Point Defiance Bypass Project

DRAFT

Point Defiance Shoreline Alternative Technical Memorandum

September 2010

Washington State Department of Transportation

Executive Summary

Purpose of the Technical Memorandum

The purpose of a technical memorandum is to capture the reasons why an alternative should or should not be carried forward for analysis in the Environmental Assessment. WSDOT staff, which consists of a multi-discipline team assigned to the production of this project, has attempted to give as thorough of an analysis as required to achieve an impartial review. The projected or predicted impacts of this alternative have been measured against the baseline (the existing facility and surroundings, assuming the project is not built). The attached technical memorandum summarizes this review and it is based upon information located in the WSDOT State Rail and Marine/ARRA Cascades High Speed Program Office.

Point Defiance Bypass: Purpose and Need

The purpose of the project is to provide more frequent high-speed intercity passenger rail service between Tacoma and Nisqually. This project addresses the deficiencies in the existing rail alignment around Point Defiance. The project needs are to enhance rail service frequency, reliability, efficiency, and to improve safety. The existing alignment is near capacity and is therefore unable to accommodate additional high-speed intercity passenger rail service without substantial improvements. In addition, the existing alignment has physical and operational constraints that adversely affect both passenger and freight train scheduling and reliability.

Specific elements of the project needs include:

- Enhanced frequency: Increase Amtrak *Cascades* round-trips from four to six by 2015 in order to meet projected service demands.
- Improved reliability: Improve reliability by reducing or eliminating passenger rail service interruptions caused by natural factors (e.g., landslides) or operational limitations (e.g., drawbridge closures).
- Enhanced efficiency: Enhance the efficient movement of people by reducing the amount of time passenger and freight trains spend yielding to other freight movements.
- Improved safety: At-grade crossings will be constructed with improved safety features including wayside horns, median barriers, pre-signals, and traffic signal improvements

Description of Project Alternative

The shoreline alternative would make improvements to the existing route between Nisqually and Tacoma. It consists of adding 15.5 miles of new track and re-aligning 15 miles of existing track. The shoreline alternative adds a third track inland along the existing route from Harbor (MP 3.22) to Titlow (MP 10.0) and from Ketron (MP 17.7) to Nisqually (MP 24.5). The third track will be located 25’ center to center from the adjacent track and would have a 13’ access road along side of it. All the curves

between Harbor (MP 3.22) and south of Nisqually (MP 25.11) will be realigned to be 2 degree curves or broader to accommodate 79 mph passenger train speeds.

Included with the improvements would be clearing and grubbing, excavation, embankment, new track, new turnouts, bridge replacement, culvert extensions, retaining walls, a 1-mile long tunnel, and other miscellaneous items.

This alternative would also involve right of way acquisition, residential relocations, commercial business impacts, and local road relocations.

Point Defiance Shoreline Alternative Summary

Although this alternative can meet the purpose and need, it introduces the following challenges and obstacles:

- Passenger trains would continue to share the track with the large majority of freight trains.
- Acquisition of a significant amount of right of way from many different owners including homes with Puget Sound views, Fort Lewis Military Reservation, Cities, Chambers Bay Golf Club, and others.
- Elimination or relocation of a boat moorage and pleasure boat-related business.
- 2.5 miles of shoreline fill.
- 4.5 million cubic yards of excavation including 220 acres of clearing and grubbing.
- Impact aesthetics along the shoreline due to 10 miles of retaining walls and the vast amount of excavation required.
- Pierce County Open Space Corridor impacts.
- This alternative could impact water quality and watersheds.
- This alternative could impact wildlife and their habitats.
- This alternative would impact wetlands.
- This alternative will significantly impact socioeconomic resources.
- This alternative will significantly impact recreation resources.
- This alternative could significantly impact historical and cultural resources.

Conclusion

It is the recommendation of the WSDOT staff that this alternative be considered and eliminated from further study based primarily on the *Engineering and Feasibility* analysis. Please note that, to a lesser extent, factors analyzed in the *Environmental Impacts* contributed to this recommendation.

Contents

Introduction

Purpose of the Technical Memorandum

The purpose of a technical memorandum is to capture the reasons why an alternative should or should not be carried forward for analysis in the Environmental Assessment. WSDOT staff, which consists of a multi-discipline team assigned to the production of this project, has attempted to give as thorough of an analysis as required to achieve an impartial review. The projected or predicted impacts of this alternative have been measured against the baseline (the existing facility and surroundings, assuming the project is not built). The attached technical memorandum summarizes this review and it is based upon information located in the WSDOT State Rail and Marine/ARRA Cascades High Speed Program Office.

Point Defiance Bypass: Purpose and Need

The purpose of the project is to provide more frequent high-speed intercity passenger rail service between Tacoma and Nisqually. This project addresses the deficiencies in the existing rail alignment around Point Defiance. The project needs are to enhance rail service frequency, reliability, efficiency, and to improve safety. The existing alignment is near capacity and is therefore unable to accommodate additional high-speed intercity passenger rail service without substantial improvements. In addition, the existing alignment has physical and operational constraints that adversely affect both passenger and freight train scheduling and reliability.

Specific elements of the project needs include:

- Enhanced frequency: Increase Amtrak *Cascades* round-trips from four to six by 2015 in order to meet projected service demands.
- Improved reliability: Improve reliability by reducing or eliminating passenger rail service interruptions caused by natural factors (e.g., landslides) or operational limitations (e.g., drawbridge closures).
- Enhanced efficiency: Enhance the efficient movement of people by reducing the amount of time passenger and freight trains spend yielding to other freight movements.
- Improved safety: Construction of at-grade crossings with improved safety features including wayside horns, median barriers, pre-signals, and traffic signal improvements.

Description of Shoreline Alternative

The shoreline alternative would make improvements to the existing route between Nisqually and Tacoma. It consists of adding 15.5 miles of new track and re-aligning 15 miles of existing track. The shoreline alternative adds a third track inland along the existing route from Harbor (MP 3.22) to Titlow (MP 10.0) and from Ketron (MP 17.7)

to Nisqually (MP 24.5). The third track will be located 25' center to center from the adjacent track and would have a 13' access road along side of it. All the curves between Harbor (MP 3.22) and south of Nisqually (MP 25.11) will be realigned to be 2 degree curves or broader to accommodate 79 mph passenger train speeds.

Figure 1 shows the location of both the shoreline alternative (shown in green) and the bypass route (shown in blue).

Included with the improvements would be clearing and grubbing, excavation, embankment, new track, new turnouts, bridge replacements, culvert extensions, retaining walls, a 1-mile long tunnel, and other miscellaneous items.

This alternative would also involve right of way acquisition, residential relocations, commercial business impacts, and local road relocations.

Relationship between Bypass Route and Shoreline Alternatives

In 2010, the shoreline alternative evolved because of comments and feedback by key stakeholders and municipalities within the project area.

The bypass route and shoreline alternatives are similar in that they enhance frequency, improve reliability, and enhance efficiency. The alternatives differ in the location of the improvements. The bypass route is located inland in Pierce County, and extends roughly 18 miles from South 66th Street in Tacoma, through Lakewood and past DuPont to just east of I-5, where it connects with the BNSF main line (see Figure 1). Below is a summary of additional major differences between the two alternatives:

1) Currently, passenger trains are often delayed because they share tracks with freight trains. Even though the shoreline alternative is adding capacity, passenger trains will still share tracks with nearly all freight trains in the area. For the bypass route alternative, the traffic volume is light and consists almost exclusively of passenger trains. Unlike typical freight trains, passenger trains operate on detailed schedules that permit conflict-free on-time operation on single-track segments.
2) The bypass route reduces the rail distance between Seattle and Portland by 5.9 miles compared to the existing/shoreline alternative.
3) The shoreline alternative will decrease travel time for passenger trains by 2-3 minutes and the bypass route will decrease it by 6 minutes within this segment.
4) The shoreline alternative constructs a new third track for approximately 14 miles. The bypass route upgrades an existing line for passenger train use.
5) The shoreline alternative will require the acquisition of a significant amount of right of way. Because the bypass route is in an existing track corridor, the right of way in general already exists.
6) The shoreline alternative extends along the shore of Puget Sound at the base of steep, heavily wooded hillsides, which are subject to mudslides, and fallen trees

during rain and windstorms that occur with regularity from late fall through early spring. The bypass route is not generally subject to such problems.

Many different design variations could be analyzed. The substantial cumulative impacts of pioneering any new alignment through partially undisturbed lands and through heavily developed lands cannot be avoided. A new route adversely affects resources protected under Section 4(f) to a much greater magnitude than do other reasonable and prudent alternatives.

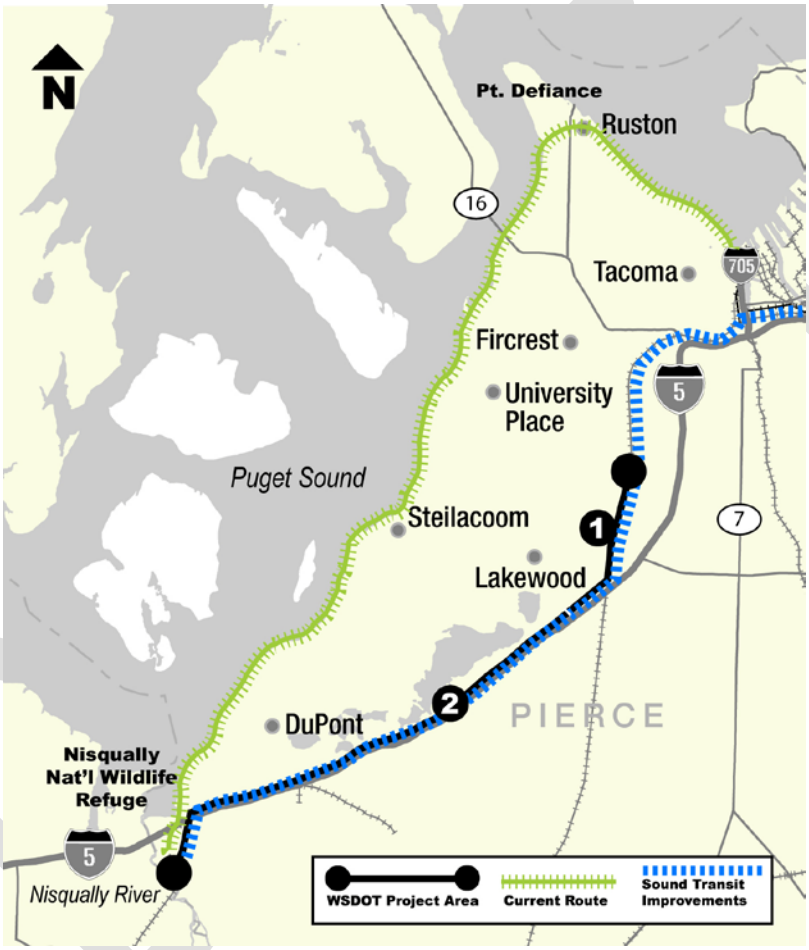

Figure 1

Engineering and Feasibility

The shoreline concept was considered for the following reasons: 1) efficiency and 2) frequency.

Efficiency

With the construction of the third track and realignment of the curves associated with this alternative, the alignment would be able to accommodate 79 mph passenger train speeds. This would amount to a schedule reduction of 2-3 minutes within this segment.

Frequency

The construction of the third track will accommodate two additional daily Amtrak *Cascades* round-trips.

Geometrics

The proposed alignment of this alternative would follow the existing Point Defiance main line from Tacoma to Nisqually. This alternative would require removal of approximately 4.5 million cubic yards of material and placing approximately 195,000 cubic yards of embankment. Excavation would require clearing and grubbing of approximately 220 acres. Because the existing cut slopes have localized instability issues, 2:1 slopes are used.

The required earthwork will increase the impacts to the project vicinity. The estimated area of land displaced by the new footprint is 378 acres. The width of the footprint varies. It may be up to 630 feet across at the widest point.

Construction of the third track in Tacoma would require the relocation of Waterview St. from MP 3.22 to MP 5.07. This is due to the steep terrain between the existing two tracks and the street. Waterview St. provides access to multiple water view homes. An alternate access would need to be identified and evaluated.

Lemon Beach Rd. W (located to the south of Titlow Park from MP 10.61 to MP 11.09) requires relocation as well due to the realignment of the curve. This is due to the steep terrain in the area. An alternate access would need to be identified and evaluated.

Structures

This alignment would construct approximately 650 linear feet of bridge, 71.5’ in width (three tracks) over Alderway St, N 40th St, N 49th S, Mounts Rd, I-5 Northbound, and I-5 Southbound. It will also construct approximately 550 linear feet of bridge, 46.5’ in width (two tracks) over Chambers Cr. Waterway, a boat launch, and 5th St. Waterway.

One tunnel approximately 1 mile long with a diameter of 39’ would be required to the south of the existing Nelson Bennett Tunnel. The tunnel would be a two-track tunnel with walkways on each side. Boring a new tunnel of this size underneath a neighborhood presents many risks. Some of the potential risks include the suitability of the soil, the condition of the structures and buildings above the proposed tunnel alignment, acquiring the right of way needed, and cost. These are only a small portion of the risks included with this alternative.

This alignment would also require approximately 10 miles of retaining walls. The retaining walls would range in height from 20’ to 35’.

Right Of Way

This alignment would require right of way purchase of approximately 103 acres. 30 acres is developed land costing approximately $1,089,000 per acre. The required right of way includes the following types of purchases:

- Approximately 60 residential relocations including homes with Puget Sound views.
- A portion of Joint Base Lewis-McChord.
- Chambers Creek Boat Owners Association. This would include the elimination of the moorage and pleasure boat-related business due to replacement of the bridge over the Chambers Creek Waterway. The moveable span would be eliminated with the bridge replacement to reduce delays to the trains.
- Chambers Bay Golf Club.
- City of Tacoma.
- City of Ruston – Ruston Playfield.
- Forest and parkland.

Beyond the areas that have been identified as being affected due to the actual construction work, there may be other affected properties. Moving the railroad closer to properties could cause impacts due to increased noise and vibration. Steep slopes could cause instabilities in the slope as well. Geotechnical investigations would be needed to further analyze all of these effects.

Two areas that have the greatest disturbance to established neighborhoods are located just to the north and to the south of Steilacoom. Another option to minimize this effect on the neighborhoods is to realign the rail alignment over the water. This would involve a structure over Puget Sound. The structure could be more than 2 miles long. There are many obstacles and issues involved with this option including but not limited to the following:

- Extensive permitting process including multiple permits from multiple federal, state, and local agencies.
- Extensive environmental impacts.
- Extensive mitigation for environmental impacts.
- Maritime impacts due to the presence of a ferry dock at Steilacoom.
- Risks involved with the construction of a structure over the water.
- Cost.

These are just a few of the concerns involved with constructing a new structure over Puget Sound. Without further analysis, the feasibility of this option is unknown. The risks involved with an undertaking of this kind are vast and could have a profound effect on the cost of this alternative.

Maintenance

The existing alignment extends along the shore of Puget Sound at the base of steep, heavily wooded hillsides. Even with the required improvements, cut slopes and trees will still exist along the route. These hillsides are subject to mudslides and fallen trees during rain and windstorms that occur with regularity from late fall through early

spring. The maintenance that is currently required on the existing route will continue to some extent with the additional third track, even with the anticipated improvements to the slopes stability.

Conclusion

The shoreline alternative is attractive because it would amount to a schedule reduction of 2-3 minutes within this segment and it adds capacity to the existing route.

This alternative also has disadvantages. The cost of this alternative is extremely high due to the vast amount of excavation needed on the steep slopes along the Puget Sound shoreline, retaining walls, bridges, tunnel, and other various items. The disadvantages also include significant right of way purchase and continued maintenance concerns on the existing route. Without having a geotechnical investigation, it is unknown whether this alternative is even feasible due to the vast amount of earth disturbance associated with the earthwork, tunnel and potential new structure(s) over Puget Sound.

Environmental Impacts

Resources

Air Quality

The Point Defiance shoreline alternative is within an air quality attainment area for ozone and carbon monoxide, and in proximity to an attainment area for particulates.

During construction, dust particles would be released as a result of construction vehicles, equipment and wind erosion over exposed earth surfaces. Fugitive dust releases generally constitute the largest source of PM_{10} during construction. Most of the dust particles would settle out immediately adjacent to the construction areas while a small fraction would contribute to the area's PM_{10} level. Air quality impacts caused by construction equipment emissions are short term and occur only when construction activities are taking place. Construction emissions would be minimized, and impacts would be less significant with mitigation measures.

Hazardous Materials

Several hazardous material sites are within 500 feet of the Point Defiance shoreline alternative. Additional studies would be necessary to assure that the alignment could avoid these sites. If any sites were located within an expanded right-of-way, WSDOT would likely be required to remediate the site(s).

Noise/Vibration

Noise: The Point Defiance shoreline alternative is approximately 25 miles long. Noise sensitive receptors within 500 feet of the route include the Nisqually National Wildlife Refuge, several publicly owned parks, schools, and homes. All receptor sites located along the proposed alignment would be subject to possible noise impacts.

Noise impacts could be reduced by initiating traffic management measures, acquiring land as buffer zones, realigning the rail route, insulating public use or nonprofit institutional structures (not residential or commercial buildings), or constructing noise barriers. Long-term noise impacts could negatively affect the Nisqually National Wildlife Refuge which would constitute a constructive use under Section 4(f) of the US Department of Transportation Act of 1966. The subsequent *Recreation/Section 4(f) and Section 6(f)* sub-section has additional information on how the Federal Railroad Administration (FRA) is required to handle impacts to Section 4(f) resources.

Vibration: According to the *Noise and Vibration Discipline Study* (revised 03/08) developed for the Point Defiance Bypass project "Because the existing train traffic in the corridor is infrequent, the vibration associated with the proposed project has been evaluated as a new source of vibration and not as an existing vibration source that will occur more frequently. In accordance with the *FRA General Assessment* procedures, it is not necessary to estimate existing vibration levels for a *General Vibration Assessment*. However, based on general projection curves, it is unlikely that vibration from existing train traffic is perceptible inside buildings that are up to approximately 60 feet from the tracks." This assessment should apply to the Point Defiance shoreline alternative as well.

Hydrology/Water Quality

The Point Defiance shoreline alternative will fill approximately 2.5 miles of Puget Sound shoreline and cross several unnamed waterbodies. One of these unnamed waterbodies is within ¼ mile of listed Washington State Department of Ecology 303(d) waterbodies (Balch and Cormorant Passages) for PCBs. It is unknown if this alternative would have a substantial impact on the water quality/water resources at this time. Further study would be necessary to determine the level of significance.

Ecosystems

Fish, Wildlife, Vegetation

With the Point Defiance shoreline alternative, approximately 103 acres (of which 30 acres are developed) would be acquired as right-of-way, and approximately 220 acres would be cleared and grubbed. Some of this acreage is likely to be wildlife habitat, which would have a direct impact on wildlife.

Marbled murrelet, which is listed as threatened species, have been documented within the corridor. Additionally, eight species of concern (bald eagle, osprey, pileated

woodpecker, purple martin, reticulate sculpin, riffle sculpin, Vaux's swift, and western bluebird) have been documented within the corridor. Further study would be necessary to determine the impacts to fish, wildlife, and vegetation.

Endangered Species Act (ESA)

Unavoidable impacts to listed threatened species could occur if the Point Defiance shoreline alternative is constructed, and a Biological Assessment will be required to determine this alternative's impact on those species and their habitats. The timeframe for formal consultation under Section 7 of the ESA, for larger projects in the Puget Sound area, generally exceeds one year and may take up to two years to complete.

Mitigating for potential impacts to threatened or endangered species' habitat would require the creation or restoration of equivalent habitat near the project. The regulatory requirements and costs of such mitigation would depend on the final alternative alignment and the result of consultation with the regulatory agencies.

Wetlands

The preliminary design information available at the time of this analysis suggests that 10 wetlands totaling 3.3 acres may be impacted by the Point Defiance shoreline alternative. Wetland impacts must be mitigated in accordance with federal, state, and local regulations.

Wetland impacts would be reduced to the greatest practicable extent by designing and implementing minimization and mitigation measures. However, for unavoidable impacts, the cost to mitigate is highly variable depending on the rating of the impacted wetlands (Categories I-IV), the type of mitigation implemented (preservation, enhancement, and/or creation), and the price of real estate. Construction costs, and the cost to subsequently monitor the mitigation site(s) (up to 10 years or more), are somewhat more stable and therefore can be predicted with a higher level of confidence.

Assuming all the wetlands identified during this analysis rated as a Category I (i.e., highest-functioning wetlands), the following two cost scenarios[1] are possible:

1. The **likely** scenario. This scenario would require a 3:1 creation/restoration ratio[2] per Class I acre impacted and include a 150-foot buffer. Based on these requirements, a total of 9.9 acres would need to be constructed or restored at a cost of approximately $2,542,000;[3,4,5] or

[1] Based on 2006 guidance, and input from Geoff Gray, SCR Biologist, on September 9, 2010.
[2] Creation/restoration ratios are negotiated with the US Army Corps of Engineers if an Individual Permit is issued.
[3] A total of $256,784/acre. This total was inflated by 15% from the 2006 guidance of $223,290/acre.
[4] This total does not include real estate acquisition costs.
[5] This cost does not include the area required for the buffer.

2. The **conservative** scenario. This scenario would require a 6:1 creation/restoration ratio[2] per Class I acre impacted and include a 300-foot buffer. Based on these requirements, a total of 19.8 acres would need to be constructed or restored at a cost of approximately $5,084,000.[3,4,5]

These cost scenarios only address the cost of constructing the wetlands; they do not address the costs of finding and purchasing the real estate for these sites.

These estimates would be refined only after accurately identifying wetland boundaries and assessing their functions and values, which would be accomplished by completing wetland delineation and wetland rating for each wetland. It is also possible that additional wetlands would be discovered during the fieldwork, which would increase mitigation costs.

Human Communities

Socioeconomic/Environmental Justice

The Point Defiance shoreline alternative could potentially impact approximately 60 private residences, private businesses, the Fort Lewis Military Reservation, and a wastewater treatment plant. Approximately 27% of the population living in this area is considered minority. The 2009 poverty guideline for a family of four is $22,050. Within the study area, the median income is $44,482, which is above the poverty guideline. Further study is necessary in order to determine whether minority or low-income populations would be disproportionately affected.

Private residences and businesses would be displaced by the Point Defiance shoreline alternative. Any individuals or businesses that would be displaced as a result of implementing this alignment would be provided with relocation assistance under the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 USC 4601).

Recreation/Section 4(f) and Section 6(f)

The Point Defiance shoreline alternative as currently designed would impact portions of the Nisqually National Wildlife Refuge and several publicly owned parks, which are Section 4(f) resources. Impacts could include increased noise levels, displacement and/or change in access.

Section 4(f), 49 U.S.C. 303, of the Department of Transportation Act states that the Federal Railroad Administration will not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or a prehistoric/historic site that is on or eligible for the National Register of Historic Places, unless a determination is made that:

1) There is no feasible and prudent alternative to the use of land from the property; and
2) The proposed action includes all possible planning to minimize harm to the property resulting from such use.

Supporting information demonstrates that there is a feasible and prudent alternative that would avoid these Section 4(f) resources. Because another alternative exists that does not impact Section 4(f) resources, the Point Defiance shoreline alternative should be considered and rejected.

Historic/Cultural

Preliminary research indicates that the Point Defiance shoreline alternative would potentially impact 24 recorded prehistoric and historic archaeological sites/resources. Some of these sites/resources could be eligible for listing on the National Register of Historic Places (NRHP) and could trigger Section 4(f) of the Department of Transportation Act. Additionally, due to its age, the Washington Department of Archaeology and Historic Preservation may require that the rail line be evaluated as a historic property in order to determine its eligibility for the NRHP.

Section 4(f) requires analysis to show that there is no prudent and feasible alternative to using such a resource and that all possible mitigation is planned. Historic/cultural sites and resources along the rail corridor and their potential importance would require extensive study and consultation with agencies with jurisdiction and affected Indian tribes, and could play a major role in developing or modifying this alternative. Excavations for data recovery and historical research would likely be needed for some of these sites/resources.

Section 106 of the National Historic Preservation Act would require any such impact to properties on or eligible for the NRHP to complete a 4(f) Evaluation. This process is discussed in the preceding *Recreation/Section 4(f) and Section 6(f)* sub-section.

Conclusion

In summary, widening the existing BNSF rail corridor to include a third track would potentially impact the following:

- Section 4(f) resources such as the Nisqually National Wildlife Refuge and several publicly owned parks;
- wildlife habitat that supports threatened species;
- approximately 60 private residences, private businesses, and a portion of Joint Base Lewis-McChord;
- approximately 3.3 acres of wetlands;

- 24 cultural/historic resources; and,
- possibly, disproportionate adverse effects to minority populations.

The purpose of this technical memorandum for the Point Defiance shoreline alternative is to evaluate the practicality and feasibility of this alternative from a technical and economic standpoint. This portion of the technical memo describes the alternative's likely impacts to the built and natural environment. While this alternative generates fewer impacts than would a 'greenfield' or new rail alignment, it creates more impacts than would either improving the Point Defiance Bypass (the proposed action) or the no action alternative.

FRA's NEPA regulations state that the process of considering environmental impacts "should begin by identifying all reasonable alternatives to the proposed action, including 'no action' and including mitigation measures not incorporated into the design of the proposed action." The Council on Environmental Quality describes "reasonable" alternatives as:

> Reasonable alternatives include those that are practical or feasible from the technical or economic standpoint and using common sense rather than simply desirable from the standpoint of the applicant.
>
> *"Forty Most Asked Questions Concerning CEQ's NEPA Regulations"*

FRA's NEPA regulations go on to state, "It is entirely proper that the number of alternatives being considered should decrease as the environmental consideration process proceeds and as analysis reveals that certain alternatives would in fact be unreasonable." Based on the Point Defiance shoreline route's technical and environmental constraints, and its extremely high cost, WSDOT does not intend to study this alternative in detail within the Environmental Assessment (EA). For alternatives eliminated from further study, the Point Defiance Bypass EA must "briefly discuss the reasons for their having been eliminated." [Council on Environmental Quality Regulations, Sec. 1502.14(a)]. Barring new information, WSDOT considers this alternative both impractical and unfeasible from an economic standpoint, and will describe it as such in the EA.

Technical Memo Summary

In summary, the shoreline alternative meets the project purpose and need. Although it meets the purpose and need, there are many challenges and obstacles to overcome in this alternative. These include right of way impacts, shoreline fill, excavation, construction of large retaining walls and a tunnel, bridge replacements, environmental impacts, continued threat of landslides and fallen trees, and other various impacts.

As a result, since the shoreline alternate has more potentially significant impacts than the bypass alternative, and since the bypass alternative better fulfills the project's purpose and need, the shoreline alternative should be eliminated. Finally, the shoreline

alternative should be considered and rejected because another alternative exists which has fewer effects and impacts.

Staff Recommendation

Staff's recommendation is that the shoreline alternative be **considered and eliminated** based on the factors described previously in this memorandum. The *Engineering and Feasibility* analysis presents the most noteworthy reasons for recommending the elimination of this alternative. To a lesser extent, project characteristics evaluated under *Environmental Impacts* also contribute to this recommendation.