Chapter Six

Cumulative Effects Analysis

Final Environmental Impact Statement

Vancouver Rail Project

Chapter Six Indirect and Cumulative Effects Analysis

This chapter presents a discussion of potential indirect and cumulative effects in the **Vancouver Rail Project** area. This indirect and cumulative effects analysis was based on findings from the environmental and community resources analyzed in this Draft Environmental Impact Statement.

What is a Cumulative Effects Analysis (CEA)?

Cumulative effects are defined[1] as:

> *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions."*[2]

Some authorities believe that most environmental effects are actually cumulative effects because almost all systems have been modified by humans. The cumulative effects of an action may be undetectable when viewed in the individual context of direct effects, but they can add to other disturbances and eventually lead to a measurable environmental change.

Cumulative effects should be evaluated along with the direct effects of each proposed alternative. The range of alternatives considered should include the No Action Alternative as a baseline against which to evaluate cumulative effects. The range of actions to be considered includes not only the proposed project but all connected and similar actions that could contribute to cumulative effects.

The Council on Environmental Quality (CEQ)[3] recommends that an agency's analysis accomplish the following:

- Focus on the effects and resources within the context of the proposed action.
- Present a concise list of issues that have relevance to the anticipated effects of the proposed action or eventual decision.
- Reach conclusions based on the best available data at the time of the analysis.
- Rely on information from other agencies and organizations on reasonably foreseeable projects or activities that are beyond the scope of the analyzing agencies purview.
- Relate to the geographic scope of the proposed project.
- Relate to the temporal period of the proposed project.

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[1] *Per the Council on Environmental Quality's (CEQ) regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA).*

[2] *40 CFR 1508.7*

[3] *The Council on Environmental Quality is the federal agency charged with implementing the National Environmental Policy Act.*

Cumulative effects can be positive as well as negative depending on the resource element being evaluated. It is possible that some resource elements can be negatively, and others positively, impacted by the same proposed project. Most cumulative effects analyses will identify varying levels of beneficial and adverse effects depending on the resource elements and the specific actions. Because of this potential mixture of effects, it is sometimes difficult to determine which alternative is best. A weighted matrix can be a useful tool for selecting the proposed alternative. However, it, too, is limited due to the subjectivity of assigned factor weights and impact/effect scoring.

How were the temporal and geographic boundaries established for this cumulative effects analysis?

Analyzing cumulative effects differs from the traditional environmental impact assessment because the analyst must consider expanding the geographic area of study beyond that of the proposed project and expanding the temporal limits to consider past, present, and future actions that may affect the resource elements of concern.

The geographic scope of analysis for a cumulatively affected resource is defined by the physical limits or boundaries of the proposed action's effect on that resource and the boundaries of other related activities that may contribute to the effects on that resource. For the **Vancouver Rail Project**, individual geographic boundaries were established for each resource evaluated. While its predecessors date back to as early as 1849, the Burlington Northern Railroad (BN) was established in March of 1970 as a result of the merger of four primary railroads. More recently, The Burlington Northern and Santa Fe (BNSF) Railway Company was created through the merger of Burlington Northern Inc. and Santa Fe Pacific Corporation in September 1995. This CEA, however, considers a thirty-year period beginning in 1991 when the Washington State Legislature directed WSDOT to develop a comprehensive assessment of the feasibility of developing a high-speed ground transportation system in the state. This is consistent with the State's current vision for passenger rail in the Pacific Northwest extending over a twenty-year horizon.

How were projects identified for inclusion in this cumulative effects analysis?

Cumulative effects were evaluated for other projects or activities such as major infrastructure projects, community development improvements, or private developments that were geographically related to the **Vancouver Rail Project**. Reliance was placed on written correspondence from agencies and planning officials, interview notes, and meeting reports from the Community Resource Team (CRT). Cumulative effects were evaluated, as appropriate, for other projects or activities that relate to the **Vancouver Rail Project**, where information was presented to the project team by local communities, officials, or interested parties. The information had to describe the other projects or activities, their relationship to

the **Vancouver Rail Project**, and the type and severity of the potential environmental impacts.

For a future related project to be made a part of the analysis it had to be planned, approved, and funded. Further, allowance will be made by the project team to consider other projects and activities not already identified in this document, provided that information is submitted prior to the close of the comment period for this Draft Environmental Impact Statement.

How was it decided to include a resource element in this cumulative effects analysis?

For a resource element to have been considered for this CEA, the resource element must have been projected to experience a measurable positive or negative impact/effect[4] due to the **Vancouver Rail Project**.

Based on the respective discipline reports, a summary of anticipated impacts[5] by resource element is as follows:

- **Soils and Geology** – no impact
- **Air** – no degradation, possible positive impact
- **Surface Water** – no impact
- **Water Quality** - no impact
- **Floodplains** – no impact
- **Vegetation and Wildlife** – low impact (loss of approximately 6.27 (Alternative B) or 5.27 (Alternative I) acres of woody vegetation – not regionally significant)
- **Wetlands** – no impact
- **Fisheries** – no impact
- **Energy** – positive impact due to improved fuel efficiency
- **Hazardous Waste** – no impact
- **Noise and Vibration** – negative or positive impact predicted for noise only
- **Land Use** – no impact
- **Cultural Resources** – no impact
- **Social Elements** – positive impact to safety depending on alternative selected. Negative relocation impact if West 39th Street overpass is constructed.
- **Visual Quality** – no impact
- **Traffic (vehicular, and freight and passenger rail)** – impact certain, nature and degree depends on alternative selected

As noted above, no impacts are anticipated for the resource elements of Soils and Geology, Surface Water, Water Quality, Wetlands, Floodplains, Fisheries,

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[4]Impact and effect are used interchangeably in this cumulative effects analysis.
[5]A detailed discussion of the direct impacts for each resource element can be found in the appropriate section of this environmental document.

Hazardous Waste, Land Use, Cultural Resources, and Visual Quality. For Vegetation and Wildlife, the 6.7 acres of woody vegetation that will be lost are of lower quality habitat and not considered to be significant regionally. Although a positive impact is predicted to the Social Element of safety if West 39th Street is either closed or an overpass is constructed, and a negative impact is associated with the Social Element of relocation if the West 39th Street overpass is constructed, no other specific projects were identified for this geographic area for inclusion in a cumulative effects analysis. The positive impact to safety and the negative relocation impact, therefore, are considered to be project-specific impacts and a CEA has not been developed for the Social Element. **Thus, a cumulative effects analysis was only conducted, and the discussion follows, for Air Quality, Energy, Noise and Vibration, and Traffic.**

What was the result of the cumulative effects analysis by resource element?

In conducting the CEA for each of the selected resource elements, the same thirty-year time period beginning in 1991was utilized. The geographic boundaries for each, however, were different as indicated in the sections that follow.

Energy and Air Quality

The geographic area examined for the Energy and Air Quality resource elements is the general Vancouver yard vicinity.

Under the No Action Alternative, the efficiency of rail operations in and through the Vancouver yard would remain unchanged initially. Fuel consumption due to locomotive engine idling and truck and passenger vehicle engine idling during West 39th Street blockages would continue. As more trains pass through the area in the future, fuel consumption would continue to increase as rail operations become less efficient and the blockages of West 39th Street become more frequent and perhaps of longer duration.

All action alternatives are essentially identical with respect to improved rail operation efficiencies. Fuel consumption differences resulting from the various West 39th Street options are not considered to be significant. The energy expended to construct the project, regardless of which alternative is implemented, is a temporary consumption and is also not considered to be significant. Implementation of the **Vancouver Rail Project** will result in reduced idling, less switching, and less time spent in the yard by freight trains and a commensurate reduction in fuel consumption. A proportional reduction in fuel combustion products discharged to the air should result in an improvement in air quality. Although an increase in the number of trains utilizing the route in the future will consume additional fuel, to the degree that those trains occur from truck-to-rail and passenger-to-rail conversions, continued energy savings and air quality improvements should be realized. Thus, the contributions to cumulative effects on energy consumption efficiency and air quality due to the **Vancouver Rail Project** are projected to be positive.

Noise and Vibration

Land use (**Exhibit 6-1**) immediately adjacent to a majority of the **Vancouver Rail Project** consists of commercial, and light and heavy industrial development. The industrialized shoreline of the Columbia River is located at the southern end of the project area. Residential development, including single-family residences and mobile homes, adjoins the northern portion of the project area. Generally, the residential development on the east side of the project area is separated from the railroad by steep slopes that support a mixture of tree and shrub habitats.

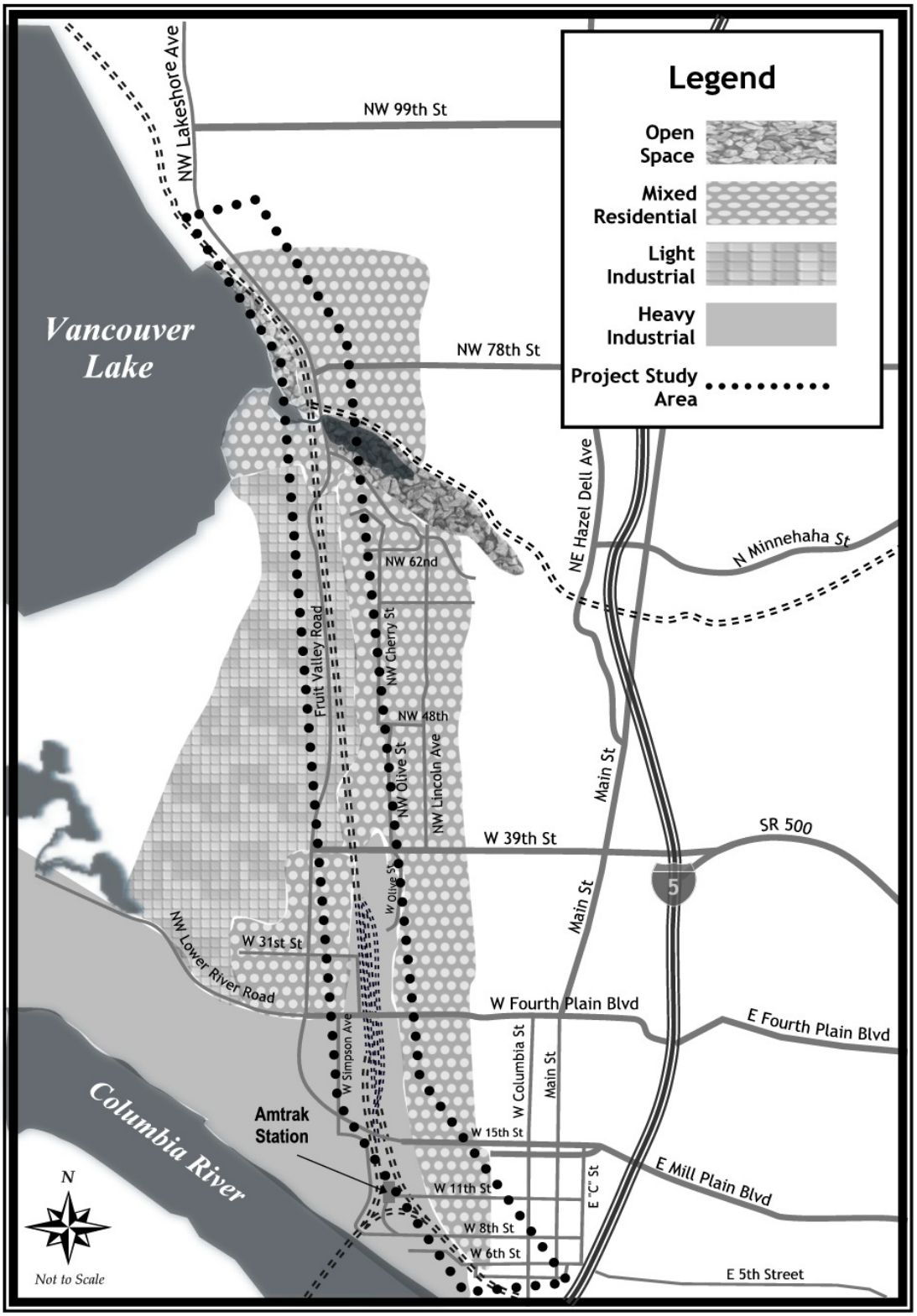
The geographic boundaries defining the CEA area examined for noise and vibration impacts are 500 feet from the northern and southern end points of the **Vancouver Rail Project** and 500 feet measured to the west of the centerline of the existing western-most track and 500 feet east of the centerline of the eastern-most proposed track.

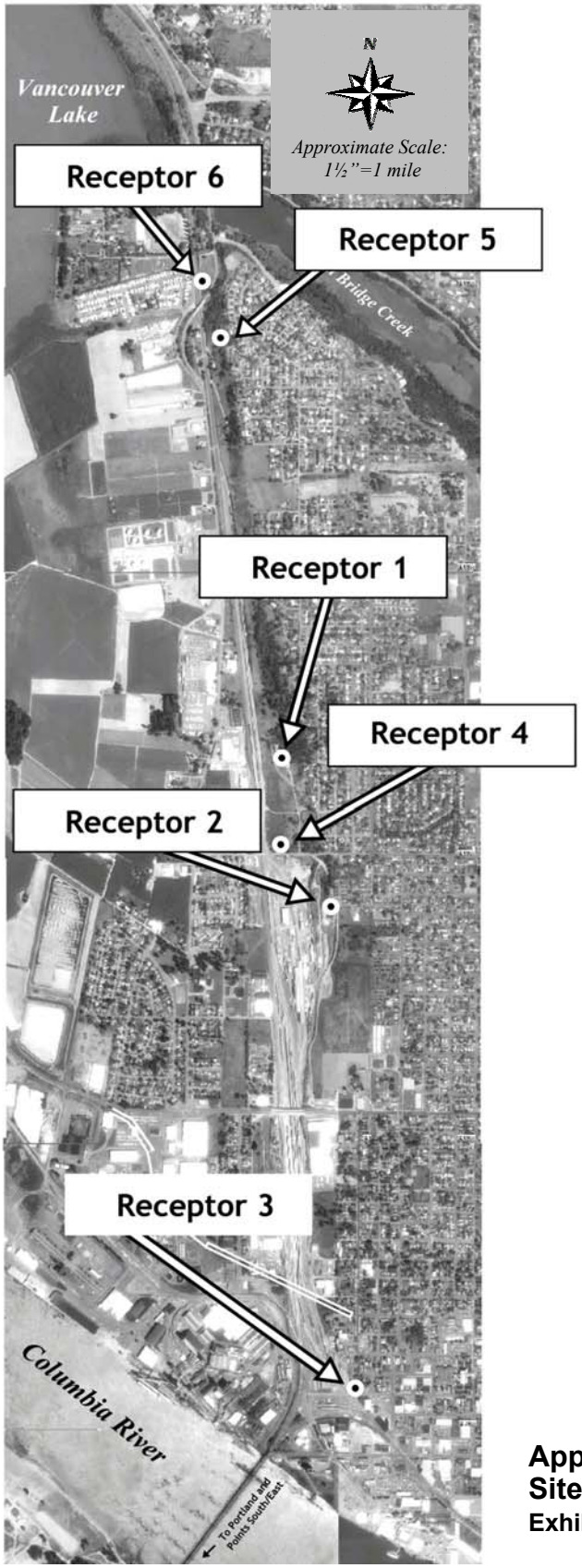
The study area for noise and vibration currently experiences noise impacts due to trains idling or passing through, sounding of train whistles at road crossings, as well as from activities in the rail yard. The frequency of occurrence of the impacts has increased as the number of trains has grown over time. Depending on the specific location, other industrial and airport-related activities add to environmental noise levels. This would be true with the No Action Alternative also. The percentage of time that elevated noise levels are present will increase in the future as more trains use the corridor and industrial and commercial development expand.

As indicated in Chapters Four and Five of this DEIS, vibration and future noise levels were calculated using the Federal Transit Administration (FTA) Transit Noise and Vibration Assessment manual. It was determined that vibrations due to train operations would not be felt at distances at or beyond fifty feet from the centerline of any new track. There are no residences (FTA category 2 receptor) or institutions with primarily daytime use (FTA category 3 receptor) within fifty feet of any proposed new track and no category 1 FTA receptors (low ambient vibration essential) exist within the study area. Therefore, impacts due to vibration should not occur to any FTA category receptors as a result of the project.

Twenty four-hour noise monitoring was conducted by WSDOT at three locations (Receptors 1, 2, and 3) (**Exhibit 6-2**) to the east of the existing tracks. Receptor 1 (two isolated residences at West 44th Street) is approximately 180 feet from the proposed new easterly track, Receptor 2 (top of bluff near the new Columbia Crest housing development) is about 400 feet from the proposed new easterly track, and Receptor 3 (residences adjacent to the commercial land that is east of the existing track between West 11th Street and Fourth Plain Boulevard) is approximately 200 feet from the existing track. The monitoring data included all freight activity in the Vancouver yard as well as noise from sources that were not related to yard

General Land Use, Vancouver Study Area
Exhibit 6-1





Approximate Location of Noise Receptor Sites, Vancouver Study Area
Exhibit 6-2

operations, such as, aircraft, nearby vehicular traffic, and barking dogs. The noise analysis assumed that the resulting data is representative of the existing and the No Action Alternative due to Vancouver yard operations. Increasing rail traffic in the future would, however, increase the frequency that the emitted noise would be experienced. Noise from other sources would likely increase as development in the area continues in the future.

Construction-related noise would be temporary and subject to local construction noise ordinances. Eliminating train whistles at West 39th Street, if West 39th Street is closed or an overpass is constructed, would result in a positive impact. However, based on the analyses conducted, operational noise impacts are still projected for both Receptors 1 and 2. Although Receptor 1 is not expected to experience an increase over existing noise levels, the noise level calculated exceeds the noise impact threshold. The noise level at Receptor 2 is predicted to exceed existing noise levels by 2 dB to 6 dB and, based on FTA noise impact criteria, is considered to be severe. Receptor 3, on the other hand, is predicted to experience a decrease in noise due to rail operations. However, added to the noise from rail operations will be the noise from other sources in the area. The cumulative noise impact is expected to increase as development continues in the area with the severity generally increasing as receptor locations move south in the project vicinity. Thus, the **Vancouver Rail Project** will contribute to cumulative noise impacts and, depending upon the location, the contribution will be positive or negative.

Traffic

Two types of traffic have been considered as part of this Cumulative Effects Analysis – vehicular traffic and rail traffic (including passenger and freight). This discussion addresses both of these elements.

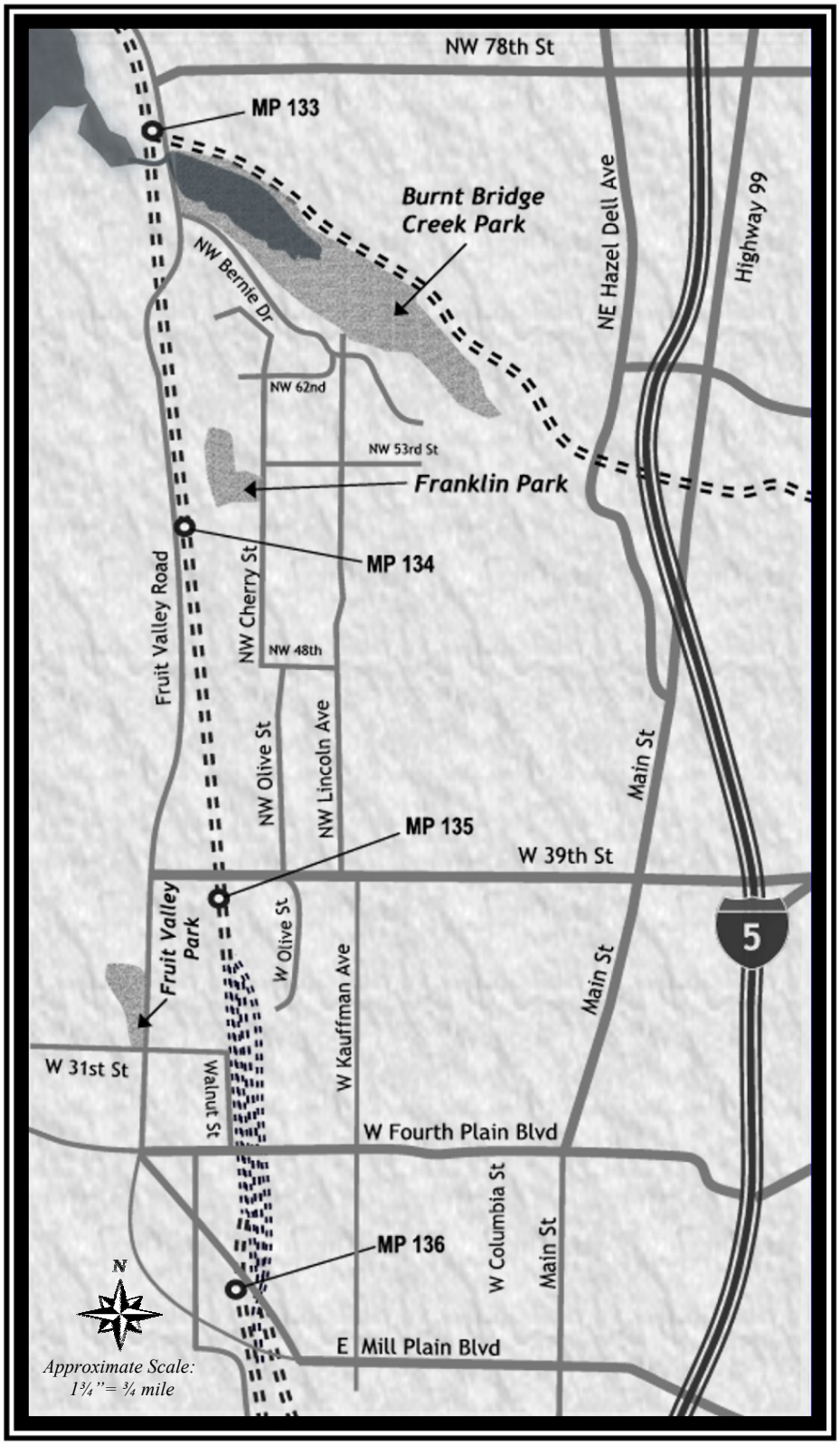
Vehicular Traffic

The geographic area selected for the traffic CEA is identical to that utilized for the project-specific traffic analysis – the area bounded by Northwest 78th Street on the north, West Mill Plain Boulevard on the south, West Fruit Valley Road on the west, and I-5 on the east (**Exhibit 6-3**).

The No Action Alternative assumed that there would be no change to West 39th Street. Action alternatives included closure of the West 39th Street rail crossing or construction of a West 39th Street overpass over the rail lines.

Currently, the rail yard operates 24 hours per day, seven days a week, with a total of 150 daily movements across West 39th Street. These train movements block the roadway an average of eight hours per day. As a result, West 39th Street remains open for only a few minutes at certain times. This situation has worsened over the last ten years due to ever-increasing train traffic. This trend is projected to continue over the next twenty years. Existing roadways and intersections in the study area will begin to reach capacity and necessitate improvements to maintain adequate traffic flow. As a consequence of greater activity in the rail yard in the future, West 39th Street could be blocked as much as fifteen to twenty hours each day.

Traffic Analysis Study Area
Exhibit 6-3



Drivers would likely use alternative routes or possibly try to drive around the gates during a perceived lull in train activity. Emergency vehicles would avoid West 39th Street altogether.

Roadway improvements would be the same for the No Action and both of the action alternatives for West 39th Street because the projected changes in traffic volumes are relatively low. The only differences would be at the un-signalized intersections of West 39th Street at West Fruit Valley Road and West Kauffman Avenue at West 39th Street. Traffic signals would probably be required at those intersections for both the No Action Alternative and the construction of an overpass at West 39th Street. If West 39th Street is closed at the rail crossing, the signals would not be needed. **Exhibit 6-4** presents current and projected Levels of Service for these roadways and other neighborhood streets.

Constructing the overpass at West 39th Street will maintain connectivity and allow emergency vehicles to use West 39th Street without concern regarding blockage due to trains. On the other hand, concern has been voiced by members of the Fruit Valley Community that constructing a rail yard overpass at West 39th Street would increase traffic in the area, specifically truck traffic due to present and future port operations. Truck usage of a West 39th Street overpass to access I-5 may not be significant, however, because of the elevation difference (steepness of the road grade) between the rail yard vicinity and I-5. Additionally, West Mill Plain Boulevard was built to help mitigate the traffic impacts associated with increased port operations.

The Vancouver School District, in cooperation with the Vancouver Housing Authority, is planning a major housing project in the Fruit Valley Neighborhood over the next three to five years. A new elementary school has already been constructed as part of these planning efforts. However, the predicted traffic associated with those changes should not be significantly different from that due to the current light-industrial operations on a per acre basis. Improvements (conversion to 3-lane roadway, left turn pockets, separated bike paths), currently in the design phase, to Fruit Valley Road will also improve traffic flow.

Freight Rail Traffic

As presented under the No Action Alternative, freight train growth will continue regardless of this project. As such, general analysis regarding the cumulative impacts of freight rail traffic on the study area was discussed throughout this document.

The I-5 Partnership Task Force recently completed a study of freight movement in the Portland – Vancouver area. That study included a review of freight rail traffic. The overall goals of the study were to improve the movement of freight throughout the corridor. Thus, it can be expected that as the I-5 partnership program moves forward, consideration of freight rail traffic may play an integral part in the overall movement of goods in the area. When improvements for movement and capacity are extended to rail, then the BNSF main line's capacity would continue to improve and have a beneficial effect on the local neighborhoods around the Vancouver Rail Yard. Improved movements would contribute to additional elimination of trains waiting along the main line to move south over the Columbia River.

Study Area Roadway Traffic Impacts
Exhibit 6-4

Signalized Location	Scenario 1: 2020 PM Peak Hour (No change to West 39th Street)		Scenario 2: 2020 PM Peak Hour (West 39th Street Rail Crossing Closure)			Scenario 3: 2020 PM Peak Hour (West 39th Street Rail Overpass)		
	Traffic Volumes (vehicles per hour)	*LOS**	*Traffic Volumes (vehicles per hour)*	*% Change compared to Scenario 1*	*LOS*	*Traffic Volumes (vehicles per hour)*	*% Change compared to Scenario 1*	*LOS*
78th Street at I-5 (1)	5021	C	5102	1.6%	C	4993	-0.6%	C
78th Street and Hazel Dell Avenue	3765	E	3858	2.5%	E	3729	-1.0%	D
78th Street at 9th Avenue	1710	B	1812	6.0%	A	1666	-2.6%	B
78th Street at Fruit Valley Road	1875	B	1955	4.3%	B	1846	-1.5%	B
39th Street at I-5 Northbound Ramp	2167	C	2159	-0.4%	C	2186	0.9%	C
39th Street at Main Street	3152	F	3010	-4.5%	E	3188	1.1%	F
Fourth Plain Boulevard at I-5 Northbound Ramps	3474	D	3483	0.3%	E	3443	-0.9%	D
Fourth Plain Boulevard at I-5 Southbound Ramps	2667	B	2689	0.8%	B	2670	0.1%	B
Fourth Plain Boulevard at Broadway Street	2543	D	2592	1.9%	D	2524	-0.7%	D
Fourth Plain Boulevard at Main Street	2686	D	2735	1.8%	D	2654	-1.2%	D
Fourth Plain Boulevard at Kauffman Avenue	1856	C	1979	6.6%	C	1802	-2.9%	C
Fourth Plain Boulevard at Fruit Valley Road	1756	D	1869	6.4%	D	1731	-1.4%	D
Mill Plain Boulevard at I-5 Northbound Ramps	3487	B	3544	1.6%	B	3509	0.6%	B
Mill Plain Boulevard at I-5 Southbound Ramps	4272	C	4310	0.9%	C	4270	-0.0%	C
Mill Plain Extension at Fourth Plain Boulevard (2)	2216	C	2169	-2.1%	C	2250	1.5%	C

Notes:

(1) The existing I-5 interchange with West 78th Street is currently under construction.

(2) The Mill Plain Extension and Fourth Plain Boulevard intersection was not evaluated for current conditions since construction of the extension was not complete at the time of this analysis.

**Level of Service*

Source: Revised Draft Report West 39th Street Rail Crossing Transportation Analysis, David Evans and Associates, April 14, 2000.

Passenger Rail Traffic

This document considered the passenger rail operational changes and their effect on the study area. However, the increase in passenger rail over the next twenty years also needs to be considered as part of this cumulative effects analysis.

The state of Washington's plans for passenger rail service between Seattle and Portland calls for a total of 13 daily round trip trains (26 one-way trips per day) by year 2023. Travel times are expected to decrease over the next twenty years, which would require an increase in speeds throughout the corridor. To examine the cumulative operational impacts of passenger rail on the communities and the environment along the corridor, WSDOT prepared an environmental overview. That programmatic analysis concluded that an increase in passenger rail service (including increased speeds) would have a minimal impact to the environment. That environmental analysis, the Pacific Northwest Rail Corridor Environmental Overview for the Intercity Passenger Rail Plan for Washington State 1998-2018 (WSDOT, December 1998), is being incorporated by reference and can be obtained from the WSDOT Rail Office

Traffic Conclusion

In conclusion, the **Vancouver Rail Project** will have either a positive, or a minor negative, contribution to the cumulative impacts to traffic in the area. The degree and nature of the actual contribution will depend on the alternative implemented as well as roadway improvements and changes to traffic flow patterns that may occur in the future.

How do indirect (secondary) effects/impacts relate to cumulative effects/impacts?

Indirect effects are different from cumulative effects. Indirect effects are caused by a proposed action, but are later in time (although reasonably foreseeable) or farther removed geographically. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural resources. For example, a road project may shift existing and anticipated housing growth to a different area of a region. The growth may have already been happening, but the road project "indirectly" influenced where it took place.

What are the anticipated indirect effects associated with the Vancouver Rail Project?

Indirect effects, while difficult to quantify and assess, must be linked to a discernable direct effect due to the project. As stated previously, for the **Vancouver Rail Project**, direct effects are anticipated to the air quality, energy, noise, social elements, and traffic resource areas.

For energy and air quality, all action alternatives would be essentially identical with respect to improved rail operation efficiencies. Implementation of the **Vancouver Rail Project** would result in reduced idling, less switching, and less time spent in the yard by freight trains and a commensurate reduction in fuel consumption. The proportional reduction in fuel combustion products discharged to the air should result in an improvement to air quality. Improved air quality could produce the indirect effect of improved health to humans, wildlife, and vegetation.

Based on the analyses conducted, increased operational noise levels are predicted for two of the six monitoring receptor locations along the project route. A decrease in noise level is anticipated at the third location. These noise level changes could produce indirect effects to land use. Additional residential development, for example, may not occur to the same degree that it might otherwise have "but for" the increased noise levels due to the **Vancouver Rail Project**.

The **Vancouver Rail Project** is expected to have a positive effect or a minor negative effect on traffic in the area, depending on which action alternative is implemented. Improved traffic conditions could produce a positive impact to the social element of emergency vehicle (police, fire, or ambulance) response time. The resulting positive indirect effects could be less crime, less property loss due to fire, and increased survival from health-related trauma.

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