAST OBS: 1988-06-16 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1988 STATE STATUS: LE
QUAD NAMES: LAKE OSWEGO LAT: 452450N SIZE: 2
PHYSIOGRAPHIC PROV: WV LONG: 1224125W MINELEV (Feet): 150
T-R-S: 002S001E 09 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: W OF DIAMOND HEAD-[SEE SR FOR MORE SPECIFIC RELOCATION DIRECTONS]
DESCRIPTION: E FACING, CLIFF AT UPPER AND MID-SLOPE
EO-DATA: 300-400 PLANTS IN 100 SQ MI - 1 HA. IN BUD AND FLOWER
EOTYPE:
COMMENTS: 1988 SUGHTING REPORT, EDWARDS, ANN, TNC
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: EDWARDS REPORT

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*003 LAST OBS: 1988-06-16 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1988 STATE STATUS: LE
QUAD NAMES: LAKE OSWEGO LAT: 452435N SIZE: 6
PHYSIOGRAPHIC PROV: WV LONG: 1224155W MINELEV (Feet): 150
T-R-S: 002S001E 09 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: S

EO-RANK/COMM: A :
DIRECTIONS: PHANTOM BLUFFS, S SHORE LAKE OSWEGO.
DESCRIPTION: BASALT CLIFFS, W/LICHENS, MOSSES, SOME FORBS FERNS & GRASSES
EO-DATA: 3 POPULATIONS: 200-300, 2000-2500, 2-3000. IN BUD & FLOWER. ALSO HERB COLL: PIPER, #2566, 5-24-19, UC; PECK #13185, 5-1919 & #9250, WLLU; GORMAN & NELSON, 1919. ALSO OBSERVED BY SIDDALL 1977.
EOTYPE:
COMMENTS: 1988 SR, EDWARDS, ANN. TNC STEWARDSHIP
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: EDWARDS FIELD SURVEY.

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*025 LAST OBS: 1999-06 FED STATUS: SOC
COUNTY(s): WASHINGTON FIRST OBS: 1997-? STATE STATUS: LE
QUAD NAMES: BEAVERTON LAT: 452643N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1225226W MINELEV (Feet):
T-R-S: 001S002W 36 QUADCODE: 4512247 MAXELEV (Feet):
T-R-S COMMENTS: NE4 PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SOUTH SIDE COOPER MT. DIRT ROAD OFF OF STONE CREEK DRIVE
DESCRIPTION: OAK SCRUB COMMUNITY. FAIRLY NATIVE. ROCKY HABITAT
EO-DATA: 100'S TO 1000'S
EOTYPE:
COMMENTS: 1999 PHONE CALL FROM STEVE NELSON, FOR RICK HARDING WHO WAS SETTING ODA PEST MONITORING TRAPS. PROBABLY SAME SITE AS ONE FOUND BY LOVERNA WILSON IN 1997.
ANNUAL OBSERVATION:
OWNER: LOCAL
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: NELSON, STEVE

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*017 LAST OBS: 1988-06-16 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1988 STATE STATUS: LE
QUAD NAMES: LAKE OSWEGO LAT: 452440N SIZE: 3
PHYSIOGRAPHIC PROV: WV LONG: 1224155W MINELEV (Feet): 150
T-R-S: 002S001E 09 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: S
EO-RANK/COMM: A :
DIRECTIONS: LAKE OSWEGO, W OF TWIN POINTS
DESCRIPTION: MOSTLY OPEN & DRY W/SOME OAK & MADRONE. CLIFF, S-FACING AT CREST & MID SLOPE
EO-DATA: 1001-10,000 PLANTS IN 1 HA+. 50% IN BUD, 50% IN FLOWER
EOTYPE:
COMMENTS: 1988 SIGHTING REPORT, EDWARDS, ANN, TNC STEWARDSHIP
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: EDWARDS FIELD SURVEY

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*011 LAST OBS: 1991-06-30 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1889 STATE STATUS: LE
QUAD NAMES: LAKE OSWEGO LAT: 452617N SIZE: 0

PHYSIOGRAPHIC PROV: WV
T-R-S: 001S001E 35
T-R-S COMMENTS:
EO-RANK/COMM: :
DIRECTIONS: ELK ROCK, NEAR OSWEGO ON W BANK OF WILLAMETTE RIVER. SOUTH END OF BISHOP'S CLOSE GARDEN ACROSS FROM ELK ROCK IN DANGLE OF MADRONE AND OTHER WILD PLANTS (NOT IN GROOMED GARDEN) (HARDIE-SCOTT 1991).
DESCRIPTION: MOIST PLACES ON CLIFF FACE. WITH MADRONE AND OTHER WILD PLANTS (HARDIE-SCOTT 1991).
EO-DATA: IN BLOOM ABOUT 6 STEMS (1 OR 2 PLANT??) STEMS VERY TANGLED NOT UPRIGHT AS IF PLANT HAD TOO MUCH SHADE (HARDIE-SCOTT 1991). SIDDALL, 6-1976 SITING. HERBARIUM COLLECTION: GORMAN, 06-1889, #17 AND HELLER #10057, ORE. VERY FEW CLUMPS. ONE SIGHTING RECORD SAYS MAY BE D. PAVONACEUM
EOTYPE:
COMMENTS: 1991 PERS. COMM., HARDIE-SCOTT, LINDA (TNC EMPLOYEE). 1976 SIDDALL SIGHTING.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA: WILLAMETTE RIVER GREENWAY
MANAGE COMM:
PROT COMM:
BEST SOURCE: SIDDALL SITING. GORMAN COLLECTION. LINDA HARDIE-SCOTT.

LONG: 1223903W
QUADCODE: 4512246
MINELEV (Feet): 100
MAXELEV (Feet):
PRECISION: M

NAME: DELPHINIUM LEUCOPHAEUM
COMMON NAME: WHITE ROCK LARKSPUR
EO-CODE: PDRANOBOYO*008
COUNTY(s): CLACKAMAS
QUAD NAMES: LAKE OSWEGO
PHYSIOGRAPHIC PROV: WV
T-R-S: 002S001E 09
T-R-S COMMENTS:
EO-RANK/COMM: C :
DIRECTIONS: W & S TIP OF DIAMOND HEAD, LAKE OSWEGO
DESCRIPTION: OREGON WHITE OAK, MADRONE, MOCK ORANGE, OCEAN SPRAY. CLIFF
EO-DATA: 11-50 PLANTS IN 2 AREAS: 5-10 SQ M & 10-100 SQ M. 50% IN FLOWER, 50% IN BUD
EOTYPE:
COMMENTS: 1988 SR, EDWARDS, ANN , TNC STEWARDSHIP DEPT
ANNUAL OBSERVATION:
OWNER: PVT
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: EDWARDS FIELD SURVEY

LAST OBS: 1988-06-16
FIRST OBS: 1988
LAT: 452452N
LONG: 1224120W
QUADCODE: 4512246
FED STATUS: SOC
STATE STATUS: LE
SIZE: 1
MINELEV (Feet): 100
MAXELEV (Feet):
PRECISION: S

NAME: HOWELLIA AQUATILIS
COMMON NAME: HOWELLIA
EO-CODE: PDCAM0A010*007
COUNTY(s): CLACKAMAS
QUAD NAMES: LAKE OSWEGO
PHYSIOGRAPHIC PROV: WV
T-R-S: 002S001E 09
T-R-S COMMENTS:
EO-RANK/COMM: :
DIRECTIONS: LAKE OSWEGO. WEST OF PORTLAND ABOUT 4 MILES.
DESCRIPTION: SHALLOW PONDS
EO-DATA: HERBARIUM COLLECTION: HOWELL, 1892, NO #, WS. AREA NOW DEVELOPED; PLANT ASSUMED EXTIRPATED.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOWELL COLLECTION

LAST OBS: 1892
FIRST OBS: 1892
LAT: 452447N
LONG: 1224130W
QUADCODE: 4512246
FED STATUS: LT
STATE STATUS:
SIZE: 0
MINELEV (Feet): 125
MAXELEV (Feet):
PRECISION: G

NAME: MONTIA HOWELLII

COMMON NAME: HOWELL'S MONTIA
EO-CODE: PDPOR05070*011 LAST OBS: 1995-02-24 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1995-02-24 STATE STATUS: C
QUAD NAMES: LAKE OSWEGO LAT: 452407N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224115W MINELEV (Feet):
T-R-S: 002S001E 16 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: NW4NE4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: S SIDE OF GREENTREE RD., LAKE OSWEGO FARM YARD
DESCRIPTION: FARMYARD - NO ANIMALS, BUT MOWED & FOOT TRAFFIC. SEEPY, MOIST AREA. S ASPECT, SLIGHT 0-20 DEG SLOPE, MID-SLOPE TOPOG.POS., OPEN LIGHT, SATURATED.
EO-DATA: 1001-10000 PLANTS IN LEAF & FLOWER ON 10-100M2
EOTYPE:
COMMENTS: 1994 SIGHTING REPORT. BRUCE NEWHOUSE, REPORTER
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: NEWHOUSE, BRUCE

NAME: SULLIVANTIA OREGANA
COMMON NAME: OREGON SULLIVANTIA
EO-CODE: PDSAX0X020*008 LAST OBS: 1978-05 FED STATUS: SOC
COUNTY(s): CLACKAMAS FIRST OBS: 1978 STATE STATUS: C
QUAD NAMES: LAKE OSWEGO LAT: 452430N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224240W MINELEV (Feet): -1111
T-R-S: 002S001E 08 QUADCODE: 4512246 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: ON PALISADES, SW CORNER OF OSWEGO LAKE
DESCRIPTION:
EO-DATA: J. SIDDALL MAY 1978 SIGHTING; 4 OR 5 PLANTS. ACCESSIBLE ONLY BY WATER;
EOTYPE:
COMMENTS: FROM GREENLEAF 1980 ENDANGERED SPECIES STATUS REPORT FOR USFWS
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: SIDDALL, JEAN

21 Records listed.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon State Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

Reply To: 1-7-00-SP-202
File Name: SP202.WPD

April 19, 2000

Gail Shaloum
URS Corporation
111 SW Columbia, Suite 900
Portland, OR 97201-5814

Dear Ms. Shaloum:

This is in response to your letter, dated February 24, 2000, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Wilsonvile-Beaverton Commuter Rail Project in Washington County. The U.S. Fish and Wildlife Service (Service) received your letter on February 29, 2000.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Wilsonvile-Beaverton Commuter Rail Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Federal Transit Association (FTA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, FTA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in NEPA (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 401.12.

If FTA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, FTA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published October 25, 1999, in the Federal Register (Vol. 64, No. 205, 57534) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect candidate species or species of concern, FTA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, FTA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages FTA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Angie Hernandez or Laura Todd at (503) 231-6179. For questions regarding anadromous fish, please contact National Marine Fisheries Service, 525 NE Oregon St., Suite 500, Portland, Oregon 97232, (503) 230-5400. All correspondence should include the above referenced file number.

Sincerely,

Nancy K. Lee

for Kemper M. McMaster
State Supervisor

Attachments
SP 202
cc: PFO-ES
ODFW (nongame)

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE WILSONVILLE-BEAVERTON COMMUTER RAIL PROJECT AREA 1-7-00-SP-202

LISTED SPECIES[1/]

Birds		
Bald eagle	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Upper Willamette River)[2/]	*Oncorhynchus mykiss*	**T
Chinook salmon (Upper Willamette River)[3/]	*Oncorhynchus tshawytscha*	**T
Plants		
Golden Indian paintbrush[4/]	*Castilleja levisecta*	T
Willamette daisy[5/]	*Erigeron decumbens* var. *decumbens*	E
Howellia	*Howellia aquatilis*	T
Bradshaw's lomatium	*Lomatium bradshawii*	E
Kincaid's lupine[5/]	*Lupinus sulphureus* var. *kincaidii*	T
Nelson's checker-mallow	*Sidalcea nelsoniana*	T

PROPOSED SPECIES

None

CANDIDATE SPECIES

Amphibians and Reptiles	
Oregon spotted frog[6/]	*Rana pretiosa*

SPECIES OF CONCERN

Mammals	
Pacific western big-eared bat	*Corynorhinus (=Plecotus) townsendii townsendii*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis (bat)	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
Birds	
Olive-sided flycatcher	*Contopus cooperi (=borealis)*
Little willow flycatcher	*Empidonax traillii brewsteri*
Amphibians and Reptiles	
Northwestern pond turtle	*Clemmys marmorata marmorata*
Northern red-legged frog	*Rana aurora aurora*

Fish	
Pacific lamprey	*Lampetra tridentata*
Plants	
White top aster	*Aster curtus*
Tall bugbane	*Cimicifuga elata*
Pale larkspur	*Delphinium leucophaeum*
Peacock larkspur	*Delphinium pavonaceum*
Shaggy horkelia	*Horkelia congesta* ssp. *congesta*
Howell's montia	*Montia howellii*
Oregon sullivantia	*Sullivantia oregana*

(LE) - Listed Endangered *(LT) - Listed Threatened* *(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered *(PT) - Proposed Threatened* *(PCH) - Critical Habitat has been proposed for this species*

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

(CF) - Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.

** *Consultation with National Marine Fisheries Service required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 1997, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.*

2/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

3/ *Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon*

4/ *Federal Register Vol. 62, No. 112, June 11, 1997, Final Rule-Castilleja levisecta*

5/ *Federal Register Vol. 65, No. 16, January 25, 2000, Final Rule-Erigeron decumbens var. decumbens, Lupinus sulphureus ssp. kincaidii and Fender's blue butterfly.*

6/ *Federal Register Vol. 64, No. 205, October 25, 1999, Notice of Review-Candidate or Proposed Animals and Plants.*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;
2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and
3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct and on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, nay problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

---

[1]A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other that construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
525 NE Oregon Street
PORTLAND, OREGON 97232-2737

March 7, 2000

Ms. Gail Shaloum
URS Corporation
111 SW Columbia, Suite 900
Portland, Oregon 97201-4014

Re: Species List for a Proposed Commuter Rail in Washington County, Oregon

Dear Ms. Shaloum:

The National Marine Fisheries Service (NMFS) has reviewed your March 2, 2000, letter requesting a list of threatened and endangered species that may occur in the vicinity of an existing freight railroad line between Wilsonville and Beaverton in Washington County, Oregon. The proposed project is to upgrade the current railroad line for use as a commuter line. We have enclosed a list of those anadromous fish species that are listed as threatened or endangered, those that are proposed for listing, and those that are candidates for listing under the Endangered Species Act (ESA). This inventory includes only anadromous species under the National Marine Fisheries Service's jurisdiction. The U.S. Fish and Wildlife Service should be contacted regarding the presence of species falling under its jurisdiction.

Your letter correctly states that Upper Willamette River chinook salmon and Upper Willamette River steelhead are present in the proposed action area. Upper Willamette River chinook salmon were listed as threatened under the Endangered Species Act (ESA) by NMFS on March 24, 1999 (64 FR 14308). Upper Willamette River steelhead were listed as threatened under the ESA by NMFS on March 25, 1999 (64 FR 14517). Critical habitat was designated for both of these species on February 16, 2000 (65 FR 7764) and includes all accessible river reaches in the Willamette River and tributaries above Willamette Falls plus the river reaches of the Willamette River and Columbia River downstream of Willamette Falls. Critical habitat includes the water, substrate, and riparian area.

Because these species are present in the proposed project area, special consideration should be given to minimizing impacts from the proposed project. Federal agencies implementing, funding or authorizing work in this area may need to initiate consultation with the NMFS pursuant to 50 CFR Part 402.10. Please refer to the ESA section 7 implementing regulations, 50 CFR Part 402, for information on the conference and consultation process.

Please note that future correspondence regarding the subject project should be directed to Ben Meyer in the Oregon State Branch Office at (503) 230-5425. If you have any questions regarding this letter, please contact Scott Carlon of my staff in the Oregon State Branch Office at (503) 231-2379.

Sincerely,

for Michael Tehan,
Chief, Oregon State Branch
Habitat Conservation Division

Enclosure

ENDANGERED, THREATENED, PROPOSED, AND CANDIDATE SPECIES UNDER NATIONAL MARINE FISHERIES SERVICE JURISDICTION THAT OCCUR IN OREGON, WASHINGTON AND IDAHO

Listed Species

Coho Salmon (*Oncorhynchus kisutch*)
- S. Oregon/N. California Coasts Evolutionarily Significant Unit (ESU) [Threatened (T)]
- Oregon Coast ESU (T)

Chinook Salmon (*O. tshawytscha*)
- Snake River Fall-run ESU (T)
- Snake River Spring/Summer-run ESU (T)
- Puget Sound ESU (T)
- Lower Columbia ESU (T)
- Upper Willamette River ESU (T)
- Upper Columbia River spring-run ESU [Endangered (E)]

Chum Salmon (*O. keta*)
- Hood Canal Summer-run ESU (T)
- Columbia River ESU (T)

Sockeye Salmon (*O. nerka*)
- Snake River ESU (E)
- Ozette Lake ESU (T)

Steelhead (*O. mykiss*)
- Upper Columbia River ESU (E)
- Snake River Basin ESU (T)
- Lower Columbia River ESU (T)
- Upper Willamette ESU (T)
- Middle Columbia River ESU (T)

Sea-run Cutthroat Trout (*O. clarki clarki*)
- Umpqua River ESU (E)

Proposed for Listing

Chinook Salmon
- S. Oregon/N. California Coastal ESU

Sea-run Cutthroat Trout
- Southwestern Washington/Columbia River ESU

Candidates for Listing

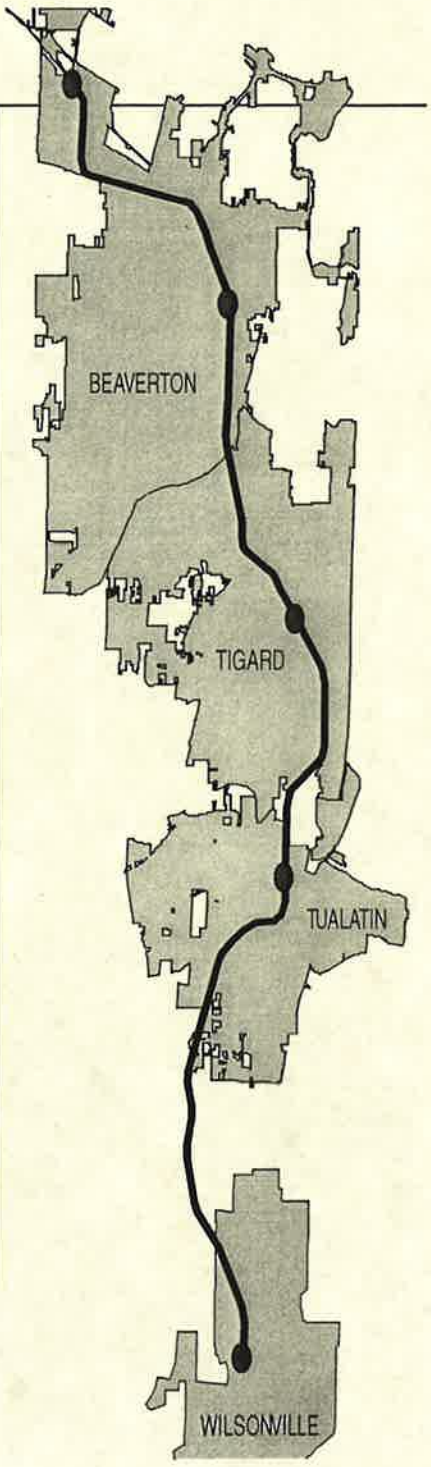
Coho Salmon
- Puget Sound/Straight of Georgia ESU
- Lower Columbia River/Southwest WA ESU

Steelhead
- Klamath mountains Province ESU
- OR Coast ESU

Sea-run Cutthroat Trout
- all coastal populations in OR, WA, and CA except Umpqua River

Appendix C

Environmental Hazards

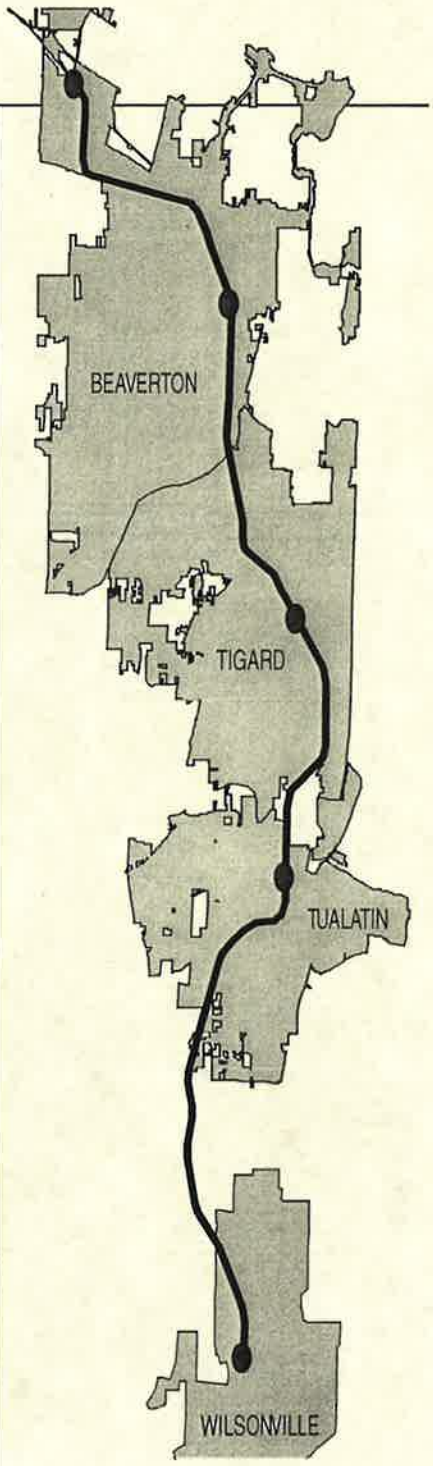


Wilsonville to Beaverton

Commuter Rail

Appendix C

Environmental Hazards



Wilsonville to Beaverton
Commuter Rail

URS Corporation
The integrated resources of
URS Greiner Woodward Clyde
Dames & Moore
BRW
Radian
O'Brien-Kreitzberg
and associated firms

111 SW Columbia, Suite 900
Portland, OR 97201-5814
Tel: 503.222.7200
Fax: 503.222.4292
Offices Worldwide

April 26, 2000

BRW, Inc.
700 NE Multnomah, Suite 1000
Portland, Oregon 97232

Attn: Mr. Terry Kearns

Re: Letter Report
Lead-Based Paint Assessment
Tualatin River Railroad Bridge
Tualatin, Oregon
Washington County Commuter Rail
D&M Job No.: 33721-058-187

Dear Mr. Kearns:

Dames & Moore is pleased to present this letter report discussing our methods and findings regarding the assessment of lead-based paint on the Tualatin River Railroad Bridge that goes over the Tualatin River in Tualatin, Oregon (subject site). The lead-based paint assessment was performed as part of our overall Phase I Environmental Site Assessments and Corridor Study for the Washington County Commuter Rail (WCCR) project.

PURPOSE

The purpose of the lead-based paint assessment was to assess the presence and condition of lead-based paint used on the bridge and the potential impact it would have on the overall WCCR project. This assessment included a site visit to visually observe the condition of the paint and collect paint chip samples for analysis.

FIELD INVESTIGATON

Dames & Moore visited the subject site on March 10, 2000, to collect paint chip samples and visually observe the condition of the paint. The bridge is of a riveted steel girder construction with silver-gray colored paint over a red colored primer. Additional colored paints were present, as portions of the bridge were covered with graffiti. The graffiti painting was not considered in this assessment since the percentage of the bridge covered with graffiti was not large and the number of colors was numerous.

A visual inspection of the paint was performed to confirm the overall condition of the paint. The visual inspection noted the paint was in good condition overall, however, some areas of the subsurface steel was beginning to show signs of corrosion and rust causing the paint to flake or peel in these areas. The areas of corrosion or rust appeared to be less than 10% of the overall structure.

NVL Laboratories, Inc.
4708 Aurora Ave. N., Seattle, WA 98103
Tel: 206.547.0100 • Fax: 206.634.1936
AIHA ELLAP #101861

Batch#:00-02803.00

ANALYSIS REPORT
Total Lead (Pb)

Client: DAMES & MOORE/URS
111 SW Columbia Ave, Suite 900
Portland, Or 97201-5814

Matrix: Paint Chip
Method: EPA 7420
Date Received: March 14, 2000
Date Reported: March 14, 2000

Attention: Shawn Williams

Total samples: 2

Project #: xxxx

Location: Tualatin River RR Bridge

Sample #	Lab ID	Sample Wt.(g)	LoD in mg/kg	Results in mg/kg	Results in Percent
WCCR-TRB-1	20033020	.17380	78	110000	11.0000
WCCR-TRB-2	20033021	.18990	71	110000	11.0000

Method Blank <54.00mg/kg

Instrument/Bench Run: 20031404

mg/kg = Milligrams per kilogram
LoD = Limit of Detection
'<' = Below the detection limit

NOTES: All standard and spike values are reported for quality control purposes. Results for QC samples represent Percent Recovery.

Analyst: Jim Haury

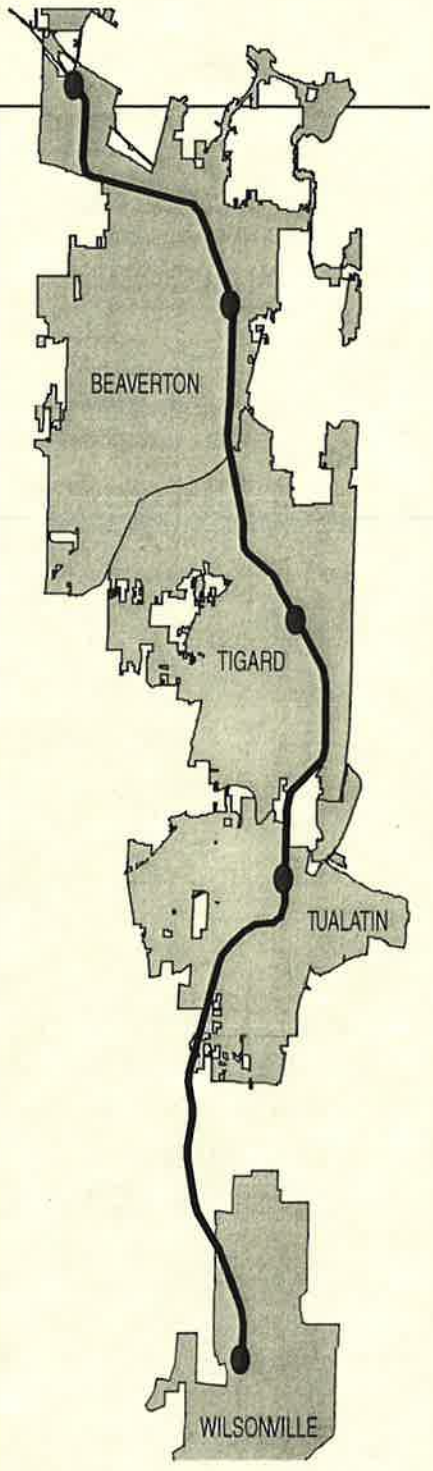
Date Analyzed: March 14, 2000

Reviewed by:

Nick Ly, Technical Director

Appendix D

Historic and Cultural Resources



Wilsonville to Beaverton

Commuter Rail

Oregon
John A. Kitzhaber, M.D., Governor

Parks and Recreation Department
State Historic Preservation Office
1115 Commercial St. NE
Salem, OR 97301-1012
(503) 378-4168
FAX (503) 378-6447

RECEIVED
BY:_____

April 13, 2000

File Code: Washington

Rosalind Keeney
ODOT Environmental Services
1158 Chemeketa Street, N.E.
Salem, OR 97301-2528

RE: Wilsonville to Beaverton Commuter Rail
Effect on Oregon Electric Railroad
Washington County

Dear Roz:

Thank you for your submission of preliminary project documentation for the Oregon Electric Railroad. This information was submitted in compliance with the National Historic Preservation Act of 1966 (16 U.S.C. 470f), Section 106, and reviewed under criteria and procedures outlined in 36 CFR Part 800. Further consultation and comment was also solicited from appropriate SHPO staff. This review resulted in the following preliminary finding:

SHPO "Concurs" with ODOT's finding that the Oregon Electric Railroad segment from Beaverton to Wilsonville is eligible for the National Register under Criterion A. SHPO also "Concurs" that the Wilsonville to Beaverton Commuter Rail Project will have "No Adverse Effect" on the railroad **on the following condition**:

- Metro Regional Center will develop Historic American Building Survey/Historic American Engineering Recordation (HABS/HAER)-type recordation measures in consultation with the SHPO to document the portion of the Oregon Electric Railroad Corridor which would be affected by the Wilsonville to Beaverton Commuter Rail Project. Metro shall complete all documentation and it shall be accepted by the SHPO prior to the alteration of this property.

SHPO will make a final determination of effect upon receipt and review of a formal submittal from ODOT.

If you have any further questions or need additional assistance, please contact me at the SHPO, extension 229.

Sincerely,

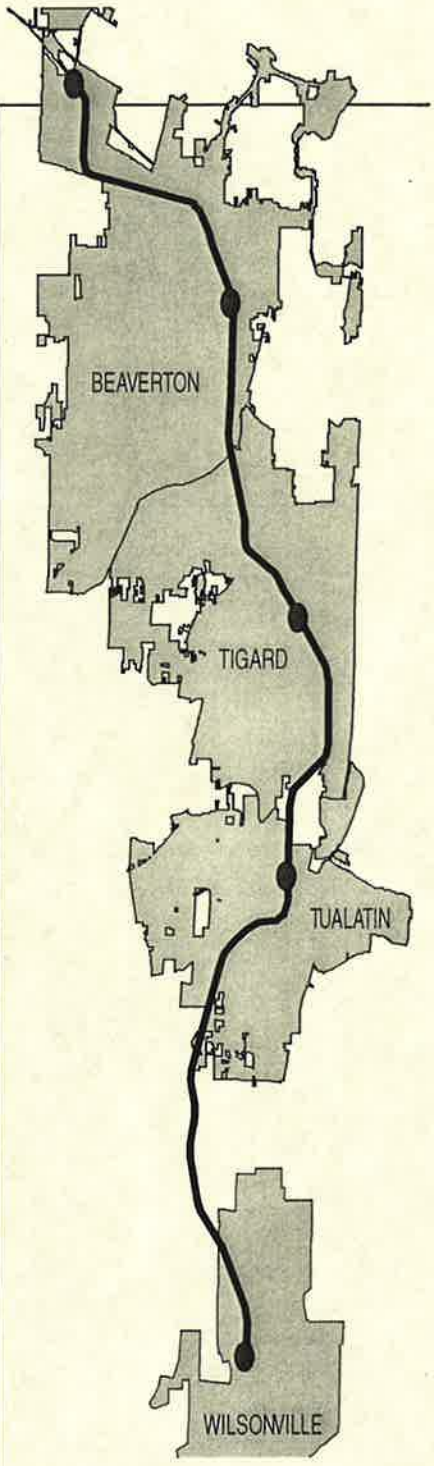
Christine A. Curran
Preservation Specialist

cc: James Hamrick, SHPO
Sharon Kelly, Metro

73410-0807

Appendix E

Safety and Security



Wilsonville to Beaverton

Commuter Rail

Proposed Crossing Protection Improvements

Crossing Number	Road Name	Unit Costs	Improve Circuitry $80,000	12 Inch Lights $2,000	Gates $180,000	Cantilevers & Gates $250,000	Ped Lights $80,000	TAAWD $20,000	Close $4,000	TSIC $2,000	No Change $0	Totals
FD-755.41	Lombard-Farmington Road											
Total St. Mary's to Lombard St.			0	0	0	0	0	0	0	0	0	
Cost St. St. Mary's to Lombard St.			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lombard St. to Greton												
FD-755.10	5th Street		1									
FD-753.30	Hall Blvd.		1									
FD-752.61	Scholls Ferry Road		1									
FD-751.90	Dakota Street					1						
Total Lombard St. to Greton			3	0	0	1	0	0	0	0	0	
Cost Lombard St. to Greton			$240,000	$0	$0	$250,000	$0	$0	$0	$0		$490,000
Greton to Tualatin												
SP Track												
FD-751.80	Tiedeman Ave.					1						
FD-751.10	Main Street					1						
FD-750.70	Hall Blvd.					1						
BN Track												
3E-031.40	Tiedeman Ave.											
3E-032.20	Main Street											
3E-032.47	Hall Blvd.											
3E-033.50	Bonita Road											
34.27	Private Crossing				1							
3E-034.40	Durham Road		1									
34.97	Private Crossing											
3E-035.80	Tualatin Road		1									
35.96	Private Crossing				1							
35.98	Private Crossing											
Total Greton to Tualatin			2	0	2	3	0	0	0	0	0	
Cost Greton to Tualatin			$160,000	$0	$360,000	$750,000	$0	$0	$0	$0	$0	$1,270,000

Proposed Crossing Protection Improvements

Crossing Number	Road Name	Unit Costs	Improve Circuitry $80,000	12 Inch Lights $2,000	Gates $180,000	Cantilevers & Gates $250,000	Ped Lights $80,000	TAAWD $20,000	Close $4,000	TSIC $2,000	No Change $0	Totals
Tualatin to Wilsonville												
3E-036.10	Nyberg Road		1									
3E-036.15	Tualatin - Sherwood Road		1									
3E-036.80	95th Court		1									
3E-037.20	Teton Avenue		1									
3E-037.50	Avery Avenue		1									
37.72	Private Crossing				1							
38.95	Private Crossing				1							
3E-039.20	Tonquin Road		1									
39.85	Private Crossing				1							
40.82	Private Crossing											
3E-041.60	Boeckman Road		1									
41.96	Private Crossing											
42.06	Private Crossing											
3E-042.10	Barber St.		1									
3E-042.60	Wilsonville Road											
42.87	Private Crossing				1							
3E-043.00	5th Street				1							
Total Tualatin to Wilsonville			8	0	5	0	0	0	0	0	0	
Cost Tualatin to Wilsonville			$640,000	$0	$900,000	$0	$0	$0	$0	$0	$0	$1,540,000
Grand Total of Crossing Signal Improvements												$3,300,000