L Indirect and Cumulative Effects Analysis

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SR 502 CORRIDOR WIDENING

IMPROVING SAFETY • INCREASING CAPACITY • REDUCING CONGESTION

I-5 TO BATTLE GROUND

FINAL

Indirect and Cumulative Effects Analysis

Prepared for:

Washington State Department of Transportation
Southwest Region
11018 NE 51st Circle
Vancouver, WA 98682-6686

Prepared by:

Parsons Brinckerhoff
400 SW Sixth Avenue, Suite 802
Portland, OR 97204

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This Project is also referred to as "SR 502/I-5 to Battle Ground – Add Lanes".

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Executive Summary

This report presents the analysis of indirect and cumulative effects for the proposed SR 502 Corridor Widening Project. The analysis addresses both the No Build Alternative and the Build Alternative proposed for the project. Indirect effects are those "secondary" effects that result from the project at a later point in time. Cumulative effects are the summation of the project's direct and indirect effects in combination with past actions that have affected the resource over time and led to its existing condition, and the direct and indirect effects of other current and reasonably foreseeable actions in close proximity to the project.

Population growth and urbanization in Clark County and Battle Ground, particularly since the middle of the twentieth century, are the overarching historic trends that have shaped the existing conditions of environmental resources. Conversion of farmland and wildlife habitat, increases in impervious surfaces, modification of streams and hydraulic regimes, and increases in automobile trips have gone hand-in-hand with population growth which have historically impacted environmental resources and continue to impact them today. Section 3.0 of this report presents additional information on past actions and historic trends that have affected specific resources. A map and list of other current and reasonably foreseeable actions identified near the project can be found in Appendix A.

Exhibit ES 1 summarizes the direct, indirect, and cumulative effects for each resource.

Exhibit ES 1. Summary of Direct, Indirect, and Cumulative Effects of Project Alternatives by Resource

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*

AGRICULTURE & FARMLANDS	• None	• Worsened air quality due to increased congestion over time could potentially effect crop growth and/or livestock health	From other current & reasonably foreseeable actions:
			• Land added to Urban Growth Areas (UGAs) will be available for development includes:
			  • 11,327 acres of land zoned for farming
			  • 7,023 acres of prime farmland soils (not exclusive from land zoned for faming)
				• Conversion of 94 - 114 acres of land currently used for agriculture to non-agricultural uses
				• Conversion of 75 - 79 acres of prime farmland soils to non-agricultural uses (not exclusive from land currently used for agriculture)
					• Temporary air & dust emissions during construction could temporarily effect crop growth and/or livestock health	• Conversion of 95 - 114 acres represents <0.1% of the County land base and ~1% of the total farmland loss projected to occur by 2024 due to expansion of UGAs
						• Conversion of 75 - 79 acres of prime farmland soils represents <0.1% of the County land base and ~1% of the total prime soil loss projected to occur by 2024 due to expansion of UGAs

FISH	• None	• None	From other current & reasonably foreseeable actions: • Increased impervious surface • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants • Removal of riparian vegetation & conversion of habitat to the built environment • Streambed sedimentation • Reduced riparian conditions & functions	• Approximately 3 acres of permanent effects below the OHWM of study area streams; approximately 2 acres would be to rearing & wintering habitat for steelhead & coho. • Increased impervious surface • Riparian enhancements & restoration as part of mitigation • In-water work for culvert replacement/ extension • Potential for fish handling and fish mortality	• Temporary increases in sedimentation • Loss of riparian habitat • Increased in stream temperatures • Reduction in total suspended solids • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants (dissolved copper & zinc)	• Increased impervious surface • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants • Removal of riparian vegetation & conversion of habitat to built environment • Streambed sedimentation • Reduced riparian conditions & functions

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*
LAND USE AND RELOCATIONS AND RIGHT OF WAY ACQUISITIONS	• None	• None	From other current & reasonably foreseeable actions: • Continued population growth is projected and is likely to put development pressure on rural lands • 11,698 acres of land added to UGAs in the County are likely to be converted from rural to urban uses	• 140-160 parcels affected with conversion of approximately 40-60 acres of land to right of way; and 68 acres for stormwater treatment and wetland mitigation on the Mill Creek North potential mitigation site • 15-25 parcels with change in access, 3-7 parcels with a loss of 15-25 parking spaces total • Relocation of 20-30 residences and 15-20 businesses	• Reduction in acreage available for farming on agricultural parcels • Changes in access points could potentially influence the number of customers • Minor population increases in the locations that displaced residents and businesses relocate to.	• Increases land in Clark County expected to be converted from agricultural uses to non-agricultural uses in the next 20 years by approximately 1% (108-128 acres) for SR 502 in addition to the 11,698 acres recently added to UGAs
NOISE** (Noise Sensitive Receptors)	• 34 residences and 1 church	• None in addition to the direct effects	• None in addition to the direct effects	• 87 residences and 3 churches	• None in addition to the direct effects	• None in addition to the direct effects
SURFACE WATER	• Current level of pollutant loading occurs	• Current level of decreased water quality conditions persist	From other current & reasonably foreseeable actions: • Increase in impervious surface • Increase in pollutant load being discharged to water bodies • Increase in peak flow due to loss of infiltration • Decrease in base flow due to loss of infiltration	• Increase in impervious surface • Decrease in pollutant load of total suspended solids due to stormwater treatment • Increase in pollutant load of total and dissolved metals	• Improved water quality for some roadway-related pollutants; degraded water quality for roadway-related metallic pollutants • Increase in peak flows due to loss of infiltration	• Increase in impervious surface • Increase in pollutant load being discharged to water bodies • Increase in peak flow due to loss of infiltration • Decrease in base flow due to loss of infiltration
VEGETATION	• None	• None	From other current & reasonably foreseeable actions: • Removal of vegetation • Loss of suitable habitat for listed plant species • Potential removal of listed plants • Long-term loss of functions provided by mature vegetation	• Removal of upland grassland, scrub-shrub, and forest habitat, and removal of wetland and riparian habitat. • Loss of disturbed remnant prairie habitat that may have been used by early Native Americans • Replanting native species and removal of invasive species as part of mitigation	• Possible later death of vegetation	• Removal of vegetation • Loss of suitable habitat for listed plant species • Potential removal of listed plants • Long-term loss of functions provided by mature vegetation

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*
WETLANDS	• None	• Current level of habitat degradation persists	From other current & reasonably foreseeable actions: • Continued habitat degradation and fragmentation • Reduced water quality and increased peak flows into wetlands • Continued loss of wetland acreage and function • Continued indirect effects including light, noise, loss of biodiversity, and increased invasive species	• Filling and clearing of approximately 9 acres of category 1-4 wetland systems • Reduction in hydrologic function (storage of flood waters, headwater storage) • Loss of water quality functions (nutrient and sediment removal) • Loss of wetland specific wildlife habitat and open space • Habitat fragmentation	• Increased noise and glare into wetlands • Loss of biodiversity • Increased presence of invasive species • Interruption of natural groundwater and surface water flow paths • Increased shading changes vegetation classes	• Continued habitat degradation and fragmentation • Reduced water quality and increased peak flows into wetlands • Continued loss of wetland acreage and function • Continued indirect effects including light, noise, loss of biodiversity, and increased invasive species
WILDLIFE	• None	• None	From other current & reasonably foreseeable actions: • Direct habitat loss • Habitat fragmentation • Disrupted migration corridors • Edge effects • Reduced wildlife diversity and increase in urban wildlife • Increase incidental wildlife deaths from collisions with traffic • Increased rates of competition and predation	• Loss of wildlife habitat and conversion to roadway • Habitat fragmentation	• Increased incidental wildlife deaths from collisions with traffic	• Direct habitat loss • Habitat fragmentation • Disrupted migration corridors • Edge effects • Reduced wildlife diversity and increase in urban wildlife • Increased incidental wildlife deaths from collisions with traffic • Increased rates of competition and predation

Notes: * Cumulative effects not only take into account direct and indirect effects of the proposed action, but also past actions, historic trends, and other current and reasonably foreseeable actions. Past actions and historic trends are described in the Historical Context under each resource in Section 3.0. A list and map of the other current and reasonably foreseeable projects that may affect the resources is provided in Appendix A.

**As described in the noise methodology section (Section 3.4.1) direct, indirect and cumulative effects are all included as part of the transportation analysis and therefore included as part of the direct effects analysis. Therefore the indirect and cumulative effects are the same as the direct effects.

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1.0 Introduction

The SR 502 Corridor Widening Project is located in north Clark County, Washington along SR 502 (NE 219th Street) between NE 15th Avenue and NE 102nd Avenue. The western terminus of the project area is approximately one mile east of Interstate 5 (I-5) and the eastern terminus is NE 102nd Avenue. The project would widen an approximate five mile segment of SR 502 from two travel lanes to four travel lanes and upgrade several intersections to improve mobility and safety. Currently, SR 502 is a rural, two-lane highway. There is one signalized intersection at SR 502 and NE 72nd Avenue. Exhibit 1 shows a vicinity map for the project. For a more detailed description of the project, see the separate *Revised Description of Alternatives* document (Parsons Brinckerhoff, 2008k).

The purpose of this document is to analyze and describe the indirect and cumulative effects for the proposed project. This report explains the methodology, documents the potential indirect and cumulative effects, and identifies opportunities for minimizing effects and/or providing mitigation. The information contained in this discipline report will be used to support the project's Environmental Impact Statement (EIS).

Exhibit 1. SR 502 Corridor Widening Project Vicinity Map

2.0 Methodology

The methodology used in this analysis of indirect and cumulative effects is based on the eight-step process outlined in Washington State Department of Transportation's (WSDOT) *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, 2008a). The eight steps are as follows:

1. Identify the resources that may have cumulative impacts to consider in the analysis;
2. Define the study area and timeframe for each affected resource;
3. Describe the current health and historical context for each;
4. Identify the direct and the indirect impacts that may contribute to a cumulative impact;
5. Identify other historic, current and reasonably foreseeable actions that may affect resources;
6. Assess potential cumulative impacts to each resource; determine magnitude and significance;
7. Report the results; and
8. Assess and discuss potential mitigation issues for all adverse impacts.

2.1 Resources Analyzed

The information gathered in the discipline reports for each resource was utilized as a starting point for making a determination as to which resources need to be analyzed in-depth for indirect and cumulative effects. Resources that may have indirect and cumulative effects include:

- Agriculture and Farmlands
- Fish
- Land Use, Relocations, and Right of Way Acquisitions
- Noise
- Surface Water
- Vegetation
- Wetlands
- Wildlife

2.2 Resources Dismissed from Analysis

It has been determined that the following resources do not warrant inclusion in the analysis of indirect and cumulative effects. A brief explanation as to why these resources are not included in the analysis is provided. Global Climate Change is addressed in a separate *Climate Change Memorandum* (Parsons Brinckerhoff, 2008j).

Air Quality

The air quality analysis described in the *Final Air Quality Discipline Report* (Parsons Brinckerhoff, 2008a) was performed using projected traffic volumes that incorporate anticipated traffic generation from planned development in the study area for the future years under both the Build and the No Build Alternatives. Therefore, the air quality analysis provided in the *Final Air Quality Discipline Report* (Parsons Brinckerhoff, 2008a) takes into account the direct, indirect, and cumulative effects of the project and other traffic growth that would be associated with the project.

Cultural

The Cultural Resource Survey for the SR 502 Corridor Widening Project (Archaeological Investigations Northwest, Inc. (AINW, 2008) identified archaeological resources within the study area that may be affected by the SR 502 Corridor Widening Project and historic buildings and structures were identified within a larger study area that included possible changes in the setting of the resources. Cumulative and indirect effects on cultural resources will be largely those that may result from additional development within and beyond the study area. For example, groundwater changes due to creation of stormwater facilities are not expected to affect archaeological resources or historic buildings outside of the immediate area of the facility, which was included in the cultural resources study for the EIS.

Development within the vicinity of the project will continue under existing developmental review regulations, which will allow a continuation of status quo development of the area. Neither the Build nor the No Build Alternative for the project are likely to cause effects on cultural resources either within or beyond the limits of the project, other than the direct effects documented in the *Cultural Resource Survey for the SR 502 Corridor Widening Project* (AINW, 2008). Therefore, as the cumulative effects on cultural resources are anticipated to be minimal and are not likely to be different under either the Build or No Build Alternatives, additional analysis is not warranted.

Floodplain

Indirect benefits to floodplains are anticipated as a result of this project. The project should reduce flooding downstream on Mill Creek due to the high water flow control proposed for the project. Through mitigation, the Build Alternative for the project will not cause a net rise in the base flood elevation. All projects constructed within floodplains must satisfy Federal Emergency Management Act (FEMA) regulations that require no net rise in the base flood elevation. Each project must comply with Clark County's Flood Hazard Areas permit which includes performing hydraulic modeling to determine if the proposed structures would increase the base flood elevations or velocities relative to existing structures. In addition, calculations need to be performed to demonstrate the preservation of flood storage capacity and to comply with the requirements for alteration of a watercourse. Cumulatively, all projects should not cause a rise in the base flood elevation on account of FEMA and Clark County's strict regulations. Direct effects of the project are documented in the *Final Water Quality / Surface Water / Floodplains / Groundwater Discipline Report* (Parsons Brinckerhoff, 2008i).

The magnitude of flood peaks could be modified by potential future watershed changes, such as increased runoff due to upstream development or construction of regional stormwater detention facilities. Clark County's stormwater development ordinances require stormwater detention to avoid increasing runoff on downstream properties, among other water quantity and quality requirements. However, some increase in runoff could be reasonably anticipated in the future as the land use shifts away from open pastures and agriculture to more urban residential and commercial development, which might increase the peak discharge on Mill Creek.

The timeframe for the Mill Creek floodplain to become developed is uncertain due to the unknown future pace of development. However, Clark County regulations for stormwater detention and preservation of flood storage capacity should serve to minimize and potentially offset any potential future discharge increases related to development.

Groundwater

Because the project is not anticipated to have direct effects to groundwater, indirect project effects have not been identified. If the Build Alternative is constructed, it would be required to meet Clark County and City of Battle Ground stormwater requirements, which protect groundwater resources. Other projects in the study area would be required to meet the same stormwater requirements; therefore, there are no anticipated cumulative effects to groundwater. Additional information on the absence of direct effects on groundwater is documented in the *Final Water Quality / Surface Water / Floodplains / Groundwater Discipline Report* (Parsons Brinckerhoff, 2008i).

In July 2006 the United States EPA designated an area within Clark County, which includes the SR 502 Corridor project area, as a "Sole Source Aquifer"; called the Troutdale Aquifer System. Once an area has been designated as a Sole Source Aquifer no commitment for Federal financial assistance may be provided for a project which may contaminate the aquifer through a recharge zone.

Subtitle 40.4 of the Clark County Code addresses Critical Areas and Shorelines. Critical Area regulations potentially applicable to this project include Critical Aquifer Recharge Areas (CARAs) (Chapter 40.410), Flood Hazard Areas (Chapter 40.420), and Shoreline Overlay District (Chapter 40.460).

The CARA chapter is intended to protect public health, safety, and welfare by preventing degradation, and where possible, enhance the quality and quantity of groundwater which will be, or might likely be, used in the future for drinking water or business purposes. This will be accomplished by limiting potential contaminants within designated CARAs. Future commercial facilities are either prohibited from locating and operating within a CARA Category 1 area or will need to obtain a CARA permit form Clark County to locate and operate within CARA Category 1 or Category 2 areas (Clark County Code 40.410.020).

Hazardous Materials

Indirect effects from hazardous waste and waste from normal operations of SR 502 following construction of the Build Alternative would primarily be associated with runoff of contaminants entrained in stormwater – including fuel, lubricants, heavy metal compounds from tires and

brake pad dust, and automobile engine coolants such as ethylene glycol leaking from passing vehicles. Construction of the project would improve traffic operations along the entire project corridor. This would ultimately help reduce the risk of accidents including those involving hazardous materials, and would thereby decrease the amount of harmful materials that might enter soil and water resources in the study area. Remediation of known or potentially contaminated hazardous materials sites for the project would potentially be an indirect benefit of the Build Alternative. Removing these materials from the study area eliminates the potential health hazards and liability risks from these materials remaining in the area.

The long-term cumulative effect of the SR 502 Corridor Widening Project Build Alternative combined with the other transportation improvement projects surrounding the study area represent a slight increase in the risk of accidental hazardous materials spills as a result of increased traffic volumes. These potential hazardous materials spills could lead to added stormwater pollution.

Indirect and cumulative effects would not be expected to occur with the No Build Alternative, as the project would not be constructed. Direct effects of the project are documented in the *Final Hazardous Materials ISA-Level Discipline Report* (Parsons Brinckerhoff, 2008c).

Public Lands

There are no parks, special use areas, designated open spaces, or other type of designated public lands within the study area, so there are no direct effects on public lands anticipated as a result of either alternative. Consequently, indirect and cumulative effects of either alternative on existing and/or future public lands beyond the study area are expected to be minimal. There is a large regional park planned north of SR 502; however, land acquisition has not yet occurred, so the location is undefined at this time. Construction of the Build Alternative could potentially improve access to existing or future public lands, but is unlikely to have other effects. Public parks are a permitted land use in most zones in Clark County, so the location of the future park is more likely to depend on negotiations with land owners and site accessibility, which could be a benefit of construction of the Build Alternative, than comprehensive plan or zoning designations, which are not proposed to change in association with the project. Additional information on the absence of direct effects on public lands is documented in the *Final Land Use/Agricultural and Farmland/Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d).

Social, Environmental Justice, and Economic

Potential indirect effects of the Build Alternative on social, environmental justice, and/or economic resources in the study area would occur later in time or further in distance from the project corridor than those discussed as direct long-term effects in the *Final Social/ Environmental Justice/ Economic Discipline Report* (Parsons Brinckerhoff, 2008f). The loss of population under the Build Alternative would result in about 20 to 30 residences, which equates to 60 to 90 persons in the study area, based on an average household size of 3.0 people (2000 US Census data). Though a substantial number of persons, it would not be significant in the region so would not be expected to indirectly affect the overall rural agricultural and residential

character of the study area. Community character would be preserved by existing land use designations and zoning.

There would be no direct effects on community facilities, public services, parklands, or major utilities other than the anticipated displacement of the one social service agency. The loss of this one agency in the project corridor, however, would not be expected to result in additional indirect effects on the community. The loss of use of water wells and septic systems for some properties along the corridor would be compensated by similar capacity utilities, so they would not have substantial additional capacity that might stimulate future development along the corridor, and so would not indirectly affect the community. Travel modes and patterns in the project corridor are not expected to change substantially. However, the displacement of 15 to 20 commercial businesses focused at Dollars Corner would be substantial and this displacement combined with the displacement of 20 to 30 residences is anticipated to adversely affect community cohesion. Indirect effects would result in redevelopment of some of these properties, but the nature and scope of the redevelopment would be similar to existing character and would not result in significant adverse indirect effects.

The No Build Alternative is not anticipated to have substantial indirect effects on social, environmental justice, and economic resources as the existing community land uses and character would continue in a status quo pattern, though there would be an on-going decrease in community cohesion and quality of life due to the many indirect adverse effects that would result from increasing congestion on SR 502 over the coming 30 years.

Potential cumulative effects of the Build Alternative on social, environmental justice, and/or economic resources in the study area would be the combined effects of the project plus past actions and historic trends that have shaped the existing condition of these resources, and the additional social, environmental justice, and economic effects of other current and reasonably foreseeable projects. The map and list of other current and reasonably foreseeable actions in Appendix A shows that development is expected to be focused in Battle Ground with some additional residential and commercial development scattered in unincorporated Clark County. This development pattern is consistent with existing city boundaries, designated urban growth boundaries, zoning, and comprehensive plans for the rural study area. Additional development beyond what is allowed by current zoning would require going through the required comprehensive plan amendment and/or zoning change processes with the appropriate jurisdiction(s); however, the access management measures included in the project design – specifically the median barrier – are anticipated to discourage additional development that might occur in the project vicinity.

Moreover, travel patterns for all modes of transportation through the study area would essentially not change from current conditions. Dollars Corner would remain the one rural commercial center in the general area, though it would be somewhat different from current conditions. As such, the magnitude and type of foreseeable development in the unincorporated county is not expected to result in substantial cumulative changes to the population, its demographics, its minority and low-income populations, businesses, or government revenues in the study area.

The No Build Alternative is not anticipated to have substantial cumulative effects on social, environmental justice, and economic resources. Anticipated land development and other related changes in the community from current and reasonably foreseeable projects would be minimized by growth management policies that contain urban growth to nearby urbanized areas such as Battle Ground and Ridgefield. Additional development beyond what is allowed by current zoning would require approval of the appropriate comprehensive plan amendment and/or zoning change processes by the appropriate jurisdiction(s).

Additional information on the direct effects of the project is provided in the *Final Social/Environmental Justice/Economic Discipline Report* (Parsons Brinckerhoff, 2008f).

Soils and Geology

Geologic and soils related resources are not expected to experience indirect or cumulative effects due to the Build Alternative for this project. The Build Alternative will not alter the geologic characteristics of the project vicinity and will not create any new geologic hazards. Indirect and cumulative effects related to ground clearing activities and soil erosion would be minimized through best management practices during construction. The construction contractor would be required to prepare and implement a Temporary Erosion and Sedimentation Control (TESC) plan prior to construction. The plan would include measures to reduce erosion of exposed soils, excavated material, and fill material.

The No Build Alternative is not anticipated to have any direct, indirect, or cumulative effects since soils will not be disturbed if the project is not constructed. Additional information on the direct effects of the project is provided in the *Final Soils and Geology Discipline Report* (Parsons Brinckerhoff, 2008g).

Transportation

Direct effects of the Build Alternative on transportation are expected to include temporary lane shifts, closures, detours, and realignments during construction that would be scheduled and coordinated to minimize effects on local access, mobility, emergency vehicles, transit and school buses, and local traffic conditions. WSDOT would be required to prepare a Traffic Management Plan (TMP) and Work Zone Traffic Control Plans (TCP) (WSDOT *Design Manual* 810.16-18) prior to making any changes that would affect traffic flow, and the public and service providers would be notified before any changes were made. WSDOT would be required to coordinate with C-TRAN regarding impacts to transit service. TMPs help manage the work zone traffic impacts of construction. The 2033 traffic analysis indicates that with the completion of the Build Alternative for the proposed project the SR 502 corridor study area would show substantial improvements in travel speed and safety.

SR 502 is a designated “Concurrency Corridor” under Clark County’s Concurrency Code (CCC 40.350.020 Transportation Concurrency Management System). Under Washington’s Growth Management Act (GMA), counties planning under GMA are required to adopt transportation level-of-service standards which must be maintained, or have a commitment to be maintained, in order to approve new development. This is called “Concurrency”.

At this time, Clark County has not identified any existing concurrency issues related to this project. This project's purpose and need is to provide for regional safety and mobility along the SR 502 corridor between I-5 and Battle Ground; it is not being undertaken due to any concurrency-related moratorium. Alternatives analysis, transportation analysis, and design was undertaken using the adopted Clark County 20-Year Comprehensive Growth Management Plan 2004-2024 (CGMP) (September, 2007), which assumes a certain level of growth through the year 2024 (the horizon year for the CGMP), along with a presumption of additional growth between 2024 and the design horizon year of 2033. The CGMP has set urban growth boundaries based on GMA requirements for a 20-year urban land supply; the growth boundaries are not dependent upon this project.

Since this analysis takes future growth and increased transportation trips into account in the model, the results of the transportation analysis already include indirect and cumulative effects of the proposed Build Alternative in combination with other current and future projects in the vicinity. At this time, the project is not anticipated to increase the level of growth and development in Clark County.

Direct, indirect, and cumulative effects of the No Build Alternative are also analyzed in the 2033 traffic analysis. The analysis shows that without the construction of the project as proposed in the Build Alternative, travel speed and safety will deteriorate substantially over time, and fuel emissions and greenhouse gases would increase due to the substantial delays along the SR 502 corridor, and by vehicles expected to divert to alternate travel paths, which are longer and less direct, thus increasing vehicle miles traveled. Additional information on the traffic analysis for the project is provided in the *Transportation Discipline Report* (Parsons Brinckerhoff, 2008l).

Visual

Indirect effects to visual quality are typically associated with growth. The indirect effects of this project are anticipated to be minimal for two reasons. First, the CGMP designations (which characterize how Clark County envisions lands to be used in the future) are primarily responsible for managing growth, depending on how the land is zoned (Clark County, 2007). These designations, rather than the highway itself, dictate how lands are to be zoned and used in the future. It is possible that there could be some redevelopment at the Dollars Corner rural commercial center. This means if businesses are displaced by the project, they could relocate on the remainder of their parcel, or new businesses could move into the Dollars Corner area once the project is complete. However, the rural commercial center designation is not anticipated to change so the overall visual appearance of Dollars Corner – a rural commercial center – would remain about the same.

Second, the project would result in a limited access facility along the corridor which would limit the kinds and types of development that could occur in the otherwise mostly rural corridor. Zoning designations and limited access facility resulting from this project would limit growth that could occur in the study area, thereby minimizing visual effects that typically occur from growth. Examples of these effects: include conversion of open space to developed residential or commercial areas, vegetation removal to accommodate new roads or developments, and increased encroachment onto natural areas by signs, traffic signals, congestion, and light and glare.

Development within the study area will continue under existing developmental review regulations, which will allow status quo development of the area. Neither the Build Alternative nor the No Build Alternative are likely to cause effects on visual resources and visual quality either within or beyond the limits of the project, other than the direct effects documented in the *Final Visual Quality Discipline Report* (Parsons Brinckerhoff, 2008h) and the very minimal indirect effects at Dollars Corner discussed above. Moreover, because of the access limitations under the Build Alternative, this project's contribution to cumulative visual quality effects would be anticipated to be minimal near the study area. Since the cumulative effects on visual resources and visual quality are anticipated to be minimal and are not likely to be different under either the Build or No Build Alternatives, additional analysis is not warranted.

2.3 Scope of Analysis

For each resource analyzed for indirect and cumulative effects, the geographic and temporal scope was defined by the environmental specialist for that resource based on WSDOT's *Guidance on Preparing Cumulative Impact Analyses* (2008a). The rationale for the selection of each spatial and temporal scope is explained and documented under each resource in Section 3.0. In general, the geographic scope is dependent upon the resource and its extent spatially. The term "study area" is defined as the geographic scope for each resource and varies by resource. The temporal scope generally ranges from a date in the past that captures trends that have led to the current state of the resource, to a date in the future based on adopted planning documents that relate to actions that will impact the resource.

2.4 Current Status and Historical Context of Resources

The historical context and current status/viability of each resource analyzed in this report are described based on a variety of resources including: US and agricultural census data, discipline reports for the SR 502 Corridor Widening Project, the CGMP, watershed recovery plans, aerial photographs, fieldwork, and an assessment of environmental baseline conditions. Additional information on the resources utilized is provided in the methodology subsection of each resource analyzed in Section 3.0 of this report.

2.5 Indirect Effects

Pursuant to Section 1502.16(b) of the CEQ NEPA Regulations, an EIS must address the indirect effects of a proposed action. Indirect effects or impacts are those that occur later in time, at some future point after the direct effects of the project, and are in the chain of cause-and-effect relationships, but are still reasonably foreseeable. Indirect effects are sometimes referred to as "secondary effects." 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 systems, including ecosystems. Global climate change is an example of an indirect effect.

The analysis presented in Section 3.0 evaluates whether the SR 502 Corridor Widening Project would indirectly affect economic, population, or housing growth within the project's surrounding environment. Information used to support conclusions in this analysis was generally derived from examining the direct effects to the resource and then using professional judgment to

forecast the effects that will occur later in time or further in distance as a result of the direct effects of the project.

2.6 Cumulative Effects

Cumulative effects or impacts are the summation of effects on a resource resulting from the incremental impact of the action when added to the past actions that have led to the existing condition of the resource and the direct and/or indirect effects of other current and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes those actions. In other words, cumulative effects represent all of the direct and indirect effects of the proposed project in the context of the trends of past events, along with the anticipated effects of other current and reasonably foreseeable future projects within the vicinity of the proposed project. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. For example, global climate change is a result of cumulative effects.

The cumulative effects analysis builds upon information derived from the direct effects analyses presented in the discipline reports for each environmental resource and from the historical context and indirect effects analyses presented within this report. For some resources there are interrelated cumulative effects. This report is organized by resource area; interrelated effects are also discussed within the respective resources (see Exhibit 5 later in this document). To analyze the SR 502 Corridor Widening Project's contribution to cumulative effects, the analysis evaluates the impact on the environment resulting from each alternative, when added to other current and reasonably foreseeable actions, as listed and mapped in Appendix A; summarizes the effects; and identifies the contribution of the proposed project to cumulative effects on the resources.

Where feasible, the cumulative effects analysis is quantitative. Qualitative analyses are also presented where quantitative data is not available and to provide a comprehensive understanding of the resource and how it is affected.

2.7 Other Current and Reasonably Foreseeable Actions

As noted in the previous section in addition to taking effects of the project, historic trends, and past actions into account, consideration must be given to other current and reasonably foreseeable actions when analyzing cumulative effects. Other current and reasonably foreseeable actions include other projects within the study area and its vicinity that are likely to take place in the future.

For the purposes of analyzing cumulative effects for the project, a list of other current and reasonably foreseeable projects near SR 502 has been compiled from adopted planning documents and reports available to the general public. Appendix A contains the list and map of recently approved, pending, and reasonably foreseeable potential projects identified near the project. Documents and reports utilized to compile the list of other current and reasonably foreseeable actions include:

- Bonneville Power Administration Transmission Projects List (2005)

- City of Battle Ground Community Development Department Monthly Report (May 2008)
- City of Battle Ground Comprehensive Plan 2004-2024
- City of Battle Ground General Sewer Plan (2006)
- City of Battle Ground Parks Improvement Plan (2003)
- City of Battle Ground Stormwater Management Plan (2004)
- City of Battle Ground Transportation System Plan 2005-2025
- City of Battle Ground Water System Plan (2004)
- City of Ridgefield Comprehensive Park and Recreation Plan (2006)
- City of Ridgefield Comprehensive Plan (2005)
- City of Ridgefield Sewer Capital Facilities Plan (2005)
- City of Ridgefield Transportation Capital Facilities Plan (2005)
- City of Ridgefield Water Capital Facilities Plan (2005)
- Clark County Comprehensive Plan 2004-2024
- Clark County Maps Online (Last accessed June 16, 2008) (projects with activity since 2006 were identified)
- Clark Public Utilities Water Services, email correspondence with Russell Knutson, Civil Engineer
- 2007-2012 Clark County Transportation Improvement Program (TIP)
- Draft 2008 Stormwater Management Program Report for Clark County Washington
- Port of Ridgefield Projects List (Last accessed June 16, 2008)
- Metropolitan Transportation Plan for Southwest Washington (2007)
- Vancouver-Clark Comprehensive Parks, Recreation and Open Space Plan (2007)
- Washington Transportation Plan 2007-2026

2.8 Potential Mitigation Measures

2.8.1 Mitigation for Direct Effects

WSDOT is responsible for mitigation of direct effects caused by the Build Alternative. The individual discipline reports provide details on the direct effects of the project, as well as measures incorporated into the project to avoid, minimize, and/or mitigate for those direct effects.

2.8.2 Mitigation for Indirect Effects

WSDOT is responsible for mitigation of indirect effects resulting from the Build Alternative. Indirect effects on environmental resources are described under each resource in Section 3.0 in this document. The Build Alternative was designed with a minimal footprint that avoids environmental resources where possible. Even with these efforts, there are still some indirect effects of the project. These indirect effects and the need for potential mitigation measures are described for each resource in Section 3.0.

2.8.3 Mitigation for Cumulative Effects

Cumulative effects are the result of other current and reasonably foreseeable actions in combination with the effects of the project, past actions, and historic trends.

Under NEPA regulations, the Federal Highway Administration (FHWA) and WSDOT are directed to mitigate for impacts that "actually result from the Administration action and represent a reasonable public expenditure after considering the impacts of the action and the benefits of the proposed mitigation measures. In making this determination, the Administration will consider, among other factors, the extent to which the proposed measures would assist in complying with a Federal statute, Executive Order, or Administration regulation or policy." (23 CRF 771.105(d)) In other words, FHWA and WSDOT are only required to mitigate for direct and indirect effects that result from their actions.

Discussion of potential mitigation measures is included for each resource in Section 3.0. The parties responsible for other current and reasonably foreseeable actions listed in Appendix A will be required to comply with the appropriate environmental compliance regulations and any mitigation required by the regulations. Appendix B provides a list of current environmental compliance regulations and indicates resources that may be subject to these regulations. It also lists the agencies with authority over the resources that could take actions to influence the sustainability of the resources.

3.0 Indirect and Cumulative Effects Discussion by Resource

Each of the following sections examines indirect and cumulative effects for the resources included in this analysis. Within each resource section is a description of the methodology utilized, the current health of the resource, historical context of the resource, indirect effects, and other current and reasonably foreseeable actions that may affect the resource. Looking at all of these pieces of information together provides an opportunity to identify cumulative effects on the resource, as well as opportunities to minimize effects and provide mitigation for direct effects of the project.

3.1 Agriculture and Farmlands

3.1.1 Methodology

Geographic and Temporal Study Boundaries

When considering effects on agriculture and farmlands, it is appropriate to consider these agriculture and farmlands in a more regional context. The geographic scope for examining the indirect and cumulative effects of the proposed project on agriculture and farmlands has been defined as the boundaries of Clark County principally because planning activities occur at the county level – more specifically, zoning designations for unincorporated land in Clark County and the determination of the boundaries of urban growth areas (UGAs) for communities within the County are determined in a county-wide process. These planning decisions, in large part, determine which lands will continue to be farmed into the future. Further, historically county boundaries have been utilized in the collection of data about agriculture, and data on trends over time is most readily available at the county and state level.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project on agriculture and farmlands have been defined as 1900, when the Agricultural Census data for the County was first collected, through 2024. Since the continuation of agriculture and farmland practices is largely driven by Clark County's zoning and UGAs, which are formally adopted in the 2004-2024 CGMP, it is appropriate to utilize 2024 as the extent of this analysis.

Historical Context and Current Health

Sources of information utilized in describing the historical context and current health are as follows:

- Agricultural Census data from the National Agricultural Statistics Service.
- Analysis of the Agricultural Economic Trends and Conditions in Clark County, Washington (Globalwise, 2007), which was prepared by Globalwise for Clark County's update of the Clark County 20-year Comprehensive Growth Management Plan 2004-2024.
- Correspondence with Jonathan Held, Historian for Archaeological Investigations Northwest, Inc (AINW).
- Cultural Resource Survey for the SR 502 Corridor Widening Project (AINW, 2008) which provides an overview of the euro-American settlement in the study area.
- *Final Land Use/Agricultural and Farmland/Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d), which provides an analysis of the prime farmland soils in the study area.

Direct Effects

Direct effects of the proposed project on agriculture and farmlands are described in detail in the *Final Land Use/Agricultural and Farmland/Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d).

Indirect Effects

Indirect effects have been identified by examining the direct effects to the resource and then forecasting what effects will occur later in time or further in distance as a result of the direct effects of the project. Because the primary direct effect of the Build Alternative is conversion of land from agriculture to right of way, which is a one time occurrence, it is not anticipated that the Build Alternative will produce any effects that will occur later in time. Further, since there are no direct effects anticipated as a result of the No Build Alternative, no indirect effects are expected to occur.

Cumulative Effects

Cumulative effects for agriculture and farmland have been assessed using the information presented above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. More specifically, for this resource, cumulative effects have been analyzed for both the No Build and Build Alternatives using the following methods:

- Method 1: Conversion of Farmlands. Data from the CGMP and correspondence with Clark County planners (Mabrey 2008a and Euler 2008) was used to determine the number of acres of land with a previous comprehensive plan designation for agriculture, rural residential, or urban reserve (all of which correspond to zones that permit agricultural/farming activities) that has been added to the UGAs in the County. Adding the estimated number of acres of land currently used for farming that will be converted to right of way for each project alternative provides an indication of cumulative effects on agriculture. This approach assumes that the majority of the loss of agricultural land is due to development and infrastructure improvement within UGAs.

- Method 2: Conversion of Prime Soils. Prime soils represent areas of land most suited for farming. Data from the Clark County 20-year CGMP and correspondence with Clark County planners (Mabrey 2008a and Euler 2008) was used to determine the number of acres of prime farmland soils that has been added to the UGAs in the County. Adding the estimated number of acres of prime farmland soils that will be converted to right of way for each project alternative provides an indication of cumulative effects. This approach assumes that the majority of the loss of agricultural land is due to development and infrastructure improvement within UGAs.

Although these two methods of analysis are similar, the distinction is that Method 1 is based on lands designated for agriculture and land identified as actually being used for some sort of agricultural purpose, where as Method 2 is based on lands most suited for farming by soil type – whether or not these lands are designated for farming or actually used for farming currently. Together, these two measures should provide a relatively good indicator of the level of

cumulative effects of this project in combination with other actions on agriculture and farmlands and in the context of past actions and historic trends.

Note: The Western Washington Growth Management Hearings Board found that the county did not comply with the state's Growth Management Act when bringing lands previously designated for agricultural uses into UGAs. The County is now appealing the Board's decision, but UGA boundaries may change again depending on the outcome of the appeal. This analysis uses data based on the UGA boundaries as adopted by the Board of County Commissioners in the September 2007 update to the CGMP.

In addition to the land anticipated to be converted due to its addition to the UGAs, there may be some other projects that convert land outside of the UGAs. Public improvements, such as the I-5/SR 502 Interchange, are usually permitted as "conditional uses" in rural zones where other types of development are not allowed. Further some of the rural residential zones outside of the UGAs, which permit farming, also permit the construction of homes on large (5, 10, or 20 acre) lots. Over time, the division of large farms into rural residential uses, which may or may not have farming associated with them, may also lead to a conversion of farmland. At this time it is not possible to quantify the conversion of other current and reasonably foreseeable actions, so the acreages for these actions are listed as "unknown" in the analyses described in Methods 1 and 2 above.

3.1.2 Current Health & Historical Context

Clark County has expanses of rural, agricultural areas that are much lower in density than the incorporated urban areas. The study area is characterized in large part by its rural, agricultural feel with rural residences sprinkled among the farms lining SR 502. Globalwise provides a descriptive overview in the *Analysis of the Agricultural Economic Trends and Conditions in Clark County, Washington* (Globalwise, 2007) that was prepared in April 2007 for the update to the County's CGMP:

> "Clark County has a long and rich tradition of agriculture. Farmers and agricultural producers have always been very diverse with regard to what they produce and their size and types of operations. Yet this industry sector continues to evolve and change in response to many influences, and it will undoubtedly continue to do so in the future. Land use planning is one of the major influences over how much and of what type of agriculture remains in Clark County."

The SR 502 Corridor has been utilized for agricultural purposes since the late 1850s when euro-American settlers first occupied the area. Farming and logging became the primary occupations of the first settlers, and in time dairy farming became a major industry within the area. Clark County, including the study area, is becoming increasingly urbanized over time, resulting in fewer and fewer acres of land being utilized for farming. Exhibit 2 shows changes in farmland in Clark County over time.

Farmland in Clark County peaked in the 1950s and has been generally declining since then. Beginning in the 1950s suburban residential and commercial development crept outward into northern and northeastern Clark County from Vancouver, utilizing former agricultural lands.

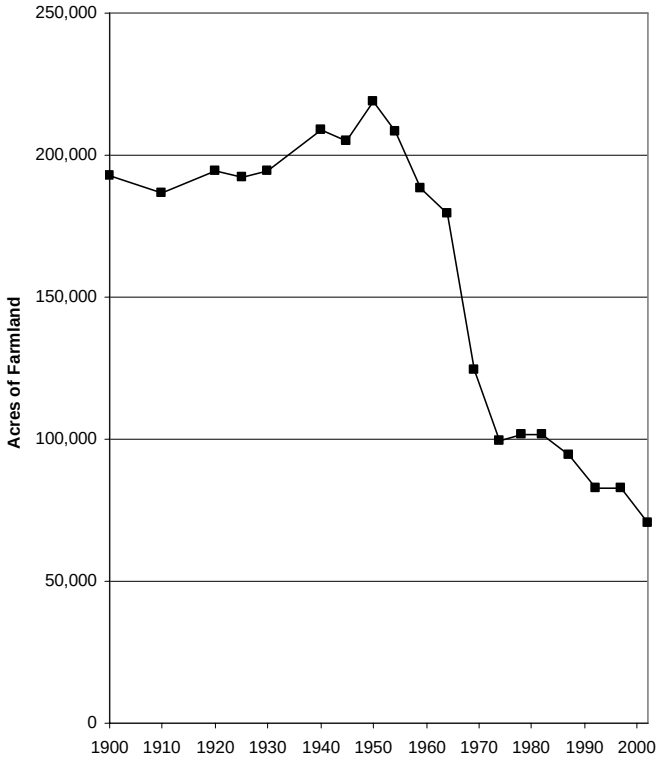
Nationally, farm policy from the 1930s through the early 1970s emphasized programs – such as acreage allotments, marketing quotas, and land retirement programs – to stabilize and support farms, farmers and the US commodity market. Land retirement programs and acreage allotments may account for the decline in farm acreage after the boom years during World War II and the Korean War. Nationally, in the 1970s, agriculture shifted towards the commercialization of agriculture and subsequent consolidation of land by fewer individual land owners (Held, 2008).

Contrary to national trends, the *Analysis of the Agricultural Economic Trends and Conditions in Clark County, Washington* (Globalwise, 2007) shows that farms in Clark County have gotten smaller over time, with the average size decreasing from 51 acres in 1954 to 44 acres in 2002, and the proportion of small farms (less than 50 acres) increasing from 66% to 80% during this time period. Further, farmland in the County has become increasingly more associated with rural homes than with commercial farming, and escalating land values have created major barriers for new farmers entering the business.

Much of the County is still zoned for agricultural uses (AG-20, AG-WL, FR-40, FR-80) and other zones which allow farms (R-5, R-10, R-20, UR-10, UR-20, UR-40, RC-1, RC-2.5).

Exhibit 2. Acres of Farmland in Clark County 1900-2002.

Year	Acres of Farmland	Percent of Total County Land Base*
1900	192,737	47.94%
1910	186,929	46.49%
1920	194,309	48.33%
1925	192,444	47.86%
1930	194,482	48.37%
1940	209,036	51.99%
1945	204,847	50.95%
1950	219,049	54.48%
1954	208,414	51.84%
1959	188,479	46.88%
1964	179,575	44.66%
1969	124,574	30.98%
1974	99,587	24.77%
1978	101,606	25.27%
1987	94,646	23.54%
1992	82,967	20.64%
1997	82,666	20.56%
2002	70,694	17.58%



Source: Pomicter 2008, USDA National Agricultural Statistics Service 1997 and 2002, 1956.
Note: * Clark County's land base is approximately 402,061 acres in size.

The land use study area defined in the *Final Land Use/ Agricultural and Farmland/ Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d) is 432 acres in size and includes approximately 343 acres of prime farmland soils, and

approximately 50 percent of the study area is estimated to be used for agricultural purposes (some parcels are also used for residential or commercial purposes) based on a site visit (Curkendall, 2008)and aerial photography (Microsoft Live Search Maps, 2008).

3.1.3 Direct Effects

The No Build Alternative is not anticipated to produce any direct effects on agriculture and farmland. The main direct effects of the Build Alternative are acquisition and conversion of 75 to 79 acres of prime farmland soils and 94 to 114 acres of land currently being used for agricultural purposes (not exclusive of prime farmland soils) to right of way. Additional details on direct effects are provided in the *Final Land Use/ Agricultural and Farmland/ Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d).

3.1.4 Indirect Effects

No Build Alternative

The only potentially foreseeable indirect effect on agriculture would result from worsened air quality due to increased congestion over time under the No Build Alternative, which could potentially have the indirect effect of negatively impacting growth of crops and/or health of livestock. Other indirect effects on agriculture and farmland are not anticipated for the No Build Alternative since no activities would take place that would trigger additional indirect effects.

Build Alternative

The main indirect effect of the Build Alternative would be temporary in nature. Construction activities may have a temporary effect of air and dust emissions during construction, which could potentially have a temporary impact on the growth of crops or health of livestock. There are no long-term indirect effects anticipated as a result of the Build Alternative, since the conversion of land from agriculture to right of way is a one time occurrence that is unlikely to have impacts later in time or space.

3.1.5 Other Current and Reasonably Foreseeable Actions

Agriculture and farmlands are most likely to be impacted by the following current and reasonably foreseeable actions that result in the conversion of agricultural land and/or prime farmland soils to non-agricultural purposes. Such actions include land development (commercial, industrial, residential, public facilities – shown as red, blue, brown, and green on the map and list in Appendix A) and right of way expansion (shown as orange on the map and list in Appendix A) within unincorporated areas.

Infrastructure improvements (projects shown as light blue and orange on the map and list in Appendix A) – including water lines, sewer lines, storm facilities, bicycle and pedestrian facilities, right of way expansions – within the UGAs are unlikely to impact agriculture and farmlands as most of this land is already highly urbanized, and the changes occurring in the land recently added to the UGAs will be taken into account in the cumulative effects analysis that follows.

The other current and reasonably foreseeable actions, listed in Appendix A, which are most likely to impact agriculture and farmlands are the following:

- The I-5 Interchange Projects
- State and County transportation improvements involving road widening or construction of new roadways outside of UGAs
- Residential development outside of UGAs
- Commercial development outside of UGAs
- Other development outside of UGAs
- Parkland acquisition and development outside of UGAs

3.1.6 Cumulative Effects

As described in Section 3.1.1, two methods are used for assessing the cumulative effects of this project in combination with other projects on agriculture and farmlands.

No Build Alternative

Method 1: Conversion of Farmlands. Under the No Build Alternative, the number of acres of land with a comprehensive plan designation for agricultural, rural residential or urban reserve would be simply the number of acres in these designations added to the UGAs (11,327 acres) by the CGMP, as the No Build Alternative would not cause the conversion of any additional soils in the study area. This is shown in Exhibit 3.

Method 2: Conversion of Prime Soils. Under the No Build Alternative, the number of acres of prime agricultural soils would be simply the number of acres added to the UGAs (7,023 acres) by the CGMP, as the No Build Alternative would not cause the conversion of any additional soils in the study area. This is shown in Exhibit 4.

Build Alternative

Method 1: Conversion of Farmlands. Under the Build Alternative, the cumulative effects of the proposed project on land currently used for agricultural purposes along with the addition of lands from rural residential, agricultural, or urban reserve comprehensive plan designations to UGAs would result in the conversion of less than an additional 0.1% of County land from agriculture to a more urbanized use as shown in Exhibit 3. In the context of the conversion of 11,327 acres of land designated as agricultural, rural residential or urban reserve which the CGMP added to the UGAs, the 95 to 114 acres that the Build Alternative would convert only represents about 1% of the total projected farmland loss.

Exhibit 3. Cumulative Effects of the Alternatives on Conversion of Farmlands (Method 1).

Action Triggering Conversion of Lands Designated or Used for Agriculture	Existing Comprehensive Plan Designation or Current Land Use	No Build Alternative		Build Alternative	
		Acres Converted to Non-Agricultural Use or Land Use Designation	Percent of Total County Land Base*	Acres Converted to Non-Agricultural Use or Land Use Designation	Percent of Total County Land Base*
Clark County 20-year Comprehensive Growth Management Plan 2004-2024	Rural Residential	4,109	1.0%	4,109	1.0%
	Agriculture	4,217	1.0%	4,217	1.0%
	Urban Reserve	3,001	0.7%	3,001	0.7%
Other Current and Reasonably Foreseeable Actions outside of UGAs	Agriculture	Unknown	Unknown	Unknown	Unknown
No Build or Build Alternative	Agriculture	0	0.0%	6 - 8	<0.1%
	Agricultural with Single Family Residence			88 – 104**	<0.1%
	Agricultural with Commercial			1 - 2	<0.1%
TOTAL		**11,327 + unknown acres of other actions**	**2.7% + unknown acres of other action**	**11,422 – 11,441 + unknown acres of other actions**	**2.8% + unknown acres of other actions**

Exhibit 4. Cumulative Effects of the Alternatives on Conversion of Prime Farmland Soils (Method 2).

Action Triggering Conversion of Prime Agricultural Soils	No Build Alternative		Build Alternative	
	Number of Acres of Prime Farmland Soils Converted to Non-Agricultural Uses	Percent of Total County Land Base*	Number of Acres of Prime Farmland Soils Converted to Non-Agricultural Uses	Percent of Total County Land Base*
Clark County 20-year Comprehensive Growth Management Plan 2004-2024	7,023	1.7%	7,023	1.7%
Other Current and Reasonably Foreseeable Actions outside of UGAs	Unknown	Unknown	Unknown	Unknown
No-Build or Build Alternative	0	0.0%	75 - 79**	<0.1%
TOTAL	**7,023 + unknown acres of other actions**	**1.7% + unknown acres of other actions**	**7,098-7,102 + unknown acres of other action**	**1.8% + unknown acres of other action**

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Method 2: Conversion of Prime Soils. Under the Build Alternative, the cumulative effects on the conversion of prime farmland soils of the proposed project along with the effects on these soils of the CGMP would result in the conversion of less than 0. 1% of the County land base as shown in Exhibit 4. In the context of the conversion of 7,023 acres of prime farmland soil which the CGMP added to the UGAs, the 75 to 79 acres that the Build Alternative would convert only represents about 1% of the total projected prime farmland soils loss.

Both methods utilized in the cumulative effects analysis above demonstrate that the project does contribute to the loss of farmland and land suitable for farming in Clark County – this is a continuation of the loss of farmland that has been occurring since the 1950's, as evidenced by the Agricultural Census data provided in Section 3.1.2 above. However, as described under each method above, the contribution of this specific project to the overall loss of farmland is relatively minor in the context of the overall pattern of land conversion, as guided by the CGMP.

In addition, as noted in the tables in this section, the acres of farmland and prime farmland soils that are likely to be converted to other uses as a result of the other current and reasonably foreseeable actions located outside of the UGAs is unknown. The list of projects shows the development of many additional rural residences, which may include the continuation of some agricultural practices on the parcels, but the division of land into smaller and smaller pieces may contribute to the overall loss of property primarily used for agriculture. Without extensive research into these other projects, it is not possible to accurately estimate the number of acres affected by the other projects, but it can be assumed that they would also be contributing to the conversion of farmland and prime farmland soils in rural Clark County.

3.1.7 Discussion of Potential Mitigation Measures

A feature incorporated in the design of the Build Alternative that helps minimize the direct effects and indirect effects (and therefore, also cumulative effects) on agriculture and farmlands is that the alignment of the Build Alternative avoids lands currently in use as agriculture to the extent practicable, maximizing usage of the existing right of way, where as some other earlier alternatives would have required the conversion of far more agricultural land.

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and mitigation measures required by these regulations. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting agriculture and farmlands will most likely have to comply with the Farmland Protection Policy Act (FPPA), as well as current county and city comprehensive plans and development ordinances.

3.2 Fish

3.2.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on fish has been defined as three subbasins – the East Fork Lewis River subbasin, the Gee Creek subbasin, and the Salmon Creek subbasin, which are the subbasins in which the direct effects of

the proposed project will occur. These subbasins are shown on the map in Appendix A. Other subbasins in the vicinity (Flume Creek, Whipple Creek, and Allen Creek subbasins) are not included in this analysis because there are no direct effects from the SR 502 Corridor Widening Project in them. Analysis for this report occurs at the subbasin level because effects of the Build Alternative at the watershed level would likely be undetectable. The major population centers in this portion of Clark County are the northern reaches of the Vancouver UGA, Battle Ground, and Ridgefield. Continued urbanization within these cities and rural development that influences the preservation, elimination, or alteration of fish resources is the basis of this geographic scope.

The East Fork Lewis River subbasin includes Mill Creek North and unnamed tributaries to the East Fork Lewis River. The Gee Creek subbasin includes unnamed tributaries to Gee Creek that are the surface water bodies within the western portion of the study area. The Salmon Creek subbasin includes Mill Creek and Curtin Creek (tributaries to Salmon Creek), which is the surface water body within the eastern and central portion of the study area. These three subbasins encompass the area of direct effects.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project for fish have been defined as 1998 to 2024. On March 19, 1998, the National Marine Fisheries Service (NMFS) listed Steelhead (*Oncorhynchus mykiss*) Lower Columbia River Distinct Population Segment (DPS) as threatened under the Endangered Species Act (ESA). This is the earliest date for a fish listing within the study area, and therefore, is the basis for the lower temporal boundary for examining historic trends that have led to the existing condition for this resource. One of the tenets of the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB, 2004), a fish and habitat recovery plan developed for these subbasins, is to manage growth and development to protect watershed processes and habitat conditions. The critical habitat regulations that are part of the local comprehensive plans are intended to guide growth and protect sensitive areas such as fish resources and adjacent wetland that could be overwintering fish habitat. Therefore, 2024, the future limit of the current CGMP, forms the upper temporal boundary for this discussion of historic context and resource trends for fish resources.

Historical Context and Current Health

Information on historical context and current health of fisheries resources came from a review of existing literature (including *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness, 1973) and *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001)), a review of an area watershed recovery plan (*Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan* (LCFRB, 2004)), the *Final Biology Discipline Report* (JD White, 2008), and aerial photographs (Spencer Gross date unknown), along with fieldwork (Reeder et al, 2007) in and around the study area and an assessment of environmental baseline conditions for the three subbasins – the Gee Creek, East Fork Lewis River, and Salmon Creek subbasins (as shown on the map in Appendix A). Study area riparian functions were also assessed using Clark County habitat rating forms.

Direct Effects

Direct effects of the proposed project on fish are described in detail in the *Final Biology Discipline Report* (JD White, 2008). Project scientists assessed direct effects to in-stream habitat and riparian buffer, wetland habitat for overwintering fish, potential effects of stormwater pollutants on fish, and temporary effects associated with clearing vegetation, soil disturbance, and in-water work. Scientists conducted field visits in the study area to assess riparian habitat, conditions, and functions. Scientists also assessed direct effects to fish habitat quantitatively.

Indirect Effects

Indirect effects were identified by examining the direct effects to the resource and forecasting effects that will occur later in time or further in distance as a result of the direct effects of the project. The CGMP, *Clark County Code (CCC), City of Battle Ground Comprehensive Plan 2004-2024, Washington Transportation System Plan 2005-2025, 2007-2012 Clark County Transportation Improvement Program, Metropolitan Transportation Plan for Clark County,* and the *Statewide Transportation Improvement Program* provided background information. These plans gave insight on the relationship between potential transportation improvements and changes in land use. In addition, local planning agency staff (Carrico 2008, Mabrey 2008b, and Orijako 2008) were consulted to determine if any proposed projects depend on the Build Alternative for construction.

Cumulative Effects

Information on the current health, past actions and historic trends, direct effects, indirect effects, and the additive potential effects on fish from other current and reasonably foreseeable actions was utilized to analyze cumulative effects on fish. More specifically, the potential cumulative effects to fish from the Build Alternative, past actions and historic trends, and other current and reasonably foreseeable projects was based on the best professional judgment of the incremental loss of vegetation resources and conversion to pollution- and non-pollution generating impervious surfaces as well as alteration of in-stream and riparian habitat. The No Build Alternative would not contribute additional effects to fish resources beyond what is presumed for past actions and the other current and reasonably foreseeable projects.

3.2.2 Current Health & Historical Context

Fish habitat includes the physical, chemical, and biological components of the environment that support fish throughout their life cycle. These components include water quality, stream flows, physical features, and ecosystem interactions related to the habitat. The *Final Biology Discipline Report* (JD White, 2008) includes an assessment of the current environmental baseline conditions of the three watersheds and characterizes the components of fish habitat. In general, the environmental baseline conditions for these subbasins are degraded and most riparian functions are rated as not properly functioning or are functioning at risk. Steelhead and coho salmon are the primary listed fish that occur in the study area. Although possible, it is unlikely that Chinook or chum salmon occur in the study area. Bull trout do not occur in the study area. Resident fish occur in the study area.

Fish populations fluctuate naturally. However, over the past century, their numbers have declined markedly and the extent and quality of their habitat has decreased. For example, the

Salmon Creek subbasin historically supported thousands of fall Chinook, winter steelhead, chum, and Coho salmon, but the numbers have plummeted to record lows that are now in the hundreds or even tens (LCFRB, 2004), which has resulted in salmon being listed under the ESA. As the human population and the extent of development have increased over time, aquatic habitat for fish has been eliminated and/or degraded. Fish habitat degradation has resulted from, in part, the removal of much of the forest cover throughout subbasins, removal of stream-side vegetation, and reduction in riparian buffers, channel modification, bank armoring, dredging, removal of woody debris from streams, routing of streams through culverts, and alteration of natural stream flow regimes. Altered habitat conditions have increased predation and altered predator/prey relationships (LCFRB, 2004). Hydropower operation on the Columbia River has altered flows, habitat, and migration conditions. Residential, commercial, and public projects in urban and rural areas have converted natural habitat to impervious surface.

The cumulative effects of degrading fish habitat and declining fish populations have led to the listing of Lower Columbia River salmon and trout as "threatened" under the ESA. This includes: coho, Chinook, and chum salmon, bull trout and steelhead. Resident fish populations may also be at risk from many of the same forces that led to the listing of the above species. In recent years, agencies, local governments, and other entities have addressed these threats by developing strategies, measures, actions, priorities and recovery plans for the subbasins (LCFRB, 2004). Although management strategies have been developed, fish populations have continued to be listed or have remained on the ESA list. Continued population growth that could impact fish and fish habitat is a primary concern. The year 2000 population in the study area, estimated at 252,000 persons is expected to increase to 519,000 by year 2020. Continued population growth will increase pressures for conversion of forest, agricultural, and rural residential land uses to higher density suburban and urban uses, with potential impacts to fish habitat conditions (LCFRB, 2004).

3.2.3 Direct Effects

There are no direct effects on fish or fish resources as a result of the No Build Alternative. For the Build Alternative, the chief direct effects on fish and fish resources are the removal and conversion of approximately 3 acres below the ordinary high water mark (OHWM) to roadway, in-water work for culvert extension or replacement, fill material for roadway slopes, or retaining walls. The removal of approximately 3 acres of habitat below the OHWM of Mill Creek North and Mill Creek would result in direct loss of habitat for listed and unlisted fish species. Of this acreage, approximately 2 acres of habitat associated with Mill Creek North is potential rearing and wintering habitat for steelhead and Coho salmon, and resident fish, and the in-stream habitat is designated critical habitat for steelhead. Additional effects include the addition of impervious surface, an increase in stormwater pollutants and potential effects on fish, removal of riparian vegetation, and potential sedimentation from clearing and grubbing. There is also the potential for fish handling from in-water work which could result in direct mortality of fish. Direct effects on fish and fish habitat are more fully discussed in the *Final Biology Discipline Report* (JD White, 2008).

Direct benefits of the Build alternative include the potential restoration of up to 1,500 linear feet of in-stream habitat on Mill Creek North and adjacent habitat restoration (including the Mill

Creek North potential mitigation site), the restoration of approximately 3,000 to 5,000 linear feet of in-stream habitat near the headwaters of Curtin Creek, restoration of approximately 10,900 square feet of riparian habitat and buffer along Mill Creek near Dollars Corner, restoration of riparian habitat elsewhere in Mill Creek, and reduction in total suspended solids and reduced peak flows, as a result of stormwater treatment and detention.

Additional details on direct effects are provided in the *Final Biology Discipline Report* (JD White, 2008).

3.2.4 Indirect Effects

No Build Alternative

No indirect effects to fish are anticipated as a result of the No Build Alternative.

Build Alternative

The review of the comprehensive plans, transportation plans, and zoning ordinances and discussions with Clark County staff revealed no instances of developments tied to the Build Alternative by permit condition.

Many factors influence land development. These include public policy, sociological and demographic factors, economics, land use regulations, local and regional land use plans, transportation facilities, and accessibility. Development generally “depends on” transportation facilities for land access, but it is not correct to make the general statement that transportation facilities “cause” development.

In general, indirect effects of increased development can result from transportation projects that provide an increased level of service. The Build Alternative is intended to improve safety and mobility in the corridor, and the results of a traffic study indicate that the improvements will result in increased capacity. The improved traffic capacity, however, is not expected to result in increased development, which could further impair fish resources. SR 502 is already a major corridor between I-5 and SR 503, and adding capacity to it is not anticipated to result in significant increases in the rate of development within the study area. The Build Alternative would provide access control along the length of the corridor and reduce the number of accesses to parcels that adjoin SR 502. The access points for rural commercial businesses along SR 502 would be reduced to one access, some properties may share an access, and rural residences would have limited access. Therefore, access restriction is anticipated to result in reduced development pressure along the corridor. Redevelopment at Dollars Corner may occur within commercially zoned properties, for properties that are displaced by the project and is therefore a potential indirect effect of the Build Alternative. Redevelopment at Dollars Corner will take place largely within already developed areas, and likely will not result in any significant amount of new impervious surface or significant additional effects to vegetation that could impair fish resources.

Another way that transportation projects can indirectly affect the rate or distribution of development is by resulting in changes in land use patterns. A review of comprehensive plan designations shows that rural residential and rural commercial designations are not expected to

change, and indicates that the rural character of the area is to be maintained. Rural commercial centers are highlighted as key areas for limited commercial development. Development within UGAs is already planned or anticipated, does not depend on the proposed action, and will be constrained by the presence of regulated resources. Impacts to regulated natural resources will require the applicant to show how the project avoids, minimizes, and/or mitigates for unavoidable impacts to resources. Development within or near sensitive areas would be controlled by federal, state, and local regulations, including critical area ordinances.

Following construction of the Build Alternative, there may be short-term effects to fish from surface runoff from disturbed soil. Mass wasting and destabilized stream banks may alter stream channels and habitat. In addition, the loss of shading functions provided by riparian forest vegetation that is associated with roadway widening and culvert installation would increase stream temperatures and reduce dissolved oxygen available to fish. Because several riparian areas already lack stream cover and are degraded, the temporal effect of the loss of shade from a mature tree canopy would primarily be limited to forested areas along a tributary, and in two sections of Mill Creek near Dollars Corner. However, over time, riparian plantings associated with project mitigation and restoration activities would grow and shade and cool the creeks.

Although there may be increases in some stormwater pollutants, such as dissolved zinc and copper, that are not removed by treatment facilities and can harm fish, stormwater treatment will remove other stormwater pollutants and total suspended solids and improve water quality for these indicators in the long term. Peak flows would be expected to increase due to loss of infiltration area due to conversion of vegetated areas to roadway. However, flow control should reduce peak flows over the current condition by detaining waters that would otherwise flow downstream very quickly, resulting in downstream erosion and habitat degradation caused by high erosive forces. Base flow contributions for Mill and Gee Creeks in the project area are primarily driven by the wetlands in the project area, including the Category 1 palustrine, emergent (PEM) wetlands located on both sides of SR 502 that begin approximately 1,000 feet west of 72nd Avenue that is hydraulically connected to Mill Creek. Base flows would be expected to decrease due to loss of infiltration area. However, implementation of the mitigation plan would provide approximately three times the surface area as the filled wetlands, and replace and enhance numerous wetland functions, including headwater storage and opportunities for recharge.

3.2.5 Other Current and Reasonably Foreseeable Actions

Fish, surface water, vegetation, wetlands, and wildlife resources are all very connected within the ecosystem. As such, these resources could be similarly affected by other current and reasonably foreseeable actions. Exhibit 5 summarizes the likely effects of other current and reasonably foreseeable actions for these resources.

Exhibit 5. Potential Effects and Benefits of Other Current and Reasonably Foreseeable Actions on Fish, Surface Water, Vegetation, Wetlands, and Wildlife Resources.

Types of Current & Reasonably Foreseeable Actions	Resources	
	Fish, Surface Water, and Wetlands	**Vegetation and Wildlife**
Transportation Projects		
Transportation projects that add capacity	Likely to result in negative effects. These projects add significant amounts of impervious surface (new roads or widening of existing roads) and could increase stormwater pollutants in area streams, temporarily increase sedimentation and erosion, modify stream flows and stream courses, require in-water work for outfalls and culvert replacement/extensions, increase stream temperatures, remove riparian vegetation, and therefore directly affect in-stream habitat for fish resources and water quality for surface water resources. However, there are opportunities to retrofit existing impervious with stormwater treatment facilities which would offset some of these direct effects. Opportunities also exist to replace underperforming culverts with respect to fish passage and fish habitat with higher functioning culverts and even clear-span bridges which would improve fluvial performance. Short-term negative effects during construction include sedimentation, habitat impacts, and direct fish handling/mortality. These are primarily related to culvert replacements or extensions that require work below ordinary high water.	Expected to have negative effects. Adding significant amounts of impervious surface would result in removal of large amounts of vegetation to widen or realign roadways and have consequent effects on wildlife that depend on vegetation resources for habitat, feeding, and breeding.
Transportation projects that add new neighborhood collectors, sidewalks, bike lanes	Fewer effects to resources as these impervious surfaces are not typically high traffic volume, contributing fewer pollutants and requiring less vegetation removal.	
Transportation projects that add turn lanes or signals	Not expected to result in adverse effects because they do not typically result in significant increases in pollution generating impervious surface or remove significant quantities of vegetation.	
Commercial and Other Development Projects		
Development for large-scale commercial uses	May negatively affect resources. These projects result in conversion of pervious surfaces – including riparian and surrounding habitat for construction of a large structure (e.g. warehouse and parking lot), and are likely to affect resources through the addition of impervious surfaces, removal of vegetation, increased stream temperatures, and potential need for culverts. Operations of these facilities could result in negative effects depending on the type of on-site operations and whether water used on site is treated or otherwise discharged to a sanitary sewer facility.	May affect resources negatively, but the extent of the effects depends on the scale of construction. Projects resulting in conversion of habitat for construction of a large structure would be likely to affect resources negatively because of the scale of vegetation removal, conversion to the built environment, alteration or elimination of wildlife habitat, and temporary construction noise.
Development for small-scale commercial uses	Construction of smaller structures with smaller parking areas is less likely to affect resources because less impervious surface is added, and less vegetation would be removed.	
Development for other uses (e.g. churches and schools)	Potential to affect resources by increasing impervious surface, likely requiring removal of vegetation for construction of buildings and parking lots, and temporary construction noise.	
Redevelopment of commercial structures	Redevelopment of commercial structures unlikely to affect resources because they are presumed to be already devoid of some (or all) vegetation, riparian habitat, and other pervious surfaces.	
Residential Development Projects		
Smaller Rural Residential Projects	These projects generally do not add significant amounts of pollution-generating impervious surface, but they do result in removal of some vegetation and pervious surfaces and a reduction in infiltration. Stormwater treatment facilities constructed for subdivisions would reduce negative effects to resources. The use of lawn and landscaping chemicals could have a negative effect on resources.	Typically these projects remove some vegetation and alter wildlife, but retain some open space. Rural residential projects are usually smaller in scale and would be anticipated to result in the least amount of vegetation and wildlife habitat removal.
Large Subdivisions Projects	Large subdivisions are likely to result in significant vegetation and pervious surface removal, producing greater effects on the resources than smaller, more rural residential projects.	
Utility Improvement Projects		
New utility lines (e.g. new water mains, sewer trunk lines)	Few to no direct effects on riparian habitat and vegetation and not expected to affect resources except where new utility corridors are constructed. These could result in direct effects to riparian habitat and removal of significant amounts of vegetation.	
New detention and water quality facilities or new regional sewer connections	Expected to improve water quality for area streams, but could also increase the pace of development, which could in turn negatively affect resources due to removal of vegetation, increased impervious surface, reduced infiltration, and direct effects to riparian habitat.	
Parkland Improvements		
Parkland improvement and acquisition projects	Not expected to affect resources negatively, and may benefit resources. Although there may be limited habitat alteration, parklands in general are set aside and excluded from other types of development that may continue to urbanize area and pose risks to resources. Within rural and urban centers, parkland habitat for wildlife generally includes more diverse habitat types than the surrounding area, providing multiple cover types, which are beneficial to different types of wildlife and generally result in a greater diversity of species. Parkland may also serve as a corridor to connect wildlife habitat areas, benefiting the resource overall.	

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3.2.6 Cumulative Effects

Transportation improvement projects that add capacity could result in direct effects to fish resources from conversion to roadway. Increases in stormwater pollutants in area streams, primarily dissolved zinc and dissolved copper that are released from the brake pads of automobiles and are not fully removed by treatment facilities, could increase fish mortality. Additional stream crossings could alter stream habitat and channel alignment and increase shading and fish predation. Removal of riparian vegetation could increase stream temperatures and reduce dissolved oxygen available to fish. Temporary increases in sedimentation could reduce water quality. Potential benefits could also result from transportation projects such as improved fish passage from culvert replacement, reduction in total suspended solids and reduction in peak flows in the subbasins due to stormwater treatment and detention. Transportation projects that could further degrade fish resources while improving capacity are primarily located in the Gee Creek and Salmon Creek subbasins.

Commercial and other development projects may negatively affect fish resources due to removal of riparian vegetation and conversion of habitat to impervious surface. Removal of riparian vegetation and increased impervious surface would likely reduce infiltration, increase stream temperatures, and reduce water quality. Future commercial developments, primarily located in the Salmon Creek subbasin, and other development projects, such as churches and schools primarily located in the Gee Creek and Salmon Creek subbasins, could further degrade fish resources.

Residential development may negatively affect fish resources because of removal of vegetation, reduced infiltration, and increased peak flows in area streams. Short plats and subdividing primarily rural properties for construction of rural residences generally results in more landscaping and lawns and the use of fertilizers and pesticides and other household chemicals by residents that could reduce water quality. Much of the area is already in agriculture. Fecal coliform, primarily from farm animals and leaky septic systems, and agricultural fertilizers have already degraded area waters, but the addition of harmful chemicals could further degrade the subbasins. Residential development, primarily concentrated in the Gee Creek and Salmon Creek subbasins, could further degrade fish resources.

Utility improvement projects, such as new water mains, sewer trunk lines, and increasing the capacity of existing stormwater treatment and detention facilities or building new facilities, are not expected to affect fish resources negatively during construction. Although water quality improvements may occur, such improvements could also lead to future urbanization and further degrade fish by removing vegetation, converting to impervious surface, increasing stream temperatures, reducing infiltration, and altering peak and base flows. Utility improvement projects are primarily concentrated in the Gee Creek and Salmon Creek subbasins.

Parkland improvement and park acquisition projects are not expected to affect fish resources negatively. Although there may be limited habitat alteration of parkland, in general these lands would be excluded from other types of development such as commercial or residential projects that continue to urbanize areas and pose some effects to fish. Parkland improvement and acquisition projects are almost exclusively located in the Salmon Creek subbasin.

Cumulatively, the additive effects of current and reasonably foreseeable actions are expected to negatively affect fish resources.

No Build Alternative

Because the No Build Alternative would have no direct or indirect effects, there would be no additional effects to fish resources in the three subbasins from that alternative, other than what is already anticipated cumulatively from the aforementioned project types.

Build Alternative

Construction of the Build Alternative would result in direct effects to in-stream habitat in both fish-bearing and non-fish-bearing streams and would affect overwintering fish habitat directly. Loss of riparian habitat, increase in stormwater pollutants (namely dissolved zinc and copper), and increased impervious surface could impact fish and fish habitat. The three subbasins are already degraded. However, if not adequately mitigated, the effects of the Build Alternative in combination with other actions could further degrade fish resources. Mitigation proposed for the Build Alternative would help offset most of the negative effects to fish and is described more fully below.

Assuming the other types of projects as noted in Appendix A are constructed and placed in operation, the cumulative effects on fish would be as noted above.

3.2.7 Discussion of Potential Mitigation Measures

Benefits of the Build Alternative on area fish resources include the potential restoration of up to 1,000 to 1,500 linear feet of in-stream habitat on Mill Creek North and adjacent habitat restoration (including the Mill Creek North potential mitigation site), and the restoration of approximately 3,000 to 5,000 linear feet of in-stream habitat near the headwaters of Curtin Creek. These proposed habitat improvements would reconstruct the stream channels to restore natural channel morphology, re-establish floodplain connectivity, and restore native riparian plant communities, greatly improving habitat for listed fish species. Approximately 10,900 square feet of riparian habitat would be restored along Mill Creek near Dollars Corner, where there is very little to no riparian buffer existing.

Additionally, the Build Alternative would realign/restore sections of Mill Creek and would include riparian plantings, placement of large woody debris, removal of concrete bank armoring, and realignment of the stream channel.

The additional current and reasonably foreseeable actions described earlier also will be obliged to follow environmental regulations and the mitigation measures they require. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting fish will have to comply with federal, state, and local regulations that may be associated with conditions of approval that would offset negative effects to fish resources in the subbasins. If proposing development within critical areas, these regulations may require culvert replacement to improve fish passage, mitigation in the form of riparian restoration, including planting native trees and shrubs to shade streams, installing large woody debris to increase habitat structure, removing concrete bank armoring, and realigning the stream channels. These

types of mitigation activities would help replace lost or reduced functions and values and offset negative effects of projects on fish resources in the subbasins.

3.3 Land Use, Relocations, and Right of Way Acquisitions

3.3.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on land use, relocations, and right of way acquisitions has been defined as the boundary of parcels within or partially within the study area. In general, land uses should be considered in the context of the entire county since the county is the level at which comprehensive plan and zoning designations are made, which determine the uses of the land. However, for this project, effects to land uses are expected to be minimal, with effects primarily being felt within the study area itself. Development (and changes in land use) around the project is only expected to occur in the form of redevelopment around Dollars Corner and new development in the land recently annexed into the City of Battle Ground between NE 92nd and NE 102nd Avenues. The defined geographic scope is an appropriate scale for consideration, since those residents and businesses that would be displaced under the Build Alternative may choose to relocate within a relatively close vicinity to their current locations.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project on land use and relocations and right of way acquisitions have been defined as 1950 through 2030. Nineteen-fifty (1950) was selected as the starting year because the CGMP utilizes this year as the beginning date in its analysis of population trends. The latest extent of the adopted planning documents used to compile the list of other current and reasonably foreseeable projects is 2030, so this is used as the ending temporal boundary.

Historical Context and Current Health

Information for the historical context and current health section comes from US Census data, the CGMP, the *Cultural Resource Survey for the SR 502 Corridor Widening Project* (AINW, 2008), the *Final Land Use/ Agricultural and Farmland/ Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d), aerial photographs (Microsoft Live Search Maps, 2008), and a site visit (Curkendall, 2008).

Direct Effects

Direct effects of the proposed project on land use and relocations and right of way acquisitions are described in detail in the *Final Land Use/Agricultural and Farmland/Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d).

Indirect Effects

Indirect effects have been identified by examining the direct effects to the resource and then forecasting what effects will occur later in time or further removed in distance as a result of the direct effects of the project.

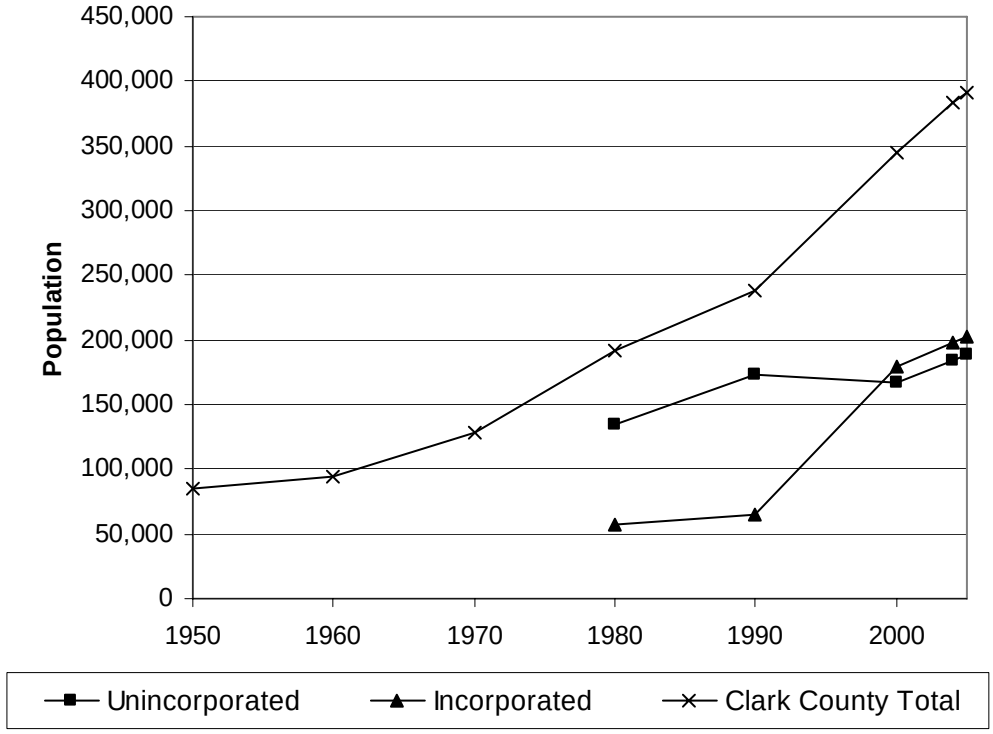
Cumulative Effects

Cumulative effects for land use, relocations, and right of way acquisitions have been assessed using the information presented above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. While it is not possible to accurately quantify the changes in land use, right of way acquisition, or relocations that other projects might require, the projects which have potential to cause these types of changes were identified to the extent possible, to provide context for the effects of the project on a larger scale. In addition, the alternatives are considered in the context of historic trends and overall expected land use changes in the County using the CGMP.

3.3.2 Current Health & Historical Context

As described in Section 3.1.2, Clark County has been becoming more and more urbanized over the last century. Both urban and rural populations grew between 1990 and 2000, but during that time period the urban population increased by 53.8% while the rural population only increased 14.9% (1990 and 2000 US Census Data). Exhibit 6 shows population trends for Clark County with more specific data for unincorporated versus incorporated areas from 1980 through 2005. Like the US Census data, the figure shows that incorporated areas – which tend to be more urban – have grown more than unincorporated rural areas.

Exhibit 6. Population Trends in Clark County 1950-2005.



Source: *Clark County Comprehensive Plan 2004-2024*, Tables 2.1 and 2.9.

The study area is characterized in large part by its rural, agricultural feel with rural residences sprinkled among the farms lining SR 502 and a rural commercial center around Dollars Corner at

the intersection of NE 72nd Avenue and SR 502. Land in the study area is primarily zoned for agricultural, rural residential, and commercial uses, except at the east end, which is within the City of Battle Ground UGA and partially within the City of Battle Ground city limits. Land in the UGA is zoned for mixed use, and land in the City is zoned for regional commercial use. The *Final Land Use/ Agricultural and Farmland/ Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d) includes maps showing the zoning and existing land uses.

Most properties in the study area have direct access to SR 502, although some have access via one of the north-south streets that intersect SR 502. Access points along SR 502 have likely increased over time as large farms have gradually been divided and additional residences have been built.

3.3.3 Direct Effects

The No Build Alternative is not anticipated to have any land use effects since this would not cause land to be converted to a different use or different comprehensive plan or zoning designation. The No Build Alternative would not require relocation of any residents or businesses, changes in access to parcels, or loss in parking.

The main direct effects of the Build Alternative are the partial or full acquisition of 140 to 160 parcels of land in various zones and its conversion to a transportation use; the resulting relocations of 20 to 30 residences and 15 to 20 businesses; changes to access for 15 to 25 parcels; and loss of 15 to 25 parking spaces for three to seven parcels in the study area. The Build Alternative would not trigger the rezoning of any parcels and is only anticipated to stimulate a small amount of commercial redevelopment around Dollars Corner.

Direct effects on land use, relocations, and right of way acquisition are described in greater detail in the *Final Land Use/ Agricultural and Farmland/ Public Lands/ Relocations and Right of Way Acquisitions Discipline Report* (Parsons Brinckerhoff, 2008d) and *Final Social/ Environmental Justice/ Economic Discipline Report* (Parsons Brinckerhoff, 2008f).

3.3.4 Indirect Effects

No Build Alternative

Under the No Build Alternative, land uses would continue on a status quo trajectory and no relocations would be needed, as no right of way would be acquired. It is not anticipated that the No Build Alternative would have any indirect effects that would happen later in time or space.

Build Alternative

The direct effects of the Build Alternative – conversion of approximately 40-60 acres of land to right of way; changing the access points of 15-25 parcels; relocating 20-30 residences and 15-20 businesses – could potentially have the following indirect effects:

- Reduction in acreage available for farming on agricultural parcels – potentially causing a shift in the primary use of the parcel. Since most of the land potentially proposed for right of way acquisition is a relatively small strip along the front of the parcels, it seems likely

that the remainder of the parcels could continue to be used for agriculture, so the overall impact on agricultural production in the area would be minimal.

- Changes in access points for businesses could potentially positively or negatively influence the number of customers/clients visiting, causing changes in the local economy. Given that only a few of the changed access points would be for commercial properties, a slight increase or decrease in clientele is unlikely to influence the overall economy of the local area. All parcels would still be provided access in a safe manner, and it is assumed that businesses would continue to serve their customers.

- Minor population increases in the locations that displaced residents and businesses relocate to. Given that the number of residents and businesses potentially relocating is quite small and that they are unlikely to choose to all relocate to the same place, any population increases resulting from this alternative would likely be miniscule. Further, some of the businesses that would be displaced from their current location could potentially relocate on the same parcel of land – moving from the front of the parcel further to the rear of the parcel, which would minimize the movement to other communities.

3.3.5 Other Current and Reasonably Foreseeable Actions

Land use is most likely to be impacted by the following current and reasonably foreseeable actions:

- Subdivision of large parcels in the unincorporated portions of Clark County into smaller parcels, which is likely to change the use of the land from primarily agricultural to primarily residential;

- Utility improvements within the UGAs which will make possible the development of land within the UGAs and urban reserves; and

- Acquisition of parkland for a 200 acre regional park which is likely to change the use of the land from agricultural and/or rural residential to public open space, and could potentially cause relocations.

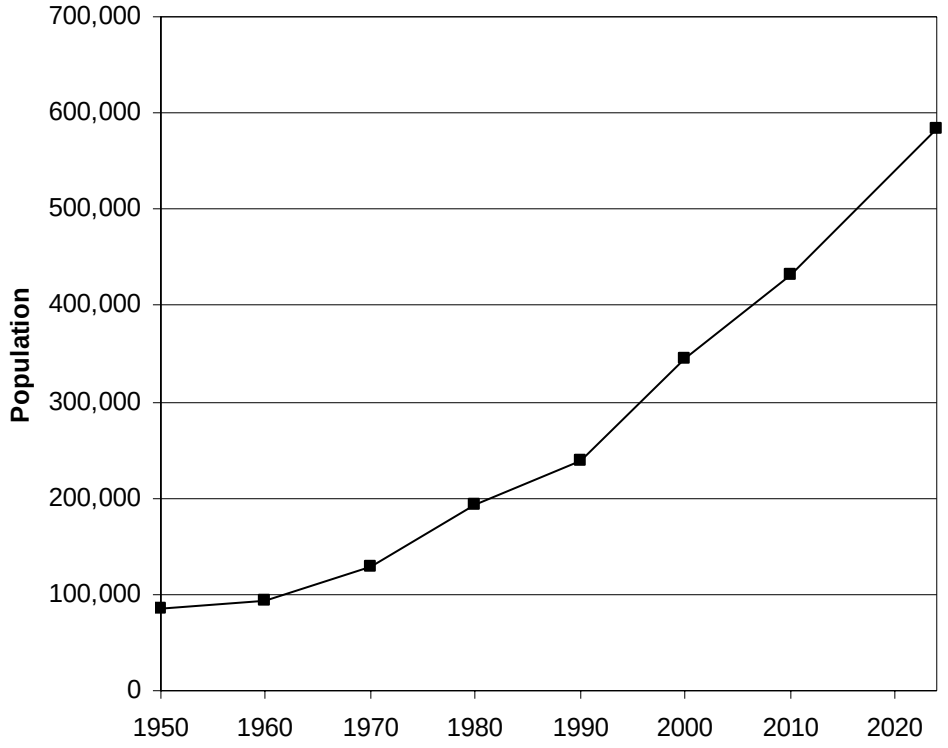
Other projects involving transportation improvements may also require alteration of access points or could potentially require relocations if right of way is acquired. It is unknown exactly which of the proposed projects will definitely cause a change to existing land use, require right of way acquisition, or result in relocations, and trying to determine this would be highly speculative and require a substantial level of effort.

3.3.6 Cumulative Effects

The CGMP shows that the population of Clark County is expected to continue growing at an average annual rate between 1 and 5 percent over the next 16 years, as shown in Exhibit 7. This population growth will be the primary driving factor for changes in land use in future years. The CGMP establishes boundaries for the UGAs where the growth will primarily be concentrated,

and in addition, establishes comprehensive plan designations and zoning which regulate the permitted land uses in the unincorporated portions of the County.

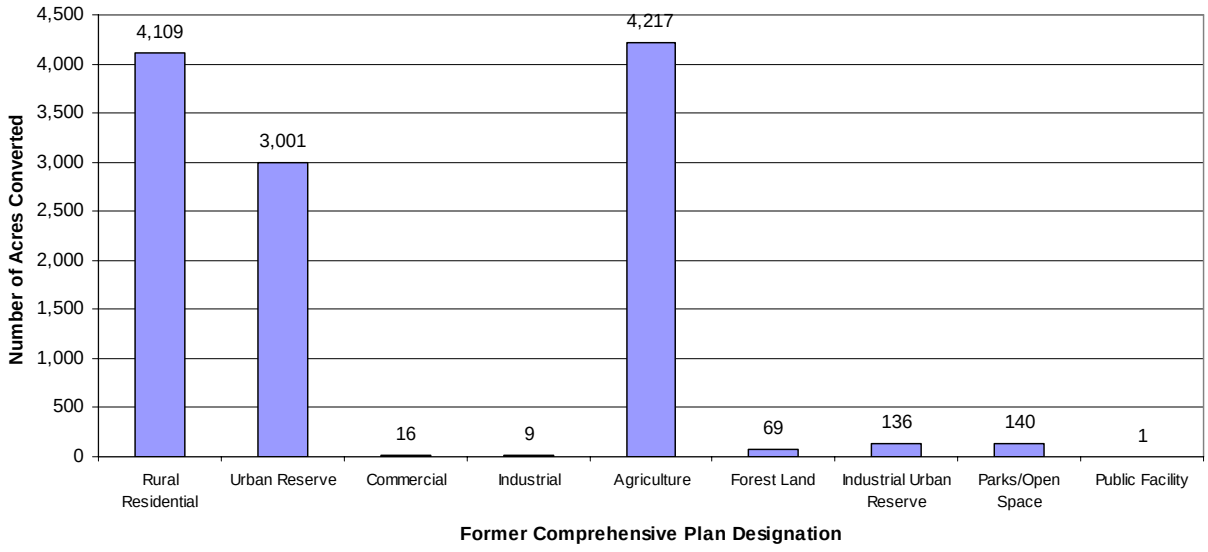
Exhibit 7. Projected Population Trends in Clark County 1950-2024



Source: *Clark County Comprehensive Growth Management Plan 2004-2024*, Table 2.9.

The recent (September, 2007) update to the CGMP is perhaps the most influential recent "other current and reasonably foreseeable action" on land use as a whole. The updated plan established new UGA boundaries for urban areas in the County. These expanded boundaries mean that land that was formerly primarily reserved for more rural uses – farming, forestry, low-density rural residences, and so forth – is now available for conversion to more urban uses. The total number of acres of land brought into UGAs, which will change land uses in the future, is 11,698 acres as shown in Exhibit 8. (Note: the Western Washington Growth Management Hearings Board found that the county did not comply with the state's Growth Management Act when bringing lands previously designated for agricultural uses into UGAs. The County is now appealing the Board's decision, but UGA boundaries may change again, depending on the outcome of the appeal)

Exhibit 8. Acres of Land Brought into Clark County UGAs in 2007 by Former Comprehensive Plan Designation.



Source: Mabrey 2008a.

No Build Alternative

Land Use: The No Build Alternative does not require the conversion of any existing land uses to transportation uses and is not expected to contribute to population growth, which in turn would drive more changes in land use. Therefore, the No Build Alternative is not expected to contribute to overall changes in land use in the study area or the entire County.

Relocations and Right of Way Acquisition: The No Build Alternative does not require the acquisition of any land for right of way, nor does it require the relocation of any residents or businesses. Therefore, this alternative is not anticipated to contribute to any cumulative effects on relocations or right of way acquisition.

Build Alternative

Land Use: The Build Alternative does not include any provisions for changing zoning or comprehensive plan designations; nor is it anticipated that it will cause any changes in existing land uses beyond some minor commercial redevelopment around Dollars Corner. The median barrier proposed as part of the Build Alternative may actually serve as a deterrent to future development, as it makes access to parcels in the study area more limited. Since the Build Alternative is not expected to trigger any additional development, this alternative is not expected to contribute to population growth, which in turn could drive more changes in land use.

The Build Alternative would convert approximately 40 to 60 acres of land from agricultural, rural residential, commercial, and church uses to right of way, a transportation use. In addition, use of the Mill Creek North potential mitigation site would convert an additional 68 acres from agriculture to a public use – wetland mitigation and stormwater treatment. This alternative, however, is not expected to contribute to or influence the conversion of land beyond the right of

way for SR 502. That is, the effects of this alternative are expected to be completely independent of the effects of other current and reasonably foreseeable projects.

The Build Alternative is also anticipated to require changes in the access point(s) of 15 to 25 parcels, excluding those parcels where displacements would occur. Changing the access point(s) on individual parcels, however, is not anticipated to cause changes in the use of the parcel as long as adequate access is still provided to serve the parcel and continue the existing use. Therefore, changes in access points are not anticipated to influence the overall land use pattern around the study area.

As described earlier, it is not possible to quantify the number of acres of land being converted from one land use to another that the other current and reasonably foreseeable projects will cause. However, it is reasonable to expect that the other current and reasonably foreseeable projects mapped and listed in Appendix A have the potential to cause changes in land use:

- Residential development (shown as red in Appendix A)
- Commercial development (shown as blue in Appendix A)
- Other development (shown as brown in Appendix A)
- Parkland acquisitions and improvements (shown as green in Appendix A)
- Transportation improvements (shown as orange in Appendix A)

It is unlikely that most utility improvements would cause a change in land use as utility lines are typically installed underground in the right of way. Projects with the potential to change the land use due to utility improvements include regional detention/water quality facilities, sewer pump stations, and public water supply wells, although none of these are planned within the geographic boundary defined for this analysis.

In the context of all of the other potential projects which could cause changes in land use, the conversion of 40 to 60 acres of land to right of way and 68 acres from agriculture to stormwater treatment and wetland mitigation, while not insignificant, is not a large contributor to overall land use changes when compared with the recent 11,698 acre expansion of the UGAs as shown in Exhibit 8. Land conversion from the Build Alternative represents only about 1% of the total land conversion expected in Clark County between now and 2024. Further, the conversion of land uses to right of way does not necessarily have the same effect on the overall land use pattern when compared with developments which are likely to cause a change in land use for entire parcels or blocks of parcels, rather than just the frontage portion of a parcel as is required for right of way expansion.

Relocations and Right of Way Acquisition: The Build Alternative is anticipated to require acquisition (and conversion) of 40 to 60 acres of land for right of way. This alternative is also anticipated to require 20 to 30 residential relocations and 15 to 20 commercial relocations.

As described earlier, it is not possible to quantify the number of relocations and the amount of right of way acquisition that the other current and reasonably foreseeable projects will require. However, some of the other current and reasonably foreseeable projects listed and mapped in Appendix A that may also have right of way and relocation effects due to transportation improvements are:

- The I-5/SR 502 Interchange and I-5/SR 501 Interchange Replacement projects
- State, County, and City transportation improvements involving road widening or construction of new roadways

In addition, the planned acquisition of park land on the north side of SR 502 may also cause relocations depending on which parcel(s) are selected for acquisition.

3.3.7 Discussion of Potential Mitigation Measures

The following is a list of features incorporated in the design of the Build Alternative that help minimize the direct effects and indirect effects (and therefore, also cumulative effects) on land use, relocations, and right of way acquisitions:

- The design of the Build Alternative alignment maximizes use of the existing right of way, therefore minimizing the amount of right of way required for acquisition, the amount of land converted to right of way from another use, and the number of relocations required.
- Fair market value compensation to land owners for acquisition of right of way.
- The Sunset Oaks mitigation site is currently vacant, so acquisition and use for mitigation does not require any relocation and is not converting the site from another use.
- The Mill Creek North potential mitigation site minimizes the need for relocations by providing some of the needed mitigation facilities on a single parcel, therefore, only causing the relocation of a single residence rather than several residences or businesses on several smaller parcels.

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and mitigation measures required by these regulations. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting land use, relocations, and right of way acquisitions will also have to comply with city and county comprehensive plans, transportation plans, public infrastructure plans, development ordinances, and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

3.4 Noise

3.4.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on noise has been defined as the public roadways accessing the SR 502 facility within the noise study area. The noise study area, as defined in the *Final Noise Discipline Report*, includes all land within 500 feet of any improvement proposed as part of the Build Alternative. The study area was chosen because it encompasses the project related improvements as well as the noise sensitive receptors near those improvements. Traffic noise from the study area roadways will not exceed any noise abatement criteria beyond 500 feet; therefore all of the direct, indirect and cumulative effects from noise to sensitive areas around the project will be contained within the noise study area.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project on noise have been defined as the 1950s to the existing year 2006 of analysis for the direct impacts through build out year 2034. The decade of the 1950s was chosen because it was around this time that the use of the automobile, which is the dominant source of traffic noise in the area, became widespread. The year 2006 is the base year for the direct effects analysis in comparison to the build out plus 20 year (2034) future noise levels.

Historical Context and Current Health

The historical context and current health for assessing the cumulative and indirect impacts of noise on the study area were derived from two reports:

- *Cultural Resource Survey for the SR 502 Corridor Widening Project* (AINW, 2008); and
- *Final Noise Discipline Report* (Parsons Brinckerhoff, 2008e).

Direct Effects

The methods for analyzing direct noise effects of the proposed project in the study area are described in detail in the *Final Noise Discipline Report* (Parsons Brinckerhoff, 2008e).

Indirect Effects

An effect is considered to be indirect when it occurs later in time or further removed in distance as a result of the direct effect of the project. Indirect effects may include effects related to changes in land use patterns, population density or growth rate, and related effects on other natural systems.

The noise analysis for this project is based on the transportation demand forecasting model and includes the effects of unmet demand on the transportation system. Unmet demand refers to traffic levels that have not yet been fulfilled. By including unmet demand, the indirect effects of increased transportation capacity are included in the direct effects analysis. Therefore the traffic analysis conducted as part of the *Transportation Discipline Report* (Parsons Brinckerhoff, 2008l) includes forecasting for all planned projects that would increase roadway traffic to the SR 502

facility and other roadways accessing it. Examples of projects that have been taken into account as part of the traffic study that would add to the indirect effects of noise in the study area are commercial developments, residential developments and other conversions of undeveloped lands to a more urbanized environment, in addition to improvements that have been already planned, independent of the SR 502 project. Therefore, the traffic used in assessing the direct noise effects takes into account indirect effects as well.

Cumulative Effects

Cumulative effects for noise have been assessed using the information presented above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. More specifically, for this resource, a noise analysis for this project has been performed based on transportation demand forecasting models and includes the effects of unmet demand on the system for both the No Build Alternative and the Build Alternative. By including the unmet demand, the indirect and cumulative effects of increased transportation capacity are included in the technical report analysis. For traffic to be cumulative to itself, existing noise traffic would need to double to add even 3 decibels (dBA) to the existing level. Therefore the results of the technical report analysis reflect potential delayed, distant, and combined effects of the SR 502 Corridor Widening Project.

3.4.2 Current Health & Historical Context

The existing SR 502 roadway network in the study area has been in place since approximately the 1940s and 1950s (see the *Cultural Resource Survey for the SR 502 Corridor Widening Project*). Roadway traffic has increased substantially since the 1950s through today because of an increase in population and the availability of the automobile. Traffic noise is the primary noise source in the study area. The increase in traffic has increased roadway noise in the area gradually over time to today (2006 for the exiting condition). Therefore to address effects to the existing noise environment, PM peak hour traffic was used which represents the peak noise hour for the year 2006. Noise levels range from 46 dBA to 66 dBA in the existing noise environment, which is approximately the equivalent of noise levels ranging from a dishwasher in the next room to a vacuum 10 feet away. Modeling results show that noise levels of one or more residences in the study area currently approach or exceed the federal noise abatement criteria levels during the loudest traffic hour. Existing conditions were then compared to anticipated future conditions in year 2034 to anticipate future noise effects in the study area.

3.4.3 Direct and Indirect Effects

As was described in the methodology section, direct and indirect effects in the study area with regards to noise are the same. Therefore, the analysis described in detail in the *Final Noise Discipline Report* (Parsons Brinckerhoff, 2008e) includes both direct and indirect effects.

Additionally, an improvement in the study area that is not directly associated with the SR 502 Corridor Widening Project (e.g. additional residential, commercial and industrial development not currently planned) would need to result in a doubling of traffic in the area to have even a 3 dBA increase in noise. It is unlikely that a development of any kind in the study area would result in this type of increase in traffic under the No Build Alternative or Build Alternative conditions.

No Build Alternative

Noise levels for the No Build Alternative are predicted to increase by 0 to 5 dBA due to increases in traffic volumes (see the *Final Noise Discipline Report* (Parsons Brinckerhoff, 2008e)). Noise levels would approach or exceed the Federal Highway Administration (FHWA) noise abatement criteria at 15 out of 61 sites, representing 34 residential units and one church.

Build Alternative

Noise levels for the Build Alternative are predicted to increase by 1 to 11 dBA relative to existing modeled noise levels, due to increases in the proximity of sensitive receptors to the widened roadway and the increases in vehicular traffic in the build year (2034). Noise levels would approach or exceed the FHWA noise abatement criteria at 34 out of 61 sites, representing 87 residences and three churches. However, 20 to 30 of the affected residences would be displaced under the Build Alternative, so noise impacts are not relevant for these parcels which would no longer be occupied. While increases in roadway noise occur at commercial sites in the study area, none of these increases exceed the FHWA Noise Abatement Criteria (NAC) listed in Exhibit 9 under the Build Alternative. The Sunset Oaks wetland mitigation site and the Mill Creek North potential mitigation site would not have any long term noise effects under the Build Alternative.

Exhibit 9. FHWA Noise Abatement Criteria (NAC)

Activity Category	L_{eq} (h) (dBA)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: U.S. Department of Transportation, 1982.

3.4.4 Other Current and Reasonably Foreseeable Actions

Noise sensitive resources are most likely to be impacted by transportation improvement projects that increase capacity connecting to the SR 502 roadway network. This will in turn result in increased noise levels to the study area. The traffic associated with planned future projects has already been included in the direct and indirect effects analysis. See Section 3.4.3.

Other developments, like new residential, commercial and industrial developments, have the potential to cause increases in traffic which could cause increases in noise. However, if these projects were to be built in the study area, a noticeable (3 dBA or greater) increase is unlikely to occur. This is because traffic levels associated with these types of developments are not expected to result in a doubling of traffic, which is what would be needed for sensitive receptors to experience a 3 dBA or greater increase.

Development of lands into industrial uses has the potential to add noise to the study area. Industrial noise would need to comply with Clark County and City of Battle Ground noise ordinances.

3.4.5 Cumulative Effects

No Build Alternative

The explanation of Cumulative Effects for the No Build Alternative and the Build Alternative are the same. See the Build Alternative section for this information.

Build Alternative

The FHWA criteria for noise effects are based on the peak noise hour, that is, the maximum hourly noise level generated by the roadway. The traffic conditions used to calculate the peak hour noise levels for this assessment result in the highest theoretical hourly noise levels that can occur along the road. The peak noise hour conditions occur when the road experiences the greatest number of cars at free flow conditions. If there are fewer cars at free flow, the noise levels generated by the road will be lower. Adding more cars results in congestion and slower travel speeds than free flow. These lower travel speeds result in lower noise levels. Therefore, the noise effects analysis is independent of how much traffic is actually projected for the road.

Additional cumulative projects would either result in the actual noise levels approaching the conditions modeled for this assessment if the road is not congested (that is, the number of cars at free flow conditions in the Build Alternative), or change the amount and/or time of congestion, which does not affect quantification of the peak noise hour levels. Because other current and reasonably foreseeable projects do not affect FHWA's definition of noise effects at peak hour noise level, there are no cumulative effects using the FHWA criteria.

The WSDOT criteria for noise effects are based on the FHWA noise criteria. Therefore, because other current and reasonably foreseeable projects do not affect FHWA's definition of noise effects at peak hour noise level, there are no cumulative effects using WSDOT's criteria.

3.4.6 Discussion of Potential Mitigation Measures

Since the effects of noise on the study area are the same for indirect and cumulative effects as they are for the direct effects, mitigation of the direct effects is applicable. In general, abatement of the direct effects from the SR 502 project on effected receptors was found to be not reasonable. The conclusions of the mitigation methods studied in the *Final Noise Discipline Report* (Parsons Brinckerhoff, 2008e) are summarized in Exhibit 10.

Exhibit 10. Summary of Mitigation Methods for Noise Effects

Abatement Method	Determination
Traffic Management Measures	Not reasonable (counter to the purpose of the SR 502 facility)
Land acquisition for noise buffers and barriers	Not reasonable (too costly)
Realigning the Roadway	Not reasonable (too costly)
Noise Insulation of Buildings	Not reasonable because interior noise levels are below 52 dBA (NAC Category E)
Noise Barriers	Not reasonable (too costly)

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and mitigation measures required by these regulations. A list of current environmental compliance regulations is included in Appendix B. Other WSDOT actions potentially impacting noise will need to comply with the WSDOT *Traffic Noise Analysis and Abatement Policy and Procedures* (WSDOT, 2006c). WSDOT cannot enforce its policies on projects not within its jurisdiction. However, other projects in Clark County, the City of Battle Ground and elsewhere will need to comply with their respective local noise ordinances which are also listed in Appendix B.

3.5 Surface Water

3.5.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on surface water has been defined as three subbasins – the East Fork Lewis River Subbasin, the Gee Creek Subbasin, and the Salmon Creek Subbasin – into which all of the surface water resources within the study area drain. Other subbasins in the vicinity including the Flume Creek, Whipple Creek, and Allen Creek are not included in this analysis because there are no direct effects from the SR 502 Corridor Widening Project in these subbasins. Subbasins are the appropriate unit of analysis for surface water because this resource is not constrained by artificial or anthropogenic boundaries such as roads, Urban Growth Boundaries, or city limits.

The East Fork Lewis River Subbasin includes Mill Creek North and other unnamed tributaries to the East Fork Lewis River. The Gee Creek Subbasin includes unnamed tributaries to Gee Creek that are the surface water bodies within the western portion of the study area. The Salmon Creek Subbasin includes Mill Creek, which is a tributary to Salmon Creek, and is the surface water body within the eastern and central portion of the study area. These three subbasins encompass the area of direct effects. The major population centers in this portion of Clark County are the northern reaches of the Vancouver UGA, Battle Ground, and Ridgefield. Continued urbanization within these cities as well as rural development is affecting the preservation of surface water resources through the elimination and alteration of surface water resources within these subbasins

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project for surface water resources is bounded on the one end by the Washington State Growth Management Act (GMA), enacted by the state legislature in 1990 in response to growth and development pressures, and on the other end, by the current 2004-2024 CGMP. The Growth Management Act was adopted because the Washington State Legislature found that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development, and the quality of life in Washington. The GMA requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating UGAs, preparing comprehensive plans and implementing them through capital investments and development regulations. Because the GMA was enacted in 1990 and comprehensive plans, critical areas ordinances, and stormwater and erosion control ordinances are applied locally to development projects, the year 1990 is used as the start date to discuss trends in vegetation and wildlife resources in and around the study area. Therefore, the boundaries used to discuss trends for surface water resources in the next section are 1990-2024.

Historical Context and Current Health

Information for an overview of the historic context and trends and current health of surface water resources in the study area came from a review of Washington State Department of Ecology's *Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington* (2006a), Water Resource Inventory Area (WRIA) theme maps (2007b), *Stormwater Management Manual for Western Washington* (2005a), and the CGMP (including the draft environmental impact statement).

Direct Effects

Direct effects of the proposed project on surface water are described in detail in the *Final Water Quality / Surface Water / Floodplains / Groundwater Discipline Report* (Parsons Brinckerhoff, 2008i).

Indirect Effects

Indirect effects were identified by examining the direct effects to the resource and then forecasting what effects will occur later in time or further in distance as a result of the direct effects of the project. The CGMP, Clark County Code (CCC), City of Battle Ground Comprehensive Plan 2004-2024, Washington Transportation System Plan 2005-2025, 2007-2012 Clark County Transportation Improvement Program, Metropolitan Transportation Plan for Clark County, and the Statewide Transportation Improvement Program provided background information. These plans gave insight on the relationship between potential transportation improvements and changes in land use.

Cumulative Effects

Cumulative effects for surface water have been assessed using the information presented above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. The potential cumulative effects on surface water resources from the Build Alternative, past actions and historic trends, and other current and reasonably foreseeable projects was based on best professional judgment of the incremental loss and alteration of ground cover from pervious to impervious. The No Build Alternative would

still have direct and indirect effects to surface water resources due to the current and continuing roadway pollutant load that would add to potential effects from past actions and the other current and reasonably foreseeable projects.

3.5.2 Current Health & Historical Context

The study area and surrounding area is characterized as semi-rural. Land uses in this area are largely based on agriculture, with large open space areas used for grazing cattle and horses and for hay and small farm production. Development is primarily rural residential homes and rural commercial properties between the larger urban centers of Vancouver, Ridgefield, and Battle Ground and the rural commercial centers of Duluth and Dollars Corner.

Clark County has an abundance of streams and groundwater supplies. Groundwater aquifers are capable of providing huge amounts of water to industry, business, residences and agriculture. The Federal Clean Water Act lists the "beneficial uses" of the United States' rivers, streams and lakes. Many beneficial uses are features valued in Clark County and protection and restoration of water bodies for these uses is required under the National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit. These beneficial uses are:

- Surface water supply for industrial water supply, agricultural water supply, domestic water supply, and stock watering;
- Fish and wildlife production and habitat, including spawning, rearing, migration, and harvesting;
- Recreation and enjoyment, including contact recreation (swimming, wading, etc.), non-contact recreation (boating and sport fishing), and aesthetic enjoyment; and
- Commerce and navigation.

Urbanization influences stream biological health. The Washington State Department of Ecology's *Stormwater Management Manual for Western Washington* (2005a) describes the effects urbanization has on water bodies. It states that before forests were cleared for farms and towns, rainfall was largely absorbed into the ground, later replenishing streams as springs and seeps. As settlement occurs, trees are removed and replaced by fields, buildings and roads. Instead of soaking into the ground and returning to streams as springs, rainwater runs off rapidly and greatly increases stream channel erosion and degrades stream habitat. During the summer, stream flow may be reduced to low levels because less water is available to springs and seeps that feed the stream. The manual also states that along with changing stream flows, urbanization adds various pollutants to surface water and groundwater.

The combination of increased runoff and pollutants in stormwater runoff drastically alters stream habitats. Pesticides washed off landscaped areas can do great harm to aquatic insects that feed fish. Much of the county was developed without stormwater control facilities to prevent pollution and excessive amounts of runoff from harming streams.

As required by section 303(d) of the federal Clean Water Act (CWA), each state must identify its polluted waterbody segments and submit a list of these water quality limited estuaries, lakes, and streams to the U.S. Environmental Protection Agency (USEPA). Washington State Department of Ecology is responsible for collecting data on water quality conditions for natural water bodies in Washington and is responsible for maintaining Washington's 303(d) list. To qualify for the list, it must be determined through water quality monitoring that the waterbody segment does not meet state surface water quality standards and that water quality is not expected to improve within the next four years. The standards are the criteria to ensure that water may be beneficially used for multiple purposes such as fishing, swimming, drinking, and fish habitat.

Twenty-six waterbody segments in the WRIAs 27 and 28 planning areas were on Washington State Department of Ecology's 1996 303(d) list. This list should not be considered an exhaustive inventory of all segments in the study area with water quality impairments, as there is a lack of quality data quantifying water quality violations in many cases; rather, the list includes only those that were formally listed on the 1996 list. Temperature and fecal coliform were the most common parameters of violation standards within the planning areas.

Twenty-five waterbody segments in the WRIAs 27 and 28 planning areas were on Washington State Department of Ecology's 1998 303(d) list. Only one waterbody on the 1998 303(d) list was added to the 1996 303(d) list Temperature and fecal coliform continued to be the most common parameters of violation standards within the planning areas.

Forty waterbodies in the WRIAs 27 and 28 planning areas were on Washington State Department of Ecology's 2002/2004 303(d) list. Only two waterbodies on the 1998 303(d) list were removed from the 2002/2004 303(d) list and seventeen new waterbodies were added. Of the forty listed waterbodies, a total of one hundred twenty-five individual segments were listed. Temperature and fecal coliform continued to be the most common parameters of violation standards within the planning areas.

Twenty waterbodies in the WRIAs 27 and 28 planning areas were proposed for Washington State Department of Ecology's 2008 303(d) list. Half of the waterbodies were removed from the 2002/2004 303(d) list because the regulatory authorities have implemented water quality improvement projects for these waterbodies. For those waterbodies without implemented water quality improvement projects, temperature, fecal coliform, and pH continue to be the most common parameters of violation standards within the planning areas.

It has also been recognized in recent years that stormwater (non-point) runoff degrades streams by flushing pollutants from roads, businesses, industrial facilities, and residences. The volumes of water running off paved areas also wash away streambed sediments and the creatures that live there. In order to begin to address this problem, a set of regulations was added to the Clean Water Act in 1987 to reduce problems caused by stormwater runoff. The Clark County Stormwater Management Program is a direct response to that mandate.

3.5.3 Direct Effects

The direct effects on surface water resources associated with the No Build Alternative include the current pollutant load generated from the roadway. Currently, there is no stormwater treatment of roadway runoff.

The main direct effects of the Build Alternative are the conversion of pervious surfaces to roadway (impervious) and the construction of stormwater treatment facilities. With the improved stormwater treatment associated with the project, the Build Alternative would result in a decrease in total suspended solids being discharged, a decrease in the concentration of total and dissolved metals being discharged, and an increase in the quantity (i.e. effluent load) of total and dissolved metals being discharged compared to conditions under the No Build Alternative.

The increase in the effluent load of metals would likely have impacts to fish habitat quality within Mill Creek and Mill Creek North within the action area. However, metal concentrations would be diluted below the biological effect threshold within a few feet (or less) of entering Mill Creek, so negative effects on fish in Mill Creek would be limited. Fish in other waterbodies within the study area (as defined in the *Final Water Quality / Surface Water / Floodplains / Groundwater Discipline Report* (Parsons Brinckerhoff, 2008i) could be temporarily exposed to dissolved metals during discharge events, as stormwater must flow for a greater distance in low volume tributaries before dissolved and suspended metals are diluted below the biological effects threshold. Increases in effluent pollutant loads would be compensated for in part by habitat improvements, culvert replacements, riparian vegetation restoration and other compensatory mitigation measures as described in the fish section.

The Build Alternative would clear and grade approximately 70 acres and would install approximately 28 acres of new pavement. Effects to riparian habitat would occur within both wetland and upland riparian habitat types. The total area of permanent upland and wetland riparian effect associated with the Build Alternative would be approximately six acres, less than one acre of this being forested riparian habitat.

With the improved stormwater treatment associated with the project, the Build Alternative would still result in a dramatic decrease in total suspended solids being discharged and an increase in total and dissolved metals being discharged. The increase in metals being discharged would likely result in a very localized decrease in fish habitat quality within Mill Creek and Mill Creek North within the action area. However, dilution modeling performed to support the Biological Assessment for this project shows that the metal concentrations would reach background levels within a few feet (or less) of entering the waterbodies.

Additional details on direct effects on surface water can be found in the *Final Water Quality / Surface Water / Floodplains / Groundwater Discipline Report* (Parsons Brinckerhoff, 2008i).

3.5.4 Indirect Effects

No Build Alternative

The indirect effects to surface water resources associated with the No Build Alternative include the continuing degradation of water quality in the project area due to the pollutant-laden stormwater reaching sensitive water resources.

Build Alternative

Stormwater treatment and detention are expected to improve overall water quality (for roadway-related pollutants) in the long term. Although there may be increases in some stormwater pollutants, such as dissolved zinc and copper, that are not removed by treatment facilities and can harm fish, stormwater treatment will remove other stormwater pollutants and suspended solids and improve water quality for these indicators in the long term. Peak flows would be expected to increase due to loss of infiltration area due to conversion of vegetated areas to roadway. However, flow control should reduce peak flows over the current condition by detaining waters that would otherwise flow downstream very quickly, resulting in downstream erosion and habitat degradation caused by high erosive forces. Base flows would be expected to decrease due to loss of infiltration area. However, implementation of the mitigation plan would provide approximately three times the surface area as the filled wetlands, and replace and enhance numerous wetland functions, including headwater storage and opportunities for recharge. Base flow contributions for Mill and Gee Creeks in the project area are primarily driven by the wetlands in the project area, including the Category 1 palustrine, emergent (PEM) wetlands located on both sides of SR 502 that begin approximately 1,000 feet west of 72nd Avenue.

3.5.5 Other Current and Reasonably Foreseeable Actions

Fish, surface water, vegetation, wetlands, and wildlife resources are all very connected within the ecosystem. As such, these resources could be similarly affected by other current and reasonably foreseeable actions. Exhibit 5 (see Section 3.2.5) describes the likely effects of other current and reasonably foreseeable actions for these resources.

3.5.6 Cumulative Effects

Transportation improvement projects that add capacity could result in direct effects to surface water resources from conversion of pervious surfaces to roadway. Transportation projects that improve capacity and could further degrade surface water resources are primarily located in the Gee Creek and Salmon Creek subbasins.

Commercial and other development projects may negatively affect surface water resources because of the conversion to impervious surface. Future commercial developments (primarily located in the Salmon Creek subbasin) and other development projects such as churches and schools (located in the Gee Creek and Salmon Creek subbasins) could further degrade surface water resources.

Residential development may negatively affect surface water resources due to partial conversion to impervious surface and the potential use of lawn and landscaping chemicals. Short plats and

subdividing primarily rural properties for construction of rural residences would generally result in the removal of less pervious surface than that needed for a larger subdivision with accompanying access roads. Future residential development (primarily concentrated in the Gee Creek and Salmon Creek subbasins) could further degrade surface water resources.

Utility improvement projects, such as new water mains and sewer trunk lines, are not anticipated to result in direct conversion of pervious surface, except in cases where new utility corridors are created. Construction of new stormwater treatment and detention facilities, or expanding the capacity of existing facilities, and construction of new utility corridors would likely require conversion of pervious surfaces and could also lead to future urbanization or increase the pace of anticipated development, and degrade surface water resources further by increasing pervious surface removal for additional development. Utility improvement projects are primarily concentrated in the Gee Creek and Salmon Creek subbasins.

Parkland improvement and park acquisition projects are not expected to affect surface water resources negatively. Although there may be limited habitat alteration of parkland, in general these lands would be excluded from other types of development such as commercial or residential projects that continue to urbanize areas and pose negative effects to surface water.

No Build Alternative

Because of the direct and indirect effects of the No Build Alternative, the No Build Alternative would have additive effects to surface water resources in the three subbasins with those already anticipated cumulatively from the project types discussed above.

Build Alternative

Construction of the Build Alternative would result in direct effects to surface water resources. The Build Alternative, in conjunction with the projects discussed above, would degrade surface water resources by the incremental conversion of pervious surface to impervious. Portions of the landscape in the three subbasins are already altered by past loss of pervious surfaces, altered flow conditions, and conversion to the built environment. The additive effects of the Build Alternative in combination with other actions could degrade surface water resources further. However, mitigation measures that would be part of federal, state, and local permitting would help offset negative effects to the resource in critical areas such as wetlands and streams. Mitigation is discussed below. Assuming the other types of projects (listed in Appendix A) are constructed and placed in operation, the cumulative effects on surface water resources would be as noted above.

3.5.7 Discussion of Potential Mitigation Measures

The following is a list of features incorporated in the design of the Build Alternative that help minimize the direct effects and indirect effects (and therefore, also cumulative effects) on water quality and water quantity:

- A Temporary Erosion and Sediment Control (TESC) plan shall be prepared prior to the start of construction and adhered to throughout the process. Stormwater discharges from the project site meeting the NPDES General Construction Stormwater permit benchmark

from zero to 25 NTU are presumed to be in compliance with the state surface water quality standards (Chapter 173-201 WAC).

- In addition to a TESC plan, the project will include a Spill Prevention, Control, and Countermeasures (SPCC) plan. These plans will guide actions that will control spills and associated pollutants throughout the project work areas. It would be the responsibility of WSDOT and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterways or wetlands and provides for the prompt and effective cleanup of spills.

The following conservation measures could be taken to avoid and minimize long-term effects on water quality and quantity:

- Stormwater treatment and flow attenuation would be a part of the project. The proposed locations of water quality and quantity BMPs for highway runoff as well as stormwater management requirements are described in the Preliminary Hydrology Analysis Report for the project.

- All stormwater facilities require routine inspection and maintenance and would be designed to facilitate these functions. Maintenance will be based on regular inspections, as deemed necessary, and by the level of funding provided by the Washington state legislature.

The following mitigation measures could be taken to avoid and minimize long-term effects on water quality and quantity:

- Wetland mitigation would likely involve a combination of wetland re-establishment, creation, rehabilitation, and/or enhancement. Washington State Department of Ecology's baseline replacement ratios for wetland mitigation, and the acreage of mitigation that would likely be required under each scenario. Additionally, a buffer would be applied to created wetlands.

- Trees removed from the riparian areas could be salvaged and used for woody debris placement to rehabilitate existing riparian areas.

- Disturbed riparian areas could be seeded and planted with a preference for woody vegetation to provide in-stream shading and prevent sediment loading to waterbodies within the study area.

Because there are no existing stormwater treatment facilities, the project would retrofit 6.04 acres of additional existing impervious surface for enhanced water quality treatment.

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and mitigation measures required by these regulations. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting surface water are most likely to have to comply with the Clark County

erosion control ordinance and the Clark County NPDES municipal stormwater permit requirements. These regulations may require mitigation in the form of erosion control during construction and detention, treatment and infiltration of on-site generated stormwater.

3.6 Vegetation

3.6.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on vegetation has been defined as three subbasins – the East Fork Lewis River subbasin, the Gee Creek subbasin, and the Salmon Creek subbasin, which are the subbasins in which the direct effects of the proposed project will occur. These subbasins are shown on the map in Appendix A. Other subbasins in the area (Flume Creek, Whipple Creek, and Allen Creek) are not included in this analysis because there are no direct effects from the SR 502 Corridor Widening Project in them. Analysis for this report occurs at the subbasin level because effects of the Build Alternative at the watershed level would likely be undetectable. The major population centers in this portion of Clark County are the northern reaches of the Vancouver UGA, Battle Ground, and Ridgefield. Continued urbanization within these cities and rural development that influences the preservation, elimination, or alteration of vegetation resources is the basis of this geographic scope.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project for vegetation is bounded on the one end by the Washington State Growth Management Act (GMA), enacted by the state legislature in 1990 in response to growth and development pressures, and on the other end, by the current CGMP. The Growth Management Act was adopted because the Washington State Legislature found that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development, and the quality of life in Washington. The GMA requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating UGAs, preparing comprehensive plans and implementing them through capital investments and development regulations. Because the GMA was enacted in 1990 and comprehensive plans and critical areas ordinances are applied locally to development projects, the year 1990 is used as the start date to discuss trends in vegetation and wildlife resources in and around the study area. Therefore, the boundaries used to discuss trends for vegetation in the next section are 1990-2024.

Historical Context and Current Health

Information for an overview of the historic context and trends and current health of vegetation resources in the study area came from a review of *Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan* (LCFRB, 2004), the CGMP, *Sustaining our Natural Heritage for Future Generations* (Washington Biodiversity Council, 2007), and *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001). Information on the existing conditions of vegetation resources was based on field reviews in and around the study area (Reeder et al, 2007 and 2008).

Direct Effects

Direct effects of the proposed project on vegetation are described in detail in the project's *Final Biology Discipline Report* (JD White, 2008). In 2007 and 2008, scientists collected field information about the vegetation communities in the study area (upland grassland, scrub-shrub, and forest) as well as wetland and riparian vegetation (Reeder et al, 2007 and 2008). They characterized upland and riparian forest communities, reviewed agency databases to identify documented locations of federal- or state-listed plant species, and visited the area to examine habitat, and assessed the current existence of prairie habitat and/or plant species in the area and habitats that may have been used by Native Americans.

Indirect Effects

Indirect effects were identified by examining the direct effects to the resource and then forecasting what effects will occur later in time or further in distance as a result of the direct effects of the project. The CGMP, *Clark County Code (CCC), CMGP Transportation System Plan 2005-2025, 2007-2012 Clark County Transportation Improvement Program, Metropolitan Transportation Plan for Clark County,* and the *Statewide Transportation Improvement Program* provided background information. These plans gave insight on the relationship between potential transportation improvements and changes in land use. In addition, local planning agency staff (Carrico 2008, Mabrey 2008b, and Orijako 2008) was consulted to determine if any proposed projects depend on the Build Alternative for construction.

Cumulative Effects

Cumulative effects for vegetation were assessed using the information above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. More specifically, the potential cumulative effects to vegetation from the Build Alternative, past actions and historic trends, and other current and reasonably foreseeable projects was based on best professional judgment of the incremental loss and alteration of vegetation resources. Because the No Build Alternative would not result in direct or indirect effects to vegetation, it would not add to potential effects from past actions and the other currently and reasonably foreseeable projects.

3.6.2 Current Health & Historical Context

The study area and surrounding area is characterized as semi-rural. Land uses are largely based on agriculture, with large open space areas used for grazing cattle and horses and for hay and small farm production. Development is primarily rural residential homes and rural commercial properties between the larger urban centers of Vancouver, Ridgefield, and Battle Ground and the rural commercial centers of Duluth and Dollars Corner. Vegetation resources are primarily grassland, scrub-shrub, and forest that include a mix of upland and wetland vegetation. Riparian habitat is adjacent to area streams. The remainder of area vegetation resources is developed and includes landscaping and lawns. The *Final Biology Discipline Report* (JD White, 2008) provides details on characteristic habitat in the study area. There are no documented federal- or state-listed plant species in the study area (USFWS, 2008), nor were any observed during field visits (Reeder et al, 2007 and 2008). However, Washington Department of Fish and Wildlife (WDFW) Priority Habitat Species data indicates that oak woodlands, a priority habitat, occur in the area. Remnants of disturbed prairie habitat occur in the study area and it is possible that before

European settlement of the area, Native Americans maintained open prairie habitat through burning practices.

The vegetation that developed within the project vicinity is typical of the *Tsuga heterophylla* zone (Franklin and Dyrness, 1973). This vegetation is primarily Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), and western hemlock (*T. heterophylla*). Garry oak (*Quercus garryana*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), vine maple (*A. circinatum*), and hazel (*Corylus* spp.) commonly occur throughout the area. Early Native Americans may have used a burning regimen to maintain open prairie grasslands and oak savannah. Starting in the late 1800s and early 1900s, when dairy farming became a major industry in the study area, much of the forest was cleared and converted to its current agricultural use. Suppression of fire and conversion to agriculture have made prairie habitat very rare and limited in extent (Johnson and O'Neil, 2001), with the remaining prairie being highly modified and degraded and generally occurring in small remnants.

Much of the study area has been in agriculture for most of the 20th century. The study area has been highly modified since the 19th century through clearing of forests and regular tilling and grazing. Land in the rural urban centers is the primary focus of population growth and those centers are where most vegetation removal and conversion to the built environment have occurred since the latter part of the 20th century. For example, in 1990 Battle Ground's population was approximately 3,758, but by 2007 it had increased more than three-fold to 16,240 residents. Area vegetation is removed and altered in and around these urban centers and converted primarily to residential and commercial uses. While some vegetation may include more common plant species, there are occurrences of rare and listed plant species and/or ecosystems that could be negatively affected by continued population growth and land conversion and development. Population growth is a major driver of the decline of biodiversity in the state (Washington Biodiversity Council, 2007). Continued population growth will increase pressures for conversion of forest, agricultural, and rural residential land uses to higher density suburban and urban uses (LCFRB, 2004; Washington Biodiversity Council, 2007), with potential impacts to vegetation resources.

3.6.3 Direct Effects

There are no direct effects on vegetation associated with the No Build Alternative.

The main direct effects of the Build Alternative are the conversion of vegetation habitat types to roadway. The Build Alternative would permanently affect the following vegetation resource types: upland grassland (approximately 29 acres), upland scrub-shrub (approximately 5 acres), and upland forest (approximately 11 acres). Effects to riparian habitat would occur within both wetland and upland riparian habitat types. The total area of permanent upland and wetland riparian effect associated with the Build Alternative would be approximately 6 acres, less than 1 acre of this being forested riparian habitat, which occurs immediately adjacent to SR 502 and is already highly fragmented and disturbed. No occurrences of listed plant species have been documented or observed and, therefore, no direct effects to listed plants are anticipated. Direct effects also include replanting native species as part of mitigation and removal of invasive plant species.

Some limited areas adjacent to the roadway that support prairie plants may represent disturbed, remnant prairie habitat once used by Native Americans and these areas would be directly affected through vegetation removal and conversion to roadway.

Additional details on direct effects are provided in the *Final Biology Discipline Report* (JD White, 2008).

3.6.4 Indirect Effects

No Build Alternative

No indirect effects to vegetation are anticipated as a result of the No Build Alternative.

Build Alternative

Project scientists reviewed comprehensive plans, transportation plans, and zoning ordinances and held discussions with Clark County staff to determine whether other development in the area could be tied to the Build Alternative by permit condition or building moratorium and to assess whether the Build Alternative would be likely to cause development.

Access restrictions associated with the Build Alternative are anticipated to result in reduced development pressure along the corridor. Redevelopment may occur within commercially zoned properties at Dollars Corner as well as within residentially zoned properties along the corridor. Redevelopment of commercial properties at Dollars Corner would take place largely within already developed areas and likely would require little vegetation removal. No federal- or state-listed plant species were documented (USFWS, 2008) or observed and none are expected in the study area (Reeder et al, 2007 and 2008). A review of the comprehensive plan designations shows that rural residential and rural commercial designations are not expected to change and that the rural character of the area is to be maintained. Development within UGAs is already planned or anticipated, is not dependent on the proposed action, and will be constrained by the presence of regulated natural resources. Impacts to regulated natural resources will require the applicant to show how the project avoids, minimizes, and/or mitigates for unavoidable impacts to them. These sensitive resources that include area streams and wetlands, and development activity that would result in vegetation removal, would be regulated by federal, state, and local regulations, including critical area ordinances.

Following construction of the Build Alternative, indirect effects to vegetation resources directly adjacent to the roadway are expected to be minimal, and would include the later possible death of nearby vegetation. In particular, the severed roots of trees adjacent to the roadway may reduce tree survival rates along the corridor. Soil temperatures adjacent to the roadway may increase with the additional impervious surface and the increase could affect plant survival.

3.6.5 Other Current and Reasonably Foreseeable Actions

Fish, surface water, vegetation, wetlands, and wildlife resources are all very connected within the ecosystem. As such, these resources could be similarly affected by other current and reasonably foreseeable actions Exhibit 5 (see Section 3.2.5) describes the likely effects of other current and reasonably foreseeable actions for these resources.

3.6.6 Cumulative Effects

Transportation improvement projects that add capacity could result in direct effects to vegetation resources from conversion to roadway. Project biologists on other current and reasonably foreseeable projects may review agency literature to determine if documented listed plant species occur in the area of construction and would perform field surveys to review the area and note any observed occurrences of such listed plant species. Listed plant species and suitable habitat could be removed for these projects. In addition, although other current and reasonably foreseeable projects would require mitigation, the effects of removing mature trees, for example, would endure for many years, before replacement trees grew to the sizes of the originals. Transportation projects that improve capacity and could further degrade vegetation resources are primarily located in the Gee Creek and Salmon Creek subbasins.

Commercial and other development projects may negatively affect vegetation resources because of the removal of vegetation and conversion to impervious surface. Vegetation removal could result in the loss of functions provided by mature plants, loss of suitable habitat for listed or rare plants, and conversion of vegetated areas to the built environment. Future commercial developments (primarily located in the Salmon Creek subbasin) and other development projects such as churches and schools (located in the Gee Creek and Salmon Creek subbasins) could further degrade vegetation resources.

Residential development may negatively affect vegetation resources due to direct vegetation removal. Short plats and subdividing primarily rural properties for construction of rural residences would generally result in the removal of less vegetation than that needed for a larger subdivision with accompanying access roads. Future residential development (primarily concentrated in the Gee Creek and Salmon Creek subbasins) could further degrade vegetation resources.

Utility improvement projects, such as new water mains and sewer trunk lines, are not anticipated to result in direct vegetation removal, except in cases where new utility corridors are created. Construction of new stormwater treatment and detention facilities, or expanding the capacity of existing facilities, and construction of new utility corridors would likely require direct vegetation removal and could also lead to future urbanization or increase the pace of anticipated development, and degrade vegetation resources further by increasing vegetation removal for additional development. Utility improvement projects are primarily concentrated in the Gee Creek and Salmon Creek subbasins.

Parkland improvement and park acquisition projects are not expected to affect vegetation resources negatively. Although there may be limited habitat alteration of parkland, in general these lands would be excluded from other types of development such as commercial or residential projects that continue to urbanize areas and pose negative effects to vegetation.

Cumulatively, the additive effects of current and reasonably foreseeable actions are expected to negatively affect vegetation resources.

No Build Alternative

Because there are no direct or indirect effects of the No Build Alternative, the proposed project would have no additional effects to vegetation resources in the three subbasins other than those already anticipated cumulatively from the project types discussed above.

Build Alternative

Construction of the Build Alternative would result in direct effects to vegetation resources. The Build Alternative, in conjunction with the projects discussed above, would degrade vegetation resources by their incremental loss; these include potential effects to listed plant species and loss of suitable habitat and the long-lasting loss of mature vegetation such as forest and scrub-shrub habitats. Portions of the landscape in the three subbasins are already degraded by past vegetation removal practices, altered habitat, and conversion to the built environment. The additive effects of the Build Alternative in combination with other actions could degrade vegetation resources further. However, mitigation measures that would be part of federal, state, and local permitting would help offset negative effects to the resource in critical areas, such as wetlands and streams. Mitigation is discussed below. Assuming the other types of projects listed in Appendix A are constructed and placed in operation, the cumulative effects on vegetation resources would be as noted above.

3.6.7 Discussion of Potential Mitigation Measures

The alignment of the Build Alternative was selected to minimize removal of forest habitat and direct effects to sensitive resources such as wetlands and streams and associated high quality habitat. Planting trees of sizes comparable to the mature trees proposed for removal along the corridor is not practicable. Disturbed areas, including cut and fill slopes, areas within or adjacent to riparian zones, and wetlands, would be revegetated and restored as appropriate with dense native vegetation to replace or enhance functions lost or reduced by construction. Invasive plant species would be removed. This will help prevent degradation of native biodiversity (Washington Biodiversity Council, 2007).

The other current and reasonably foreseeable actions described earlier will also be obliged to follow environmental regulations and the mitigation measures they require. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting vegetation in critical areas would need to comply with state and local regulations including critical area ordinances and, if there is a federal nexus such as funding or a federal permit, with federal regulations. These local, state, and federal regulations may require mitigation in the form of replanting disturbed areas with native vegetation, creating and enhancing wetland habitat, and enhancing riparian habitat with native plant species.

3.7 Wetlands

3.7.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on surface water has been defined as three subbasins – the East Fork Lewis River Subbasin, the

Gee Creek Subbasin, and the Salmon Creek Subbasin – into which all of the surface water resources (including wetlands) within the study area drain. Other subbasins in the vicinity including the Flume Creek, Whipple Creek, and Allen Creek were not included in this analysis because there are no direct effects from the SR 502 Corridor Widening Project in these subbasins. Subbasins are the appropriate unit of analysis for surface water because this resource is not constrained by artificial or anthropogenic boundaries such as roads, Urban Growth Boundaries, or city limits.

The East Fork Lewis River Subbasin includes Mill Creek North and other unnamed tributaries to the East Fork Lewis River. The Gee Creek Subbasin includes several unnamed tributaries to Gee Creek that are the surface water bodies within the western portion of the study area. The Salmon Creek Subbasin includes Mill Creek, which is a tributary to Salmon Creek, and is the surface water body within the eastern and central portion of the study area. These three subbasins encompass the area of direct effects. The major population centers in this portion of Clark County are the northern reaches of the Vancouver UGA, Battle Ground, and Ridgefield. Continued urbanization within these cities as well as rural development is affecting the extent and quality of wetland resources through the direct loss of wetland acreage and function within these subbasins.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project for wetland resources is bounded on the one end by the Washington State Growth Management Act (GMA), enacted by the state legislature in 1990 in response to growth and development pressures, and on the other end, by the current 2004-2024 CGMP. The Growth Management Act was adopted because the Washington State Legislature found that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development, and the quality of life in Washington. The GMA requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands including wetland and riparian habitats, designating UGAs, preparing comprehensive plans and implementing them through capital investments and development regulations. Because the GMA was enacted in 1990 and comprehensive plans, critical areas ordinances, and stormwater and erosion control ordinances are applied locally to development projects, the year 1990 is used as the start date to discuss trends associated with wetland resources in and around the study area. Therefore, the boundaries used to discuss trends for surface water resources in the next section are 1990-2024.

Historical Context and Current Health

Information for an overview of the historic context and trends and current health of wetland resources in the study area came from a review of Clark County GIS layers for hydric soils and wetlands (Clark County, 2004b), the *Clark County Stream Health Report* (Clark County, 2004a), the *Draft Watershed Characterization of Clark County Version 3* (Washington State Department of Ecology, 2007a), the *Watershed Assessment for WRIA 28, Salmon Washougal, Technical Report 98-02* (Washington State Department of Ecology, 1998), *Preliminary Wetland Impact Analysis and Mitigation Strategy Memorandum* (WSDOT, 2008c), and the *Final Biology Discipline Report* (JD White, 2008).

Direct Effects

Direct effects of the proposed project on surface water are described in detail in the *Draft Wetland Delineation Discipline Report* (WSDOT, 2007b), *Preliminary Wetland Impact Analysis and Mitigation Strategy Memorandum* (WSDOT, 2008c), and the *Final Biology Discipline Report* (JD White, 2008). These direct effects include filling of existing wetland resources, removal of woody and herbaceous wetland vegetation, and conversion of one wetland type to another through vegetation management. During 2005 and 2006, WSDOT Wetland Specialists conducted an extensive corridor wetland assessment and characterization of all wetland resources within 200 feet either side of the existing highway, and 100 feet up all major north-south arterials that intersected the highway. Delineated wetland boundaries were surveyed by WSDOT and inserted into a CAD base map file for design and analysis purposes.

Indirect Effects

Indirect effects were identified by examining the direct effects to the resource and then forecasting what effects will occur later in time as a result of the project. The Wetlands Protection Ordinance of the Clark County Code (CCC), the *Washington State Wetland Rating System for Western Washington – Revised, Annotated Version August 2006* (Washington State Department of Ecology, 2006b), *Wetlands in Washington State (Best Available Science), Volumes 1 and 2* (Washington State Department of Ecology, 2005b) gives guidance on assessing various indirect effects to wetland function with regards to land use changes.

Cumulative Effects

Cumulative effects for wetland resources have been assessed using the information presented above on the current extent, function, and quality of wetlands, past actions and historic trends, direct effects, and indirect effects with regards to current and reasonably foreseeable land use actions. The potential cumulative effects on wetland resources from the Build Alternative and other current and reasonably foreseeable projects was based on best professional judgment of the incremental loss and alteration of ground cover from pervious to impervious. Today's pollutant loading rates by land use type have been applied to the land use alterations to rank the alterations in terms of their impact on the watershed. The No Build Alternative would still have continuing indirect effects to wetland resources due to current and forecasted traffic volumes, and continuing roadway pollutant loads.

3.7.2 Current Health & Historical Context

Wetland resources are those areas that currently meet the federal and state definition of jurisdictional wetlands based on soil, hydrologic, and vegetative indicators. These indicators are the basis of the federal wetland delineation procedure described in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers, 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. (U.S. Army Corps of Engineers, 2008). The WSDOT wetland delineation identified seventy-four wetlands within the biological study boundary. The wetlands consist of depressional and riverine hydrogeomorphic classes, and numerous Cowardin classes are present - including palustrine, forested (PFO); palustrine, emergent (PEM); and palustrine, scrub shrub (PSS). The biological, chemical, and physical functions provided by these wetlands range from very low to high, with the higher functioning wetlands more prevalent to

the north of SR 502. There are 33 wetlands on the north side of SR 502 and 41 on the south side (Exhibit 11). Complete descriptions of each wetland and Washington State Department of Ecology's field rating forms for each wetland are provided in the *Final Wetland Delineation Discipline Report* (WSDOT, 2007b).

Exhibit 11. Wetland Resources North and South of SR 502

Wetland Category	Wetland Resources	
	North	South
Category I	2	1
Category II	9	2
Category III	13	15
Category IV	9	23
Total	**33**	**41**

WSDOT conducted additional GIS-level analysis and aerial photo interpolation for wetland systems beyond the boundary of the wetland delineation to assess general extent and connectivity of the surveyed resources. In general, the GIS analysis found that wetland resources surveyed as part of the environmental scoping process were small sections of much larger wetland complexes that extend great distances north and south of the project corridor. In general, these large wetland complexes are associated with the local stream network (both perennial and seasonal channels), depressional areas such as the Manor Trough west of NE 72nd Street, and areas of mapped hydric soils. The extent of surveyed and GIS/photo interpolated wetlands are much larger than has been identified on the Clark County GIS wetland data layer, which is based on the National Wetland Inventory.

Wetland resources have most likely experienced a significant decline from their historic extent in central Clark County due to past and current land use practices. While it is difficult to attribute a specific acreage to the potential historic extent of wetlands in the study area, it can be assumed that most lower lying or depressional areas that contain hydric soils, or shallow-sloped areas of hydric soils associated with stream headwater areas, supported wetland. Significant areas of hydric and poorly drained soils ranging from silty clay loam to muck are found in central Clark County, many deposited by continued floods of Glacial Lake Missoula. The formation of organic hydric soils was associated with lake bed deposits.

Mature/old-growth forested wetlands found throughout central Clark County in similar landscape position to the project corridor indicate that this type of vegetation was likely common throughout the study area. Other wetlands, particularly those that meet the hydrology standard during a short period of early growing season, may have been dominated by herbaceous vegetation, especially if subjected to regular natural or man-cause disturbance such as fire.

The study area and surrounding area is characterized as semi-rural. Land uses in this area are largely based on agriculture, with large open space areas used for grazing cattle and horses, and

for hay and small farm production. Development is primarily rural residential homes and rural commercial properties between the larger urban centers of Vancouver, Ridgefield, and Battle Ground and the rural commercial centers of Duluth and Dollars Corner. The general reduction in the aerial extent of historic wetland can be attributed to agricultural and urban development. Large extents of wetland associated with the Manor Trough have been ditched and drained to support pasture, hay, and field crops. Forested headwater and depressional wetlands have been converted to agricultural and residential uses. Riparian wetlands have been drained and filled as stream channels were straightened or realigned. The *Clark County Stream Health Report* (Clark County, 2004a) indicates that 71 percent of the land in the Salmon Creek Basin (Mill Creek) are either agricultural, bare earth, developed, or recently cleared forest categories. Utilizing the presumed "pre-contact" land cover of forest (per requirements of the current *Highway Runoff Manual* (WSDOT, 2006a) as the likely benchmark, there has been a significant reduction in natural forest cover, and proportionally, wetland resources and associated water quality, hydrologic, and habitat functions.

Much of the study area has been in agriculture for most of the 20th century. The study area has been highly modified since the 19th century through clearing of forests and regular tilling and grazing. Land in the rural urban centers is the primary focus of population growth and those centers are where most vegetation removal and conversion to the built environment have occurred since the latter part of the 20th century. For example, in 1990 the City of Battle Ground's population was approximately 3,758, but by 2007 it had increased more than three-fold to 16,240 residents. Natural vegetation was removed or altered in and around these urban centers and converted primarily to residential and commercial uses.

3.7.3 Direct Effects

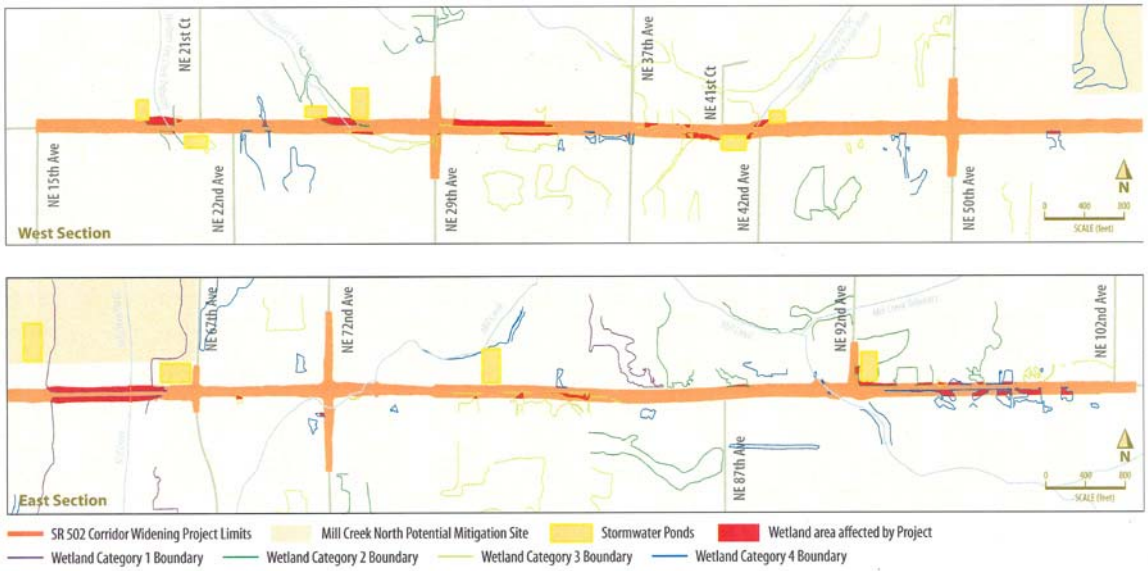
No additional direct effects beyond the operation and maintenance of the existing highway facility are anticipated with the No Build Alternative.

The primary direct effects of the Build Alternative are filling and clearing of jurisdictional wetland and wetland buffer, and the associated loss of acreage and function, as well as conversions from one Cowardin classification to another. The current Build Alternative would permanently impact approximately 9 acres of existing wetland (Exhibit 12). Exhibit 13 shows the project cut and fill limits and the effects to delineated jurisdictional wetlands within the study area that would result from the Build Alternative. Other direct effects include the development of the two proposed wetland mitigation sites, Sunset Oaks and the Mill Creek North potential mitigation site. These existing degraded floodplain wetlands would be developed to provide approximately 50 acres of wetland rehabilitation and would include the restoration of channelized stream channels and floodplain connectivity. Other mitigation actions at these sites would include wetland creation and enhancement, buffer enhancement, Oregon White Oak woodland preservation and enhancement, and critical fish habitat enhancement.

Exhibit 12. Permanent and Temporary Direct Effects of the Build Alternative on Wetland Resources

Wetland Category	Area of Permanent Direct Effects		Area of Temporary Direct Effects	
	Effects (sq ft)	Effects (acres)	Effects (sq ft)	Effects (acres)
Category I	98,830	2.27	21,349	0.62
Category II	158,759	3.64	28,331	0.65
Category III	82,669	1.90	14,105	0.32
Category IV	52,260	1.20	12,440	0.28
Total Direct Effects	**392,518**	**9.01**	**76,225**	**1.87**

Exhibit 13. Impacted Wetland Resources



Effects to wetland vegetation would occur within emergent, scrub shrub, and forested wetland Cowardin classifications, primarily in those disturbed habitats that are located immediately adjacent to the existing SR 502 corridor. The Category 1 wetland impact would occur in overwintering fish habitat associated with Mill Creek North. Upland scrub-shrub and forested wetland habitat does not represent habitat for any ESA-listed species, although forested wetlands over a certain size are considered a State priority habitat. Effects to these habitats are not likely to represent a direct loss of habitat for any listed species.

Additional details on the direct effects on wetland resources can be found in the *Preliminary Wetland Impact Analysis and Mitigation Strategy Memorandum* (WSDOT, 2008c).

3.7.4 Indirect Effects

No Build Alternative

Potential indirect effects to existing wetland resources associated with the No Build Alternative would remain the same as current conditions and would include existing habitat fragmentation and an increased presence of invasive species, noise, water quality degradation, etc.

Build Alternative

Potential indirect effects must be considered in the context of the Clark County Critical Areas Ordinance for wetland protection in the Clark County Code and *Wetlands in Washington (Best Available Science), Volumes 1 and 2* (Washington State Department of Ecology, 2006b). Clark County considers impacts to wetland buffers (loss of buffer function) to cause indirect effects to the adjacent wetlands. Wide buffers, and wider zones of potential indirect effects, are associated with wetlands with assessed habitat scores of 20 or greater (when rated using the *Washington State Wetland Rating System for Western Washington Revised* (Washington State Department of Ecology, 2006b)). Indirect effects extend outward beyond the edge of the proposed roadway prism into previously undisturbed areas of wetland. Indirect effects due the loss of buffer function are primarily habitat related and include light, noise, habitat fragmentation, loss of biodiversity, and an increased presence of invasive species. Per the Clark County Code, these indirect impacts are mitigated at the same ratio as if the wetlands were directly filled. As the project would build a comprehensive stormwater treatment and conveyance system, indirect effects associated with untreated runoff will be eliminated.

Per Washington State Department of Ecology guidance, indirect effects may include hydrologic factors such as interruption of natural surface and groundwater flow paths that my increase or decrease wetland hydroperiods over time. The stormwater management system should eliminate high peak flow into existing wetland resources reducing scour and erosion potential. Walls associated with the project may cast sufficient shade into existing wetland that the vegetation class changes and invasive species become more prevalent.

3.7.5 Other Current and Reasonably Foreseeable Actions

Wetlands, fish, surface water, vegetation, and wildlife resources are all highly connected within the ecosystem. As such, these resources could be similarly affected by other current and reasonably foreseeable actions. Exhibit 5 (Section 3.2.5) describes the likely effects of other current and reasonably foreseeable actions for these resources.

3.7.6 Cumulative Effects

Transportation improvement projects that add capacity could result in direct effects to wetland resources and associated buffers from conversion of natural ecosystems to roadway. Transportation projects that improve capacity and could further degrade surface water resources are primarily located in the Gee Creek and Salmon Creek subbasins.

Commercial and other development projects may negatively affect wetland resources because of filling of wetlands and destruction of wetland buffers and conversion to impervious surface, although the Clark County Code and state and federal requirements limit the extent of impacts

and require compensatory wetland mitigation. Future commercial developments (primarily located in the Salmon Creek subbasin) and other development projects such as churches and schools (located in the Gee Creek and Salmon Creek subbasins) could further impact wetland resources.

Residential development may negatively affect wetland resources due to filling of wetlands and destruction of wetland buffers and conversion to impervious surfaces, structures, and lawn. Landscape management within commercial and residential areas has a high potential to result in water quality degradation within stream and wetland resources due to intensive use of fertilizers and various pesticides. Future residential development (primarily concentrated in the Gee Creek and Salmon Creek subbasins) could further degrade wetland resources.

Utility improvement projects, such as new water mains and sewer trunk lines typically do not result in wetland fill unless access roads and maintenance/access structures are included, although there is a high potential for wetland conversion from forested systems to emergent or scrub shrub systems. Construction of new stormwater treatment and detention facilities, or expanding the capacity of existing facilities, and construction of new utility corridors may result in wetland impacts and future urbanization. Anticipated utility improvement projects are primarily concentrated in the Gee Creek and Salmon Creek subbasins.

Any potential park improvement and park acquisition projects would not be expected to affect wetland resources negatively. Removal of wetland buffer vegetation may occur during park development, but any impacts would have to meet the requirements of the Clark County Code. In general, park lands would exclude other types of development such as commercial or residential projects that continue to urbanize areas and result in negative effects to wetland resources.

No Build Alternative

Because there are no new direct and indirect effects of the No Build Alternative, the proposed project would have not additional effects to wetland resources in the three subbasins other than those already anticipated cumulatively from the project types discussed above.

Build Alternative

Construction of the Build Alternative would result in direct and indirect effects to existing wetland and wetland buffer resources, and therefore contributes to cumulative effects to wetland resources. The Build Alternative, in conjunction with the projects discussed above, past actions, and historic trends would result in an incremental loss of wetland acreage, function, and connectivity to other wetlands, stream networks, and other natural areas.

Temporal loss of complex, interrelated processes and habitat fragmentation of wetland resources would occur through the incremental conversion of natural ecosystems to urban uses. Portions of the landscape in the three subbasins are already altered by past loss of wetlands, altered hydrologic conditions, and conversion to the built environment. The Build Alternative along with other potential projects would continue this trend, especially to lower quality wetlands (category 3 and 4) and wetland buffers. Clark County will only permit impacts to category 1 or 2 wetland systems or their buffers in very limited circumstances, essentially protecting these systems from most residential and commercial development pressures. Lower quality wetlands

(category 3 and 4), however, would likely continue to see impacts, especially those wetlands within the Battleground urban growth boundary and rural centers. Where urban development would tend to be more compact and potentially have greater direct wetland impacts, rural development has a higher potential for habitat fragmentation and indirect impacts due to long driveways, large clearings around homes, outbuildings, and closer proximity to relatively undisturbed natural habitats.

While it is anticipated that the cumulative effects of the Build Alternative will be adequately mitigated, the additive effects of the Build Alternative in combination with other actions may further degrade wetland resources. WSDOT would meet all applicable local, state, and federal wetland mitigation rules for direct and indirect project impacts, would replace lost wetland and wetland buffer acreage and function, and would install a comprehensive storm water treatment and conveyance system that would provide water quality treatment and volume control to minimize hydrologic effects on existing wetlands and streams. Wetland mitigation measures that would be part of federal, state, and local permitting would help offset negative resource effects associated with other current and reasonably foreseeable projects, although habitat fragmentation and temporal loss associated with small developments in urbanizing areas will likely continue. Mitigation is discussed in the following section.

3.7.7 Discussion of Potential Mitigation Measures

WSDOT would implement a comprehensive, watershed-based mitigation plan that will include multiple wetland mitigation sites placed throughout the watershed to 1.) restore lost acreage and function of direct wetland and wetland buffer loss, 2.) address temporal wetland loss by following the recommended replacement ratios published by the Washington State Department of Ecology, U.S. Army Corps of Engineers, and Clark County, and 3.) restore watershed function and maximize the effectiveness of mitigation by addressing limiting factors in the affected watersheds through proper design and establishment of the mitigation sites including headwater storage, flood desynchronization, nutrient and sediment sequestration, stream shading, and food chain support. Connectivity within a watershed context will be improved. Additional habitat mitigation will improve degraded stream channel and riparian habitat. These factors will meet legal mitigation requirements and are anticipated to offset negative effects to wetland resources.

The following is a list of features incorporated in the design of the Build Alternative that help minimize the direct effects and indirect effects (and therefore, also cumulative effects) on wetland resources:

- A Temporary Erosion and Sediment Control (TESC) plan shall be prepared prior to the start of construction and adhered to throughout the process. Stormwater discharges from the project site meeting the NPDES General Construction Stormwater permit benchmark from zero to 25 NTU are presumed to be in compliance with the state surface water quality standards (Chapter 173-201 WAC).

- Alignment adjustments will be considered in order to avoid (when possible) higher quality wetland resources, and minimize permanent effects to others.

- Design changes will be considered to reduce the project footprint, thus reducing impacts to wetlands and their associated buffers. Design changes may include constructing steeper slopes, utilizing walls where feasible, and narrowing shoulders and/or medians.

- Stormwater facilities will be located outside of existing wetlands and their associated buffers where possible.

The following conservation measures could be taken to avoid and minimize long-term effects to wetland resources:

- Stormwater treatment and flow attenuation would be a part of the project. The proposed locations of water quality and quantity BMPs for highway runoff as well as stormwater management requirements are described in the *Preliminary Hydrology Analysis Report* for the project. This system would treat highway runoff prior to its discharge into adjacent wetlands and streams improving water quality over current non-treated conditions, and minimize scour potential.

- Establish and maintain adequate buffers along wetland boundaries adjacent to the highway facility as appropriate. Select and install plant species to provide quick, dense cover to improve erosion potential, promote infiltration, reduce light and glare, and provide visual separation. Buffers would be established and monitored according the final approved wetland mitigation plan.

The following mitigation measures could be taken to avoid and minimize long-term effects on water quality and quantity:

- A comprehensive, watershed-based mitigation strategy for the project would create new wetlands, and restore and enhance degraded wetlands to a higher level of function. Mitigation will involve a combination of wetland re-establishment, creation, rehabilitation, and/or enhancement, providing roughly three times the amount of wetland than may be potentially impacted. The *Preliminary Wetland Impact Analysis and Mitigation Strategy Memorandum* (WSDOT, 2008c) presents Washington State Department of Ecology's baseline replacement ratios for wetland mitigation, and the acreage of mitigation that would likely be required under each scenario. Additionally, a buffer would be applied to created wetlands.

- Multiple mitigation sites would be strategically located in the affected watersheds to maximize environmental benefits and the effectiveness of mitigation by addressing limiting factors in the affected watersheds. Function to be developed at the mitigation sites include headwater storage, flood desynchronization and erosive flow reduction, nutrient sequestration, stream shading, and food chain support. Connectivity within a watershed context will be improved by selecting and establishing sites adjacent to stream networks or large existing wetlands.

- Mitigation sites would include a comprehensive management plan and performance standards designed to meet state and federal requirements. The mitigation sites would be

monitored annually by WSDOT's state-wide Environmental Monitoring Program, and measured against numerous performance standards for success. Scientific monitoring results are quantified and published on an annual basis, and are shared with all applicable permitting agencies. Based on the results and recommendations of the monitoring report, steps will be taken on an on-going basis to address underperforming performance standards.

- WSDOT would routinely maintain the mitigation sites utilizing its in-house Restoration Crew, trained in natural resource management, site restoration activities, and integrated vegetation management. All site establishment activities are funded by an agency-wide environmental management fund, with funds allocated for each site as needed throughout the designated establishment period.

- Mitigation sites would have a protective conservation covenant recorded on each parcel as required by Clark County code.

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and the mitigation measures required by those regulations. Appendix B includes a list of current environmental regulations that the other actions may be subject to.

3.8 Wildlife

3.8.1 Methodology

Geographic and Temporal Study Boundaries

The geographic scope for examining the indirect and cumulative effects of the proposed project on vegetation has been defined as three subbasins – the East Fork Lewis River subbasin, the Gee Creek subbasin, and the Salmon Creek subbasin, which are the subbasins in which the direct effects of the proposed project will occur. These subbasins are shown on the map in Appendix A. Other subbasins in the area (Flume Creek, Whipple Creek, and Allen Creek) are not included in this analysis because there are no direct effects from the SR 502 Corridor Widening Project in them. Analysis for this report occurs at the subbasin level because effects of the Build Alternative at the watershed level would likely be undetectable. The major population centers in this portion of Clark County are the northern reaches of the Vancouver UGA, Battle Ground, and Ridgefield. Continued urbanization within these cities and development in rural areas that influence the preservation, elimination, and alteration of wildlife resources are the basis of this geographic scope.

The temporal boundaries (timeframe) for examining the cumulative effects of the proposed project for wildlife is bounded on the one end by the Washington State Growth Management Act (GMA), enacted by the state legislature in 1990 in response to growth and development pressures, and on the other end, by the current CGMP. The Growth Management Act was adopted because the Washington State Legislature found that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development, and the quality of life in Washington. The GMA requires state and local governments to manage Washington's

growth by identifying and protecting critical areas and natural resource lands, designating UGAs, preparing comprehensive plans and implementing them through capital investments and development regulations. Because the GMA was enacted in 1990 and comprehensive plans and critical areas ordinances are applied locally to development projects, the year 1990 is used as the start date to discuss trends in vegetation and wildlife resources in and around the study area. Therefore, the boundaries used to discuss trends for vegetation resources and the associated cascading effects on wildlife habitat are 1990-2024.

Historical Context and Current Health

Information for an overview of the historic context and trends and current health of wildlife resources in the area came from a review of *Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan* (LCFRB, 2004), CGMP, *Sustaining our Natural Heritage for Future Generations* (Washington Biodiversity Council, 2007),and *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001). Information on the existing conditions of wildlife resources was based on field reviews in and around the study area (Reeder et al, 2007 and 2008).

Direct Effects

Direct effects of the proposed project on wildlife are described in detail in the project's *Final Biology Discipline Report* (JD White, 2008). The fieldwork and the database examinations reviewed for vegetation resources also helped scientists evaluate the suitability of habitat for wildlife and whether populations of federal- or state-listed, state candidate, state sensitive, or state monitor wildlife species were documented in the area.

Indirect Effects

Indirect effects were identified by examining the direct effects to the resource and then forecasting what effects will occur later in time or further in distance as a result of the direct effects of the project. The CGMP, *Clark County Code (CCC), CMGP, Washington Transportation System Plan 2005-2025, 2007-2012 Clark County Transportation Improvement Program, Metropolitan Transportation Plan for Clark County,* and the *Statewide Transportation Improvement Program* provided background information. These plans gave insight on the relationship between potential transportation improvements and changes in land use. In addition, local planning agency staff (Carrico 2008, Mabrey 2008b, and Orijako 2008) was consulted to determine if any proposed projects depend on the Build Alternative for construction.

Cumulative Effects

Cumulative effects for wildlife were assessed using the information presented above on the current health, past actions and historic trends, direct effects, indirect effects, and other current and reasonably foreseeable actions. More specifically, the potential cumulative effects to wildlife from the Build Alternative, past actions and historic trends, and other current and reasonably foreseeable projects was based on best professional judgment of the incremental loss and alteration of vegetation resources and the associated loss or elimination of wildlife habitat. Because the No Build Alternative would not result in direct or indirect effects to vegetation and associated wildlife habitat, it would not add to potential effects from past actions and the other current and reasonably foreseeable projects.

3.8.2 Current Health & Historical Context

The study area and surrounding area is characterized as semi-rural. Land uses are largely based on agriculture, with large open space areas used for grazing cattle and horses and for hay and small farm production. Development is primarily rural residential homes and rural commercial properties between the larger urban centers of the northern reaches of the Vancouver UGA, Ridgefield, Battle Ground, and the rural commercial centers of Duluth and Dollars Corner. Vegetation habitat types are primarily grassland, scrub-shrub, and forest that include a mix of upland and wetland vegetation. Riparian habitat is adjacent to area streams. The remaining habitat is developed and landscaped with ornamental plants. The *Final Biology Discipline Report* (JD White, 2008) provides details on habitat types and characteristic wildlife in the study area.

Because much of the study area is characterized as agriculture, pastures, and mixed environs, many of the wildlife species present are generalists, adapted for using several vegetation types for feeding and breeding (Johnson and O'Neil, 2001). Characteristic wildlife includes songbirds, waterfowl, coyote, raccoon, opossum, and deer. No federal- or state-listed wildlife species were documented in the area (USFWS, 2008 and WDFW, 2008), nor were any observed during field visits (Reeder et al, 2007 and 2008). However, Washington Department of Fish and Wildlife (WDFW) Priority Habitat Species data indicates wintering waterfowl are concentrated in the center of the study area at Mill Creek North, a perennial stream which ponds to lake-like conditions during the late fall, winter, and early spring.

The vegetation that developed within the project vicinity is typical of the *Tsuga heterophylla* zone. This vegetation is primarily Douglas-fir, western red cedar, and western hemlock. Garry oak, big leaf maple, red alder, vine maple, and hazel are also common trees throughout the study area. Early Native Americans may have used a burning regimen to maintain open prairie grasslands and oak savannah. Starting in the late 1800s and early 1900s, when dairy farming became a major industry in the study area, much of the forest was cleared and converted to its current agricultural use. Suppression of fire and conversion to agriculture have made prairie habitat very rare and limited in extent (Johnson and O'Neil, 2001), with the remaining prairie habitat being highly modified and degraded. Much of the study area is regularly maintained by tilling and grazing. Land in the urban centers is the primary focus of population growth. For example, the population in Battle Ground was roughly 3,758 in 1990, but by 2007 had increased more than three-fold to 16,240 residents. Area vegetation is removed in and around these urban centers and converted to residential and commercial uses. The CGMP seeks to maintain the study area's rural character, but continued growth is forecasted for urban centers. In the process of development and urbanization, area vegetation is eliminated or altered which directly affects wildlife because of lost or altered habitat. As areas urbanize, wildlife more acclimated to the presence of humans (typically generalists) are favored while other wildlife (typically specialists) are stressed or eliminated (Washington Biodiversity Council, 2007; Johnson and O'Neil, 2001). For example, common species such as the western scrub jay and American robin are able to take advantage of disturbances from development or colonize altered environments and have increased (Washington Biodiversity Council, 2007).

3.8.3 Direct Effects

No direct effects on wildlife are associated with the No Build Alternative.

The main direct effects of the Build Alternative are permanent vegetation removal that could result in fragmentation of habitat and loss of wildlife habitat.

No federal- or state-listed wildlife have been documented in the study area, nor were any observed. However, concentrations of wintering waterfowl use the winter lake conditions associated with Mill Creek North in the center of the study area. The Build Alternative would result in direct effects to vegetation that wildlife use including approximately 29 acres of upland grassland, 5 acres of upland scrub-shrub, and 11 acres of upland forest. Effects to riparian habitat would occur within both wetland and upland and would be approximately 6 acres. Of this, approximately 2 acres of land directly adjacent to the roadway and associated with Mill Creek North and wintering waterfowl use would be converted to roadway. However, the Mill Creek North potential mitigation site (or other appropriate mitigation site) would likely be designed to enhance in-stream and floodplain habitat and would enhance wildlife habitat. The proposed Build Alternative would maintain the area's winter lake conditions and mitigation would provide overall wildlife benefits to wintering waterfowl.

Additional details on direct effects are provided in the *Final Biology Discipline Report* (JD White, 2008).

3.8.4 Indirect Effects

No Build Alternative

No indirect effects to wildlife are anticipated from the No Build Alternative.

Build Alternative

Project scientists reviewed comprehensive plans, transportation plans, and zoning ordinances and held discussions with Clark County staff to determine whether other development in the vicinity could be tied to the Build Alternative by permit condition or building moratorium and to assess whether the Build Alternative would be likely to cause development.

Access restrictions associated with the Build Alternative are anticipated to result in reduced development pressure along the corridor. Redevelopment may occur within commercially zoned properties at Dollars Corner. Redevelopment of commercial properties at Dollars Corner would take place largely within already developed areas and likely would require little vegetation and wildlife habitat removal. No federal- or state-listed plant species were documented or observed and none are expected along the corridor. A review of the comprehensive plan designations shows that rural residential and rural commercial designations are not expected to change and that the rural character of the area is to be maintained. Development within UGAs is already planned or anticipated and is not dependent on the proposed action. These resources include area streams and wetlands. Development activity that would result in vegetation and wildlife habitat removal within regulated sensitive areas would have to comply with federal, state, and local regulations, including critical area ordinances. Impacts to regulated natural resources will require the applicant to show how the project avoids, minimizes, and/or mitigates for unavoidable impacts to regulated resources.

Indirect effects to wildlife resources as a result of the Build Alternative would be incidental deaths due to increased traffic and a wider roadway to cross. Although there may be a slight increase in wildlife mortality due to traffic and the wider roadway, the wildlife corridor is impacted by road crossings already.

3.8.5 Other Current and Reasonably Foreseeable Actions

Fish, surface water, vegetation, wetlands, and wildlife resources are all very connected within the ecosystem. As such, these resources could be similarly affected by other current and reasonably foreseeable actions. Exhibit 5 (see Section 3.2.5) describes the likely effects of other current and reasonably foreseeable actions for these resources.

3.8.6 Cumulative Effects

Transportation improvement projects that add capacity are likely to result in removal of vegetation that wildlife depends on for habitat, feeding, and breeding. Transportation projects that construct new roadways are a major contributor to habitat fragmentation because they divide habitat into smaller patches and convert interior habitat to edge habitat. Fragmented habitat increases edge effects, brings together species that might not otherwise interact, potentially increases rates of competition and predation, increases incidental deaths from collision with passing vehicles, and disrupts migration corridors. In general, larger patches of continuous habitat support larger wildlife populations and support a greater diversity of species (Washington Biodiversity Council, 2007).

Transportation projects that widen and align existing roadways would be expected to have lesser effect to wildlife because a roadway already exists, but these projects typically require removal of vegetation on which wildlife depend. However, the widening may increase wildlife deaths from traffic collisions and roadside vegetation represents poor wildlife habitat and supports wildlife more typical of edge habitat. Transportation improvement projects that add new neighborhood collectors, sidewalks, and bike lanes typically would result in lesser amounts of vegetation removal and therefore fewer effects to wildlife resources. Transportation projects that add turn lanes or signals would not be expected to remove significant quantities of vegetation, and therefore, would have few negative effects on wildlife resources. Transportation projects that could further impair wildlife are primarily located in the Gee Creek and Salmon Creek subbasins.

Commercial development and other development projects such as new churches and schools may affect wildlife resources negatively, but the extent depends on the scale of construction proposed. Because of its scale, construction of a large structure such as a warehouse with an associated parking lot is likely to affect wildlife resources negatively because of the alteration or elimination of wildlife habitat and because of temporary construction noise. Construction of smaller structures with reduced parking areas would directly affect lesser amounts of wildlife habitat.

Redevelopment of commercial structures is unlikely to affect wildlife negatively because it is presumed that most of these properties are already developed. In areas of development, it is presumed that wildlife more typical of urban areas would be present. Future commercial

developments (primarily located in the Salmon Creek subbasin) and other development projects such as churches and schools (located in the Gee Creek and Salmon Creek subbasins) could further degrade wildlife resources and result in an increase in urban wildlife.

Residential development generally results in the removal of some vegetation on the property and altered wildlife habitat. Based on the scale of residential development, rural residential development would be anticipated to result in the least amount of vegetation removal and therefore, the fewest negative effects to wildlife. Larger-scale residential development (such as the construction of a subdivision) would be expected to result in more vegetation removal, greater effects to wildlife, and increased urban wildlife. Residential development (primarily concentrated in the Gee Creek and Salmon Creek subbasins) could further degrade wildlife resources.

Utility improvement projects such as new water mains or sewer trunk lines that occur along existing corridors are not expected to result in large amounts direct vegetation removal and elimination of wildlife habitat. However, construction of new stormwater treatment facilities, expanding the capacity of existing facilities, and construction of new utility corridors would likely require significant vegetation and wildlife habitat removal. These types of projects could be expected to increase the pace of surrounding development, which could in turn degrade wildlife resources further. Utility projects are primarily concentrated in the Gee Creek and Salmon Creek subbasins.

Parkland improvement and park acquisition projects are expected to benefit wildlife. Although there may be limited habitat alteration, in general parklands are set aside and excluded from other types of development such as commercial or residential projects that continue to urbanize areas. Within rural residential and urban centers, parkland habitat includes more diverse habitat types than the surrounding area. This more diverse habitat provides multiple cover types that are beneficial to different types of wildlife and generally results in a greater diversity of wildlife. In addition, parkland may also serve as a corridor to connect wildlife habitats that would benefit the resource overall.

Cumulatively, the additive effects of current and reasonably foreseeable actions are expected to negatively affect wildlife resources.

No Build Alternative

There would no cumulative effects on wildlife from the No Build Alternative. Because there are no direct or indirect effects of the No Build Alternative, the proposed project would have no additional effects to wildlife resources in the three subbasins other than those already anticipated cumulatively from the project types discussed above.

Build Alternative

The main direct effects of the Build Alternative are permanent vegetation removal that could result in increased habitat fragmentation and elimination of wildlife habitat.

The Build Alternative would result in removal of upland and aquatic habitat and associated vegetation on which wildlife depend. Although the Build Alternative would result in direct

effects to approximately 2 acres of land in the vicinity of Mill Creek North, this land is directly adjacent to the roadway and already is poor wildlife habitat. The Mill Creek North potential mitigation site (or other appropriate mitigation site) would likely be designed to enhance in-stream and floodplain habitat and would enhance wildlife habitat. The proposed Build Alternative would maintain the winter lake conditions of this area and mitigation would provide overall benefits to wintering waterfowl and other wildlife. Assuming the other types of projects as noted in Appendix A are constructed and placed in operation, the cumulative effects on wildlife would be as noted above.

3.8.7 Discussion of Potential Mitigation Measures

The alignment of the Build Alternative was selected to minimize removal of forest habitat and direct effects to sensitive resources such as wetlands and streams and associated high quality habitat. Planting trees of sizes comparable to the mature trees proposed for removal along the corridor is not practicable. Temporarily disturbed areas and adjacent riparian and wetland habitat would be revegetated and restored, as appropriate, with dense native vegetation to replace or enhance functions lost or reduced by construction. Native vegetation would be used in landscaping to enhance wildlife habitat. Invasive plant species would be removed. This will help prevent degradation of native biodiversity (Washington Biodiversity Council, 2007).

The other current and reasonably foreseeable actions described earlier will also be required to follow environmental regulations and mitigation measures required by these regulations. A list of current environmental compliance regulations is included in Appendix B. Other actions potentially impacting wildlife would most likely be required to comply with federal, state, and local regulations. These regulations may require mitigation in the form of planting disturbed areas with native vegetation, creating and enhancing wetland habitat, enhancing and restoring riparian habitat with native plant species and large woody debris, and preserving high quality habitat through a conservation covenant. Any and all of these mitigation measures are possible for the other projects and would help offset negative effects to wildlife in the three subbasins.

4.0 Summary

Exhibit 14 summarizes the direct, indirect, and cumulative effects of the No Build Alternative and the Build Alternative for the SR 502 Corridor Widening Project.

Some of the key indirect effects of the alternatives include:

- Right of way acquisition for the Build Alternative would reduce the acreage available for farming.
- Eighty-seven (87) residences and three churches affected by noise under the Build Alternative versus 34 residences and one church impacted by the No Build Alternative. This would be the same for cumulative effects.
- Mitigation and restoration activities would lessen negative indirect effects to fish, surface water, vegetation, wetlands, and wildlife under the Build Alternative

Key cumulative effects of the alternatives include:

- Loss of 1-2% more county farmland in addition to the land planned for inclusion in UGAs by 2024 as a result of the Build Alternative, including conversion of 75 to 79 acres of prime farmland soils.

- Both the Build and No Build Alternatives would result in increased impervious surface, increased stormwater pollutants, conversion of riparian areas to urban uses, habitat loss and fragmentation, vegetation removal, and reduced riparian conditions and functions.

In summary, although the No Build Alternative has fewer indirect and cumulative impacts to the resources, it will not meet the purpose and need of the project. The Build Alternative has been designed to minimize effects to the resources, to the extent possible, while also still making improvements that will improve the mobility and safety of the SR 502 Corridor.

Exhibit 14. Summary of Direct, Indirect, and Cumulative Effects of Project Alternatives by Resource

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*

AGRICULTURE & FARMLANDS	• None	• Worsened air quality due to increased congestion over time could potentially effect crop growth and/or livestock health	From other current & reasonably foreseeable actions:
			• Land added to Urban Growth Areas (UGAs) will be available for development includes:
			  • 11,327 acres of land zoned for farming
			  • 7,023 acres of prime farmland soils (not exclusive from land zoned for faming)
				• Conversion of 94 - 114 acres of land currently used for agriculture to non-agricultural uses
				• Conversion of 75 - 79 acres of prime farmland soils to non-agricultural uses (not exclusive from land currently used for agriculture)
					• Temporary air & dust emissions during construction could temporarily effect crop growth and/or livestock health	• Conversion of 95 - 114 acres represents <0.1% of the County land base and ~1% of the total farmland loss projected to occur by 2024 due to expansion of UGAs
						• Conversion of 75 - 79 acres of prime farmland soils represents <0.1% of the County land base and ~1% of the total prime soil loss projected to occur by 2024 due to expansion of UGAs

FISH	• None	• None	From other current & reasonably foreseeable actions: • Increased impervious surface • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants • Removal of riparian vegetation & conversion of habitat to the built environment • Streambed sedimentation • Reduced riparian conditions & functions	• Approximately 3 acres of permanent effects below the OHWM of study area streams; approximately 2 acres would be to rearing & wintering habitat for steelhead & coho. • Increased impervious surface • Riparian enhancements & restoration as part of mitigation • In-water work for culvert replacement/ extension • Potential for fish handling and fish mortality	• Temporary increases in sedimentation • Loss of riparian habitat • Increased in stream temperatures • Reduction in total suspended solids • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants (dissolved copper & zinc)	• Increased impervious surface • Increase in peak flows due to loss of infiltration • Increased stormwater pollutants • Removal of riparian vegetation & conversion of habitat to built environment • Streambed sedimentation • Reduced riparian conditions & functions

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*
Land Use and Relocations and Right of Way Acquisitions	• None	• None	From other current & reasonably foreseeable actions: • Continued population growth is projected and is likely to put development pressure on rural lands • 11,698 acres of land added to UGAs in the County are likely to be converted from rural to urban uses	• 140-160 parcels affected with conversion of approximately 40-60 acres of land to right of way; and 68 acres for stormwater treatment and wetland mitigation on the Mill Creek North potential mitigation site • 15-25 parcels with change in access, 3-7 parcels with a loss of 15-25 parking spaces total • Relocation of 20-30 residences and 15-20 businesses	• Reduction in acreage available for farming on agricultural parcels • Changes in access points could potentially influence the number of customers • Minor population increases in the locations that displaced residents and businesses relocate to.	• Increases land in Clark County expected to be converted from agricultural uses to non-agricultural uses in the next 20 years by approximately 1% (108-128 acres) for SR 502 in addition to the 11,698 acres recently added to UGAs
Noise** (Noise Sensitive Receptors)	• 34 resi-dences and 1 church	• None in addition to the direct effects	• None in addition to the direct effects	• 87 residences and 3 churches	• None in addition to the direct effects	• None in addition to the direct effects
Surface Water	• Current level of pollutant loading occurs	• Current level of decreased water quality conditions persist	From other current & reasonably foreseeable actions: • Increase in impervious surface • Increase in pollutant load being discharged to water bodies • Increase in peak flow due to loss of infiltration • Decrease in base flow due to loss of infiltration	• Increase in impervious surface • Decrease in pollutant load of total suspended solids due to stormwater treatment • Increase in pollutant load of total and dissolved metals	• Improved water quality for some roadway-related pollutants; degraded water quality for roadway-related metallic pollutants • Increase in peak flows due to loss of infiltration	• Increase in impervious surface • Increase in pollutant load being discharged to water bodies • Increase in peak flow due to loss of infiltration • Decrease in base flow due to loss of infiltration
Vegetation	• None	• None	From other current & reasonably foreseeable actions: • Removal of vegetation • Loss of suitable habitat for listed plant species • Potential removal of listed plants • Long-term loss of functions provided by mature vegetation	• Removal of upland grassland, scrub-shrub, and forest habitat, and removal of wetland and riparian habitat. • Loss of disturbed remnant prairie habitat that may have been used by early Native Americans • Replanting native species and removal of invasive species as part of mitigation	• Possible later death of vegetation	• Removal of vegetation • Loss of suitable habitat for listed plant species • Potential removal of listed plants • Long-term loss of functions provided by mature vegetation

Resource	No Build Alternative			Build Alternative		
	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*	Direct Effect(s)	Indirect Effect(s)	Cumulative Effect(s)*
WETLANDS	• None	• Current level of habitat degradation persists	From other current & reasonably foreseeable actions: • Continued habitat degradation and fragmentation • Reduced water quality and increased peak flows into wetlands • Continued loss of wetland acreage and function • Continued indirect effects including light, noise, loss of biodiversity, and increased invasive species	• Filling and clearing of approximately 9 acres of category 1-4 wetland systems • Reduction in hydrologic function (storage of flood waters, headwater storage) • Loss of water quality functions (nutrient and sediment removal) • Loss of wetland specific wildlife habitat and open space • Habitat fragmentation	• Increased noise and glare into wetlands • Loss of biodiversity • Increased presence of invasive species • Interruption of natural groundwater and surface water flow paths • Increased shading changes vegetation classes	• Continued habitat degradation and fragmentation • Reduced water quality and increased peak flows into wetlands • Continued loss of wetland acreage and function • Continued indirect effects including light, noise, loss of biodiversity, and increased invasive species
WILDLIFE	• None	• None	From other current & reasonably foreseeable actions: • Direct habitat loss • Habitat fragmentation • Disrupted migration corridors • Edge effects • Reduced wildlife diversity and increase in urban wildlife • Increase incidental wildlife deaths from collisions with traffic • Increased rates of competition and predation	• Loss of wildlife habitat and conversion to roadway • Habitat fragmentation	• Increased incidental wildlife deaths from collisions with traffic	• Direct habitat loss • Habitat fragmentation • Disrupted migration corridors • Edge effects • Reduced wildlife diversity and increase in urban wildlife • Increased incidental wildlife deaths from collisions with traffic • Increased rates of competition and predation

Notes: * Cumulative effects not only take into account direct and indirect effects of the proposed action, but also past actions, historic trends, and other current and reasonably foreseeable actions. Past actions and historic trends are described in the Historical Context under each resource in Section 3.0. A list and map of the other current and reasonably foreseeable projects that may affect the resources is provided in Appendix A.

**As described in the noise methodology section (Section 3.4.1) direct, indirect and cumulative effects are all included as part of the transportation analysis and therefore included as part of the direct effects analysis. Therefore the indirect and cumulative effects are the same as the direct effects.

5.0 References

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Appendix A

Map and List Other Current and Reasonably Foreseeable Actions

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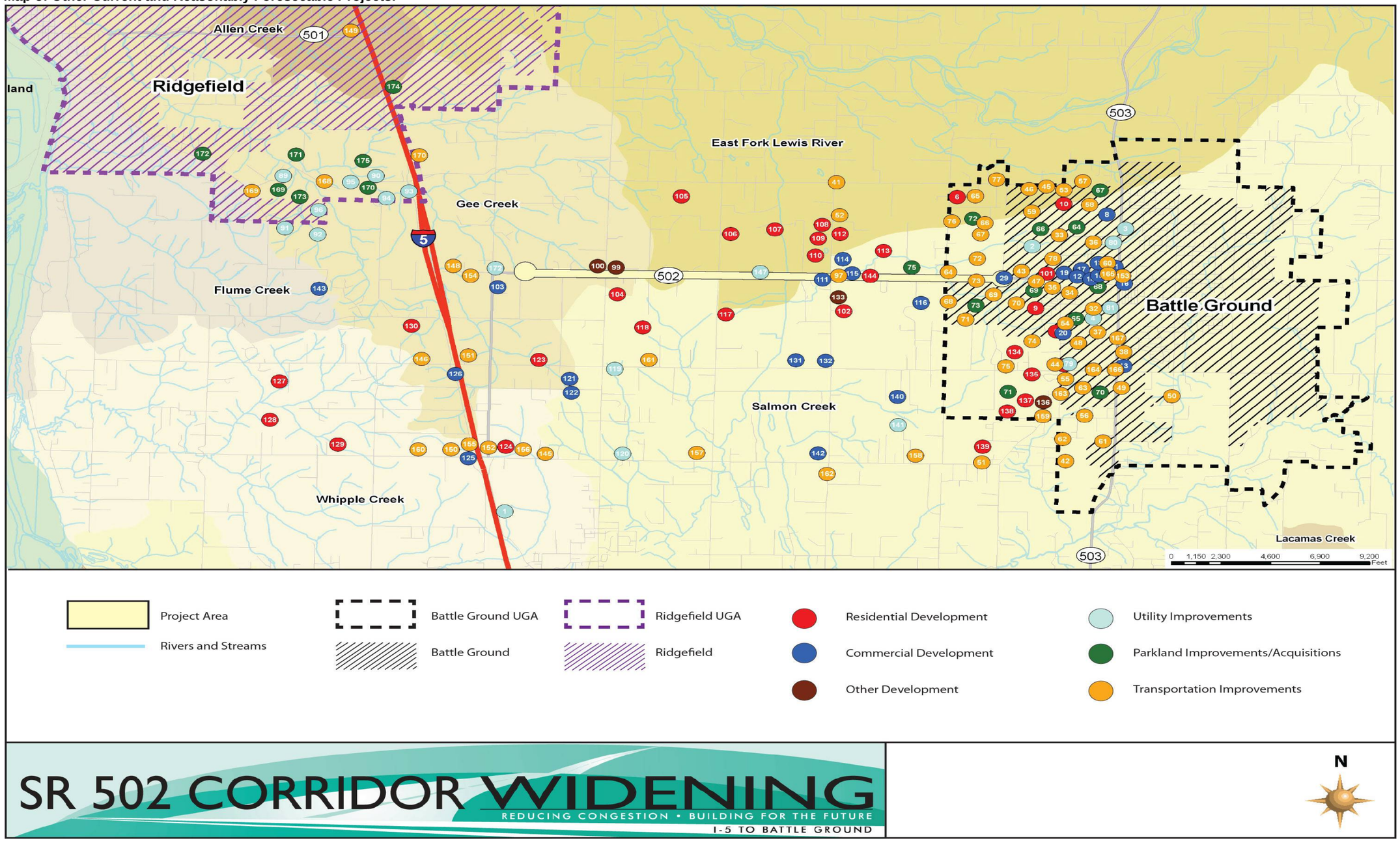
Map of Other Current and Reasonably Foreseeable Projects.



List of Other Current and Reasonably Foreseeable Projects.

Types of Projects

- Residential Development
- Commercial Development
- Other Development
- Utility Improvements
- Parkland Improvements
- Transportation Improvements

Map ID	Project Name	Approximate Location	General Project Description	Est. Date of Completion	Source of Information
1	SW Washington/NW Oregon 500-kw Reinforcement Project (BPA)	I-5 Corridor from Portland to SW Washington	Construction of new 500kw transmission line to strengthen this portion of the bulk transmission line		Bonneville Power Administration (BPA) Transmission Projects List www.transmission.bpa.gov
2	North Mill Regional Detention/Water Quality Facility (NM-1)	North & South sides of SR 502 at NW 26th Avenue, Battle Ground	New detention and water quality facility; will be used to control peak flows and stormwater quality from upstream basin		City of Battle Ground Capital Improvement Program - Stormwater Management Plan
3	South Mill/Gardner Ditch Trash Rack (TR-2)	East Side of SR 503 between 8th and 10th Streets, Battle Ground	Modification of upstream end of 30" culvert to allow only overflows into the South Mill Creek system; flows south of SR 502 and east of SR 503 would stay in the Gardner Ditch drainage area.		City of Battle Ground Capital Improvement Program - Stormwater Management Plan
4	South Mill Regional Detention/Water Quality Facility (SM-3)	Remy Property Park Site - Between 10th & 20th Streets, south of 6th Avenue, Battle Ground	New detention and water quality facility; will be used to reduce peak flows into South Mill Creek and improve water quality.		City of Battle Ground Capital Improvement Program - Stormwater Management Plan
5	Southwest Battle Ground Annexation	South of SE 11th Street on the west side of NE 112TH Avenue.	Annexation of 90 acres of residential low density land	Pending 60% petition signatures; 06/03/08- open house	City of Battle Ground Community Development Monthly Report May 2008
6	92nd Avenue Annexation	North side of 219th street from western city limits to NE 92nd Avenue and extending to 239th Street.	Annexation of 310 acres of mixed use residential and employment land	60% petition submitted 4/22/08	City of Battle Ground Community Development Monthly Report May 2008
7	Barnes Annexation	19113 & 19105 NE 112th Avenue (NE corner or 199th St & 112th Ave)	Annexation of 6 acres of residential development	Effective 7/2/08	City of Battle Ground Community Development Monthly Report May 2008
8	Lines & Signs by Mackie	1309 NW 13TH St	Business license issued for service business	5/08	City of Battle Ground Community Development Monthly Report May 2008
9	Donais Garage Addition	2403 SW 7th Street/ parcel # 192683-054	Building permit for residential addition	Approved 5/1/2008	City of Battle Ground Community Development Monthly Report May 2008
10	Wingate Crossing II	1511 NW 17th place - 228772-000 & 1607 NW 17th Place	2 Building permits for 2 single family residences	Approved 4/30/2008 & 5/8/2008	City of Battle Ground Community Development Monthly Report May 2008
11	Watters Vision Care Center & Conway Jensen Dental Pac. Dev. Medical Office	101 NW 12th Ave	Building permit for commercial tenant improvements	Approved 4/28/2008	City of Battle Ground Community Development Monthly Report May 2008
12	Mason Short Plat	SW Corner of W Main and 18th Ave	Active commercial projects- 4 lot subdivision zoned regional commercial	3/29/2008	City of Battle Ground Community Development Monthly Report May 2008
13	Gardner Center/ Jenkins Short Plat	NE corner of 199th Street and SR503/ (Jenkins Short Plat) lot 4 Gardner Center Subd - Parcel #091103-182	Active commercial projects -Remaining building: 1 bank.	Under construction & 3/12/2010 - Jenkins	City of Battle Ground Community Development Monthly Report May 2008
14	BG Motel Commercial Space	South side of W Main St at 15th Ave	Active commercial projects - Restaurant and Retail space	Under construction	City of Battle Ground Community Development Monthly Report May 2008
15	Premier Dental Clinic	1400 block of W Main St between Chevron and Washington Mutual Bank	Active commercial projects- one story dental clinic	Under construction	City of Battle Ground Community Development Monthly Report May 2008
16	Kristi Retail Buildings	~200 ft south of Main St on east side of SR503 immediately north of Wilco Store	Active commercial projects - 2 one-story buildings	Under construction	City of Battle Ground Community Development Monthly Report May 2008
17	Napa Auto Parts	Relocation for Napa Auto parts store on the SW corner of NW 18th Ave and the future extension of NW 1st St north of Master Tech Auto Repair	Active commercial project	In review for final site plan and engineering	City of Battle Ground Community Development Monthly Report May 2008
18	Pacific Dev. Assoc	NW corner of NW 1st Street and 12th Ave	Active commercial project - single story medical office building	Under construction	City of Battle Ground Community Development Monthly Report May 2008
19	Goodwill Industries	15 NW 20th Ave	Active commercial project - retail/donation facility - 2.17acres	Under construction	City of Battle Ground Community Development Monthly Report May 2008
20	BG Sports Complex	20521 NE 112th Ave	Active commercial project - 6 baseball/softball fields and associated buildings	Preliminary approval 12/07	City of Battle Ground Community Development Monthly Report May 2008
21	Acquisition of Park land In Neighborhood Service Area (NSA) #1		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
22	Acquisition of Park land In Neighborhood Service Area (NSA) #3		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
23	Acquisition of Park land Service Area (NSA) #18		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
24	Acquisition of Park land In Neighborhood Service Area (NSA) #19		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
25	Acquisition of Park lane In Neighborhood Service Area (NSA) #S2		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
26	Acquisition of Park land In Neighborhood Service Area (NSA) #S3		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
27	Acquisition of Park land In Neighborhood Service Area (NSA) #S4		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
28	Acquisition of Park land In Neighborhood Service Area (NSA) #S5		Acquire 3-5 acres for park development	2024	City of Battle Ground Comprehensive Plan, Table 8-2
29	Home Depot (west end of Battle Ground)	South side of SR 502 near 102nd Avenue. 2903 W Main St	New development with frontage improvements on SR 502. Store w/garden center and 2 potential restaurant pads	Pre-Application 2/08 *Currently on hold*	City of Battle Ground Monthly Report May 2008
30	Improvements to Florence Robinson Park	Florence Robinson Park, Battle Ground	Addition of site furnishings, pavilion shelter, site lighting, and basketball roof		City of Battle Ground Parks Improvement Plan

Map ID	Project Name	Approximate Location	General Project Description	Est. Date of Completion	Source of Information
31	Improvements to Remy Property Park	Remy Property Park Site - Between 10th & 20th Streets, south of 6th Avenue, Battle Ground	Addition of 2 covered basketball/sports courts, children's play equipment, picnic shelters with utility hook-ups, flexible use area/dog park, baseball field complex with parking, access, restrooms, and concessions, nature/wetland trails and brides with education/interpretive stations, soccer fields with parking, access, and restrooms		City of Battle Ground Parks Improvement Plan
32	SW Rasmussen Blvd, Phase 2 (#15)	Between SW 20th Avenue and SR 503, Battle Ground	Construct new road, lighting, storm drainage, sidewalks, striping, landscaping, signing, bike lanes, install traffic signal at intersection of SR 503/Rasmussen Boulevard	2006-2010	City of Battle Ground TSP, Table 9-3
33	NW 20th Avenue (#16)	SR 502 to NW Onsdorff Blvd, Battle Ground	Widen and add sidewalks, storm drainage, striping, lighting, landscaping, signing, bike facilities	2006-2010	City of Battle Ground TSP, Table 9-3
34	SW 20th Avenue (#17)	SR 502 to SW Rasmussen Blvd, Battle Ground	Widen and add sidewalks, storm drainage, striping, lighting, landscaping, signing, bike facilities	2006-2010	City of Battle Ground TSP, Table 9-3
35	NW /SW 1st Streets (#25)	Frontages parallel to W Main Street, Battle Ground	New construction completing frontage roads on north and south sides of road	2006-2010	City of Battle Ground TSP, Table 9-3
36	NW 15th Avenue (#30)	NW 9th Street to NW 4th Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2006-2010	City of Battle Ground TSP, Table 9-3
37	SW 15th Avenue (#32)	SR 502 to NE 199th Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2006-2010	City of Battle Ground TSP, Table 9-3
38	SW Scotton Way (#34)	SR 503 to west terminus, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2006-2010	City of Battle Ground TSP, Table 9-3
39	I-5/SR 502 - WSDOT Improvement (#4)	West of the project	Construct new interchange	2011-2015	City of Battle Ground TSP, Table 9-4
40	SW 502 - WSDOT Improvement (#1)	Duluth to Battle Ground city limits	Widen to four lanes with two-way left turn channelization	2011-2015	City of Battle Ground TSP, Table 9-4
41	NE 72nd Avenue & NE 239th - Clark County Improvement (#6)		Upgrade intersection	2011-2015	City of Battle Ground TSP, Table 9-4
42	NE 179th Street - Clark County Improvement (#8)	NE Cramer Road to SR 503	Construct 2-lane rural major collector standard	2011-2015	City of Battle Ground TSP, Table 9-4
43	SR 502 and NW 29th Avenue (#F)	SR 502 & NW 29th Avenue Intersection, Battle Ground	Add fourth (southerly) leg of intersection and signalize	2011-2015	City of Battle Ground TSP, Table 9-4
44	NE 199th & NE 112th Avenue (#J)	NE 199th & NE 112th Avenue Intersection, Battle Ground	Signalize, add left turn lanes on all approaches	2011-2015	City of Battle Ground TSP, Table 9-4
45	NW Onsdorff Blvd (#46)	NE 239th to NE 20th Avenue, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
46	NW 29th Avenue (#47)	NE 239th Street to NW 3rd Street, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
47	SW 24th Avenue (#48)	SR 502 to SW 6th Street	Construct new urban neighborhood collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
48	SW Scotton Way (#49)	SW 20th Avenue to SR 502	Construct new urban neighborhood collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
49	SW 15th Avenue (#50)	NE 199th Street to NE 189th Street	Construct new urban neighborhood collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
50	SW 7th Avenue (#51)	NE 199th Street to NE 189th Street	Construct new urban neighborhood collector with bike lanes and sidewalks	2011-2015	City of Battle Ground TSP, Table 9-4
51	NE 179th Street - Clark County Improvement (#9)	NE 50th Avenue to NE Cramer Road	Improve to provide 1 lane in each direction with turn lane	2016-2025	City of Battle Ground TSP, Table 9-5
52	NE 72nd Avenue - Clark County Improvement (#10)	SR 502 to NE 259th Street	Upgrade roadway	2016-2025	City of Battle Ground TSP, Table 9-5
53	NE 239th Street (#38)	NW Onsdorff to NE 112th Avenue, Battle Ground	Improve to urban two-lane section with sidewalks and bike lanes	2016-2025	City of Battle Ground TSP, Table 9-5
54	SW 29th Avenue (#56)	SW Rasmussen Blvd to NE 199th Street, Battle Ground	Improve to three-lane section with sidewalks and bike lanes	2016-2025	City of Battle Ground TSP, Table 9-5
55	NE 112th Avenue (#57)	NE 199ths Street to NE 189th Street, Battle Ground	Improve to three-lane section with sidewalks and bike lanes	2016-2025	City of Battle Ground TSP, Table 9-5
56	NE 189th Street (#58)	NE 112th Avenue to SR 503, Battle Ground	Improve to three-lane section with sidewalks and bike lanes	2016-2025	City of Battle Ground TSP, Table 9-5
57	NW 16th Avenue (#60)	NE 244th Street to NW Onsdorff Blvd, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
58	NW 25th Avenue (#61)	NW Onsdorff Blvd to NW 15th Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
59	NW 13th Street (#62)	NW 29th Ave to NW 25th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
60	NW 4th Street (#63)	east of NE 15th Ave to SR 503, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
61	SW 15th Avenue (#74)	NE 189th Street to NE 179th Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
62	NE 112th Avenue (#75)	NE 189th Street to NE 179th Street, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
63	NE 192nd Street (#76)	SW 20th Ave to SW 15th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	2016-2025	City of Battle Ground TSP, Table 9-5
64	SR 502 & NE 92nd Avenue (#E)	SR 502 & NE 92nd Avenue, Battle Ground	Add southerly leg of intersection, signalized, add right turn and left turn lanes on all approaches	Beyond 2025	City of Battle Ground TSP, Table 9-6
65	NW 35th Ave (#78)	NE 239th Street to NW 2nd Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
66	NW 13th Street (#79)	NE 92nd Ave to NW 29th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
67	NW 9th Avenue (#80)	NE 92nd Ave to western terminus, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
68	NE 92nd Avenue (#81)	SR 502 to NE 199th Street, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
69	SW 34th Avenue (#82)	SR 502 to NE 199th Street, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
70	SW 6th Street (#83)	SW 34th Ave to SW 24th Ave, Battle Ground	Construct new urban major collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
71	SW 9th Street (#84)	NE 92nd Ave to SW 34th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
72	NW 2nd Street (#85)	NE 92nd Ave to NW 29th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
73	SW 1st Street (#86)	SW 34th Ave to SW 29th Ave, Battle Ground	Construct new frontage road on south side of highway	Beyond 2025	City of Battle Ground TSP, Table 9-6
74	SW 25th Avenue (#87)	SW 9th Street to NE 199th Street, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
75	NE 199th Street (#90)	NE 92nd Ave to SW 20th/NE 112th Ave, Battle Ground	Improve to urban three-lane section with sidewalks and bike lanes	Beyond 2025	City of Battle Ground TSP, Table 9-6
76	NE 92nd Ave (#91)	NE 239th Street to SR 502, Battle Ground	Improve to urban three-lane section with sidewalks and bike lanes	Beyond 2025	City of Battle Ground TSP, Table 9-6

Map ID	Project Name	Approximate Location	General Project Description	Est. Date of Completion	Source of Information
77	NE 239th Street (#92)	NE 92nd Ave to NW Onsdorff Blvd, Battle Ground	Improve to urban three-lane section with sidewalks and bike lanes	Beyond 2025	City of Battle Ground TSP, Table 9-6
78	SW Scotton Way (#93)	SW 25th Ave to SW 20th Ave, Battle Ground	Construct new urban neighborhood collector with bike lanes and sidewalks	Beyond 2025	City of Battle Ground TSP, Table 9-6
79	SW 20th Ave & NE 199th Water Distribution Project (#E)	SE Grace Ave from Main Street to SE 11th Way	Replacement of 8" AC line with 10" PVC line at SE 11th Way (~2900 feet)	2009	City of Battle Ground Water System Plan
80	NW 12th to NW 16th Connector Water Distribution Project (#F)	From end of current line along 20th Ave to NE 199th Street	Installation of ~5400 feet of 12" DIP line to complete southwestern portion of the grid	2010	City of Battle Ground Water System Plan
81	SW 12th Ave to NE 199th Water Distribution Project (#G)	NW 12th & NW 4th to NW 15th Ave and NW 5th Street	Installation of ~1500 feet of 12" DIP line connecting line from NW 12th and NW 4th to line along NW 15th Ave & NW 7th Street	2011	City of Battle Ground Water System Plan
82	New Neighborhood Park (NP-9)	31st Ave & 219th	Acquisition and development of a new neighborhood park	2026	City of Ridgefield Comprehensive Park and Recreation Plan
83	New Neighborhood Park (NP-10)	11th Ave & 219th	Acquisition and development of a new neighborhood park	2026	City of Ridgefield Comprehensive Park and Recreation Plan
84	Gee Creek Trail (T-2)	From Main Street to 219th	Construction of 5.2 mile ped/bike trail/greenway	2012	City of Ridgefield Comprehensive Park and Recreation Plan
85	S Hillhurst Pathway (P-5)	Hillhurst Road between Pioneer Street and 219th?	Construction of a 3.3 mile ped/bike pathway	2026	City of Ridgefield Comprehensive Park and Recreation Plan
86	NW 219th Street Pathway (P-14)	Along 219th between Hillhurst and UGA limits	Construction of a ped/bike pathway along or adjacent to 219th Street	2026	City of Ridgefield Comprehensive Park and Recreation Plan
87	Interstate-5 Regional Pathway (P-15)	Parallel to I-5 within UGA limits	Construction of 2.6 mile pathway	2026	City of Ridgefield Comprehensive Park and Recreation Plan
88	NW Carty Road to NW 219th Street Pathway (P-18)	NW Carty Road to NW 219th	Construction of pathway	2026	City of Ridgefield Comprehensive Park and Recreation Plan
89	New Sewer Force Main (FM-6)		New sewer force main line		City of Ridgefield Sewer Capital Facilities Plan
90	New Sewer Pump Station (PS#8)		New sewer pump station		City of Ridgefield Sewer Capital Facilities Plan
91	New Sewer Trunk Line (T-27W)		New sewer trunk line		City of Ridgefield Sewer Capital Facilities Plan
92	New Sewer Trunk Line (T-27)		New sewer trunk line		City of Ridgefield Sewer Capital Facilities Plan
93	New Sewer Trunk Line (T-24S)		New sewer trunk line		City of Ridgefield Sewer Capital Facilities Plan
94	New Sewer Trunk Line (T-26E)		New sewer trunk line		City of Ridgefield Sewer Capital Facilities Plan
95	New Water Main - Carty Road	Hillhurst to I-5	New water main line	2020	City of Ridgefield Water Capital Facilities Plan
96	New Water Map - Hillhurst, NW 219th, Carty Road	Loop - Hillhurst, NW 219th, Carty Road	New water main line	2020	City of Ridgefield Water Capital Facilities Plan
97	Potential local circulation plan	Dollars Corner area	Discussion of developing local circulation plan for Dollars Corner in response to corridor project - would require formation of LID for implementation of a grass-roots effort	unknown	Clark County
98	Mill Creek Outfall	Location in Clark County unknown	Minimize bank erosion and turbidity in the stream; stream bank restoration	2009	Clark County Draft Stormwater Management Program
99	Ridgefield LDS Church	NE 29th Avenue at SR 502. Parcel 116350000	Construction of new church	Under construction	Clark County Maps On-Line
100	Cedar Tree Christian School	Near NE 29th Avenue at SR 502. Parcel 178853000	Construction of private K-12 school	Final Site Plan Review Approved 12/07	Clark County Maps On-Line
101	M&M Acres Short Plat	2217 NE 219th Parcel 116380000	A short plat approximately of 10 acres into two single family residential lots	Preliminary Plat Approved 12/07	Clark County Maps On-line
102	Meadowbrook Acres	Parcel 192929000	5 lot subdivision	Preliminary Plat Approved 8/07	Clark County Maps On-line
103	Sanders Trucking	Parcel 179113000	Preliminary site plan review for development of site for operation of truck storage/repair facility	Application 3/08	Clark County Maps On-line
104	Lieser Short Plat	Parcel 178909000	Divide ~10 acres into 2 lots	Final Plat Approved 6/08	Clark County Maps On-line
105	Hoodview Estates	Parcel 217402000	Divide ~15 acres into 3 lots	Preliminary Plat Approved 7/07	Clark County Maps On-line
106	Alicorn Cluster Development	Parcel 228033000	Divide ~20 acres into 4 lots	Preliminary Plat Approved 2/08	Clark County Maps On-line
107	Swoyer Short Plat	Parcel 227848000	Divide ~10 acres into 2 lots	Final Plat Approved 3/08	Clark County Maps On-line
108	Nistor Subdivision	Parcel 228086000	Divide ~6.7 acres into 5 lots	Preliminary Plat Approved 2/08	Clark County Maps On-line
109	Eden Acres	Parcel 228061000	Divide ~10 acres into 8 lots	Preliminary Plat Approved 4/08	Clark County Maps On-line
110	Oak Meadows Subdivision	Parcel 228055000	Divide ~10 acres into 10 lots	Pre-Application Conference 10/07	Clark County Maps On-line
111	Newtons Dollar Corner	Parcel 193073000	Demo and remove house; construct steel building for retail shop	Pre-Application Conference 10/06	Clark County Maps On-line
112	72nd Avenue Subdivision	Parcel 121170000	Subdivide ~9.8 acres into 9 lots	Preliminary Plat Approved 2/07	Clark County Maps On-line
113	Stillman Short Plat	Parcel 228317000	3 lot short plat	Final Plat Approved 10/07	Clark County Maps On-line
114	S&R Floorcovering Warehouse	Parcel 121260000	Prelim. site plan review for development of 2 warehouse buildings	Preliminary approval 4/08	Clark County Maps On-line
115	Synsvoll Chiropractic Buildings	Parcel 121271000	Pre-application conference for proposed commercial building	Pre-application conference 7/07	Clark County Maps On-line
116	Dollars Corner Co-locate	Parcel 192848000	Preliminary site plan review for Co-location of cell tower	Application 5/08	Clark County Maps On-line
117	Russell Short Plat	Parcel 193054000	Divide ~19.3 acres into 2 lots	Final Plat Approved 6/08	Clark County Maps On-line
118	Helmes Short Plat	Parcel 178955000	Divide ~20 acres into 4 lots	Final Plat Approved 10/06	Clark County Maps On-line
119	Ridgefield Force Main	Parcel 181475000	Construct force main within existing roadbed and a pump station within a Category III wetland	Pre-Application Conference 5/08	Clark County Maps On-line
120	Mayer Estates Plat Alteration	Parcel 181530000	Removal of storm easement	Final Plat Approved 8/07	Clark County Maps On-line
121	Good Hope Wireless Communication Facility	Parcel 181196000	Install cell tower	Pre-application Conference 6/07	Clark County Maps On-line
122	Good Hope PO 1803A	Parcel 117765050	Final site plan review of radio frequency transmission facility	Application 12/06	Clark County Maps On-line

Map ID	Project Name	Approximate Location	General Project Description	Est. Date of Completion	Source of Information
123	George's Short Plat	Parcel 179151000	Divide 6 acres into 2 lots	Pre-Application Conference 9/07	Clark County Maps On-line
124	Annual Review for Zone Changes	Parcel 181201000	Pre-application conference for annual review of zone change for 5 parcels	Pre-Application Conference 12/07	Clark County Maps On-line
125	Gas & Food Properties	Parcel 116480000	Remove RV parking and expand commercial building	Pre-Application Conference 12/07	Clark County Maps On-line
126	Delfel Parking Lot	Parcel 117711000	Pre-application conference for parking of light commercial equipment in the MX Zone	Pre-Application Conference 3/06	Clark County Maps On-line
127	Hildman Short Plat	Parcel 180841000	Divide 15 acres into 3 lots	Pre-Application conference 5/08	Clark County Maps On-line
128	Lee Family Short Plat	Parcel 180777000	Divide 22.6 acres into 4 lots	Pre-Application conference 5/08	Clark County Maps On-line
129	Kimball Short Plat	Parcel 18076000	Divide 20 acres into 4 lots	Preliminary Plat Approved 11/07	Clark County Maps On-line
130	Christenson Short Plat	Parcel 179395000	Divide 10 acres into 2 lots	Preliminary Plat Approved 7/07	Clark County Maps On-line
131	Good Hope PDX 003	Parcel 193134000	Final site plan review of co-location of cell tower	Final Site Plan Review Approved 10/06	Clark County Maps On-line
132	Vu's Landscaping and Nursery	Parcel 193039000	Final site plan review for expansion of existing operation to include retail sales and yard for maintenance and storage	Application 4/08	Clark County Maps On-line
133	Battle Ground Four Square Church	Parcel 192811000	Build church structure and parking lot	Pre-application conference 9/06	Clark County Maps On-line
134	Winterlake Subdivision	Parcel 192635000	Subdivide 7.5 acres to 7 lots	Final Plat approved 6/07	Clark County Maps On-line
135	Enzler Homestead Subdivision	Parcel 193774000	Divide 5 acres into 5 lots	Pre-Application conference 10/07	Clark County Maps On-line
136	Columbia Adventist Academy	Parcel 193793000	Construct new replacement admin/classroom building	Final Site Plan Review Approved 4/08	Clark County Maps On-line
137	Enzler Woods Short Plat	Parcel 193898000	Divide 2.3 acres into 2 lots	Preliminary Plat Approved 8/06	Clark County Maps On-line
138	Jackson Homestead	Parcel 19377000	Divide 6 acres into 6 lots	Final Plat Application 3/08	Clark County Maps On-line
139	Wallace Short Plat	Parcel 193787000	Divide 5.4 acres into 4 lots	Pre-application 1/08	Clark County Maps On-line
140	Mind Your Manners Dog Training	Parcel 193539000	Remodel existing building	Pre-application 8/07	Clark County Maps On-line
141	Clark Public Utilities Well	Parcel 193624000	Construct public water supply well, well house, driveway, water treatment facility	Final Site Plan Review Approved 10/06	Clark County Maps On-line
142	Clark County Lawn & Tractor	Parcel 193300000	Construct building	Preliminary Site Plan Approved 6/08	Clark County Maps On-line
143	Whipple Creek	Parcel 179595005	Modification to cell tower	Approved 11/07	Clark County Maps On-line
144	Mattox Short Plat	7902 NE 219th Street	Dividing approximately 20 acres into 3 residential lots	Application submitted 6/06 ON HOLD	Clark County Maps On-Line
145	NE 179th Street from I-5 to west of NE 29th Avenue	NE Union Rd to NE 29th Ave	Improve to 4-lane principal arterial	2010	Clark County Transportation Improvement Program
146	NE/NW 199th St	NW 11th Ave to NE 10th Ave	Improve to 2-lane collector standard	2012	Clark County Transportation Improvement Program
147	New water main	Along SR 502 between NE 21st Ave and the City of Battle Ground.	New 16" water main line on the south side of SR 502 from NE 87th Ave to the City of Battle Ground. Line will cross SR 502 around NE 87th .and continue on the north side of SR 502 to NE 29th Ave. Between NE 29th Ave and NE 21st Ave a 12" main will be installed to connect to the main installed with the SR 502 Interchange Project. All mains will be within the public right of way.	Prior to or concurrent with SR 502 Corridor Widening construction	Clark Public Utilities Water Services – email correspondence with Russell Knutson, PE 9/22/2008.
148	I-5/SR 502 Interchange	Immediately west of project. Connects to west end of SR 502 Corridor Widening Project.	Extension of SR 502 from NE 10th Avenue to I-5 and new interchange at I-5.	2008	Metropolitan Transportation Plan, Clark County
149	Ridgefield Interchange I-5 and SR 501	Approximately 2 miles north and slightly west of the SR 502 Corridor Widening Project	Improvements to the Ridgefield interchange and SR 501. This project will improve safety and mobility by replacing the existing I-5 interchange at SR 501 in Ridgefield, widening SR 501 to two lanes in each direction and adding new turn lanes at the interchange, making improvements to the SR 501/56th Pl. and 269th Street/ 65th Avenue intersections, and adding bike lanes and sidewalks for pedestrian travel.	Starting in 2009	Metropolitan Transportation Plan, Clark County WSDOT www.wsdot.wa.gov/Projects/I5/SR501Interchange/ Port of Ridgefield Projects List www.portridgefield.org
150	I-5 - 1-205 to 179th St (WSDOT)	I-5 - 1-205 to 179th St	Auxiliary lane in each direction	2012-2013	Metropolitan Transportation Plan, Clark County
151	I-5 179th St to SR 502 (WSDOT)	I-5 179th St to SR 502	Auxiliary lane in each direction	2016-2025	Metropolitan Transportation Plan, Clark County
152	I-5 179th St Interchange (WSDOT)	I-5/179th St	Reconstruct interchange	2016-2025	Metropolitan Transportation Plan, Clark County
153	SR 503/SR 502 (WSDOT)	SR 502/SR 503 Intersection	Intersection improvement	2011-2016	Metropolitan Transportation Plan, Clark County
154	219th St Park & Ride (C-TRAN)	I-5/SR 502 intersection	Park and ride facility at new interchange	2020-2030	Metropolitan Transportation Plan, Clark County
155	179th/Fairgrounds Park & Ride (C-TRAN)	I-5/NE 179th St	Develop park and ride facility	2020-2030	Metropolitan Transportation Plan, Clark County
156	179th Street (Clark Co)	NE 10th to NE 29th Ave	Add 1 lane in each direction and turn lane	2010-2013	Metropolitan Transportation Plan, Clark County
157	179th Street (Clark Co)	NE 29th Ave to NE 72 Ave	Add 1 lane in each direction and turn lane	2013-2030	Metropolitan Transportation Plan, Clark County
158	179th Street (Clark Co)	NE 72nd Ave to Cramer Rd	Add turn lane	2013-2039	Metropolitan Transportation Plan, Clark County
159	179th Street (Clark Co)	Cramer Rd to NE 112th Ave	1 lane each direction w/turn lane	2013-2030	Metropolitan Transportation Plan, Clark County
160	179th Street (Clark Co)	I-5 to NW 11th Ave	frontage improvements	2013-2030	Metropolitan Transportation Plan, Clark County
161	NE 199th St (Clark Co)	NE 10th to NE 72nd Ave	Add turn lane	2013-2030	Metropolitan Transportation Plan, Clark County
162	NE 72nd Ave (Clark Co)	NE 133rd to NE 219th St	Add 1 lane in each direction and turn lane	2013-2030	Metropolitan Transportation Plan, Clark County
163	NE 112th Avenue (Battle Ground)	NE 199th to NE 189th St	1 lane each direction w/turn lane, bicycle, and pedestrian facilities	2016-2025	Metropolitan Transportation Plan, Clark County
164	NE 199th St (Battle Ground)	NE 112th Avenue to SR 503, Battle Ground	1 lane each direction w/turn lane, bicycle, and pedestrian facilities	2011-2015	Metropolitan Transportation Plan, Clark County
165	SR 502/12th Ave (Battle Ground)	SR 502/12th Ave	Reconfigure roadway system and remove signal	2009	Metropolitan Transportation Plan, Clark County
166	SR 503 & NE 199th St (Battle Ground)	SR 503 & NE 199th St	Improve Intersection - add turn lanes	2011-2015	Metropolitan Transportation Plan, Clark County
167	SR503 & Scotton Way (Battle Ground)	SR 503 & Scotton Way	Add east and west intersection legs	2016-2025	Metropolitan Transportation Plan, Clark County
168	Carty Road (Ridgefield)	Hillhurst to I-5	Upgrade to minor arterial	2020	Metropolitan Transportation Plan, Clark County
169	Hillhurst Road (Ridgefield)	Royle to 229th extension	Upgrade to 5 lane principal arterial (add 3 lanes)	2012	Metropolitan Transportation Plan, Clark County
170	I-5 (Ridgefield/WSDOT)	219th St to SR 501	Auxiliary lane in each direction		Metropolitan Transportation Plan, Clark County
171	Proposed Regional Park	North of SR 502 near 84th Avenue	Acquisition of ~200 acres for regional park	Acquisition 2010	Vancouver-Clark Comprehensive Parks, Recreation, and Open Space Plan

Map ID	Project Name	Approximate Location	General Project Description	Est. Date of Completion	Source of Information
172	Possible regional sewer connection	From Ridgefield to Vancouver, crossing SR 502 at NE 10th or NE 29th Avenues.			

Appendix B

List of Current Environmental Compliance Regulations

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List of Current Environmental Compliance Regulations.

Regulation	Regulating Agency(s)	Brief Description of Regulation	Applicable Resources							
			Ag. & Farmlands	Fish	Land Use	Noise	Vegetation	Surface Water	Wetlands	Wildlife
Federal Regulations										
Clean Water Act (CSA) (33 USC 1251-1376) Sections 404 (Fish Authorizations) /401 Water Quality Certification and 402 Discharge Authorizations	Administered by US Army Corps of Engineers (Corps) /Administered by the Environmental Protection Agency (EPA) or its designees (i.e. Washington State Department of Ecology)	The CWA implements pollution protection, wetlands protection, and dredging provisions in waters of the United States. The purpose of the Section 401 is to ensure federally permitted activities comply with the CWA and state water quality laws.		X				X		
Federal Farmland Protection Policy Act of 1981 (FPPA)	US Department of Agriculture Natural Resources Conservation Service (NRCS)	Intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—Federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland.	X		X					
Fish and Wildlife Coordination Act (16 USC 661-667e)	USFWS and Washington Department of Fish and Wildlife (WDFW)	Provides for cooperation with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. Amendments in 1946 require consultation with USFWS and WDFW where waters of any stream or other water body are proposed or authorized, permitted or licensed to be impounded, diverted….or otherwise controlled or modified….to prevent loss of and damage to wildlife resources.		X						X
Magnuson-Stevens Fishery Conservation and Management Act (FCMA) (16 USC 1801)	Administered by NMFS	This Act provides for the conservation and management of fishery resources.		X						
Migratory Bird Treaty Act (MBTA) (16 USC 703-712)	Administered by USFWS	This domestic law affirms, or implements the US' commitment to four international conventions for the protection of shared migratory bird resources.								X
National Pollutant Discharge Elimination System (NPDES) (Title 40 CFR Part 122)	Administered by EPA or its designees (i.e. Washington State Department of Ecology)	This legislation regulates all soil disturbing activities where construction activity would disturb 1 or more acres and would result in discharge of stormwater to receiving water, and/or storm drains that discharge to a receiving water.		X				X		
Section 7 of the Endangered Species Act	Administered by National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS)	Protects plants, animals and fish listed as endangered or threatened under federal rules.		X			X			X
Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise	FHWA	This paper discusses the three-part approach to dealing with the problem of highway traffic noise in the United States. The first part, noise-compatible land use planning, is traditionally an area of local responsibility. The other two parts, source control of vehicle noise emissions and highway project noise mitigation are the joint responsibility of private industry and of Federal, State, and local governments. The paper also contains FHWA's noise regulations and is intended for the general public, elected officials, and anyone interested in learning about highway traffic noise requirements.				X				
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970	US Department of Transportation Federal Highway Administration	Provides protections and assistance for people affected by the acquisition, rehabilitation, or demolition of real property for Federal or federally funded projects.	X		X					
State Regulations										
Code, 1989. Chapter 173-60	WSDOT	Maximum Environmental Noise Levels				X				
Directive D22-22	WSDOT	Noise Evaluation Procedures for Existing Highways				X				
EPM M 31-11.01 Section 446	WSDOT	Environmental noise procedures.				X				
Traffic Noise Analysis and Abatement Policy and Procedures	WSDOT	The policy and procedures for analysis of and abatement of traffic related noise.				X				
Washington State Environmental Policy Act (SEPA) (WAC 197-11)	Administered by Washington State Department of Ecology	The SEPA requires that all state and local governmental agencies determine the environmental impact of land use decisions and promote efforts that would prevent or eliminate damage to the environment.		X			X	X		X
Washington State Hydraulic code (RCW Chapter 77.55) and through rules under WAC 220-110	Administered by WDFW	This code requires a permit for work that would use, divert, obstruct, or change the natural flow or bed of any state waters (e.g. culver work, stream realignment, bridge replacement). The State Hydraulic Code contains rules that protect all fish life, which includes the habitat that fish live in.		X				X		
Washington Transportation Plan 2007-2026	Washington State Department of Transportation (WSDOT)	Provides a blueprint and strategies to guide decisions and investments needed to develop Washington's transportation system to serve its citizens', communities', and economy's future needs, while safeguarding its environment.	X		X					
Regional Regulations										
Metropolitan Transportation Plan (2007)	Southwest Washington Regional Transportation Council (RTC)	The region's principal transportation planning document for the metropolitan area of Clark County. The plan is developed through a coordinated process between local jurisdictions, agencies, and the public, in order to develop regional solutions to transportation needs.	X		X					

Regulation	Regulating Agency(s)	Brief Description of Regulation	Applicable Resources							
			Ag. & Farmlands	Fish	Land Use	Noise	Vegetation	Surface Water	Wetlands	Wildlife
Vancouver-Clark Parks, Recreation and Open Space Plan (2007)	City of Vancouver and Clark County	Guides efforts to acquire and develop parks and open spaces, and enhance and expand recreation programs throughout Vancouver and greater Clark County. Focuses on parks, trails, sports fields, recreation facilities, conservation and greenway systems, and wildlife habitat. Reflects the community's vision and lays out a six-year roadmap to meet the park and recreation needs of the community.	X		X					
County Regulations										
Clark County 2007-2012 Transportation Improvement Program	Clark County	Implementation tool for achieving the goals and objectives of the CGMP. Evaluates and prioritizes possible road improvement projects.	X		X					
Clark County 20-Year Comprehensive Growth Management Plan 2004-2024	Clark County	Establishes urban growth boundaries and encourages growth in those areas, implementing the state's Growth Management Act (GMA). Assigns comprehensive plan designations to land in the County.	X		X					
Clark County Code	Clark County	Regulatory code for unincorporated Clark County. Includes regulations for critical areas, zoning, stormwater, erosion control, and noise.	X		X	X		X		
Clark County Habitat Conservation Ordinance (Clark County Code 40.440)	Administered by Clark County	This ordinance sets standards of no net loss of habitat functions and values to conserve the functional integrity of the habitats needed to perpetually support fish and wildlife populations within designated habitat areas by protecting environmentally distinct, fragile, and valuable fish and wildlife habitat areas. These habitat areas include riparian priority habitat, other priority habitat and species, and locally important habitats and species.		X			X			X
City Regulations										
City of Battle Ground Comprehensive Plan 2004-2024	City of Battle Ground	Implements the GMA within the Urban Growth Area (UGA) for the City of Battle Ground. Assigns comprehensive plan designations to land in the City.	X		X					
City of Battle Ground Municipal Code (includes zoning, critical areas, stormwater control, drainage and noise ordinance)	City of Battle Ground	Regulatory code for the City of Battle Ground. Includes regulations for critical areas, zoning, stormwater control, drainage and noise.	X		X	X		X		
City of Battle Ground Parks Improvement Plan (2005)	City of Battle Ground	Blueprint for acquiring and developing parks, trails, recreation facilities and open spaces.	X		X					
City of Battle Ground Transportation System Plan 2005-2025	City of Battle Ground	Guiding document that outlines the goals, policies, and action strategies for developing the transportation system within the City's UGA.	X		X					
City of Ridgefield Comprehensive Plan	City of Ridgefield	Implements the GMA within the Urban Growth Area (UGA) for the City of Ridgefield. Assigns comprehensive plan designations to land in the City.	X		X					
City of Ridgefield Municipal Code	City of Ridgefield	Regulatory code for the City of Ridgefield. Includes regulations for critical areas and zoning.	X		X			X		
City of Vancouver Comprehensive Plan 2003-2023	City of Vancouver	Implements the GMA within the Urban Growth Area (UGA) for the City of Vancouver. Assigns comprehensive plan designations to land in the City.	X		X					