Chapter 5: Evaluation and Conclusions

This chapter compares the two potential bypass options based on the evaluation findings and presents the conclusions of this study.

A side-by-side evaluation of the options was conducted as a final step in this feasibility study to compare the ability of each option to improve mobility and access and establish sufficient community support. Effects on the environment, design feasibility, and construction costs were also included as part of this evaluation comparison. The data and information contained in this step were based on the technical findings and results from the various environmental discipline studies described in Chapter 4. An evaluation summary matrix that highlights the key analysis findings and outcomes of this study is provided in Appendix F.

While no specific recommendations are made based on the outcomes of the evaluation comparison, the end product (the evaluation matrix) is intended to serve as a starting point for further environmental review work, traffic analysis, and design refinements if and when more formalized environmental and design studies are conducted in the future. As part of any future environmental review process, additional alternatives could be developed and a preferred option selected.

5.1. Evaluation Findings

The evaluation of options included an assessment of the following areas: safety, mobility and access, community support, environmental effects, and construction cost.

5.1.1. Mobility and Access

This section primarily focuses on the findings of the traffic analysis in terms of operations and accessibility of the two bypass options.

5.1.1.1 Traffic Operations

As discussed in Section 4.1.1, the traffic operational analysis was comprised of an assessment and review of level-of-service and travel-time results for the two bypass options, as summarized in Exhibit 5.1. The level-of-service results show that the two options would provide similar performance benefits in terms of reducing intersection delay. Also, there would be no substantial difference in travel times between the two options; however, there would be a reduction in travel times under the two options when compared to a Baseline (No-Action) scenario.

Exhibit 5.1 Traffic Operations Evaluation Summary

Measure of Effectiveness	Dogwood Option	Grid Option
Level-of-Service	Summary of LOS for targeted study area intersections: AM Peak LOS A: 5 intersections LOS B: 2 intersections LOS C: 2 intersections LOS D: 0 intersections LOS E: 2 intersections LOS F: 0 intersections PM Peak LOS A: 1 intersection LOS B: 3 intersections LOS C: 4 intersections LOS D: 1 intersection LOS E: 1 intersection LOS F: 1 intersection	Summary of LOS for targeted study area intersections: AM Peak LOS A: 2 intersections LOS B: 3 intersections LOS C: 3 intersections LOS D: 2 intersections LOS E: 1 intersection LOS F: 0 intersections PM Peak LOS A: 1 intersection LOS B: 3 intersections LOS C: 2 intersections LOS D: 2 intersections LOS E: 2 intersections LOS F: 1 intersection
Travel Times	Travel time between SR 164/ SR 18 interchange and SR 164/ Dogwood Street SE via bypass: AM Peak: EB: 6.5 min, WB: 6.3 min PM Peak: EB: 6.3 min, WB: 6.3 min	Travel time between SR 164/ SR 18 interchange and SR 164/ Dogwood Street SE via bypass: AM Peak: EB: 6.5 min, WB: 6.7 min PM Peak: EB: 7.8 min, WB: 6.5 min

Specific intersection-level differences in delays and LOS are attributed to where traffic using the bypass options would enter

the SR 164 traffic stream. For example, traffic volumes and delays between M Street SE and Dogwood Street SE are generally higher for the Grid Option than for the Dogwood Option due in part to the southern terminus connection at Muckleshoot Plaza under the Grid Option. Bypass traffic for the Dogwood Option would connect to SR 164 at Dogwood Street SE, translating to fewer trips on SR 164 between M Street SE and Dogwood Street SE.

With regard to travel times, both bypass options would result in potential reductions up to 30 to 50 percent during critical peak-traffic periods compared to Baseline (No-Action) conditions. The Grid Option would provide marginally greater benefits than the Dogwood Option for the travel routes (end points) analyzed. Furthermore, given the increased network connections for the Grid Option, north-south travel-time reductions would likely be more pronounced and improve more dramatically than for the Dogwood Option.

5.1.1.2 Consistency with State Access Management Master Plan

Potential access impacts or modifications to affected state highways or arterial facilities due to the bypass options were evaluated based on whether an option is consistent or inconsistent with the State's Access Management Master Plan. Since each of the proposed bypass connections to SR 164 are located either at an existing signalized intersection (Muckleshoot Plaza for the Grid Option) or at an existing arterial (Dogwood Street SE for the Dogwood Option), no violation of access standards would arise.

However, the new full-movement interchange on SR 18 would require a new access point between the existing Auburn Way and Auburn-Black Diamond Road interchanges. As such, both options would require a formal state review of this added access interchange for the SR 18 facility. The minimum 1-mile separation from the proposed interchange to adjacent upstream and downstream interchanges is not violated by either bypass option.

5.1.2. Community Support

Community support is considered a follow-up measure of how well each of the options is received and the level of endorsement the options obtain by participating agencies and organizations within the Corridor Working Group (CWG). The participating agencies and organizations included in the CWG that would be solicited explicitly for feedback and support include the following:

- City of Auburn
- City of Enumclaw
- King County
- Muckleshoot Tribe
- Puget Sound Regional Council
- WSDOT

While the CWG was instrumental in guiding the development of suitable bypass concepts that were investigated as part of this study, community support reflects a post-analysis assessment of how the options and concepts meet the needs of each respective agency. Support for one or both options would be given on a qualitative basis and would be based on how well each option meets the goals and objectives of the study and of each respective group. This measure will be addressed and finalized as a future effort after publication of this Bypass Feasibility Study.

5.1.3. Environmental

5.1.3.1 Built Environment

As shown in Exhibit 5.2, the Grid Option could affect more residential, office, and heavy industrial land, tribal land, farmland, and public services than the Dogwood Option. Minority and low-income populations could experience more effects with the Dogwood Option than with the Grid Option. Noise effects may be experienced by more residences with the Grid Option, while the Dogwood Option includes potentially higher noise levels at White Lake Cemetery. The same hazardous materials site is located within both design options, as discussed below.

Exhibit 5.2 Built Environment Evaluation Summary

Resource	Dogwood Option	Grid Option
Land Use	13.7 acres of residential/public use land would be converted to roadway use. Five residences would be acquired.	22.8 acres of residential, office, and heavy industrial use land would be converted to roadway use. No residences would be acquired.
Tribal Land	12.2 acres of tribal land would be converted to roadway use. The five residential acquisitions could be owned by the Tribe. The alignment would need tribal environmental review and appeal.	14.1 acres of tribal land would be converted to roadway use. This includes land owned by the Muckleshoot Tribe Realty Trust Services that would be needed for acquisition. The alignment would need tribal environmental review and appeal.
Farmland	3.8 acres of farmland of statewide importance and 8.9 acres of prime farmland if irrigated (no acres if drained) would be converted to roadway use.	12.2 acres of farmland of statewide importance and 3.0 acres of prime farmland if irrigated (.03 acres if drained) would be converted to roadway use.
Public Lands	No adverse effects are anticipated.	No adverse effects are anticipated.
Public Services	Roadway widening along Dogwood Street SE would require adjustments to existing utilities, resulting in minor relocation or temporary disruptions in service.	A Puget Sound Energy substation is located at the intersection of 12th Street SE and M Street SE. Future coordination with Puget Sound Energy would be needed to ensure that the alignment maintains necessary setbacks at the substation. Any adjustments to the existing utilities would result in minor adverse effects from relocation or temporary disruptions in service.
Environmental Justice	Minority and low-income populations may be displaced as a result of the five residential acquisitions. All populations would experience similar project-related effects, such as increases in traffic noise.	All populations would experience similar project-related effects, such as increases in traffic noise.
Air Quality	No adverse effects are anticipated.	No adverse effects are anticipated.
Noise	White Lake Cemetery and residential areas located at SR 18 and M Street SE and along Dogwood Street SE may experience an increase in traffic noise.	Residential areas located at SR 18 and M Street SE, west of M Street SE and 12th Street SE, and at the 17th Street SE and R Street SE intersection may experience an increase in traffic noise.
Hazardous Materials	One site with a past Leaking Underground Storage Tank incident and a current Underground Storage Tank in operation is located within the design alignment along Auburn-Black Diamond Road, north of SR 18. This site would need further investigation to determine potential effects.	One site with a past Leaking Underground Storage Tank incident and a current Underground Storage Tank in operation is located within the design alignment along Auburn-Black Diamond Road, north of SR 18. This site would need further investigation to determine potential effects.

5.1.3.2 Natural Environment

As described in Exhibit 5.3, the Grid Option could affect more of the natural environment than the Dogwood Option. The Grid Option has larger potential impact areas for surface water, wetlands, and geologic hazards. For groundwater and protected species and habitat, the predicted impacts of both design options would be similar.

Exhibit 5.3 Natural Environment Evaluation Summary

Resource	Dogwood Option	Grid Option
Wildlife, Fish, and Vegetation	Protected species and/or habitat are not expected to occur within the design alignment, and no adverse effects are anticipated.	Protected species and/or habitat are not expected to occur within the design alignment, and no adverse effects are anticipated.
Surface Water	0.35 acre of surface water associated with ponds near White Lake are mapped within the design alignment. Further investigation is necessary to determine potential effects.	0.62 acre of surface water associated with ponds near White Lake are mapped within the design alignment. Further investigation is necessary to determine potential effects.
Wetlands	0.17 acre of wetland is mapped within the design alignment. Further investigation is necessary to determine potential effects.	0.97 acre of wetland is mapped within the design alignment. Further investigation is necessary to determine potential effects.
Groundwater	The entire design alignment is located within a Critical Aquifer Recharge Area. A water quality report and stormwater collection, detention, and/or treatment facility would be required.	The entire design alignment is located within a Critical Aquifer Recharge Area. A water quality report and stormwater collection, detention, and/or treatment facility would be required.
Erosion Hazard	5.35 acres are located within the design alignment.	6.61 acres are located within the design alignment.
Liquefaction Hazard (moderate)	16.9 acres are located within the design alignment.	26.0 acres are located within the design alignment.
Liquefaction Hazard (high)	No acres are located within the design alignment.	0.73 acre is located within the design alignment.

5.1.4. Right-of-Way Acquisition/Business Displacements

Exhibit 5.4 summarizes the total right-of-way that would be required for each design option, and Exhibits 5.5 and 5.6 depict the approximate locations of the acquisitions. Right-of-way areas are separated into tribal and non-tribal land. Full

acquisition of non-tribal (public) properties would include one full business acquisition for the Grid Option (Puget Sound Energy at the northeast corner of M Street SE and 12th Street SE), and five full residential acquisitions for the Dogwood Option (along the east side of Dogwood Street SE).

Exhibit 5.4 Right-of-Way Acquisition

	Dogwood Option	Grid Option
Right-of-Way		
Private Land Right-of-Way (Tribal)	530,000 ft^2	615,000 ft^2
Public Right-of-Way Needs	66,000 ft^2	380,000 ft^2
Residential/Business Displacements		
Residential Units (Full Acquisitions)	5 (49,000 ft^2)	0
Businesses (Full Acquisitions)	0	1 (27,000 ft^2)

Exhibit 5.5 Dogwood Option ROW Acquisition

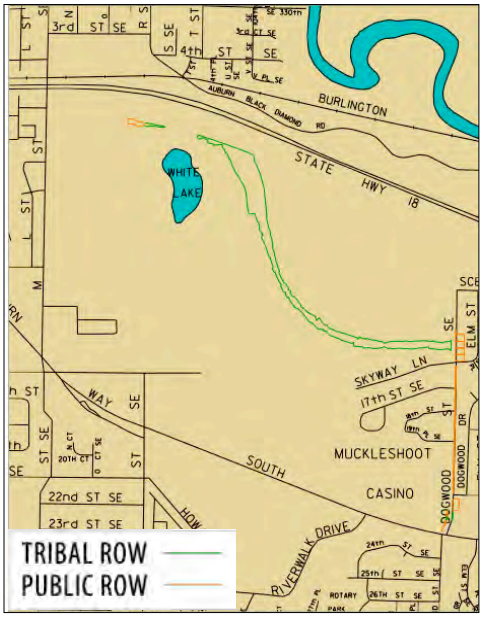
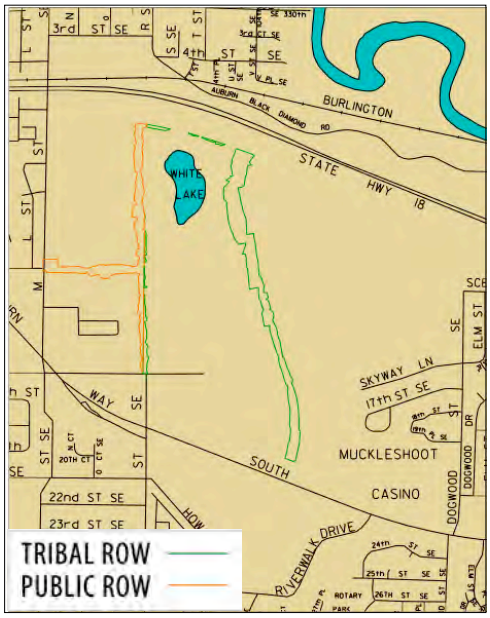


Exhibit 5.6 Grid Option ROW Acquisition



5.1.5. Construction Cost

Exhibit 5.7 summarizes the construction costs of the two options. The cost estimate is used as one method of differentiating the options and is not meant to provide programmatic budget estimation. More details are provided in Appendix D.

Exhibit 5.7 Construction Cost

	Dogwood Option	Grid Option[1]
New SR 18 Interchange		
Capital Construction Costs	$29,180,000	$29,180,000
Other Costs (right-of-way, contingencies, etc)	$18,970,000	$18,970,000
Total Interchange Costs	$48,150,000	$48,150,000
Bypass Roadway		
Capital Construction Costs	$9,310,000	$8,270,000
Other Costs (right-of-way, contingencies, etc)	$20,950,000	$19,570,000
Total Bypass Roadway Costs	$30,260,000	$27,840,000
Secondary Roadways		
Capital Construction Costs	$0	$3,460,000
Other Costs (right-of-way, contingencies, etc)	$0	$12,900,000
Total Secondary Roadway Costs	$0	$16,360,000
Total Bypass Option Cost	*$78,410,000*	*$92,350,000*
Total Bypass Cost Per Lane-Mile	*$37,931,000*	*$41,749,000*

[1]Potential substation relocation was not included in the construction cost of the Grid Option.

5.1.6. Cost-Effectiveness

Cost-effectiveness was used as a planning-level comparison measure that compared travel-time benefits with construction cost to summarize the congestion-reduction value of each option. This measure was represented as a simple ratio of travel-time benefits and overall construction cost.

As a general theme in terms of the performance benefits of a potential bypass facility, both options are expected to provide reasonable levels of travel-time savings even when cost is considered. Nonetheless, based on the specific comparison of effectiveness, the value of the Dogwood Option for providing congestion-reduction benefits may be slightly higher than for the Grid Option. Appendix E provides a tabular summary of the inputs and outcomes related to the cost-effectiveness assessment. A formal benefit cost analysis could be conducted as a future task if and when future environmental reviews are performed to better establish the projected value of any proposed bypass option(s).

5.2. Conclusions

Two alternatives were selected to study and compare different options and alignment themes; however, additional study and

discussion would be required as part of any future environmental review process to arrive at a set of refined options or a preferred alternative. The findings of this feasibility study and development of the matrix summary indicate that both the Dogwood and Grid Options would provide congestion-reduction benefits along the targeted segment of SR 164 by shifting traffic demands away from the core "hot-spot" areas to a new bypass within the study area. Additionally, both options would have modest influences on the natural and built environments. Areas of the built environment that were identified as possible issues (such as noise impacts for both options and residential displacements for the Dogwood Option) are manageable from an implementation and mitigation standpoint.

With regard to design and constructability, both options appear feasible in terms of meeting geometric standards and accommodating desired/proposed lane configurations at intersection points and along the connecting bypass roadway segments. The estimated construction costs are proportional to the features of each option, with the Grid Option having higher costs (15 to 20 percent higher than the Dogwood Option) due to the greater number of roadway connections.

The effectiveness of each option for reducing travel times through the study area in the context of cost (i.e., the perceived value of each option), differs slightly but favors the Dogwood Option. Travel-time reductions for the Dogwood Option are generally on par with those of the Grid Option. However, when combined with the lower overall construction cost, the Dogwood Option appears to be more cost–effective, particularly if a reduction in east-west traffic congestion is the primary goal.

The north-south network redundancy provided by the Grid Option would likely result in greater benefits for communities south of the SR 164 corridor (along R Street SE south of Howard Road for example). However, given that the primary objective of the bypass facility is to reduce congestion on SR

164 itself, both options are generally comparable, with the Dogwood Option having a potentially higher value.

At this early stage of a potentially long-term alternatives development, design, and implementation process, both bypass options are considered suitable candidates to carry forward into a more detailed environmental evaluation. Although this study highlights the characteristics of each option and provides stakeholders with a reasonable comparison of the two alternatives, additional coordination and decisions would be required to address non-technical items related to the following:

- Public feedback and support
- Property ownership and access to and through parcels
- Land use and future development plans on tribal land
- Bypass roadway ownership and operations/maintenance
- Project funding (design, construction, mitigation, etc)

5.3. Next Steps

The two options studied show the potential benefits of a new bypass facility, but additional study would be required as part of any future environmental review process. The work conducted as part of this bypass feasibility study will be valuable if and when a more detailed environmental evaluation is performed. In addition, the findings and results of this study, with respect to the potential congestion-reduction benefits of each option, will provide a strong foundation for any state required added-access reviews or Interchange Justification Report for the SR 18 corridor.

Additional analysis of the benefits and impacts of the new interchange on traffic flow and operations along SR 18 and at the existing SR 18/Auburn Way interchange is strongly recommended to ensure that the regional effects of any project actions are thoroughly captured and documented. The following types of studies would likely be needed if a new bypass connection moves forward:

- Interchange Justification Report – This study would determine whether a new interchange or break-in-

access along a specific highway corridor is deemed acceptable based on a set of review criteria.

- SR 18 Mainline Traffic Analysis – In addition to the Interchange Justification Report, a more detailed evaluation of the SR 18 corridor near the interchange of SR 18 and Auburn Way would provide additional documentation of the effects of a proposed SR 164 bypass on regional facilities.
- Preliminary Engineering and Cost Estimation – This effort would be a follow-on to the design work conducted as part of this study that would further refine the design elements for the bypass alternatives and provide more detailed cost estimates.
- Environmental Review – Environmental analysis and documentation, including studies such as an Environmental Assessment or Environmental Impact Statement, would be conducted, along with alternative selection and analysis of mitigation measures.

Washington State
Department of Transportation

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