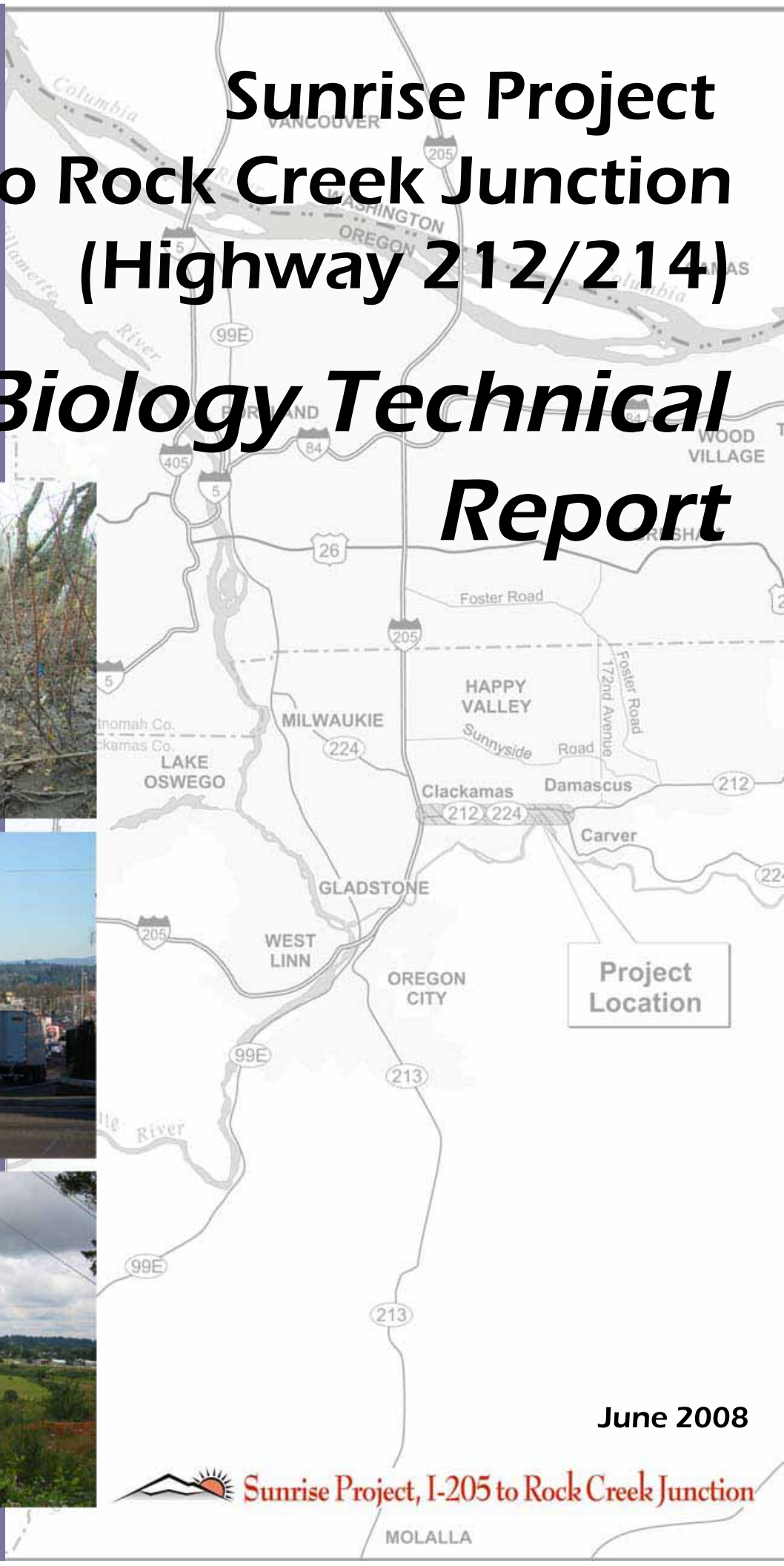
Sunrise Project
I-205 to Rock Creek Junction (Highway 212/214)

Biology Technical Report



June 2008

Sunrise Project, I-205 to Rock Creek Junction

October 2008

TO: Readers of the Sunrise Technical Reports

FROM: Sunrise Project Team

SUBJECT: Differences between Sunrise SDEIS and Technical Reports

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The Sunrise Project: I-205 to Rock Creek Junction Supplemental Draft Environmental Impact Statement (SDEIS) presents information summarized from numerous technical documents. Most of these documents are discipline specific technical reports (e.g., cultural resources, noise, wetlands, etc.). These reports include a detailed explanation of the data gathering and analytical methods used by each discipline team.

The technical reports are longer and more detailed than the SDEIS and should be referred to for information beyond that which is presented in the SDEIS. Findings summarized in the SDEIS are supported by analysis in the technical reports and their appendices. References used to develop the reports and underlying data are presented in the technical reports.

The draft technical reports were largely completed in late 2007. Since the technical reports were completed, new information has been discovered that has been incorporated into the SDEIS. Thus, the SDEIS reflects more recent public and agency input than is included in the technical reports. For example, since the technical reports were completed, additional work has been conducted for the cultural resource documentation for Camp Withycombe and the RTP planning process has progressed with federal approvals of local plans. Also, the cumulative effects section of the document was written after reviewing all of the technical reports. No one technical report includes this comprehensive analysis.

Please refer to the appropriate section of the SDEIS for the most current information.

SUMMARY

The proposed project is located in the western, urbanized portion of Clackamas County in the vicinity of State Highway 212/224. Much of the project area has undergone considerable impacts to its wildlife, fish, and botanical habitats for decades, but some important wildlife features maintain a tenuous hold.

Mount Talbert, the Three Creeks area (the large wetland and upland complex west of SE 82nd Avenue, which contains the confluence of Phillips and Dean creeks to Mount Scott Creek), and a large forested parcel between Mount Talbert and Camp Withycombe that was purchased by ODOT for this project maintain significant habitat patches for wildlife. The Clackamas River provides another regionally important habitat feature for fish and wildlife. Deer, coyote, and other small mammals continue to move between these patches through wildlife corridors (Mount Talbert to Three Creeks Corridor and Mount Talbert to Rock Creek Corridor). While wildlife use of some of these areas is well documented and evident to the casual observer, use of other areas is less well documented. Through the project area, ODFW has documented deer and small game trails on both sides of SE 135th Avenue, SE 142nd Avenue, and SE 152nd Avenue (ODOT 2005a, Appendix A). Biologists from ODFW, Metro, and the Audubon Society of Portland have also verified that these corridors are known or anticipated wildlife movement areas (ODOT 2005a).

In some areas these corridors are wide and secure, but mostly they have been bisected and crowded by development. In some areas, the corridors are extremely narrow and future development could easily sever them. The proposed Sunrise Project further impacts these corridors. A few areas of particular concern are summarized below:

- **Mount Scott Creek to Dean Creek:** This area is southeast of Interstate 205 (I-205) and wildlife currently travels a very narrow corridor along the freeway fill slope. The proposed I-205 on-ramp over Mount Scott Creek has the potential to sever the corridor unless land isn't set aside for a wildlife corridor or Mount Scott Creek is bridged allowing wildlife to use the Mount Scott Creek riparian corridor as their main travel corridor rather than using a circuitous route along I-205 and Dean Creek to the Tree Creeks area. Fill slopes for this on-ramp would further restrict an already narrow section of the corridor.

- **Lawnfield Road Realignment:** The realignement of Lawnfield Road would bisect a large, high-quality wetland complex located in and around the KEX radio tower site. Wildlife use the wetland for forage and thermal refuge as they travel the Mount Talbert to Three Creeks corridor. Fill slopes for the Sunrise Project would meet fill slopes for the Lawnfield Realignment creating a V-shaped, ravine-like condition which wildlife typically avoid because of the limited potential for escape. Under Design Option A-2, the Lawnfield Road would not be realigned.

- **Mount Scott Creek at SE 82nd Avenue:** A new bridge is proposed to connect the southern and northern sections of SE Ambler Road. This bridge would be constructed over the Mount Talbert to Three Creeks wildlife corridor.

- **Clackamas Bluffs east of Camp Withycombe:** A section of the Mount Talbert to Rock Creek wildlife corridor extends along a terrace escarpment known as the Clackamas Bluffs where single-family housing is the dominant land use on the terrace and industrial land uses dominate the base of the escarpment. The Sunrise Project would be built along the lower portion of the escarpment, further reducing the corridor's width.

- **Area between an unnamed tributary to Rock Creek and the Rock Creek riparian corridor**: This wildlife corridor (immediately east of SE 152nd Avenue) is limited to a narrow strip of mixed-forest land between housing developments to the north and a mobile home court to the south. This area is the narrowest section of the vegetated corridor but wildlife use of this narrow patch as part of the corridor is not documented. Depending on the design option selected, construction of the Sunrise through this area would further restrict the width this of habitat patch, as would any urban development of properties as allowed by current zoning.

Fish habitat has also suffered from development pressure over the years, and most of the smaller streams in the project area have been realigned, ditched, or piped. Rock Creek, however, still maintains populations of Lower Columbia River Chinook and coho salmon, as well as steelhead trout. Chinook have not been documented in Mount Scott Creek or Dean Creek but may be present in Kellogg Creek, several miles downstream of the project area. Project-area reaches of Mount Scott Creek, Rock Creek, and the Clackamas River have been designated as critical habitat for steelhead under the federal Endangered Species Act (ESA).

Alternatives 2 and 3 involve the same number of creek crossings. All new structures over Dean, Mount Scott, Seiben, and Rock creeks (either bridges or culverts) would be built to Oregon Department of Fish and Wildlife (ODFW) fish passage standards, which would be an improvement over the existing situation. The proposed project would result in a substantial increase in impervious surface, which is the most useful measure in quantifying and comparing project impacts to fish. Increased impervious surface typically reduces dry-season base flows by reducing stormwater infiltration and groundwater recharge. Reduced base flows can kill or injure fish directly by stranding, depleting dissolved oxygen, and increasing water temperature. Using this measure, Design Options A, D, D-2, and D-3 would have the most potentially adverse effects on fish as these options result in the greatest amount of new impervious surface.

There are no documented occurrences of listed threatened or endangered wildlife or plant species within the project's area of potential impact (API), although bald eagles occur along the Clackamas River, which provides nesting, roosting, and foraging habitat.

As part of completing its Goal 5 inventory, the Metropolitan Service District (Metro) mapped upland and riparian wildlife habitats within the project area (Metro 2005). Through an extensive public involvement and review process, Metro determined the significance of these habitats. The results of Metro's study formed the basis for quantifying impacts to wildlife resources.

Alternative 2 impacts 56.2 acres of Metro's mapped upland habitat and 44.6 acres of mapped riparian habitat. Alternative 3 has the same riparian impacts (44.6 acres) and impacts 3 fewer acres of upland habitat (53.2 acres). The 3 acres impacted under Alternative 2, but not under Alternative 3, are the area needed to construct the midpoint interchange that would be located on

the Clackamas Bluffs east of Camp Withycombe. Design Option B-2, the modified split interchange option, slightly reduces upland habitat impacts compared to either of the base alternatives (Alternatives 2 and 3).

Between SE 135th Avenue and SE 152nd Avenue, two design options are being considered. Option C-2 places the Sunrise Project close to Highway 212, while Option C-3 places it north of the two base alternatives. Option C-2 reduces impacts to wildlife habitat through this area compared with the base alternatives and Option C-3. Option C-3, on the other hand, greatly increases impacts to mapped upland habitat by impacting wetland and forested habitats north of the base alternatives. These areas are privately held parcels with no guarantee that the habitats would remain intact.

Immediately east of SE 152nd Avenue is the narrowest portion of the wildlife corridor linking Mount Talbert to Rock Creek and beyond. Design Option D-2, the folded diamond interchange, entirely avoids this area. Alternatives 2 and 3 and Design Option D-3 impact this area, leaving only the northernmost portion of the corridor unaffected. Construction activities and the narrowness of the remaining corridor would create a substantial barrier to wildlife movement.

Table S1 summarizes the amount of impact, in acres, to upland and riparian habitats for the base alternatives and design options.

Table S1. Areas of Impact to Upland and Riparian Habitats (acres)

	Upland Habitat			Riparian Habitat			Total		
	Class A	**Class B**	**Class C**	**Class I**	**Class II**	**Class III**	**Upland**	**Riparian**	**Total**
Alt. 1 (No Build)	0	0	0	0	0	0	0	0	0
Alt. 2	8.7	24.8	22.8	22.7	19.2	2.8	56.3	44.7	100.9
Alt. 3	8.7	21.8	22.8	22.7	19.2	2.8	53.3	44.7	97.9
Alt. 2 Option A-2	8.7	24.2	22.7	20.7	19.2	2.8	55.6	42.7	98.3
Alt 3 Option A-2	8.7	21.2	22.7	20.7	19.2	2.8	52.6	42.7	95.3
Alt. 2 Option B-2	8.7	20.9	23.9	24.1	20.8	2.8	53.5	47.7	101.2
Alt. 3 Option B-2	Option B-2 is not applicable to Alternative 3								
Alt. 2 Option C-2	8.7	20.2	23.2	20.1	17.8	2.8	52.1	40.7	92.8
Alt. 3 Option C-2	8.7	17.2	23.2	20.1	17.8	2.8	49.1	40.7	89.8
Alt. 2 Option C- 3	8.7	39.2	22.3	19.4	18.7	2.8	70.2	40.9	111.1
Alt. 3 Option C-3	8.7	36.2	22.3	19.4	18.7	2.8	67.2	40.9	108.1
Alt. 2 Option D-2	9.1	25.9	22.7	23.3	19.0	1.9	57.7	44.2	101.9
Alt. 3 Option D-2	9.1	22.9	22.7	23.3	19.0	1.9	54.7	44.2	98.9
Alt. 2 Option D-3	6.8	24.8	23.2	23.2	19.2	2.8	54.8	45.2	100.0
Alt. 3 Option D-3	6.8	21.8	23.2	23.2	19.2	2.8	51.8	45.2	97.0

Impact areas are also provided by zone in order to compare the impacts associated with the various design options compared to the impacts associated with the base alternatives. Table S2 lists the upland habitat impacts, and Table S3 lists riparian habitat impacts.

Table S2. Upland Habitat Impacts by Zone (acres)

Design Option	I-205 Interchange Area (Zone A)			Midpoint Area (Zone B)			SE 135th to SE 152nd Avenue (Zone C)			East End Area (Zone D)		
	Class A	Class B	Class C	Class A	Class B	Class C	Class A	Class B	Class C	Class A	Class B	Class C
Alt. 2	1.7	1.0	9.9	0.0	11.4	0.0	0.0	9.3	2.7	7.0	3.1	10.1
Alt. 3	1.7	1.0	9.9	0.0	8.4	0.0	0.0	9.3	2.7	7.0	3.1	10.1
A-2	1.7	0.5	9.9									
B-2				0.0	7.4	0.0	0.0	9.4	3.3			
C-2							0.0	4.7	3.2			
C-3							0.0	23.7	2.3			
D-2										7.4	4.2	10.0
D-3										5.2	3.1	10.5

Table S3. Riparian Habitat Impacts by Zone (acres)

Design Option	I-205 Interchange Area (Zone A)			Midpoint Area (Zone B)			135th to SE 152nd Avenue (Zone C)			East End Area (Zone D)		
	Class I	Class II	Class III	Class I	Class II	Class III	Class I	Class II	Class III	Class I	Class II	Class III
Alt. 2	10.7	8.2	1.9	0.0	0.0	0.0	7.0	6.6	0.0	5.0	4.4	0.9
Alt. 3	10.7	8.2	1.9	0.0	0.0	0.0	7.0	6.6	0.0	5.0	4.4	0.9
A-2	8.8	8.2	1.9									
B-2				0.0	0.0	0.0	8.4	8.2	0.0			
C-2							4.4	5.2	0.0			
C-3							3.7	6.2	0.0			
D-2										5.6	4.2	0.0
D-3										5.6	4.4	0.9

TABLE OF CONTENTS

INTRODUCTION **11**

PROJECT LOCATION 11
PROJECT PURPOSE AND NEED 11
PROPOSED ACTION 11

ALTERNATIVES **12**

ALTERNATIVE 1: NO-BUILD 12
ALTERNATIVE 2: BUILD WITH MIDPOINT INTERCHANGE 12
ALTERNATIVE 3: BUILD WITH NO MIDPOINT INTERCHANGE 12
DESIGN OPTIONS 12
Design Option A-2: Modified 1996 Design *13*
Design Option B-2: 1996 Split Interchange (Modified) *13*
Design Option C-2: Central Alignment *13*
Design Option C-3: Modified Follow Tree-Line Alignment *13*
Design Option D-2: Alignment through Knoll (Folded Diamond Interchange) *13*
Design Option D-3: Single-Point Diamond Interchange *13*

METHODOLOGY AND DATA SOURCES **37**

INITIAL SITE MEETING 37
DOCUMENT GATHERING AND REVIEW 37
FIELD VISITS 38
INTERVIEWS WITH EXPERTS WITH LOCAL KNOWLEDGE 38
INTERNAL TEAM MEETINGS 38
ODOT WILDLIFE CORRIDOR ENHANCEMENT AND MITIGATION STRATEGY 39

AFFECTED ENVIRONMENT **40**

WILDLIFE RESOURCES 40
Habitat Types *41*
Threatened, Endangered, and Sensitive Species *43*
Wildlife Corridors *48*
Mount Talbert to Rock Creek (Eastward) *48*
Factors Affecting Corridor Quality *50*
FISH RESOURCES 52
Mount Scott Creek *55*
Dean Creek *55*
Phillips Creek *56*
Clackamas River *56*
Cow Creek *56*
Sieben Creek *57*
Graham Creek *57*
Rock Creek *57*
Rock Creek West Tributary *58*
Trillium Creek *58*
Trillium Creek Tributary *58*
Federal Threatened and Endangered Fish Species *58*
BOTANICAL RESOURCES 61
Plant Communities *61*
Sensitive Plant Species *67*
Noxious Weeds *76*

ENVIRONMENTAL CONSEQUENCES **78**

WILDLIFE AND BOTANICAL RESOURCES 78

Sensitive Plant Species *78*
Sensitive Plant Communities *78*
Alternative 1: No-Build *78*
Alternative 2: Build with Midpoint Interchange *78*
Alternative 3: Build with No Midpoint Interchange *84*
Design Options *85*
Design Option A-2 ..... *85*
FISH RESOURCES 93
Types of Potential Impact *93*
Impervious Surface *94*
Dissolved Copper *95*
CUMULATIVE EFFECTS 96
Highways and Arterial Road Facilities *96*
SUMMARY OF PERMITS REQUIRED 100
MITIGATION MEASURES 103
Wildlife and Botanical Resources *103*
FISH RESOURCES 108

REFERENCES AND AGENCY CONSULTATIONS 111

ACRONYMS AND ABBREVIATIONS 116

LIST OF PREPARERS 117

LIST OF FIGURES

FIGURE 1 VICINITY MAP 14
FIGURE 2 ALTERNATIVE 1: NO-BUILD 15
FIGURE 3 ALTERNATIVE 2 WITH DESIGN OPTIONS 17
FIGURE 4 ALTERNATIVE 2 19
FIGURE 5 ALTERNATIVE 3 WITH DESIGN OPTIONS 21
FIGURE 6 ALTERNATIVE 3 23
FIGURE 7 OPTION A2: LAWNFIELD 82ND CONNECTION 25
FIGURE 8 OPTION B2: SPLIT INTERCHANGE 27
FIGURE 9 OPTION C2: CENTRAL ALIGNMENT 29
FIGURE 10 OPTION C3: MODIFIED FOLLOW TREE-LINE ALIGNMENT 31
FIGURE 11 OPTION D2: ALIGNMENT THROUGH KNOLL FOLDED DIAMOND INTERCHANGE 33
FIGURE 12 OPTION D3: ALIGNMENT NORTH OF KNOLL - SINGLE POINT DIAMOND INTERCHANGE 35

LIST OF TABLES

TABLE S1. AREAS OF IMPACT TO UPLAND AND RIPARIAN HABITATS (ACRES) 4
TABLE S2. UPLAND HABITAT IMPACTS BY ZONE (ACRES) 5
TABLE S3. RIPARIAN HABITAT IMPACTS BY ZONE (ACRES) 6
TABLE 1. SENSITIVE WILDLIFE SPECIES THAT MAY OCCUR IN THE SUNRISE PROJECT CORRIDOR 44
TABLE 2. POTENTIAL FISH SPECIES OCCURRENCE IN THE SUNRISE PROJECT AREA 54
TABLE 3. SPECIES COMMON TO THE INDUSTRIAL DISTURBED PLANT COMMUNITY 62
TABLE 4. SPECIES COMMON TO THE EMERGENT WETLAND COMMUNITY 63
TABLE 5. FORESTED /SCRUB-SHRUB PLANT COMMUNITY TYPICAL SPECIES 64
TABLE 6. UPLAND GRASSLAND PLANT COMMUNITY TYPICAL SPECIES 65
TABLE 7. MIXED FOREST PLANT COMMUNITY TYPICAL SPECIES 66
TABLE 8. CONIFEROUS FOREST PLANT COMMUNITY TYPICAL SPECIES 66
TABLE 9. STATUS OF SENSITIVE PLANT SPECIES 69
TABLE 10. ORNHIC GLOBAL RANKINGS AND DEFINITIONS FOR RARE, THREATENED, AND ENDANGERED SPECIES 70
TABLE 11. ORNHIC GLOBAL RANKINGS AND DEFINITIONS 70
TABLE 12. ONHP RANKINGS AND DEFINITIONS 71
TABLE 13. RANKINGS AND STATUS FOR SENSITIVE SPECIES IN THE SUNRISE PROJECT AREA 71
TABLE 14. B-DESIGNATED NOXIOUS WEEDS IN THE SUNRISE PROJECT CORRIDOR 77
TABLE 15. ALTERNATIVE 2 IMPACTS TO WILDLIFE HABITAT (UPLAND AND RIPARIAN) 79
TABLE 16. ALTERNATIVE 3 IMPACTS TO WILDLIFE HABITAT 84
TABLE 17. COMPARISON OF IMPACTS TO UPLAND AND RIPARIAN WILDLIFE HABITAT UNDER ALTERNATIVES 2 AND 3 85
TABLE 18. COMPARISON OF AREAS OF WILDLIFE IMPACT FOR DESIGN OPTION A-2 UNDER ALTERNATIVES 2 AND 3 (ACRES) 85
TABLE 19. IMPACTS TO UPLAND AND RIPARIAN HABITATS IN ZONE A (ACRES) 86
TABLE 20. IMPACTS TO WILDLIFE HABITAT UNDER ALTERNATIVE 2 WITH AND WITHOUT DESIGN OPTION B-2 (ACRES) 86
TABLE 21. IMPACTS TO UPLAND AND RIPARIAN HABITATS IN ZONES B AND C 87
TABLE 22. COMPARISON OF DESIGN OPTION C-2 IMPACTS TO WILDLIFE HABITAT UNDER ALTERNATIVES 2 AND 3 (ACRES) 88
TABLE 23. IMPACTS TO UPLAND AND RIPARIAN HABITATS IN ZONE C (ACRES) 88
TABLE 24. COMPARISON OF DESIGN OPTION C-3 IMPACTS TO WILDLIFE HABITAT UNDER ALTERNATIVES 2 AND 3 (ACRES) 89
TABLE 25. IMPACTS TO UPLAND AND RIPARIAN HABITATS IN ZONE C (ACRES) 90
TABLE 26. COMPARISON OF DESIGN OPTION D-2 IMPACTS TO WILDLIFE HABITAT UNDER ALTERNATIVES 2 AND 3 91
TABLE 27. IMPACTS TO UPLAND AND RIPARIAN HABITATS IN ZONE D (ACRES) 91

TABLE 28. COMPARISON OF DESIGN OPTION D-3 IMPACTS TO WILDLIFE HABITAT UNDER ALTERNATIVES 2 AND 3 (ACRES) 92
TABLE 29. IMPACTS TO UPLAND AND RIPARIAN HABITAT IN ZONE D 92
TABLE 30. NEW IMPERVIOUS AREA ADDED TO EACH DRAINAGE BASIN BY DESIGN OPTION (ACRES)....94
TABLE 31. TOTAL NEW IMPERVIOUS AREA FOR ALTERNATIVE 2 AND ALTERNATIVE 3 FOR THE ..95
TABLE 32. PERCENT INCREASE IN IMPERVIOUS AREA IN ACRES 95
TABLE 33. WILDLIFE CORRIDOR PROPERTIES....109

INTRODUCTION

Project Location

The proposed project is located in the western, urbanized portion of Clackamas County in the vicinity of State Highway 212/224 (see Figure 1, Project Vicinity). The project limits extend approximately 4.9 miles from approximately 1,000 feet west of SE Johnson Road to SE 172nd Avenue, just beyond Rock Creek Junction where Highways 212 and 224 diverge.

Project Purpose and Need

The purpose of this project is to effectively address congestion and safety problems in the Highway 212/224 corridor between its interchange with Interstate 205 (I-205) and Rock Creek Junction, and to serve the growing demand for regional travel and access to the state highway system.

The need for the project is generated by the following factors:

- Highway 212/224 between I-205 and Rock Creek Junction is currently experiencing unacceptable levels of congestion and delay during the peak travel periods. By 2030, the projected traffic volume will exceed the volume that the existing four-lane arterial can be expected to handle at an acceptable level of service.
- By 2030, the numbers of households and jobs in the area served by this section of Highway 212/224 are expected to increase by 136 percent and 85 percent, respectively.
- Both the north and southbound weave sections of I-205 between SE 82nd Avenue and Highway 212/224 are approaching capacity, resulting in frequent stop-and-go movements, difficulty in changing lanes, and long queues forming because of minor incidents. By 2015, this section of I-205 is expected to exceed its design capacity and the extent of these stop-and-go movements may continue to grow if no action is taken. Some traffic traveling on the Milwaukie Expressway (Highway 224) heading east on Highway 212/224, as well as the reverse direction, may have to use either the above section of I-205 or the currently congested SE 82nd Avenue.
- Highway 212/224 near I-205 is ranked in the top 10 percent of state routes for vehicle crash rate. A vehicle crash rate of 3.10 was reported for this area during the 5-year period from 1998 through 2002. The comparable statewide facility rate is 2.47. The high crash rate is attributed to severe congestion and roadway deficiencies. Inadequate bicycle and pedestrian facilities reduce the safety and connectivity for these modes of travel in the project area.

Proposed Action

The proposed action would provide a new limited-access expressway between I-205 and the Rock Creek Junction. The facility would be comprised of six lanes, plus auxiliary lanes, and would include an improved interchange at I-205. This new expressway would become the designated State Highway 212/224, with the existing route reverting to a county arterial.

ALTERNATIVES

A no-build alternative and two build alternatives are being evaluated. Design options within each of the build alternatives are also being considered. Both build alternatives and all design options would incorporate an improved interchange at I-205 and an interchange at Rock Creek Junction. The alignment of the facility would generally follow a natural bluff-line that extends from Mt. Talbert east to Rock Creek on the north side of Highway 212/224. Associated improvements to address local circulation are also included.

Alternative 1: No-Build

The National Environmental Policy Act (NEPA), Oregon Department of Transportation (ODOT), and Federal Highway Administration (FHWA) guidelines require that a no-build option be evaluated. The No-Build Alternative (see Figure 2) would maintain the existing roadway except for committed improvements scheduled in ODOT's four-year Statewide Transportation Improvement Program (STIP) and Metro's Financially Constrained Projects listed in the Regional Transportation Plan (RTP). These listed projects include the following:

Widen SE 82nd Avenue between Lawnfield Road and Highway 212/224.

Improve the Highway 212 connection to Mather Road via SE 102nd Avenue and Industrial Way.

Construct a new northerly extension of Highway 224 at Rock Creek Junction that curves east to connect to SE 162nd and SE 172nd Avenues.

Create a climbing lane on Highway 212 between Rock Creek Junction and SE 172nd Avenue.

Widen SE 172nd Avenue between Foster Road and Highway 212.

Widen Highway 224 between Rock Creek Junction and the Carver Bridge.

Widen the Carver Bridge to five lanes.

Alternative 2: Build with Midpoint Interchange

This alternative is distinguished by the inclusion of a midpoint interchange in the vicinity of SE 122nd Avenue, which would connect the expressway to the existing Highway 212/224 (see Figure 3).

Alternative 3: Build with No Midpoint Interchange

In contrast to Alternative 2, this alternative would not have a midpoint interchange, resulting in no access to the expressway between I-205 and Rock Creek Junction (see Figure 4).

Design Options

In addition to the two build alternatives described above, a number of design options are under consideration. These options are organized by geographic zones, as described below.

- ***Zone A*** is the westernmost portion of the corridor and represents the I-205 Interchange Area and the Lawnfield Business Area, with a western terminus aligned with SE Johnson Road

and an eastern terminus bisecting Camp Withycombe. The north and south boundaries extend from Clackamas Town Center to south of SE Jennifer Street.

- ***Zone B*** is the "Midpoint Area" and extends from Camp Withycombe to SE 135th Avenue, north to Clackamas High School and south to SE Jennifer Street.

- ***Zone C*** has the same north and south boundaries as Zone B and extends from SE 135th Avenue east to the Rock Creek area.

- ***Zone D*** represents the eastern end of the corridor and stretches east to SE 172nd Avenue with the same north and south boundaries as Zones B and C.

Many design options were considered, but only a few were carried forward for study. The design options described below retain their original numbering system.

Design Option A-2: Modified 1996 Design

This design option, located in Zone A, would extend SE Lawnfield Road west and south toward SE Clackamas Road (see Figures 5, 6 and 7). A further change would be to route SE Mather Road west to the SE Lawnfield Road extension, instead of south along SE Industrial Way.

Design Option B-2: 1996 Split Interchange (Modified)

Located in Zone B, this design option for the midpoint interchange would incorporate a modified split interchange involving both SE 122nd Avenue and SE 135th Avenue. This option would be applicable only to Alternative 2, as displayed in Figures 5, 6, and 8.

Design Option C-2: Central Alignment

This design option, located in Zone C and displayed in Figures 5, 6, and 9, would adjust the corridor alignment in the vicinity of Rock Creek closer to the existing Highway 212/224 alignment.

Design Option C-3: Modified Follow Tree-Line Alignment

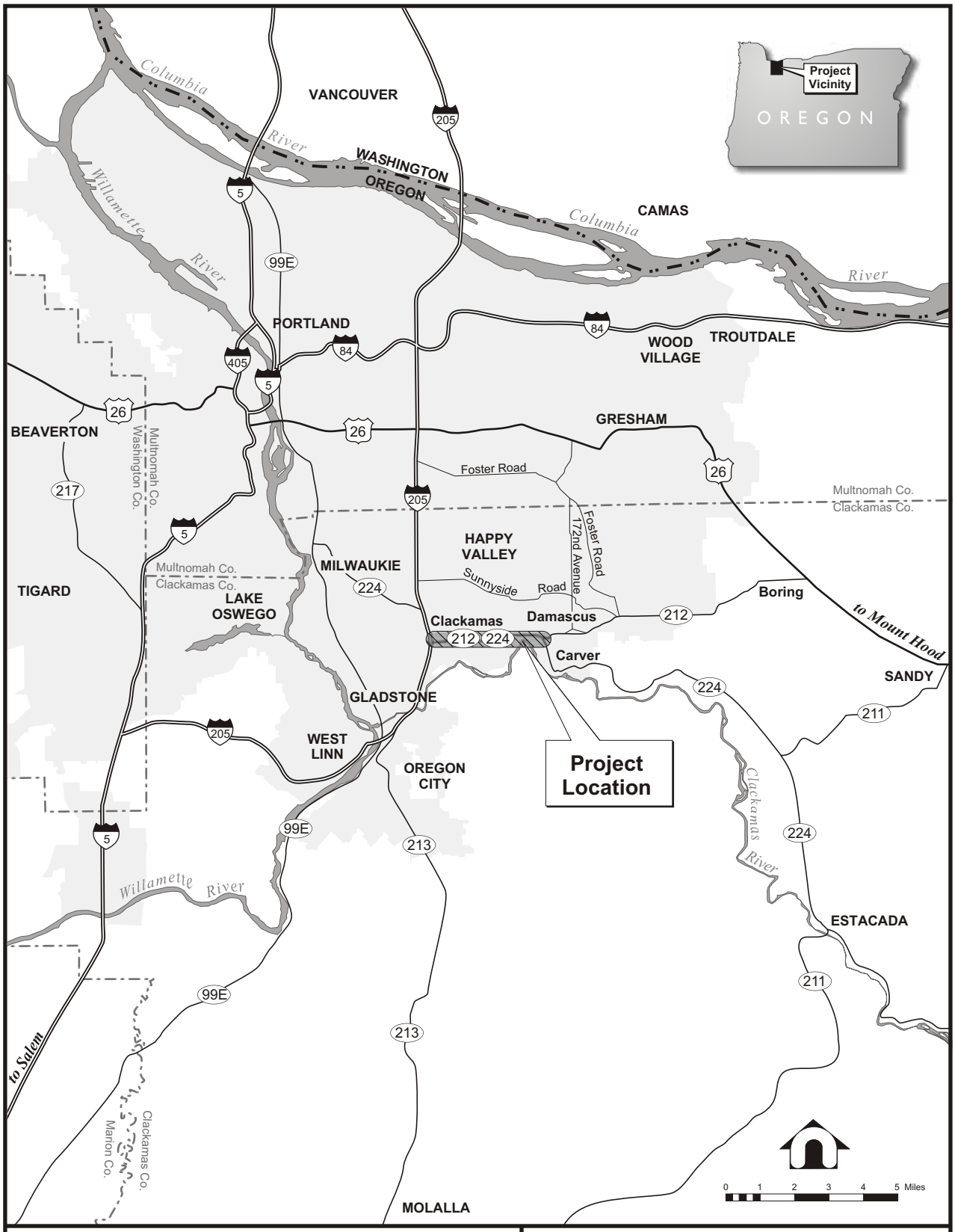
In contrast to Option C-2, this option would more closely follow the existing tree line to the north, as shown in Figures 5, 6, and 10.

Design Option D-2: Alignment through Knoll (Folded Diamond Interchange)

Instead of incorporating a folded diamond interchange north of a natural knoll in Zone D, this option would place the alignment through the knoll, as depicted in Figures 5, 6, and 11.

Design Option D-3: Single-Point Diamond Interchange

This design option replaces the folded diamond interchange with a single-point diamond- design interchange situated farther south in Zone D, as shown in Figures 5, 6, and 12.



Legend

- County Boundary
- Project Location
- Rivers
- State Boundary
- Urban Growth Boundary

INCORPORATED CITY

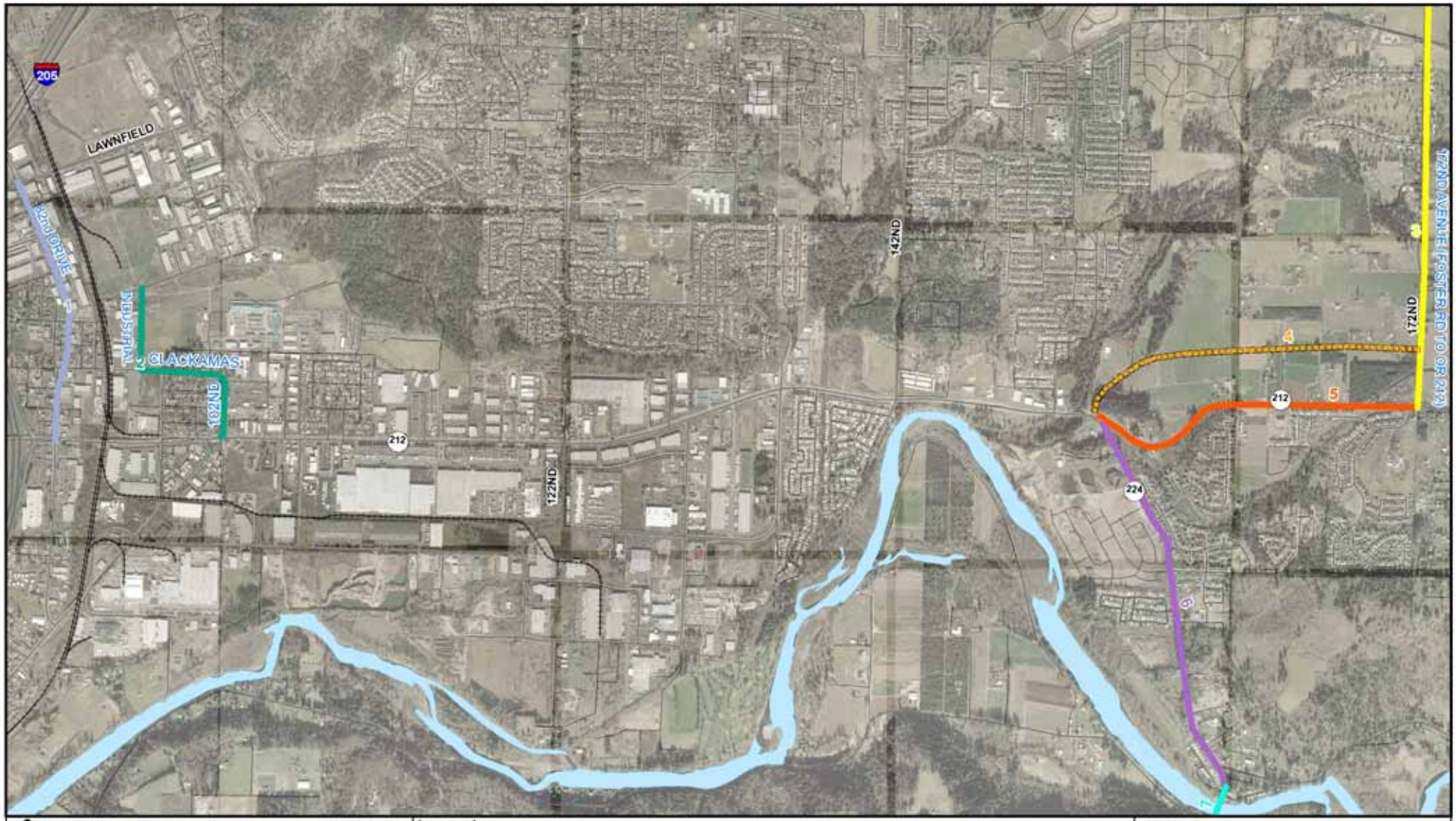
Unincorporated Community

- Interstate
- U.S. Highway
- State Highway
- Other Major Roads

Figure 1

Project Vicinity

Sunrise Project, I-205 to Rock Creek Junction



2,000 1,000 0 2,000 Feet

Sources:
ODOT and Metro, Portland OR

Legend

Railroad

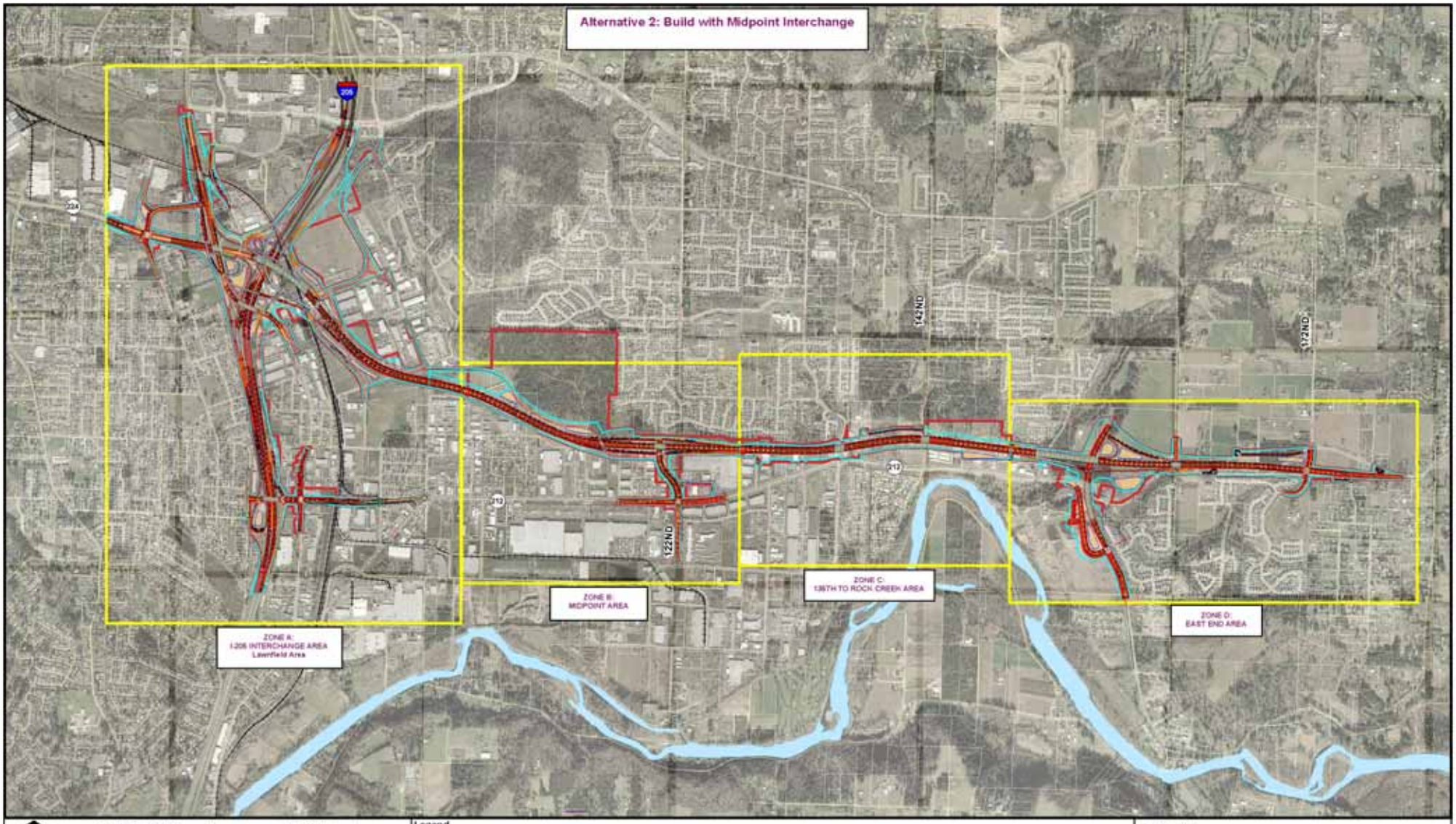
Future Funded Projects

1 Widen to 5 Lanes
2 Upgrade Roadway
3 Widen to 5 Lanes
4 New Arterial
5 Hwy 212 Widening
6 Hwy 224 Widening
7 Widen to 5 Lanes

Figure 2

Alternative 1: No-Build

Sunrise Project, I-205 to Rock Creek Junction



N

2,000 1,000 0 2,000 Feet

Sources:
ODOT and Metro, Portland OR

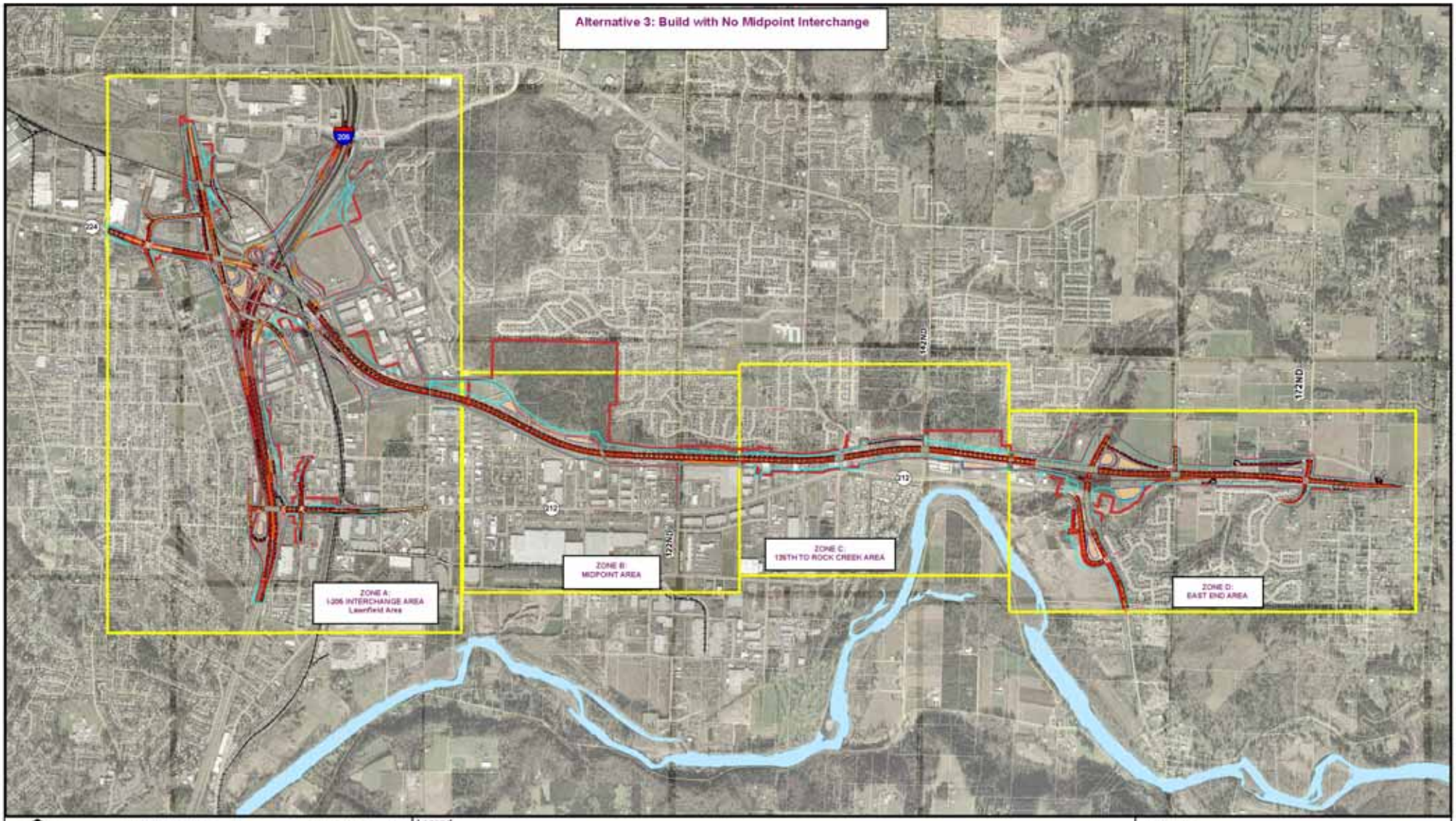
Legend

- Zone Boundary
- Construction Impact Line
- Lanelane
- Lane Striping
- Median
- Proposed Rights-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 3

Alternative 2: Build with Midpoint Interchange

Sunrise Project, I-205 to Rock Creek Junction



2,000 1,000 0 2,000 Feet

Sources:
ODOT and Metro, Portland OR

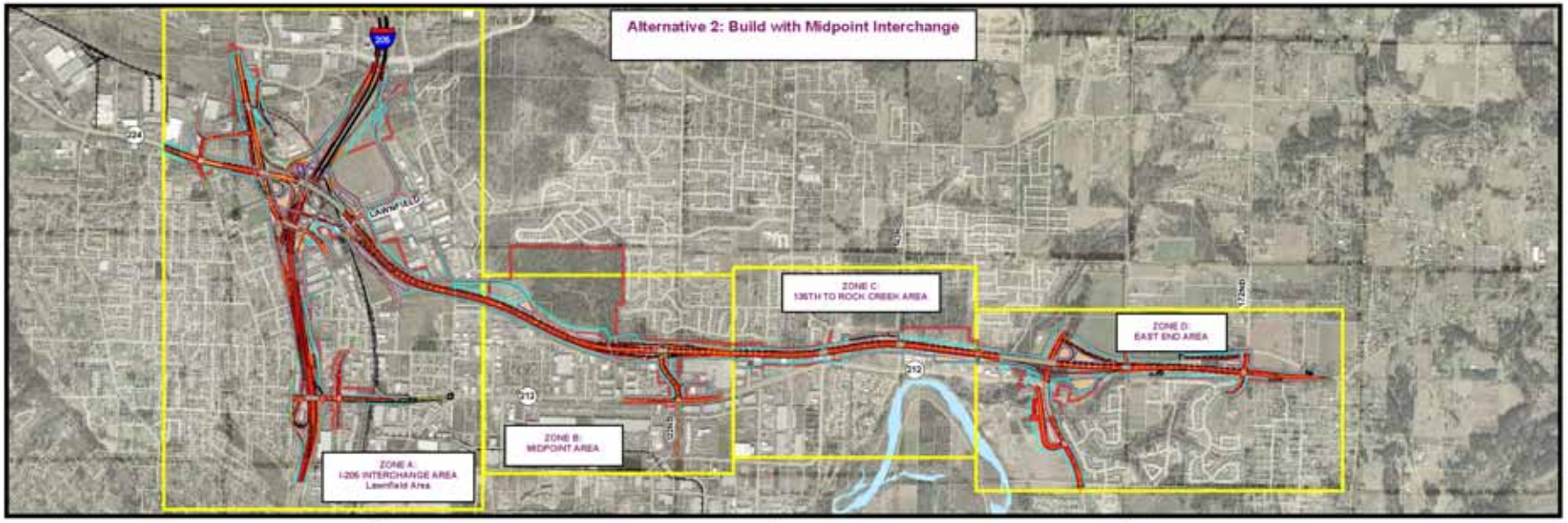
Legend

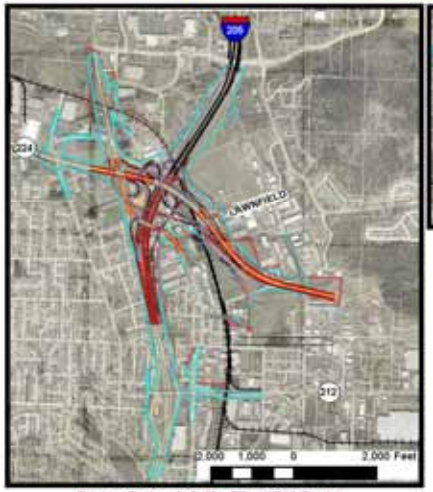
- Zone Boundary
- Construction Impact Line
- Lanelane
- Lane Striping
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 4

Alternative 3: Build with No Midpoint Interchange

Sunrise Project, I-205 to Rock Creek Junction





Design Option A-2: Modified 1996 Design

Design Option B-2: 1996 Split Interchange

Design Option C-2: Central Alignment

Design Option D-2: Alignment Through Knoll
(Folded Diamond Interchange)

Design Option C-3: Modified Follow Tree-Line Alignment

Design Option D-3: Single Point Diamond Interchange

N

3,000 1,500 0 3,000 Feet

Note: Scale bar represents main Alternative 2 data frame

Sources:
ODOT and Metro, Portland OR

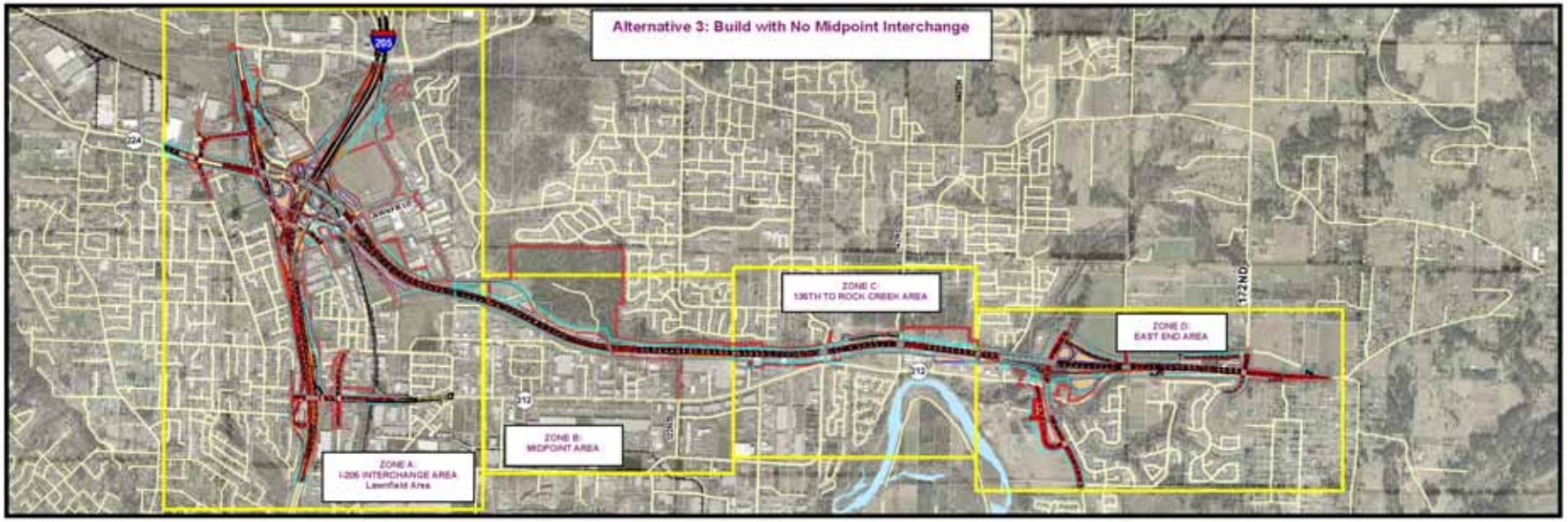
Legend

- Zone Boundary
- Construction Impact Line
- Lanelane
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 5

Alternative 2 with Design Options

Sunrise Project, I-205 to Rock Creek Junction



Design Option A2: Modified 1996 Design

Design Option C-2: Central Alignment

Design Option D-2: Alignment Through Knoll (Folded Diamond Interchange)

Design Option C-3: Modified Follow Tree-Line Alignment

Design Option D-3: Single-Point Diamond Interchange

3,000 1,500 0 3,000 Feet

Note: Scale bar represents main Alternative 3 data frame

Sources:
ODOT and Metro, Portland OR

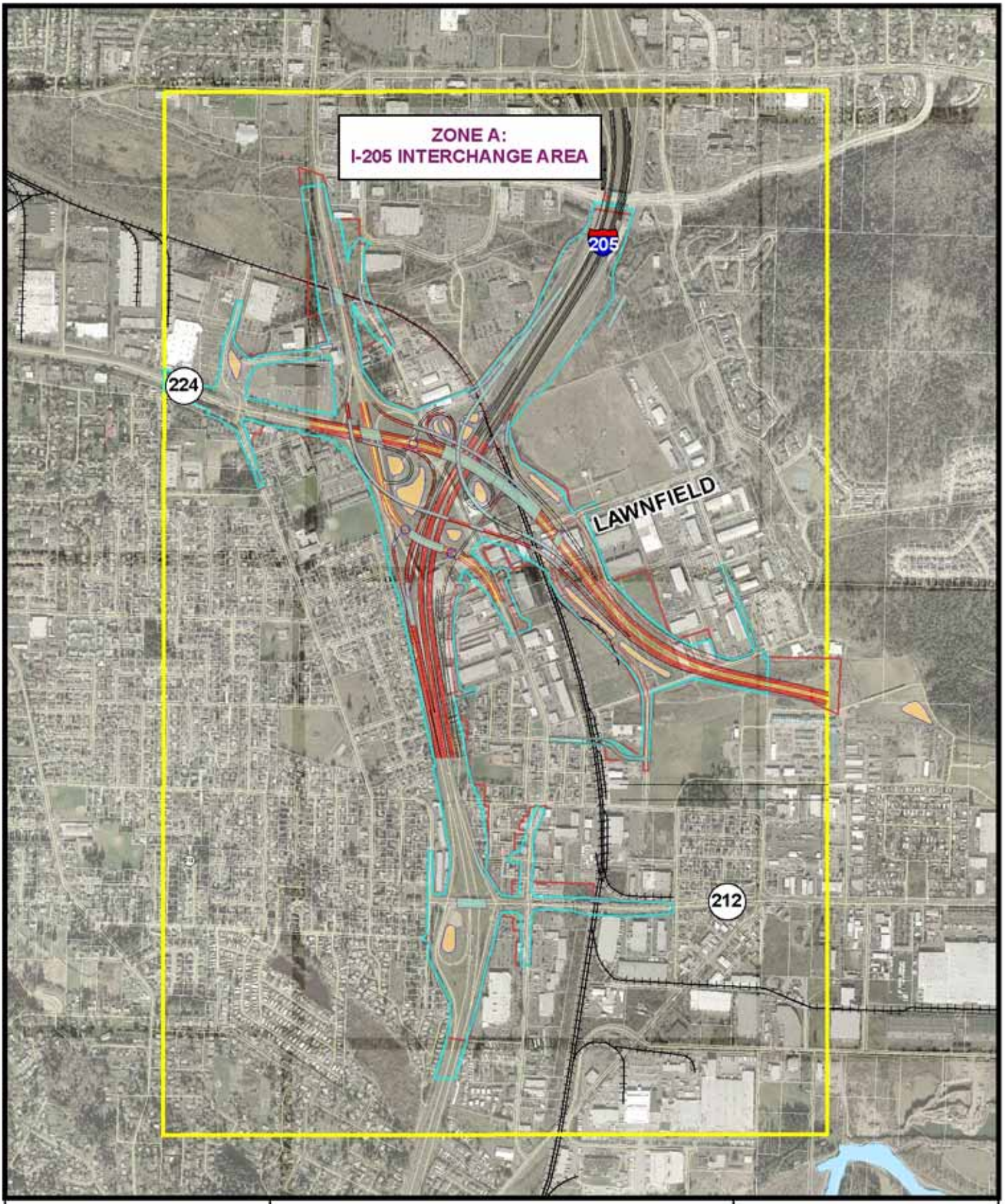
Legend

- Zone Boundary
- Construction Impact Line
- Lanelane
- Median
- Proposed Rights-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 6

Alternative 3 with Design Options

Sunrise Project, I-205 to Rock Creek Junction



810 405 0 810 Feet

Sources
ODOT and Metro, Portland OR

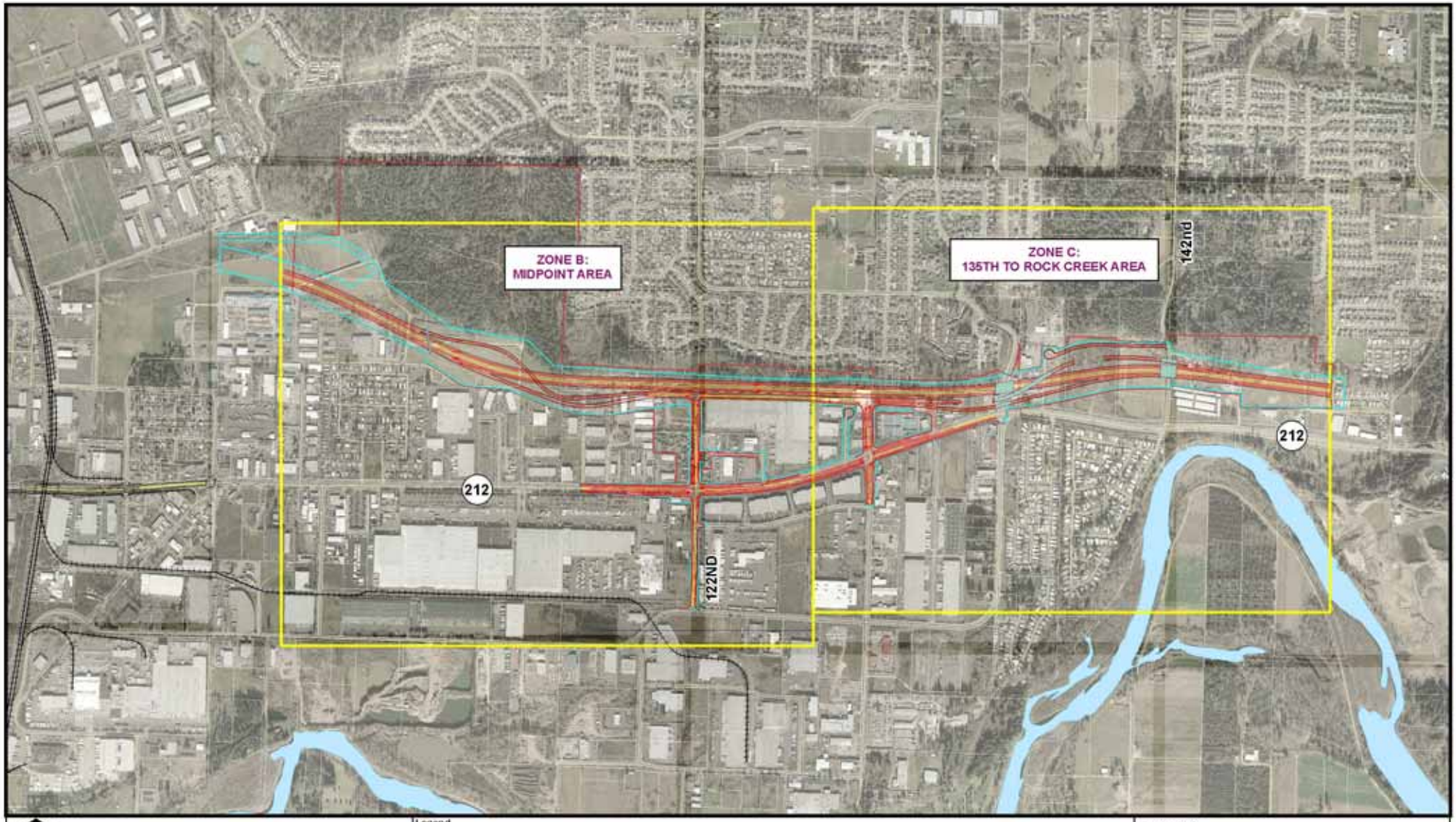
Legend

- Zone Boundary
- Construction Impact Line
- Laneline
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 7

Option A-2:
Modified 1996 Design

Sunrise Project, I-205 to Rock Creek Junction



950 475 0 950 Feet

Sources:
ODOT and Metro, Portland OR

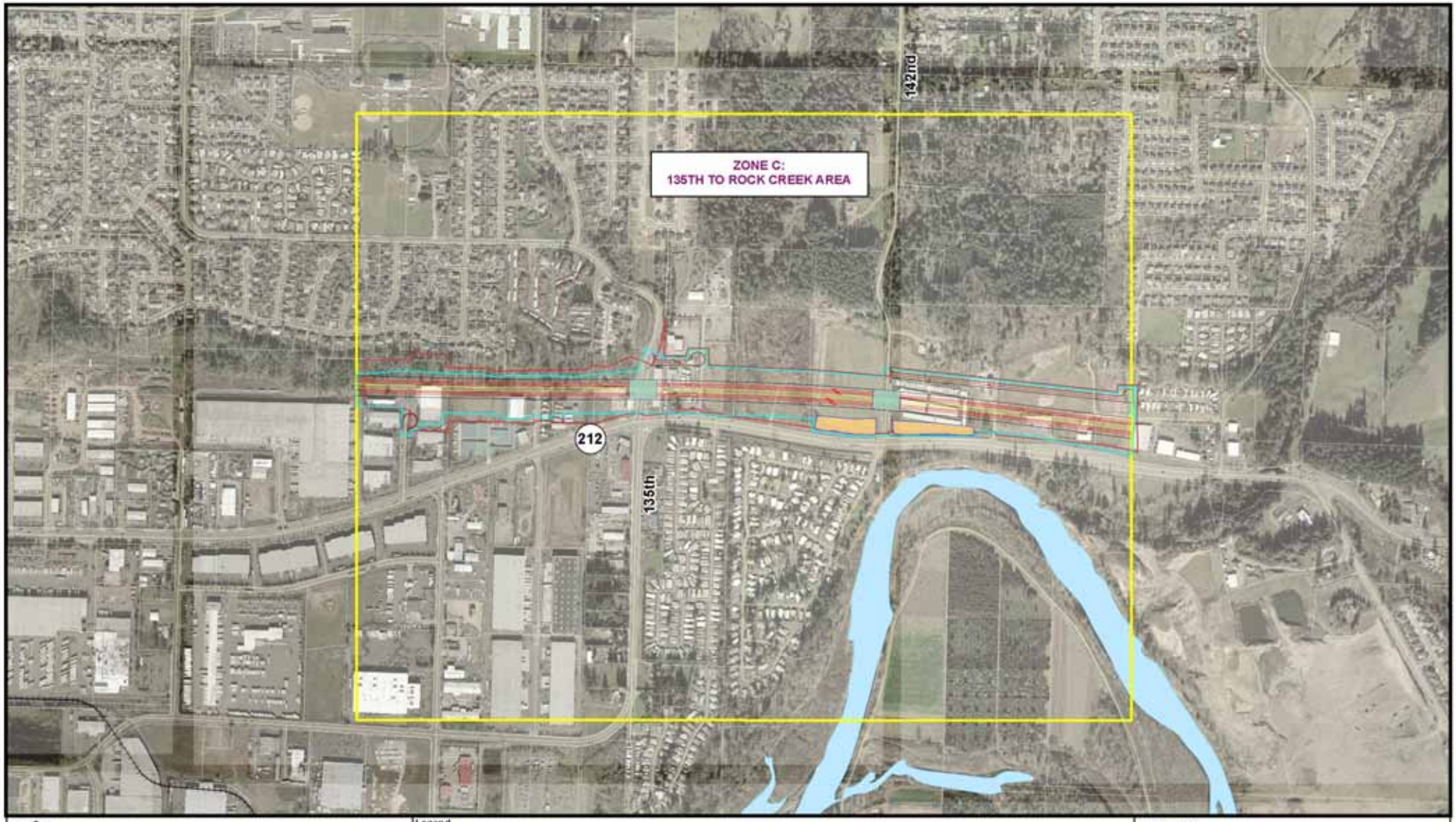
Legend

- Zone Boundary
- Construction Impact Line
- Lanelane
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 8

Option B-2: 1996 Split Interchange

Sunrise Project, I-205 to Rock Creek Junction



800 400 0 800 Feet

Sources:
ODOT and Metro, Portland OR

Legend
Zone Boundary
Construction Impact Line
Lanelane
Median
Proposed Right-Of-Way Line
Tax Lots
Wall
Water Quality/Retention
Railroad
Structure

Figure 9

Option C-2: Central Alignment

Sunrise Project, I-205 to Rock Creek Junction

800 400 0 800 Feet

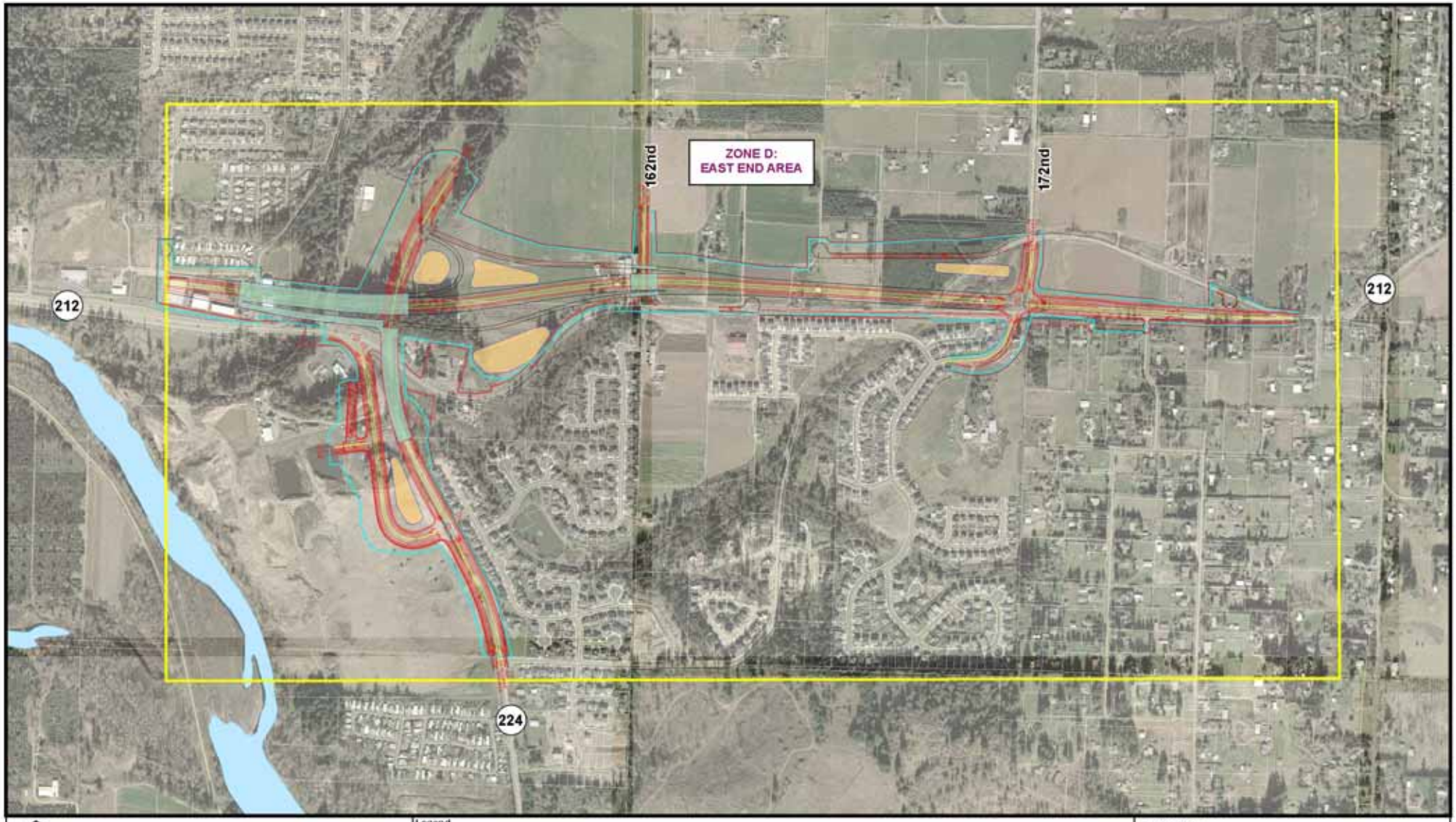
Sources:
ODOT and Metro, Portland OR

Legend
Zone Boundary
Construction Impact Line
Laneline
Median
Proposed Right-Of-Way Line
Tax Lots
Wall
Water Quality/Retention
Railroad
Structure

Figure 10

Option C-3: Modified Follow Tree-line Alignment

Sunrise Project, I-205 to Rock Creek Junction



800 400 0 800 Feet

Sources:
ODOT and Metro, Portland OR

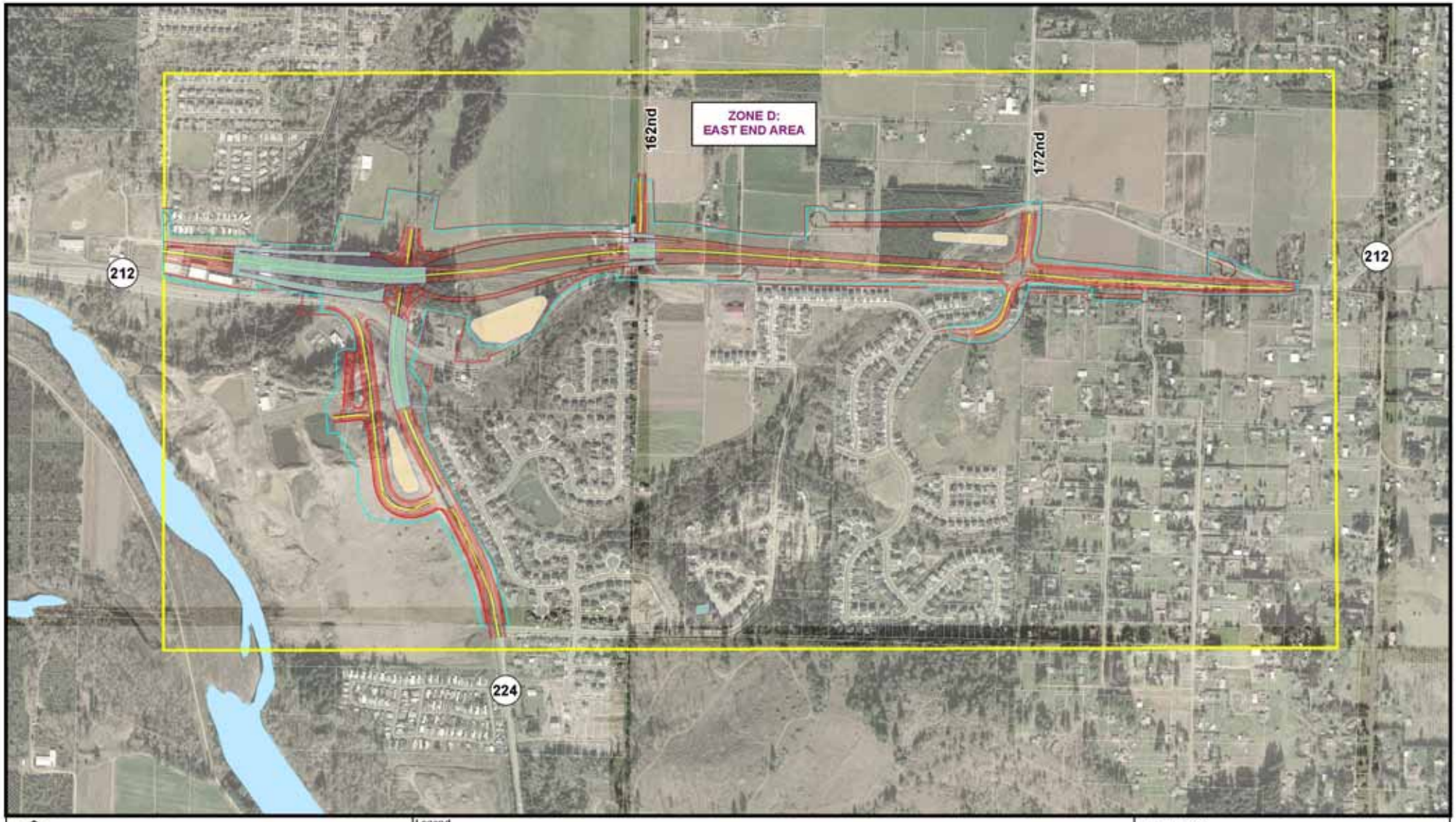
Legend

- Zone Boundary
- Construction Impact Line
- Laneline
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 11

Option D-2: Alignment Through Knoll (Folded Diamond Interchange)

Sunrise Project, I-205 to Rock Creek Junction



800 400 0 800 Feet

Sources:
ODOT and Metro, Portland OR

Legend

- Zone Boundary
- Construction Impact Line
- Laneline
- Median
- Proposed Right-Of-Way Line
- Tax Lots
- Wall
- Water Quality/Retention
- Railroad
- Structure

Figure 12

Option D-3: Single Point Diamond Interchange

Sunrise Project, I-205 to Rock Creek Junction

METHODOLOGY AND DATA SOURCES

The consultant team wildlife biologist followed a multi-step methodology in developing the Wildlife Resources section. These steps included an initial site meeting, document gathering and review, field visits, interviews with experts with local knowledge, and internal team meetings to link findings of investigations of wetlands, fish and aquatic habitats, and vegetation into a comprehensive whole. Each step is briefly described below.

Initial Site Meeting

An initial site meeting, held on April 30, 2004, included representatives from Clackamas County and ODOT, as well as technical experts from the consultant project team. This field visit was conducted to discuss site-specific engineering and environmental issues that were addressed in the Draft EIS (U.S. Department of Transportation 1993). The site meeting allowed all technical experts to begin discussions of site-specific issues at a preliminary phase and to plan and coordinate field investigations.

Document Gathering and Review

The consultant team reviewed the extensive body of literature already developed for this project. The following published materials were included in this review.

- Final Technical Report on Natural Resources: Plants and Animals, Sunrise Corridor Project Area (Dames and Moore 1993)
- Water Resources and Water Quality Impacts Report–Sunrise Corridor Environmental Impact Statement (Dames and Moore 1992)
- Distribution of Fish and Crayfish, and Measurement of Available Habitat in Urban Streams of North Clackamas County (Friesen and Zimmerman 1999)
- Draft Water Quality Technical Report for the Sunrise Project (David Evans and Associates 2006)
- Revised Draft: Technical Report for Goal 5 (Metro 2002)
- Riparian Corridor and Wildlife Habitat Inventories (Metro 2005)
- Interactive on-line map – Inventory of Regionally Significant Habitat (Metro 2004)
- Fish Distribution and Habitat Maps (ODFW 2004)
- Oregon Natural Heritage Information Center: Vascular Plant Rare, Threatened and Endangered Species List (ORNHIC 2004)
- Amphibians of Oregon, Washington and British Columbia (Corkran and Thoms 1996)
- Atlas of Oregon Wildlife (Csuti et al. 1997)
- Wildlife-Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001)

Agencies and individuals interviewed included the following:

- Oregon Department of Fish and Wildlife (Murtagh 2004, Alsbury 2004, Scheerer 2004)
- Clackamas County Water and Environment Services (Streeter 2004, Burch 2004, Nagy 2006)
- U.S. Fish and Wildlife Service (Maurice 2004, Marshall 2004)
- Metro Regional Parks and Greenspaces (Budhabhatti 2004)

Additional information obtained for this study included Metro's proposed Goal 5 habitat maps and maps of significant wildlife features.

The Oregon Natural Heritage Program (ONHP) and U.S. Fish and Wildlife Service (USFWS) databases were queried for documented and projected occurrences of candidate, proposed, and listed species in the project area (ONHP 2004).

Field Visits

Consultant team biologists completed several field trips between May 2004 and December 2006 to document species occurrences, characterize wildlife habitats, observe stream channel conditions, and investigate drainage patterns within the project corridor. They walked the corridor to note and characterize the presence of wildlife, plant communities, and habitat features, including locally rare habitat features such as rock outcrops and large wetlands.

Interviews with Experts with Local Knowledge

The consultant team conducted interviews with experts having specific local knowledge and those with a more generalized knowledge of the greater southeast metropolitan area. Wildlife experts included Tom Murtagh (ODFW Wildlife Biologist), and Jennifer Budhabhatti (Metro Regional Parks and Greenspaces). They were queried about known presence of sensitive wildlife features, results of any wildlife surveys conducted in the area, knowledge of at-risk populations and threats placing them at risk, as well as the importance of the wildlife habitats within the project corridor as they relate to their surroundings.

Todd Alsbury (ODFW Fisheries Habitat Biologist) provided information on fish species presence. Drainage and water resources experts included Jim Burch, Karen Streeter, and John Nagy of Clackamas County Water and Environment Services, who provided information on drainage patterns and infrastructure in the proposed project area.

Internal Team Meetings

Internal team meetings of consultant team fish and wildlife biologists, ecologists, and wetland biologists were held to discuss preliminary findings based on document review, field surveys, and expert interviews. These meetings focused on the significance of features and habitats and ensuring that findings were consistent.

ODOT Wildlife Corridor Enhancement and Mitigation Strategy

As part of the overall planning strategy for the Sunrise Project, ODOT developed the Wildlife Corridor Enhancement and Mitigation Strategy (Wildlife Strategy), which is presented in Appendix A. The Wildlife Strategy was designed to evaluate wildlife habitats and movement corridors in the project area as integrated components of the larger regional habitat system. The goals of the Wildlife Strategy are to minimize project-related impacts to these corridors and to maintain and preserve habitat connections to the regional habitat system.

The Wildlife Strategy is based on data on wildlife habitat primarily derived from Metro Planning Department's Resource Class habitat mapping, which inventoried and characterized areas of greatest significance to the region (Metro 2004).

ODOT identified regional wildlife corridors in the area based on an assessment of the habitat maps combined with input from local stakeholders (Appendix A). The main wildlife movement corridors were identified within the combined wildlife habitat coverage by interpretation of aerial photographs and site visits to evaluate actual movement corridors. Local biologists from ODFW (Tom Murtagh and Susan Barnes), Portland Metro Planning Department (Lori Hennings), and the Audubon Society of Portland (Bob Sallinger) verified that the mapped wildlife corridors are known or anticipated wildlife movement areas.

The Wildlife Strategy goal of minimizing project-related impacts to these corridors and maintaining and preserving habitat connections through attainment of conservation easements or fee acquisition provides the basis for the mitigation strategy presented in this report.

AFFECTED ENVIRONMENT

Wildlife Resources

The proposed project is located near what was, until recently, the eastern edge of the urban growth boundary (UGB). Because the project is within the UGB, remaining wildlife habitats are generally fragmented and have been further degraded by invasive, non-native species; noise; pollution; and close proximity to human activities. Two fragmented, but still used wildlife corridors run through the project area. Additionally, because the project area was until recently at the edge of the UGB, it is adjacent to larger tracts of moderate- to high-valued wildlife habitats, lying just to the east, that are connected to the project area via vegetated corridors along streams or undeveloped tracts. In 2002, Metro made the decision to extend the UGB eastward. Land once in agriculture or undeveloped will be developed over the years. A process is now under way to plan for future growth requirements while conserving important fish and wildlife habitats.

Mount Talbert sits just to the north of the project corridor, immediately east of I-205. Metro has purchased 40 acres of land on the top of Mount Talbert for addition to its Green Spaces land bank. This purchase was made because of the site's unique geology and significant wildlife habitat, among other values. Just south and east of Metro's purchase, ODOT owns a large tract of Douglas fir-dominated forest on the southern flank of Mount Talbert. This Douglas fir forest and the forested corridor along the Clackamas Bluffs leading east to Rock Creek is the only remaining vegetated wildlife corridor linking Mount Talbert to Rock Creek and the Clackamas River. Rock Creek, in turn, creates a wildlife corridor to extensive habitats to the north and east. The Clackamas River creates an additional corridor to the southeast, eventually leading into areas of extensive wildlife habitat in the Willamette National Forest.

Another wildlife corridor extends from Mount Talbert to the Three Creeks area west of SE 82nd Avenue. This corridor takes a circuitous route along Mount Scott Creek, I-205 fill slopes, and Dean Creek, which eventually drains into Mount Scott Creek, which in turn drains into Kellogg Creek and the Willamette River in the City of Milwaukie. While fragmented along the way, this route provides a wildlife corridor from Mount Talbert to the Willamette River.

An important biological component of this project is its effect on these relatively narrow wildlife corridors. Both build alternatives would further encroach into already narrow segments of these corridors. The effects of such encroachment are discussed below.

As part of completing its Goal 5 inventory, Metro mapped upland and riparian wildlife habitats within the project area (Metro 2005). The Goal 5 process also requires Metro to determine the significance of the mapped habitats. Following a long public process and multiple reviews, Metro published its findings in 2005. Because of the considerable effort in developing its findings and the extensive participation of the public and various resource agencies in reviewing and modifying drafts of the document, Metro's study results form the basis for impact evaluation to wildlife resources in the project area. Metro's report can be found on-line at http://www.metro-region.org/library_docs/nat_resource/inventory_narrative.pdf

A thorough discussion of methodologies and results is provided, and the reader is referred to that document for additional information.

As used in Metro's Goal 5 Technical Report (Metro 2002), riparian corridors include the stream or river; riparian vegetation; off-channel habitat, such as wetlands, side channels, and the floodplain; the hyporheic zone (the interface between groundwater and stream water); and the zone of influence (the transition area between the riparian area and the upland forest where vegetation is not directly influenced by hydrologic conditions).

Upland habitat refers to all wildlife habitats that are not riparian, wetland, or open water habitats (Metro 2002). Upland habitat includes natural areas that provide wildlife with breeding, foraging, and wintering habitat, as well as the corridors that connect larger habitat patches that allow for dispersal, home range movements, seasonal migration, and daily or weekly uses.

Metro ranked upland habitat and riparian corridors as low, medium, or high based on their value for protecting fish and wildlife (Class A, B, and C for upland habitats and Class 1, 2, and 3 for riparian habitat). This classification scheme provided the basis for mapping wildlife habitat within the project corridor (Figure 13).

Habitat Types

The project area includes seven general habitat types: urban development, which includes industrial and residential development; agriculture; upland grassland; emergent wetland; forested/scrub-shrub wetland; coniferous forest; and mixed forest. These habitat types are the same as the plant communities described in the Botanical Resources section of this report. The location of these habitats within the project corridor's API is illustrated in Figure 14.

Urban Development

The majority of the project area either is currently in industrial use, was previously in industrial use, or is residential development. This community corresponds to Metro's Urban and Mixed Environs habitat type (Metro 2002). Residential development is increasing within the project corridor itself, as well as in general vicinity of the project. Species that do well in these high-density urban developments include those species that are gregarious, weakly territorial, tolerant of human disturbance, and dietary generalists. Exotic wildlife species, such as rock doves, starlings, and house sparrows, often are the most abundant and conspicuous wildlife in these areas. Wildlife dispersal or movement is limited and highly restricted, and is often dangerous. As a result, most of the species found in high-density urban areas are either birds or small mammals with small home ranges. Most native vegetation has been removed and much of the wildlife habitat consists of human-made structures (Johnson and O'Neil 2001).

Agriculture

Agricultural areas within the corridor include croplands, nurseries, and Christmas tree farms. This habitat type corresponds to Metro's Agricultural, Pasture, and Mixed Environs habitat type (Metro 2002). The quality of wildlife habitat in agricultural areas is typically low due to the lack of structure (which usually provides cover and breeding habitat), as well as the high level of human disturbance. Structural diversity is typically low because usually only one crop or a few crops of similar height are cultivated at one time. If several types of crops are grown in close

proximity, the quality of the wildlife habitat increases due to the increase in structural diversity, which could provide cover, forage, and breeding habitat for a higher diversity of species. The habitat value of agricultural areas varies according to the presence of food sources, such as grains, fruit, and insects, as well as the presence of surface water. Seasonally flooded fields provide valuable habitat for the migrating and wintering waterfowl, gulls, and shorebirds (Dames and Moore 1993).

Upland Grassland

This habitat type includes abandoned fields, grazed pastures, and hay fields. It corresponds to Metro's Agricultural, Pasture, and Mixed Environs habitat type (Metro 2002). The herbaceous vegetation usually provides limited cover, forage, and nesting opportunities for wildlife species. Because the higher level of human disturbance, hay fields and grazed pastures provides lower-quality habitat than the abandoned fields. Typically, pastures surrounded by urban development have a lower value to wildlife than those areas adjacent to forested areas.

Emergent Wetland

Emergent wetlands can provide foraging and breeding habitat for those species adapted to aquatic/wetland habitats, such as waterfowl, wading birds, and several species of amphibians and reptiles. Seven emergent wetlands are found within the project area. These wetlands are primarily small, isolated, and dominated by non-native species. They would provide limited habitat for wildlife species owing to their small size, lack of native species, and high level of human disturbance. The larger emergent wetlands located on the KEX tower site, Camp Withycombe, and the property immediately west of SE 142nd Avenue would provide habitat for a larger number of wildlife species than would the small wetlands.

North of the KEX tower site is an emergent wetland dominated by tufted hairgrass (*Deschampsia caespitosa*), rushes (*Juncus* sp.) and sedges (*Carex* sp.) that while invaded by non-native and invasive species provides valuable habitat that is becoming increasingly scarce. The lot north of the KEX tower site will be purchased as part of securing right-of-way for this project.

Forested/Scrub-Shrub Wetland

Forested and scrub-shrub wetlands provide habitat for a higher diversity of wildlife species because of the increase in structural diversity. The trees and shrubs provide nesting and foraging habitat for terrestrial species, as well as for riparian-associated species. The forested/scrub-shrub community is located along waterways and ditches throughout the corridor.

A prime example of this community is found north and east of the KEX tower site. There, a large wetland complex includes a forested component supporting an Oregon ash–slough sedge plant community. This community is also found on the property immediately west of SE 142nd Avenue. Forest and scrub cover is provided by black cottonwood and willows, along with non-native English hawthorn. Two wetland complexes within the project corridor, one of which is adjacent to the forested bluff, contain forested, scrub-shrub, and emergent wetlands. These areas would provide the highest wildlife diversity because of the variety of habitat types.

Coniferous and Mixed Forest

Forested habitat areas generally support a higher diversity of wildlife species, including those species that are forest-habitat obligates for their entire life cycle, habitat generalists that occur in the forest but are also found within non-forested habitats, and transient species that are found incidentally in forest because of their proximity to other habitats (Johnson and O'Neil 2001). The actual occurrence and density of these species in the project corridor depends on site-specific habitat conditions, such as vegetation structure and complexity, source of water, habitat patch size, and level of human disturbance.

The forested habitat within the project corridor is generally second-growth forest. It includes coniferous forest dominated by Douglas fir and mixed deciduous/coniferous forest dominated by both Douglas fir and big-leaf maple. These forested areas generally have three vegetation layers (understory, midstory, and overstory) with a few snags and down logs. Microhabitats found within these forest types, such as rock outcrops and seeps, increase the diversity of wildlife associated with these areas. Those stands dominated by deciduous trees have a higher component of invasive species in the understory, which could limit species diversity and impede wildlife traveling through these areas. This habitat type corresponds to Metro's Westside Lowlands Conifer – Hardwood Forest habitat type (Metro 2002).

Threatened, Endangered, and Sensitive Species

The USFWS query indicated that the bald eagle, which until it was recently delisted (USFWS 2008) was the only threatened or endangered wildlife species that may occur within the project corridor (USFWS 2004). Bald eagle remain an Oregon state-listed species. The query to the Oregon Natural Heritage Information Center (ORNHIC) resulted in no reported occurrences of threatened or endangered wildlife species within 2 miles of the project corridor (2004). Therefore, there are no documented or expected occurrences of federally ESA listed species within the project's API.

USFWS (2004) identified 19 federal candidate species or species of concern as potentially occurring within the project corridor, as listed in Table 1. Six of the federal species of concern are documented as occurring within 2 miles of the corridor (ORNHIC 2004). Species identified by USFWS as having a potential to occur within the project area are described in further detail in the subsections following the table.

Table 1. Sensitive Wildlife Species that May Occur in the Sunrise Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Habitat type	Potential Habitat within Corridor
Yellow-billed cuckoo	*Coccyzus americanus*	C	SC	Thick, closed canopy riparian forest with understory of dense brush.	No, deciduous riparian habitat not present to support species.
Streaked horned lark	*Eremophila alpestris strigata*	C	SC	Open fields with short ground cover and areas of sparse vegetation and bare ground.	Yes
Band-tailed pigeon	*Columba fasciata*	SOC	--	Inhabits coniferous or mixed forest.	Yes
Olive-sided flycatcher	*Contopus cooperi borealis*	SOC	SV	Prefers open coniferous forest near streams or wetlands that contain numerous tall conifers and tall snags.	No, forested habitat lacks uneven canopy and tall trees and snags used for perches.
Yellow-breasted chat	*Icteria virens*	SOC	SC	Breeds in brushy areas and in riparian woodlands along streams.	Yes
Mountain quail	*Oreortyx pictus*	SOC	SU	Prefers high, open forest and woodlands with ample brushy vegetation. Avoids agricultural areas.	No, unlikely to occur in lower elevation forest in project corridor
Oregon vesper sparrow	*Pooecetes gramineus affinis*	SOC	SC	Open habitats, including grasslands, pastures, and agricultural areas.	Yes
Purple martin	*Progne subis*	SOC	SC	Nests in large-diameter snags adjacent to large forest openings, in abandoned northern flicker or pileated woodpecker nests. Will nest in artificial boxes.	No, nesting habitat not present in project corridor
Oregon spotted frog	*Rana pretiosa*	C	SC	Marshes, permanent ponds, lake edges, and slow streams, with abundant aquatic vegetation.	Yes
Northern red-legged frog	*Rana aurora aurora*	SOC	SV	Moist coniferous or deciduous forest. Breeds in ponds, lakes, and slow streams.	Yes
Oregon slender salamander	*Batrachoseps wrightorum*	SOC	SV	Coniferous forest with large downed logs	No, forests lack large downed wood

Common Name	Scientific Name	Federal Status	State Status	Habitat type	Potential Habitat within Corridor
Long-eared myotis	*Myotis evotis*	SOC	--	Coniferous forests, alder forest along streams.	Yes
Fringed myotis	*Myotis thysanodes*	SOC	SV	Forested or riparian areas.	Yes
Pacific western big-eared bat	*Corynorhinus townsendii*	SOC	SC	Roosts in buildings, caves, mines, and bridges.	No. Species intolerant of human disturbance. No caves, mines.
Silver-haired bat	*Lasionycteris noctivagans*	SOC	SU	Forested areas but more abundant in older coniferous forest.	Yes
Long-legged myotis	*Myotis volans*	SOC	SU	Coniferous forests. Roosts in buildings, under bridges, under bark, and in snags.	Yes
Yuma myotis	*Myotis yumanensis*	SOC	--	Closely associated with water. Roosts in buildings, under bridges, and in caves and mines.	Yes
Camas pocket gopher	*Thomomys bulbivorus*	SOC	--	Occurs in grassy areas, such as pastures, roadsides, and agricultural lands.	Yes
Northwestern pond turtle	*Emys marmorata marmorata*	SOC	SC	Quiet water in small lakes, marshes, sluggish streams and rivers.	Yes

C = Federal candidate, SOC = Federal species of concern; SV = State sensitive vulnerable; SC = State sensitive critical, SU = State undetermined status

Streaked Horned Lark

In the Willamette Valley, streaked horned larks mainly occur in open fields with short (less than 1 foot tall), herb-dominated ground cover, significant areas of sparse vegetation, and patches of bare ground. Nesting includes a wide variety of agricultural land, including cultivated grass fields, row-crop agriculture, plowed or burned fields, moderate to heavily grazed pasture, or nonagricultural lands such as lightly traveled gravel roads (Marshall et al. 2003). Agricultural lands are located within the eastern portion of the project corridor that could provide habitat for this species. For example, grazed grass fields occur near the Rock Creek Bridge and upland grassland areas are present within Camp Withycombe.

Band-tailed Pigeon

The band-tailed pigeon exists mainly in coniferous or mixed deciduous oak and conifer forests in Oregon. They generally breed in forested mountain areas below 4,000 feet but frequent valleys to exploit mineral sites and feed. Habitat components identified as important for reproduction include closed-canopy forest for nesting, open canopy forest for foraging, and mineral sites (Marshall et al. 2003). The forested habitat within the project corridor may provide limited habitat for this species.

Yellow-breasted Chat

In the Willamette Valley, yellow-breasted chats are typically found in riparian zones consisting of Himalayan blackberry, Oregon ash, willow, red-stemmed dogwood, Douglas spirea, and small deciduous tree (Marshall et al. 2003). Within the project area, yellow-breasted chats could be found within forested/scrub-shrub communities located at the Sieben Creek junction and at the headwaters of a tributary to Dean Creek.

Oregon Vesper Sparrow

This species is associated with two habitat types in the Willamette Valley. It occurs in lightly grazed pastures with scattered shrubs where grass height is less than 2 feet high and in Christmas tree farms, particularly young farms if extensive grasses and weeds are present (Marshall et al. 2003). Habitat for this species may be found within the agricultural areas that provide the structure components required by this species.

Oregon Spotted Frog

The Oregon spotted frog lives in marshes, permanent ponds, lake edges, and slow streams, usually where there is abundant aquatic vegetation. They breed in very shallow water, such as a flooded meadow beside a pond or stream or water pooled on top of flattened, dead vegetation at the edge of a pond. Adults live in well-vegetated ponds, marshes, or slow weedy streams that meander through meadows (Corkran and Thoms 1996). Habitat for this species is limited within the corridor, as there are only a few permanent ponds or ditches that may provide habitat.

Red-legged Frog

The red-legged frog lives in moist coniferous or deciduous forest and forested wetlands. They breed in the winter to early spring in water that is 1.6 to 6.6 feet (0.5 to 2 meters) deep in cool, usually well-shaded ponds, or lake edges, or slow streams. They attach their eggs to a submerged branch or stem. During the summer, froglets and adults live along streams, in moist sedge or brush, on shaded pond edges, or under logs and debris. During damp conditions, they are likely to occur in forests far from water (Corkran and Thoms 1996). The ORNHIC identified red-legged frogs as occurring in the Rock Creek drainage. Breeding habitat for this species is likely to be limited in the Rock Creek drainage because it is a higher gradient stream. There is a mitigation site within the project corridor that could provide habitat for red-legged once its tree and shrub species become established.

Long-eared Myotis

In Oregon, the long-eared myotis is widely distributed but is not abundant. This species is associated primarily with forested habitats and forested edges, including Douglas fir and alder and willow along streams. Information about the long-eared myotis' reproduction is lacking. This species forages by picking prey items off the surface of foliage. Moth species are its primary prey (Csuti et al. 1997). Long-eared myotis could be found in the coniferous and mixed forests within the project corridor.

Fringed Myotis

The fringed myotis is rare in Oregon. It is found in a variety of habitat but seems to prefer forested or riparian areas. Its nursery colonies are established in caves, mines, and buildings. This species is thought to forage by picking up food items from shrubs or the ground. It consumes beetles, moths, harvestmen, crickets, and spiders (Csuti et al. 1997). This species could occur in the project corridor, but its nursery habitat is limited to buildings.

Silver-haired Bat

The silver-haired bat is associated with forested areas but is most abundant in older Douglas fir/western hemlock forests. It forages over ponds and streams in the woods, and typically roosts under loose bark during the day (Csuti et al.1997). The lack of old-growth or mature forests would limit the presence of this species within the project corridor. In urban environments, such as the project corridor, the silver-haired bat is likely to be found at fewer frequencies and fewer locations (Johnson and O'Neil 2001).

Long-legged Myotis

This is one of the more common myotis species and may be present within the project area. The long-legged myotis is found in coniferous forests. It seeks shelter in a variety of roost sites including crevices in cliff faces, abandoned buildings, caves, and mines (Csuti et al 1997). The species often feeds over water and roost in forest, but it also forages in the forest canopy. The long-legged myotis could be found within the coniferous forest in the project corridor. However, there are no caves, mines, or cliffs within the project corridor that would limit roosting habitat for this species.

Yuma Myotis

Yuma myotis are closely associated with water, over which they feed. In western Oregon, they are found in older Douglas fir forests. They establish large colonies in buildings, mines, caves, or under bridges, and may be locally abundant. This species is somewhat sensitive to disturbance (Csuti et al. 1997). Due to the lack of old growth forest habitat, limited preferred roosting habitat, and the high level of disturbance, this species is unlikely to occur within the project corridor.

Camas Pocket Gopher

This species is associated with early seral plant communities or agricultural lands that mimic early seral conditions. This species has been found in alfalfa, wheat, and orchards and in weedy lawns and waste-ground areas. It does not occur in wetlands or other areas with poor drainage (Verts and Carraway 1998). This species could be found within the upland grasslands and agricultural areas located at the eastern end of the project corridor.

Northwestern Pond Turtle

Once quite common in the Willamette Valley, the northwestern pond turtle has declined by as much as 96 to 98 percent since the beginning of the 20th century. This species prefers quiet water in small lakes, marshes, and sluggish streams and rivers. It requires basking sites, such as logs, rocks, mud banks, or cattail mats. Nests can be located several hundred feet from water and in a variety of vegetation types. This species typically hibernates in bottom mud. Habitat for the northwestern pond turtle has been reduced by development within the project corridor and is currently limited.

Wildlife Corridors

For much of its length, the proposed Sunrise corridor parallels an existing wildlife corridor that stretches from the Three Creeks area to Rock Creek and the Clackamas River. The corridor plays an important role in wildlife movement in this rapidly developing area. For purposes of this discussion the corridor is described in two sections, from Mount Talbert to Rock Creek (eastward) and from Mount Talbert to Three Creeks (westward). Figure 15 illustrates the location of these corridors relative to the project's API.

Mount Talbert to Rock Creek (Eastward)

The Mount Talbert to Rock Creek corridor provides a wildlife travel corridor between these two areas. From Mount Talbert, the corridor crosses SE Mather Road before entering the Douglas fir-dominated forest on land owned by ODOT. Through this forested tract, the corridor turns eastward through privately owned parcels between approximately SE 115th and SE 135th Avenues, where it traverses a relatively steep escarpment supporting a mixed deciduous/coniferous forest dominated by both Douglas fir and big-leaf maple. Here, the corridor is confined between residential subdivisions on the terrace and industrial development below. This forested slope also allows for the movement of foraging birds, including neo-tropical passerines. ODFW has observed predatory birds such as red-tail hawk, American kestrel and Cooper's hawk using this area (ODFW 2005a Appendix A).

The corridor continues northeast along the cut slope of SE 135th Avenue, crosses 135th Avenue, and then crosses Sieben Creek north of the API. Between Sieben Creek and an unnamed tributary to Rock Creek, the corridor again widens out through areas that are currently forested or converted to agricultural uses. A large wetland/upland complex is located just to the south of the corridor on undeveloped property between SE 135th Avenue and SE 142nd Avenue. This site is zoned commercial and approved for construction of a shopping center. In its current state, this wetland/upland complex adds habitat complexity to the corridor and could provide valuable resources to wildlife moving through the corridor. ODFW has documented deer and small game trails on both sides of SE 135th Avenue and SE 142nd Avenue (ODOT 2005a Appendix A).

Between the unnamed tributary to Rock Creek and the Rock Creek riparian corridor, the wildlife corridor is limited to a narrow strip (less than 200 feet wide) of Douglas fir–mixed forest habitat between housing developments to the north and a mobile home court to the south. It is then bisected by SE 152nd Avenue before entering Rock Creek's riparian corridor. ODFW has documented deer and small game trails on both sides of SE 152nd Avenue (ODOT 2005a Appendix A).The Rock Creek riparian corridor is steep, but it provides a link to extensive habitats to the north and east and to the Clackamas River.

In its current condition, the Mount Talbert to Rock Creek wildlife corridor is far from pristine. It is bisected by several roads, and current development creates several "pinch points" where the corridor narrows considerably. Importantly, two of the narrowest areas of the corridor occur within the project's API. They are the Clackamas Bluffs from approximately SE 115th Avenue to 135th Avenue, and the narrow strip of habitat between single-family housing and a trailer court just west of SE 152nd Avenue.

Mount Talbert to Three Creeks (Westward)

The other main wildlife corridor connects Mount Talbert to the Three Creeks area immediately east of SE 82nd Avenue and points westward via a circuitous route from Mount Talbert down Mount Scott Creek and I-205 fill slopes that lead to a narrow patch of habitat along the east side of I-205 at the KEX tower site. The corridor continues along a channelized section of Dean Creek that has been day-lighted under the I-205 freeway bridge. Wildlife travels through a vegetated corridor behind the Oregon State Patrol Forensic Laboratory, leaving Dean Creek when it crosses southeast under the Union Pacific Railroad (UPRR) track. The vegetated corridor eventually leads back to Mount Scott Creek in the area where a new bridge would be built connecting the northern and southern sections of SE Ambler Road over the railroad track and Mount Scott Creek.

The corridor continues westward under the SE 82nd Avenue bridge to the Three Creeks area which is a large wetland and upland complex west of SE 82nd Avenue. A more direct route for wildlife would be along Mount Scott Creek directly to Three Creeks, thereby negating the need to traverse along I-205; however, the 15-foot corrugated metal pipe culvert that passes Mount Scott Creek under I-205 creates a significant barrier to wildlife movement due to its width, length, and baffles on the lower surface that were constructed to allow fish passage.

Wildlife traveling from Mount Talbert to Three Creeks enter the project area via the Mount Scott Creek riparian corridor. As wildlife approach the Mount Scott Creek culvert, they appear to take two routes around it. Based on visible wildlife trails, it appears that some wildlife travel along the southern bank, but Himalayan blackberry thickets in the understory force most wildlife up and over the culvert against the Sunnybrook off-ramp, which is much more open. The wildlife corridor then becomes critically narrow immediately south of the Mount Scott Creek culvert where wildlife are confined to an almost single-file path along the Sunnybrook off-ramp fill slope between the off-ramp and a dense Himalayan blackberry thicket. Here, the width of the corridor is only 20 to 30 feet wide. Wildlife trails are evident near the blackberry thicket, which allows the deer to be as far from traffic as possible. The Sunnybrook off-ramp is higher in elevation than the wildlife corridor, thus providing a degree of cover for wildlife traveling through the area.

Heading toward Dean Creek, the corridor widens out to at the toe of the I-205 fill slope to an area that contains water quality treatment facilities. These facilities are maintained by ODOT and are accessed by a road alongside Dean Creek under the I-205 bridge. These facilities would be moved under both build alternatives.

The Dean Creek/I-205 under-crossing has low quality wildlife habitat because of its poor vegetation cover and disturbances associated with the access road and railroad tracks that pass under I-205, but it is heavily used by wildlife. Deer, coyote, and small mammal tracks have been observed along the dirt maintenance road (ODOT 2005a).

Factors Affecting Corridor Quality

The role a vegetated corridor plays is related to the scale at which a wildlife species perceives its environment. A small patch of habitat may provide all necessary life functions for one species, while it may only be suitable for dispersal habitat for another. Two major functions of wildlife corridors are providing foraging and breeding habitat for particular species and providing a conduit for movement among habitat fragments. The ability of a wildlife corridor to fulfill these functions depends on its width, land cover, edge effects, barriers, and habitat fragmentation.

Width

Species vary in the widths of corridors that they require. Generally, corridors should be as wide as feasible and at least wide enough to allow for movement and to provide adequate feeding and shelter opportunities. If a corridor is to provide long-term habitat for a species, then it should be large enough to fulfill the species' patch size requirements. For large mammals such as white-tailed deer, patch sizes ranging from 600 to 1,200 feet in diameter have been recommended to provide adequate shelter and thermal cover (Fleury and Brown 1997). The average home range size for bobcats varies from about 300 to 675 acres depending on sex and degree of habitat fragmentation (Tigas et al. 2002). Bobcat home ranges typically consist of natural habitats. Adult males and young females occasionally include non-natural habitat within their home ranges, possibly due to a reduction in habitat quality which tends to increase their overall home range size (Riley et al. 2003).

The width of a corridor determines its ratio of edge to interior habitat, with a wide corridor providing more habitat for interior species. If corridors are too narrow, then they may consist entirely of edge habitat and fail to provide the interior conditions required by the species that they are intended to support (Thomas 1991, as cited in Fleury and Brown 1997). This type of constriction in a corridor can form a bottleneck, introducing risks to species not adapted to edge habitat. The impact of a bottleneck is likely to depend on its length, which determines the amount of time that animals passing through the area are exposed to unsuitable habitat. In these types of corridor segments, animals are likely to pass through without seeking habitat elements such as shelter, cover, or food.

Land Cover

Complex vegetation structure has been associated with species diversity within corridors (Forman and Baudry 1984, as cited in Fleury and Brown 1997). A corridor that is structurally diverse has the ability to support a greater diversity of species. Layers in the form of grasses, various-sized shrubs, and different ages of deciduous and coniferous trees can provide structure as well as snags and boulders. Large mammals such as deer and bobcats tend to require trees at least 5 feet tall with 75 percent canopy closure. Conifers provide cover during the winter (Fleury and Brown 1997). When wide and structurally diverse corridors are not feasible, a network of habitat types within a corridor may support a range of species (Noss 1993, as cited in Fleury and Brown 1997).

Barriers

Barriers to movement within a corridor, such as roads, urbanized areas, and impassable streams, increase the likelihood of the corridor becoming an isolated patch. Population isolation can lead to negative genetic consequences (e.g., the expression of deleterious recessive traits through inbreeding depression). Barriers can also cause habitat fragmentation as they disrupt the distribution of habitat across a landscape. When introducing barriers to an area is unavoidable, the likelihood of their fragmenting a corridor and isolating populations can be decreased by making them narrow (Fleury and Brown 1997). Bobcats are likely to be particularly sensitive to barriers caused by roads and urbanized areas because they require large home ranges and they are sensitive to human contact.

Deer have been reported to remain varying distances from roads and human activity. One study (Fleury and Brown 1997) reported that white-tailed deer preferred to be 1,312 feet away from moving traffic and 2,624 feet from human activity (e.g., pedestrians). In other cases, deer have been reported to remain 656 feet beyond roads (Rost and Bailey (1979), as cited in Kaseloo and Tyson 2004). Singleton and Lenkmkuhl (1999) reported no differences in deer observed within 1 mile of a highway and beyond this distance. The noise produced by traffic is generally believed to deter mammals from areas crossed by roads, although there is little evidence to directly support this idea (Kaseloo and Tyson 2004; Rost and Bailey (1979), as cited in Kaseloo and Tyson 2004). Generally, it appears that deer prefer to use areas undisturbed by roads and human activity, but they are able to adapt to these factors except when exposed to hunting pressure (Kaseloo and Tyson 2004).

When roads limit habitat connectivity, deer can suffer injuries and mortality from attempting to cross roads. This outcome can be reduced by constructing easily detectable edges and installing fencing combined with crossing structures (Buechner 1987 and Stamps et al. 1987, as cited in Fleury and Brown 1997; National Cooperative Highway Research Program [NCHRP] 2002). Eight-foot tall fencing is recommended to keep large mammals from entering roadway areas (Clevenger and Waltho 2000). When movement is restricted for long distances, connectivity should be provided at some point (e.g., by crossing structures) to prevent population isolation. When using crossing structures, deer are most likely to use those that provide a wide field of view and do not contain water. For this reason, overpasses tend to be favored over culverts. Overpasses are more common in Europe than in the United States, and width may be an important determinant in their effectiveness. Drainage culverts may provide passage for fish and amphibians when they contain water, and for reptiles and small mammals when they are dry. Large culverts with natural substrates and dry adjacent upland are likely to provide passage for the greatest variety of species. Some deer species may use box culverts as under-crossings (NCHRP 2002). The impact of barriers can be also reduced by providing alternative corridors or loops within a corridor (Noss 1993, as cited in Fleury and Brown 1997). Animals are more likely to use corridor paths and crossings that conserve energy (e.g., by avoiding water or following gentle terrain).

Edge Effects

Edge habitat arises when interior forest habitat becomes fragmented by barriers and disturbances. In such habitat, animals adapted to interior forest conditions may be more likely to encounter predators and are less likely to fulfill their habitat requirements (Weldon 2006). Edge effects

that influence wildlife can extend over distances of 1,000 to 3,000 feet into a forest, whereas major vegetational changes are only apparent for 30 to 100 feet (Thomas 1991, as cited in Fleury and Brown 1997). Greater impacts of edge effects tend to arise when a corridor is surrounded by more inhospitable habitat (Fleury and Brown 1997).

Habitat Fragmentation

When habitat becomes surrounded by barriers, it can become fragmented and isolated from surrounding habitat. Fragmentation can also occur when remaining connections among habitat patches are eliminated by human activities or catastrophic events. Maintaining multiple connections and networks within a corridor can provide protection from catastrophes that may permanently or temporarily make portions of corridors inaccessible (Noss 1993, as cited in Fleury and Brown 1997). Because species richness tends to increase with area (MacArthur and Wilson 1967), the species diversity within a habitat fragment is likely to increase with its size (reviewed in Watling and Donnelly 2006). Habitat fragmentation caused by urbanization sometimes leaves pieces of habitat that are too small to support a large mammal population. Carnivores may respond by abandoning a former habitat or by combining several fragments to create a single home range. The potential for fragments to be combined depends on the matrix that surrounds them, whether it can be traversed safely or whether it presents dangerous obstacles (Watling and Donnelly 2006). Corridors and crossings can provide safe passage, and therefore connectivity, among habitat fragments.

Although bobcats tend to avoid human activity, they can behaviorally adjust to fragmentation resulting from urbanization by decreasing their daytime activity levels, using corridors, and using crossing structures. When using crossing structures, bobcats appear to prefer crossing over roads rather than using culverts (Tigas et. al 2002). In some cases, fragmentation due to urbanization has been associated with an increase in home range size, possibly because of a correlated decrease in habitat quality (Riley et al. 2003; see also Tigas et al. 2002).

Fish Resources

The API drains to Mount Scott Creek to the north and to the Clackamas River to the south. Project-area streams draining to Mount Scott Creek are Dean Creek and Phillips Creek. Project-area streams draining to the Clackamas River are Cow Creek, Sieben Creek, Rock Creek, Graham Creek, an unnamed tributary to Rock Creek, and Trillium Creek (Figure 16) Photographs of the streams are provided in Appendix B.

Up to 35 fish species are likely to occur in the API, as listed in

Table 2 (Dames and Moore 1993, Friesen and Zimmerman 1999, Tinus et al 2003). However, some of these fish species would be limited to the Clackamas River mainstem and to tributary reaches downstream of the project area, as described below. ODFW performed fish surveys of project-area streams from 1997 through 1999. The specific results for each water body are described in the text following Table 2.

Table 2. Potential Fish Species Occurrence in the Sunrise Project Area

Common Name	Scientific Name
American Shad	*Alosa sapidissima*
Banded Killifish	*Fundulus diaphanus*
Bluegill	*Lepomis macrochirus*
Brook Trout	*Salvelinus fontinalis*
Brown Bullhead	*Ictalurus nebulosus*
Brown Trout	*Salmon trutta*
Chinook Salmon*	*Oncorhynchus tshawytscha*
Chiselmouth	*Acrochelius alutaceus*
Coho Salmon*	*Oncorhynchus kisutch*
Common Carp	*Cyprinus carpio*
Cutthroat Trout	*Oncorhynchus mykiss*
Largemouth Bass	*Micropterus salmoides*
Large scale Sucker	*Catostomus macrochelius*
Longnose Dace	*Rhinichthys cataractae*
Mountain Sucker	*Catostomus platyrhynchus*
Mountain Whitefish	*Prosopium williamsoni*
Mosquitofish	*Gambusia affinis*
Northern Pikeminnow	*Ptychochelius oregonensis*
Oriental Weatherfish	*Misgurnus anguillicaudatus*
Pacific Lamprey	*Entosphenus tridentatus*
Peamouth	*Mylochelius caurinus*
Prickly Sculpin	*Cottus asper*
Pumpkinseed	*Lepomis gibbosus*
Rainbow Trout	*Oncorhynchus clarki*
Redside Shiner	*Richardsonius balteatus*
Reticulate Sculpin	*Cottus perplexus*
Sand Roller	*Percopsis transmontana*
Smallmouth Bass	*Micropterus dolomieui*
Speckled Dace	*Rhinichthys osculus*
Steelhead Trout*	*Oncorhynchus mykiss*
Three-spine Stickleback	*Gasterostetus aculeatus*
Torrent sculpin	*Cottus rhotheus*
Walleye	*Stizostedian vitreum*
Western Brook Lamprey	*Lampetra richardsoni*
Yellow Bullhead	*Ictalurus natalis*
Yellow Perch	*Perca flavescens*

Source: Dames and Moore 1993; Friesen and Zimmerman 1999.

* ESA listed, proposed, or candidate species.

Mount Scott Creek

Mount Scott Creek drains the portion of the API that lies north of SE Clackamas Road and east of approximately SE Piazza Avenue, including most of Camp Withycombe. This stream flows into the API from the east under SE 97th Avenue through a large arch culvert. It continues westward under I-205 and SE 82nd Avenue NE, then parallels the UPRR track as it continues off site to its mouth at Kellogg Creek (Figure 16).

This stream supports steelhead trout and coho salmon (ODFW 2004). Chinook have not been documented in Mount Scott Creek or Dean Creek (ODFW 2004, Streeter, pers. comm., 2003). Other species documented to be present are Pacific lamprey, cutthroat trout, mosquitofish, prickly sculpin, reticulate sculpin, and largemouth bass (Friesen and Zimmerman 1999). Metro (2004) has mapped the on-site reach of Mount Scott Creek as "Class 1 Riparian Habitat, highest-value." The project area reach of Mount Scott Creek has been designated Essential Salmonid Habitat by the Department of State Lands (DSL 2004).

Dean Creek

Dean Creek (also known as Deer Creek), a tributary to Mount Scott Creek, drains the area from the project's western extent, through the northern and western parts of Camp Withycombe (Burch, pers. comm., 2004). The mainstem of Dean Creek begins in the large wetland area adjoining the KEX radio towers north of Lawnfield Road. Dean Creek flows north and eastward under I-205 and through box culverts under SE 82nd Avenue, ultimately discharging to Mount Scott Creek through culverts under the UPRR track.

The portion of the project drained by Dean Creek includes a network of roadside and drainage ditches in the KEX radio tower property and between Lawnfield and Mather Roads (Figure 16). These ditches were not documented in the 1993 study (Dames and Moore 1993), but they will likely be considered jurisdictional by the U.S. Army Corps of Engineers (USACE) under current policy because of their ultimate connections to "Waters of the United States." In addition, there are likely other stormwater drainage pipes and culverts in the Dean Creek basin that have not been documented (Burch, pers. comm., 2004). The stream and its tributaries generally have the morphology of uniform ditches in the project area. Metro (2004) has mapped the project area reach of mainstem Dean Creek and several tributaries as "Class 2 Riparian, medium value habitat."

The most abundant fish species documented in Dean Creek are redside shiner and reticulate sculpin. Other species known to occur there include western brook lamprey, speckled dace, and mosquitofish (Friesen and Zimmerman 1999). The stream lacks significant salmonid spawning or rearing habitat because of its silty substrate, channelization, and lack of habitat elements such as pools, riffles, and large woody debris. Habitat access is degraded by numerous piped and culverted sections. The project area portion of the stream is likely to support few salmonids because of poor habitat and water quality (Dames and Moore 1993, Alsbury, pers.comm., 2004). Dean Creek currently exceeds State of Oregon acute water quality criteria for dissolved copper on a once in three-year basis (ODEQ 2006).

Phillips Creek.

Phillips Creek is a small highly urbanized drainage that flows southward along SE 84th Avenue into the northern tip of the API. From there, it flows westward under SE 82nd Avenue through a box culvert to its mouth at Mount Scott Creek. A stormwater treatment facility operated by Clackamas County adjoins Phillips Creek immediately east of SE 82nd Avenue.

Speckled dace, reticulate sculpin, and redside shiner are the most abundant fish species in Phillips Creek. Other documented species are cutthroat trout, rainbow trout, smallmouth bass, and mosquitofish (Friesen and Zimmerman 1999, Tinus et al 2003).

Clackamas River

A bend in the Clackamas River extends into the project area immediately east of SE 142nd Avenue, where it borders Highway 212/224. Most of the project area drainage in this vicinity appears to be captured by the Rock Creek tributary that passes under Highway 212/224, rather than draining directly to the Clackamas River (Figure 16). The Clackamas River supports runs of coho salmon, Chinook salmon, and steelhead trout, as well as all other species listed in Table 2.

Metro (2004) has mapped the project area between the Clackamas River and Highway 212/224 as "Class 1 Riparian Habitat." DSL (2004) has designated the project area reach of the Clackamas River as Essential Salmonid Habitat.

Cow Creek

Cow Creek is a small, highly urbanized tributary of the Clackamas River that parallels Highway 212/224 to the north in the project area (Figure 16). The uppermost open channel found in the site inspection was a small constructed swale at SE 125th Court north of Highway 212/224. From this point, the stream flows through a series of channelized reaches and culverts, each up to several hundred feet long, passing through a pipe under the intersection of SE 102nd Avenue, to its exit from the project area (Figure 16). The channelized reaches were generally bordered by a narrow band of streambank vegetation dominated by Himalayan blackberry (*Rubus armeniacus*), willow (*Salix spp.*) and reed canarygrass (*Phalaris arundinacea*) (Appendix B). Numerous stormwater outfalls were observed on the stream, together with moderate amounts of refuse in the stream. There is, however, a somewhat more natural reach of Cow Creek between SE 114th Avenue and SE 118th Avenue. This reach, which flows through an undeveloped field, includes a narrow riparian area vegetated with black cottonwood (*Populus balsamifera*) and Oregon white oak (*Quercus garryana*).

Currently, the project-area reach of Cow Creek is not known to support fish life. A variety of fish species have been documented in the lowest reach of Cow Creek, downstream of the API. Fish are not likely to occur upstream of these reaches because of poor water quality and habitat conditions farther upstream (Alsbury, pers. comm., 2004; Dames and Moore 1993). In fact, ODFW electrofishing studies found virtually no fish upstream of Evelyn Street, which lies below the API (Friesen and Zimmerman 1999). Cow Creek currently exceeds State of Oregon acute water quality criteria for dissolved copper on a once in three-year basis (DEA 2006).

Sieben Creek

Sieben Creek flows down from the hillslopes to the north of the project area in an open linear ditch (Figure 16). The stream is conveyed under Highway 212/224 through a box culvert east of SE 135th Avenue and directly south to the Clackamas River in an open linear ditch. The stream substrate is primarily cobbles and large gravel. The segment upstream of the highway is about 10 feet wide and 3 feet deep and flows through an open pasture with Himalayan blackberry thickets (see Appendix B). The segment downstream of the highway flows through a 15-foot-deep eroded channel west of a mobile home park (Appendix B). Metro (2204) has mapped the project area corridor along Sieben Creek upstream of Highway 212/224 as "Class 1 Riparian, highest-value habitat."

Speckled dace and rainbow trout are the most abundant fish in Sieben Creek, and they were the only species found upstream of Highway 212/224 during ODFW sampling (Friesen and Zimmerman 1999). Other species found in the lowest reach of this stream were northern pikeminnow, longnose dace, redside shiner, largescale sucker, Chinook salmon, and coho salmon.

The culvert under Highway 212/224 is partially passable, however, and resident and anadromous salmonids can access the on-site reaches of the stream (Murtagh pers. comm. 2005). The project area portion of Sieben Creek currently has minimal salmonid habitat because it lacks habitat elements such as pools or cover (e.g., large woody debris). The lowermost off-site reach has been proposed as a habitat mitigation site (Burch, pers. comm., 2004).

Graham Creek

Graham Creek, another small corridor of riparian habitat, is located north of Highway 212/224 at SE 130th Avenue. This water body was found during the 2004 field inspection to be a small stream flowing from the Clackamas Bluffs into a fully vegetated wetland ditch in the project area. This area is mapped as wetland and is discussed in the Wetland Technical Report. Water from this feature flows into underground pipes and ultimately discharges to the Cow Creek drainage according to an earlier study (TAMS 1990). It is isolated by the degraded reaches described for Cow Creek, and thus is unlikely to harbor any fish.

Rock Creek

Rock Creek crosses the project area through a deep, narrow, forested ravine. The substrate is primarily cobble, boulders, and scoured bedrock, with gravel beds at some pool tails and depositional areas. Habitat is primarily high-gradient riffles and pocket water, with an average of one large pool every 165 feet (Dames and Moore 1993). A natural waterfall upstream of the Highway 212/224 bridge blocks fish migration. Metro (2004) has mapped a corridor throughout the project area as "Class 1 riparian, highest-value habitat."

Rock Creek is likely to support most species listed in Table 2, including the ESA-listed Chinook salmon and steelhead trout (ODFW 2004). Fish species found in the project-area reach downstream of the waterfall include longnose dace, speckled dace, redside shiner, largescale sucker, rainbow trout, cutthroat trout, and torrent sculpin. Reticulate sculpin and Pacific lamprey

were the only fish species found upstream of the waterfall (Friesen and Zimmerman 1999). DSL (2004) has designated this reach as Essential Salmonid Habitat.

Rock Creek West Tributary

A small tributary flowing to Rock Creek from the west extends down from the hillslopes to the north and enters the project area between SE 142nd Avenue and SE 152nd Avenue (Figure 16). The stream flows under Highway 212/224 immediately east of a truck weigh station, through a culvert that is impassable because of a concrete apron at its inlet and a drop of several feet below its outlet. Above Highway 212/224, the project area reach of the stream occupies an entrenched linear channel about 8 feet wide and 6 feet deep, with Himalayan blackberry thickets along the bank and a substrate of cobble/coarse gravel (Appendix B). Downstream of the highway, the stream has formed a large eroded gulch about 50 feet wide and 30 feet deep, through which it flows down to Rock Creek (Appendix B). Metro (2004) has mapped the project area reach of this tributary as "Class 2 riparian, medium-value habitat" and the reaches immediately upstream and downstream as "Class 1 riparian, highest-value habitat."

The Rock Creek tributary is likely to support sculpins in its coarse substrate. Near its confluence with Rock Creek, it may contain salmonids, including cutthroat trout, juvenile coho salmon, and steelhead trout, and Pacific lamprey. Salmonid use upstream of Highway 212/224 is unlikely because of the migration barriers and poor habitat. Because of the extensive erosion, the entire channel downstream of the 212/224 culvert would likely require reconstruction before fish passage is possible.

Trillium Creek

Trillium Creek enters the eastern tip of the project area at Armstrong Circle and flows southwest through a forested ravine into the project area. It continues through an impounded pond in a residential subdivision and on through an abandoned orchard to cross beneath Highway 224 a short distance south of the existing Rock Creek interchange (Figure 16). The Highway 224 crossing is an impassable corrugated metal culvert, with an approximately 1-foot drop at the outlet (Appendix B). Downstream of Highway 224, Trillium Creek flows through a gulch that is well over 50-feet deep at its mouth at Rock Creek. This reach of Trillium Creek is eroded down to hard clay, and upstream fish migration is blocked at its mouth by a 4-foot-high waterfall.

Trillium Creek Tributary

An unnamed Trillium Creek tributary flows southward from its origin near the intersection of SE 162nd Avenue and Highway 212. The tributary flows into the project area through a well-forested ravine along the south side of Highway 212. Like Trillium Creek, this tributary has formed a deep gulch and is incised down to hard clay material. It discharges to Trillium Creek upstream of the Highway 224 culvert.

Federal Threatened and Endangered Fish Species

The USFWS indicates that four listed fish species, one candidate species, and one species of concern under the federal Endangered Species Act may occur in the project vicinity:

- Lower Columbia River evolutionary significant unit (ESU) of Chinook salmon (Threatened 64 FR 14308, 63 FR 13347)

- Upper Willamette River ESU of Chinook salmon (Threatened 64 FR 14308, 63 FR 13347)
- Lower Columbia River ESU of steelhead trout (Threatened 64 FR 14308, 63 FR 13347)
- Oregon chub (Endangered 58 FR 53800 53804)
- Lower Columbia River ESU of coho salmon (Threatened 70 FR 37160)
- Pacific lamprey (Species of Concern)

Oregon Chub

Oregon chub are listed by the USFWS (2004) as being potentially present in the project vicinity. The Oregon chub historic range was backwaters, side channels, and oxbows throughout the lower elevations of the Willamette River (USFWS 1993). However the nearest occurrence documented by ORNHIC is a 1904 occurrence in the mainstem Willamette at Oregon City. This area was sampled again in 1983 without any Oregon chub being found. ODFW has sampled in Rock Creek and the Clackamas River without finding any Oregon chub.

Suitable Oregon chub habitat is typically low- or zero-velocity flow, silty substrates, and abundant aquatic and overhanging vegetation (USFWS 1993). It is unlikely that Oregon chub would occur in any on-site streams, because urbanization and drainage modifications have left few backwaters, side channels or oxbows with these characteristics. In addition, winter flushing flows in such urbanized areas would preclude suitable habitat (Scheerer, pers. comm., 2004).

Pacific Lamprey

USFWS (2004) listed Pacific lamprey as potentially occurring in the project area. Pacific lamprey were documented in Mount Scott Creek and in Rock Creek during ODFW fish sampling in 1999 (Friesen and Zimmerman 1999). Unidentified lamprey were found in Dean, Philips, Mount Scott, and Rock Creek in 2003, and may possibly have included Pacific Lamprey.

Pacific lamprey are anadromous, and adults enter fresh water in spring to spawn. Spawning sites generally occur in low gradient stream sections over gravel with a mix of pebbles and sand in water from 1 to 13 feet deep. Ammocoaetes (immature lamprey), are sedentary and blind. They survive by filtering food particles, such as detritus, diatoms, and algae suspended above and within the substrate. Ammocoaetes are usually found in cold water but have been collected in water ranging up to 77°F. They inhabit the fine silt deposits in backwaters and quiet eddies of steams (Wydowski and Whitney 1979). Spawning habitat is unlikely to occur in the API reaches of Cow Creek, and in Sieben and Rock tributary creeks upstream of their mouths, because of the apparent lack of suitable gravel beds.

Salmonids

The USFWS data search (2004) listed Upper Willamette River Chinook as potentially present. A search of the ORNHIC data base indicates that this stock is present in the Clackamas River (ORNHIC 2004).

Lower Columbia River Chinook, steelhead, and coho are present in the Clackamas River and lower Rock Creek in the project area. Upper Willamette River Chinook are also identified as occurring in the Clackamas River (ORNHIC 2004). Chinook have not been documented in Mount Scott Creek or Dean Creek, but the may be present in Kellogg Creek, several miles

downstream of the project area (ODFW 2004, Streeter, pers. comm., 2003). Suitable habitat for resident salmonids and rearing coho salmon is likely present to some extent in all project area streams with the exception Cow Creek, and all but the mouths of Sieben and Rock West Tributary creeks. Cow Creek has primarily silty or embedded substrates that would not be optimal for spawning, while Sieben and Rock West Tributary creeks have eroded channels with coarse substrate and few gravel beds.

Critical Habitat

Project-area reaches of Mount Scott Creek, Rock Creek, and the Clackamas River have been designated as critical habitat for steelhead under the ESA, and the latter two streams have been designated as such for Chinook salmon. Although Dean Creek, Cow Creek, Trillium Creek, and Sieben Creek do not support ESA fish species in the project area, they, too, will likely fall within ESA jurisdiction because they discharge to ESA salmon-bearing waters within several miles downstream of the site.

Essential Fish Habitat

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in Federal fishery management plans and to require Federal agencies to consult with NMFS on activities that may adversely affect EFH. "Essential Fish Habitat" means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" as defined by the Magnuson-Stevens Act. The Pacific Fisheries Management Council (PFMC) has recommended an EFH designation for the Pacific salmon fishery that would include those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery.

The consultation requirements of section 305(b) of the Magnuson-Stevens Act (16 U.S.C. 1855(b)) provide that:

> Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
>
> NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH;
>
> Federal agencies shall, within 30 days after receiving conservation recommendations from NMFS, provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations.

Salmon fishery EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California. Salmon EFH excludes areas upstream of longstanding naturally impassable barriers, and certain specified man-made barriers.

The Pacific salmon management unit includes chinook, coho, and pink salmon (*Oncorhynchus gorbuscha*). Of these, coho and chinook are present in the Sunrise corridor API. Although coho presence is currently limited to the Clackamas River and lower Rock Creek, it is likely that they may have historically inhabited nearly all streams in the API with the exception of Rock Creek above the natural waterfall that was discussed earlier in this document.

Botanical Resources

Plant Communities

Plant communities within the project corridor include native-dominated coniferous and mixed forests; upland and wetland pastures; and highly disturbed communities dominated by ruderal, weedy species. Native-dominated communities are typical of those found within the lower Willamette Valley. No plant communities observed are considered to be rare (Kagen et al., 2004).

Seven generalized plant communities were mapped along the corridor (Figure 14). These include an industrial disturbed community, emergent wetland, forested/scrub-shrub wetland, upland grass, mixed forest, and coniferous forest. Residential, industrial, and agricultural lands that contain scattered vegetation along fence rows and at residences are not discussed.

Industrial Disturbed

The industrial disturbed plant community is located in areas disturbed by past or on-going industrial/development actions. This community corresponds to Metro's Urban and Mixed Environs habitat type (Metro 2002). The industrial disturbed plant community is dominated by ruderal, weedy species typically encountered on disturbed sites. The tree and shrub layer is sparse and usually confined to fence rows. Species common to this plant community are listed in Table 3. Scotch broom, Himalayan blackberry, Canada thistle, and meadow knapweed, all of which are state listed noxious weeds, are found in this community.

Table 3. Species Common to the Industrial Disturbed Plant Community

Common Name	Scientific Name	Dominant	Noxious Weed
Trees			
English Hawthorn	*Crataegus monogyna*		
Shrubs			
Scotch Broom	*Cytisus scoparius*		✓
Rose	*Rosa* sp.		
Himalayan Blackberry	*Rubus armeniacus*		✓
Herbs			
Redtop Bentgrass	*Agrostis alba*		
Colonial Bentgrass	*Agrostis tenuis*	✓	
Sweet Vernal-Grass	*Anthoxanthum odoratum*		
Meadow Knapweed	*Centuarea pratensis*		✓
Ox-Eye Daisy	*Chrysanthemum leucanthemum*	✓	
Canada Thistle	*Cirsium arvense*		✓
Orchard-Grass	*Dactylis glomerata*	✓	
Stork's-Bill	*Erodium cicutarium*		
Tall Fescue	*Festuca arundinacea*	✓	
Velvetgrass	*Holcus lanatus*	✓	
Spotted Cats-Ear	*Hypochaeris radicata*	✓	
Perennial Ryegrass	*Lolium perenne*	✓	
Pineapple Weed	*Matricaria matricarioides*		
Doorweed	*Polygonum aviculare*		
Prickly Sow-Thistle	*Sonchus asper*		
Red Clover	*Trifolium pratense*		
Dutch Clover	*Trifolium repens*		

Emergent Wetland

Best examples of the emergent wetland community are found on the KEX tower site, Camp Withycombe, and the property immediately west of SE 142nd Avenue. The emergent wetland community is discussed in the Wetlands Technical Report. Non-native grasses and forbs dominate this community, to the extent it could not be classified as one of the 76 native freshwater plant associations found in northwest Oregon (Christy 2004). The shrub stratum is sparse, never constituting more than 25 percent cover, and is often confined to fence rows. Species common to this plant community are listed in Table 4.

Table 4. Species Common to the Emergent Wetland Community

Common Name	Scientific Name	Dominant	Noxious Weed
Meadow Foxtail	*Alopecurus pratensis*		
Reed Canarygrass	*Phalaris arundinacea*		
Redtop	*Agrosis alba*	✓	
Velvet Grass	*Holcus lanatus*	✓	
Tall Fescue	*Festuca arundinacea*	✓	
Sweet Vernalgrass	*Anthoxanthum odoratum*		
Soft Rush	*Juncus effusus*	✓	
Spike Rush	*Eleocharis palustris*		
Common Camas	*Cammasia quamash*		
Popcorn Flower	*Plagiobothyrus figuratus*		
Teasel	*Dipsacus sylvestris*		
Sedge	Carex sp.		
Common Cattail	*Typha lattifolia*		

Forested and Scrub-Shrub Wetlands

A prime example of a forested wetland occurs in the wetland complex that encompasses some of the 7th Day Adventist property which was recently purchased for this project. The forested component contains a good example of the Oregon ash/slough sedge plant community. Globally, this community is found only in western Oregon and southwestern Washington. Although it is not rare within the state, there is cause for long-term concern due to loss through development or other conversions (Christy 2004).

The forested/scrub-shrub community is located along waterways and ditches throughout the corridor. It is also found on the property immediately west of SE 142nd Avenue. Black cottonwood and willows provide forest and scrub cover along with the non-native English hawthorn. Non-native grasses and forbs dominate this community, to the extent that it, too, could not be classified as one of the 76 native freshwater plant associations found in northwest Oregon (Christy 2004). Species common to this plant community are listed in Table 5.

Table 5. Forested /Scrub-Shrub Plant Community Typical Species

Common Name	Scientific Name	Dominant	Noxious Weed
Douglas Hawthorn	*Crataegus douglasii*		
Black Cottonwood	*Populus balsamifera*	✓	
English Hawthorn	*Crataegus monogyna*	✓	
Pacific Willow	*Salix lucida*	✓	
Red-Osier Dogwood	*Cornus stolonifera*		
Oregon Ash	*Fraxinus latifolia*	✓	
Douglas Spirea	*Spiraea douglasii*		
Common Horsetail	*Equisetum arvense*		
Reed Canarygrass	*Phalaris arundinacea*	✓	
Slough Sedge	*Carex obnupta*	✓	
Soft Rush	*Juncus effusus*	✓	
Spike Rush	*Eleocharis palustris*		
Teasel	*Dipsacus sylvestris*		
Common Cattail	*Typha lattifolia*		
Redtop	*Agrosis alba*		
Himalayan Blackberry	*Rubus armeniacus*	✓	✓
Sedge	*Carex* sp.		

Upland Grassland

This community occurs in upland portions of pastures along the corridor. Non-native grasses dominate this community, indicating past disturbances to these sites. The upland pastures at Camp Withycombe provide the best example of this community. This community corresponds to Metro's Urban and Mixed Environs habitat type (Metro 2002). Canada thistle and meadow knapweed, both state-listed noxious weeds, are found in this community. The species common to this plant community are listed in Table 6.

Table 6. Upland Grassland Plant Community Typical Species

Common Name	Botanical Name	Dominant	Noxious Weed
Redtop Bentgrass	*Agrostis alba*		
Colonial Bentgrass	*Agrostis tenuis*	✓	
Sweet Vernal-Grass	*Anthoxanthum odoratum*		
Soft Brome	*Bromus mollis*	✓	
Meadow Knapweed	*Centuarea pratensis*		✓
Ox-Eye Daisy	*Chrysanthemum leucanthemum*	✓	
Canada Thistle	*Cirsium arvense*		✓
Orchard-Grass	*Dactylis glomerata*	✓	
Tall Fescue	*Festuca arundinacea*	✓	
Velvetgrass	*Holcus lanatus*	✓	
Spotted Cats-Ear	*Hypochaeris radicata*	✓	
Perennial Ryegrass	*Lolium perenne*	✓	
Common Dandelion	*Taraxacum officinale*		

Mixed Forest

The mixed forest community is dominated by big-leaf maple and Douglas fir, though Douglas fir becomes sparse in areas. This community dominates the Clackamas Bluffs from Camp Withycombe east to approximately SE 135th Avenue and extends to Rock Creek and beyond, creating a more or less vegetated corridor throughout the length of the project (Table 7). This mixed forest plant community is an example of the big-leaf maple/Douglas fir/vine maple/swordfern plant community (Kagen et al. 2004). The long- term persistence of this community type is rated as secure because of its many occurrences within the state and Pacific Northwest (Kagen et al. 2004).

The canopy approaches 100 percent cover in most areas of this mixed forest. This community supports mainly plants native to Pacific Northwest lowland forests. English ivy, a state-listed noxious weed, is common in areas, climbing numerous trees. Himalayan blackberry dominates the understory along the toe of the slope, where clearing for industrial development has allowed this species to invade and spread. This community corresponds to Metro's Westside lowlands conifer-hardwood forest habitat type (Metro 2002).

Table 7. Mixed Forest Plant Community Typical Species

Common Name	Botanical Name	Dominant	Noxious Weed
Trees			
Big-Leaf Maple	*Acer macrophyllum*	✓	
Red Alder	*Alnus rubra*		
English Hawthorn	*Crataegus monogyna*		
Hazelnut	*Corylus cornuta*		
Black Cottonwood	*Populus balsamifera var. trichocarpa*		
Douglas Fir	*Pseudotsuga menziesii*	✓	
Shrubs			
Vine Maple	*Acer circinatum*		
Salal	*Gaultheria shallon*		
Ocean-Spray	*Holodiscus armeniacus*		
English Holly	*Ilex aquifolium*		
Cascade Oregon-Grape	*Mahonia nervosa*	✓	
Indian Plum	*Oemleria cerasiformis*		
Himalayan Blackberry	*Rubus armeniacus*	✓	
Common Snowberry	*Symphoricarpos albus*	✓	
Herbs			
Henderson's Sedge	*Carex hendersonii*		
English Ivy	*Hedera helix*	✓	✓
Narrow-Leaved Montia	*Montia linearis*		
Pacific Swordfern	*Polystichum munitum*	✓	
Trailing Blackberry	*Rubus ursinus*		
Western False Solomon's Seal	*Smilacina racemosa*		
White Inside-Out Flower	*Vancouveria hexandra*		

Coniferous Forest

This community type is located primarily along the southern flank of Mount Talbert on land owned by ODOT between Mount Talbert to the north and Camp Withycombe to the south. Big-leaf maple occurs in this community, but not as a dominant, as indicated in Table 8. This community may be classified as a Douglas fir/common snowberry community (Kagen et al. 2004). The long-term persistence of this community type is rated as secure because of its many occurrences within the state and Pacific Northwest (Kagen et al. 2004). This community would also correspond to Metro's Westside lowlands conifer-hardwood forest habitat type (Metro 2002).

Table 8. Coniferous Forest Plant Community Typical Species

Common Name	Botanical Name	Dominant	Noxious Weed
Trees			
Big-Leaf Maple	*Acer macrophyllum*		
Pacific Dogwood	*Populus balsamifera var. trichocarpa*		
Douglas Fir	*Pseudotsuga menziesii*	✓	
Shrubs			
Salal	*Gaultheria shallon*	✓	
Indian Plum	*Oemleria cerasiformis*		
Dwarf Oregon-Grape	*Mahonia nervosa*	✓	
Rose	*Rosa* sp.		
Common Snowberry	*Symphoricarpos albus*	✓	
Herbs			
Narrow-Leaved Montia	*Montia linearis*		
Pacific Swordfern	*Polystichum munitum*	✓	
Trailing Blackberry	*Rubus ursinus*		
Western False Solomon's Seal	*Smilacina racemosa*		
White Inside-Out Flower	*Vancouveria hexandra*		

Sensitive Plant Species

The ORNHIC and USFWS databases were queried to identify sensitive species that have been documented or have the potential to occur within the project corridor. ONHP identified thin-leaved peavine (*Lathyrus holochlorus*) and white rock larkspur (*Delphinium leucophaeum*) as occurring near, but not within, the project corridor (ORNHIC 2004). USFWS identified the following plants listed under the ESA as potentially occurring in the project corridor: Golden paintbrush (*Castilleja levisecta*), Willamette Valley daisy (*Erigeron decumbens* var. *decumbens*), Howellia (*Howellia aquatilis*), Bradshaw's lomatium (*Lomatium bradshawii*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), and Nelson's sidalcea (aka Nelson's checkermallow) (*Sidalcea nelsoniana*). Additionally, USFWS identified the following species of concern as potentially occurring in the project corridor: white-topped aster (*Aster curtus*), white rock larkspur (aka pale larkspur), Willamette Valley larkspur (*D. oreganum*), peacock larkspur (*D. pavonaceum*), and thin-leaved peavine (*Lathyrus holochlorus*).

ODOT biologists conducted rare plant surveys in June 2005 over the entire corridor, and again in April 2006 in areas identified as suitable habitat for Bradshaw's lomatium. These areas were resurveyed because the 2005 survey was performed after the optimal flowering period, which is the best time to positively identify Bradshaw's lomatium in the field (ODOT 2005b, ODOT 2006b).

Species nomenclature follows that used by the ORNHIC database, as defined below:

- Listed Endangered (LE). A species may be classified for protection as “endangered” when it is in danger of extinction within the foreseeable future throughout all or a significant portion of its range.
- Listed Threatened (LT). A “threatened” classification is provided to those plants likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges.
- Species of Concern (SOC). This category is intended to be composed of species whose conservation standing is of concern to USFWS, but for which status information is still needed.
- Candidate (C) Taxa for which the National Oceanic and Atmospheric Administration (NOAA) Fisheries or USFWS have sufficient information to support a proposal to list under the ESA, or which is a candidate for listing by the Oregon Department of Agriculture (ODA) under the Oregon Endangered Species Act (OESA).

For the species noted above, Table 9 summarizes the federal and state listings, habitat type, and whether potential habitat occurs in the project corridor.

Table 9. Status of Sensitive Plant Species

Common Name	Scientific Name	Federal Status*	State Status *	Habitat type	Potential habitat within corridor
Golden Paintbrush	*Castilleja levisecta*	LT	LE	Open grasslands on glacial outwash or depositional material.	No
Bradshaw's Lomatium	*Lomatium bradshawii*	LE	LE	Seasonally saturated or flooded prairies.	Yes, emergent wetlands.
Nelson's Sidalcea	*Sidalcea nelsoniana*	LT	LT	Open ground in meadows and occasionally in wooded habitats on poorly drained to well-drained clay, clay loam, and gravelly loam soils. Also occurs along stream-sides in open areas and along fencerows.	Yes, pastures and emergent wetlands.
Willamette Valley Daisy	*Erigeron decumbens var. decumbens*	LE	LE	Native wetland prairies where flooding creates anaerobic and strongly reduced soil conditions.	Yes, emergent wetlands.
Howellia	*Howellia aquatilis*	LE	NL	Wetlands associated with ephemeral glacial pothole ponds and former river oxbows.	No
Kincaid's Lupine	*Lupinus sulphureus ssp. kincaidii*	LT	LT	Willamette Valley native upland prairie sites.	No
White-Topped Aster	*Aster curtus*	SOC	LT	Native prairies that are seasonally mesic but moisture-stressed in late summer.	Yes, but pastures dominated by invasive species
White Rock Larkspur	*Delphinium leucophaeum*	SOC	LE	Dry bluffs, cliffs and rocky areas.	No
Willamette Valley Larkspur	*Delphinium oreganum*	SOC	C	Native prairies that are seasonally moist.	Yes, pastures and emergent wetlands
Peacock Larkspur	*Delphinium pavonaceum*	SOC	LT	Native prairies that are seasonally moist.	Yes, pastures and emergent wetlands.
Thin-Leaved Peavine	*Lathyrus holochlorus*	SOC	LE	Margins of forests and fence rows.	Yes

* LE = Listed Endangered; LT = Listed Threatened; SOC = Species of Concern; C = Candidate

The ONHP participates in a national system for ranking rare, threatened, and endangered species throughout the world based on their conservation status, both globally and sub-nationally (in a particular state or province). The global rank characterizes the relative rarity of the species worldwide, while the subnational ranking considers only Oregon State. For each sensitive species identified as having the potential to occur in the project area, both the ORNHIC global rank and the subnational (state) rank are provided. ONHP maintains a separate ranking for rare, threatened, and endangered species in Oregon State, which is also provided. Ranking and

definitions for each list are provided in Tables 10 to 12. In the following subsections, global, state, and ONHP rankings are reported for each sensitive species.

Table 10. ORNHIC Global Rankings and Definitions for Rare, Threatened, and Endangered Species

Global Rank	Definition
G1	Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	Secure – Common, widespread and abundant.
Q	Questionable taxonomy - Global ranks sometimes have a "Q" at the end. This indicates that there are questions related to the taxonomic validity of the taxon.
T	If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator.

Table 11. ORNHIC Global Rankings and Definitions

State Rank	Definition
S1	Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.
S2	Imperiled because of rarity or because other factors demonstrably make it vulnerable to extinction, typically with 6-20 occurrences.
S3	Rare, uncommon, or threatened, but not immediately imperiled, typically with 21-100 occurrences.
S4	Not rare and apparently secure but with cause for long-term concern, usually with more than 100 occurrences.
S5	Demonstrably widespread, abundant, and secure.
SH	Historical occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered.

Table 12. ONHP Rankings and Definitions

ONHP List	Definition
1	Taxa that are threatened with extinction or presumed extinct throughout their entire range.
2	Taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon.
3	Taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
4	Taxa that are of a conservation concern but are not listed as threatened or endangered. This includes taxa that are rare but currently secure, as well as taxa that are declining in numbers or habitat, but are still too common to be proposed as threatened or endangered.

Eleven sensitive species are described in the following subsections. Table 13 summarizes their respective rankings and definitions.

Table 13. Rankings and Status for Sensitive Species in the Sunrise Project Area

Species	Global Rank	Heritage State Rank	Federal Status	State Status	Heritage List
Golden Paintbrush	GI	SH	LT	LE	1-ex
Bradshaw's Lomatium	G2	S2	LE	LE	1
Nelson's Sidalcea	G2	S2	LT	LT	1
Willamette Valley Daisy	G4T1	S1	LE	LE	1
Howellia	G2	S1	LT	NL	1
Kincaid's Lupine	G2	S1	LT	NL	1
White-topped Aster	G3	S2	SOC	LT	1
White Rock Larkspur	G3	S2	SOC	LT	1
Willamette Valley Larkspur	GIQ	S1	SOC	C	1
Peacock Larkspur	G3	S2	SOC	LT	1
Thin-leaved Peavine	G2	S2	SOC	LE	1

Golden Paintbrush

Golden paintbrush (*Castilleja levisecta*) is listed as threatened under the ESA (USFWS 1997) and the OESA (ORNHIC 2004). Critical habitat has not been designated for this species under the ESA. Golden paintbrush once occurred in the Willamette Valley province in Oregon, but it is now believed to be extirpated from this province. Golden paintbrush occurs in the Puget Trough physiographic province in Washington and British Columbia. It is now known in 10 extant populations in this province. The Rocky Prairie Natural Area Preserve population in Thurston County, Washington, is the southernmost known population of this species (USFWS 1997).

Golden paintbrush occurs in open grasslands at elevations below 350 feet elevation. This species is most commonly found on substrate composed of glacial outwash. This species blooms from April to June (USFWS 1997).

ODOT biologists found no individuals, populations, or suitable habitat for Golden paintbrush during their survey of the project corridor in June 2005, concluding that the project corridor was too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Bradshaw's Lomatium

Bradshaw's lomatium (*Lomatium bradshawii*) is listed as endangered under both the ESA (USFWS 1988) and OESA (ORNHIC 2004). Critical habitat has not been designated for this species under the ESA. The species is endemic to seasonally wet prairies within the central and southern portions of the Willamette Valley. It is known to occur in Benton, Lane, Linn, Marion, and Douglas counties (ORNHIC 2004). There are no extant or confirmed records of Bradshaw's lomatium occurring in Clackamas County (ORNHIC 2004). -

The majority of Bradshaw's lomatium populations occur on seasonally saturated or flooded prairies. The species is usually found by creeks and small rivers in the southern Willamette Valley. The populations may also occur on vernally saturated seepage channels with shallow soil over bedrock. This species blooms during the early spring (USFWS 1988).

ODOT biologists observed potentially suitable habitat for Bradshaw's lomatium during their June 2005 survey in the wetlands between Sieben Creek and SE 142nd Avenue and the palustrine emergent wetlands near the KEX towers. Since this survey was conducted after the optimal flowering period for this species, the site was revisited in April 2006 and a second meander survey was conducted. No individuals or populations of Bradshaw's lomatium were observed during this second survey (ODOT 2006b).

Nelson's Sidalcea

Nelson's sidalcea (*Sidalcea nelsoniana*) is listed as threatened under both the ESA (USFWS 1993) and the OESA (ORNHIC 2004). Critical habitat has not been designated for this species under the ESA. This species is reduced to relict remnant populations in the Willamette Valley centers, one population within the Coast Range, and a separate population in Cowlitz County, Washington. Over half of the remaining Willamette Valley locales have fewer than 100 plants. Nelson's sidalcea is known to occur in Clackamas, Linn, Marion, Polk, Tillamook, Washington, Yamhill counties (ORNHIC 2004).

Nelson's sidalcea occurs on moist, open ground in meadows and occasionally in wooded habitats. It is also known to occur along stream-sides and fencerows. The soils range from poorly drained to well-drained clay, clay loam, and gravelly loam. This species blooms in June and July (USFWS 1993).

ODOT biologists observed potentially suitable habitat for Nelson's sidalcea during their June 2005 survey This survey took place after the optimal flowering period for this species. No

individuals or populations of Nelson's sidalcea were observed in June 2005 (ODOT 2005b). Potentially suitable habitat was resurveyed in April 2006 and, again, no individuals or populations of Nelson's sidalcea were observed (ODOT 2006b). Most of this site appears to have been disturbed in the past from a variety of activities, providing marginal habitat at best (ODOT 2006b).

Willamette Valley Daisy

Willamette Valley daisy (*Erigeron decumbens* var. *decumbens*) is listed as endangered under both the ESA (USFWS 2000) and the OESA (ORNHIC 2004). Critical habitat has been designated for this species under the ESA (USFWS 2006). The project's API does not contain any designated critical habitat. When the Willamette Valley daisy was proposed for listing, it was known to occupy 28 sites across 286 acres in the Willamette Valley. These sites are scattered within Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill counties, Oregon (ORNHIC 2004).

This species generally flowers in June and July. The primary habitat for the Willamette Valley daisy is native wetland prairies where flooding creates anaerobic and strongly reduced soil conditions (USFWS 2000b).

ODOT biologists found no individuals, populations, or suitable habitat for the Willamette Valley daisy during their survey of the project corridor in June 2005, concluding that the corridor was too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Howellia (Howellia aquatilis)

Howellia is listed as threatened under the ESA (USFWS 1994). Critical habitat has not been designated for this species under the ESA. Historically, this species occurred over a large area of the Pacific Northwest and south into California. Populations in Oregon occurred within the floodplains of the lower Columbia and Willamette rivers in Clackamas, Marion, and Multnomah counties. Currently, howellia is thought to be extirpated in Oregon, and it is not listed under the OESA (ORNHIC 2004).

Howellia grows in firm, consolidated clay and organic sediments that occur in wetlands associated with ephemeral glacial pothole ponds and former river oxbows. These wetland habitats are filled with spring rains and, depending on temperature and precipitation, may exhibit some drying in some years (USFWS 1994). This species flowers in May.

ODOT biologists found no individuals, populations, or suitable habitat for Howellia during their survey of the project corridor in June of 2005, concluding that wetlands within the corridor are too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Kincaid's Lupine

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) is listed as threatened under both the ESA (USFWS 2000b) and OESA (ORNHIC 2004). Critical habitat has been designated for this species under the ESA (USFWS 2006). The project's API does not contain any designated critical habitat. At the time it was proposed for listing, Kincaid's lupine was known to occupy 51

sites throughout the Willamette Valley and one site in southern Washington. The northern limit of this subspecies is Lewis County, Washington, while it ranges south to Douglas County, Oregon (USFWS 2000b).

Kincaid's lupine is generally found in the Willamette Valley native upland prairie sites that are characterized by heavier soils and mesic to slightly xeric soil moisture levels. This species blooming period is from May to June (USFWS 2000b).

ODOT biologists found no individuals, populations, or suitable habitat for Kincaid's lupine during their survey of the project corridor in June 2005, concluding that the project area does not contain suitable habitat for Kincaid's lupine (ODOT 2005b).

White-topped Aster

White-topped aster (*Aster curtus*) is a federal species of concern (SOC). It is listed as threatened under the OESA (ORNHIC 2004). White-topper aster is a perennial. Its stems are typically unbranched and topped with clusters of inconspicuous white ray flowers that begin to emerge by April. Flowering occurs from July to September (Eastman 1990, Gilkey and Dennis 2001).

White-topped aster is restricted to the Willamette Valley–Puget Lowlands from Lane County, Oregon, north through the Willamette Valley to Thurston, Pierce, and Island counties, Washington, to the southeastern portions of Vancouver Island, British Columbia. It is known to occur in Clackamas, Lane, Linn, and Marion counties and may be present in Multnomah County (ORNHIC 2004).

White-topped aster is a native prairie species (Eastman 1990, Gilkey and Dennis 2001). Most habitats are seasonally mesic but are moisture-stressed in late summer. White-topped aster habitats are dominated by native grasses, often bordered by Douglas fir and Oregon white oak.

ODOT biologists found no individuals, populations, or suitable habitat for white-topped aster during their survey of the project corridor in June 2005, concluding that grassland sites within the corridor are too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

White Rock Larkspur

White rock larkspur (*Delphinium leucophaeum*) is a federal species of concern. It is listed as endangered under the OESA (ORNHIC 2004). White rock larkspur is slender perennial that grows from a cluster of small bulbs. The flowering stems range from 8 inches to 2 feet in height. The flower head may have from 6 to 30 individual flowers. The flowers range from white to cream-colored; the petals may have lavender edges (Gilkey and Dennis 2001). The species flowers from May through June and fruits from May to August. White rock larkspur is known to occur in Clackamas, Marion, Multnomah, Washington, and Yamhill counties in Oregon and in one known site in Lewis County, Washington (ORNHIC 2004).

White rock larkspur inhabits undisturbed sites on dry bluffs, cliffs, and rocky areas along the lower Willamette and Columbia Rivers (Eastman 1990, Gilkey and Dennis 2001) as well as prairies, meadows, ditches, and fencerows.

ODOT Biologists found no individuals, populations, or suitable habitat for White rock larkspur during their survey of the project corridor in June of 2005, concluding that the project area does not contain any rocky bluff or other suitable habitat for White rock larkspur (ODOT 2005b).

Willamette Valley Larkspur

Willamette Valley larkspur (*Delphinium oreganum*) is a federal species of concern. It is a candidate for listing under the OESA (ORNHIC 2004). Willamette Valley larkspur is a perennial that grows from a tuber-like base. The leaf blades are from 1 to 2 inches wide. The flowering stems range from 1.5 to 2.5 feet in height. The flowers range from dark-blue to purple (Gilkey and Dennis 2001). Willamette Valley larkspur is known to occur in Clatsop, Lane, Linn, Marion, and Yamhill counties, and it may occur in Polk County (ORNHIC 2004).

Willamette Valley larkspur inhabits moist open ground (Gilkey and Dennis 2001). No individuals or populations of white rock larkspur were observed within the project corridor during the on-site field reconnaissances, but the corridor has not been subject to an intensive plant survey.

ODOT biologists found no individuals, populations, or suitable habitat for Willamette Valley larkspur during their survey of the project corridor in June of 2005, concluding that the corridor was too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Peacock Larkspur (Delphinium pavonaceum)

Peacock larkspur is a federal species of concern. It is listed as endangered under the OESA (ORNHIC 2004). Peacock larkspur is similar to white rock larkspur but larger, growing to 3 feet in height. The flowers are white with a tinge of purple at the base (Eastman 1990). The species flowers in May and June (Eastman 1990). Peacock larkspur is known to occur in Benton, Clackamas, Lane, Marion, and Polk counties (ORNHIC 2004).

Peacock larkspur inhabits moist areas of native prairie, and it is found along roadsides that have escaped development (Gilkey and Dennis 2001).

ODOT biologists found no individuals, populations, or suitable habitat for Peacock larkspur during their survey of the project corridor in June 2005, concluding that the corridor was too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Thin-leaved Peavine

Thin-leaved peavine (*Lathyrus holochlorus*) is a federal species of concern. It is listed as endangered under the OESA (ORNHIC 2004). Thin-leaved peavine is a stout, rhizomatous perennial that grows up to 3 feet tall. The flowers are creamy-yellow, turning deep yellowish-

brown. The legumes are smooth and up to 2 inches long (Gilkey and Dennis 2001). The species is endemic to the Willamette Valley and southwestern Washington. In Oreon, it is known to occur in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill counties and may occur in Douglas County as well (ORNHIC 2004).

The species occupies forest borders and openings. It is found along margins of woods and fence rows (Gilkey and Dennis 2001), along roadsides in grassland, or climbing in low shrubby vegetation (Gilkey and Dennis 2001).

ODOT biologists found no individuals, populations, or suitable habitat for thin-leaved peavine during their survey of the project corridor in June 2005, concluding that the corridor was too disturbed to be considered potentially suitable habitat for this species (ODOT 2005b).

Noxious Weeds

Executive Order 13112 requires federal agencies to detect and respond rapidly to and control populations of invasive species in a cost-effective and environmentally friendly manner; to monitor invasive species populations; and to provide for habitat restoration of native species and habitat conditions in ecosystems that have been invaded. An invasive species is a non-native species whose introduction causes, or is likely to cause, economic or environmental harm, or harm to human health.

Although much of the corridor has been subjected to a long history of disturbance and plant communities are often dominated by non-native species that arguably cause environmental harm, Executive Order 13112 is usually applied to the state-listed noxious weeds that are discussed below.

Noxious weeds are defined by the Oregon State Weed Board as exotic, nonindigenous species that are injurious to public health, agriculture, recreation, wildlife, or any public or private property. The Oregon Department of Agriculture has designated Oregon State listed noxious weeds as either “A,” “B,” and/or “T,” according to the its Noxious Weed Rating System. A weed designated as “A” is a weed of known economic importance that occurs in the state in small enough infestations to make eradication/containment possible; or one that is not known to occur, but its presence in neighboring states makes future occurrence in Oregon seem imminent. Infestations are subject to intensive control when and where found.

A weed designated as “B” is a weed of economic importance that is regionally abundant, but that may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is not feasible, biological control should be the main control approach. Limited intensive control at the state or county level is determined on a case-by-case basis.

A weed designated as “T” is a priority noxious weed, designated by the State Weed Board as a target weed species for which ODA will implement a statewide management plan (ODA 2003).

No A- or T-designated noxious weeds were found within the project corridor. The survey resulted in the detection of seven B-designated noxious weed species. Species with a B rating are

subject to limited to intensive control measures, as deemed necessary by Clackamas County. The seven B-designated noxious weeds observed in the project corridor are listed in Table 14.

Table 14. B-Designated Noxious Weeds in the Sunrise Project Corridor

Common Name	Scientific Name	Associated Plant Communities
Scotch broom	*Cytisus scoparius*	Industrial disturbed, upland grass
English ivy	*Hedera helix*	Mixed deciduous, conifer forest
Himalayan blackberry	*Rubus armeniacus*	Industrial disturbed, upland grass, mixed deciduous, conifer forest
Meadow knapweed	*Centaurea pratensis*	Industrial disturbed, upland grass, Camp Withycombe area, northeast of KEX Radio tower site
Quackgrass	*Agropyron repens*	Industrial disturbed, upland grass
Common St. John's-wort	*Hypericum perforatum*	Industrial disturbed, upland grass
Canada thistle	*Cirsium arvense*	Industrial disturbed, upland grass
Japanese Knotweed	*Polygonum cuspidatum*	

ENVIRONMENTAL CONSEQUENCES

Wildlife and Botanical Resources

Sensitive Plant Species

The project corridor has been subject to a history of disturbance and at best provides marginal habitat for only Bradshaw's lomatium and Nelson's sidalcea in the wetlands between Sieben Creek and SE 142nd Avenue (ODOT 2005). This site was subject to two meander surveys, one in June 2005 and the other in April 2006, which were timed to the flowering period of these two species. No individuals or populations of either species were observed during the surveys (ODOT 2005b, 2006b). The history of disturbance has left the remainder of the corridor unsuitable for any other sensitive plant species identified as potentially occurring with the project corridor by USFWS and ORNHIC (ODOT 2005b, 2006b). There will be no direct, indirect, or cumulative impacts to sensitive plant species.

Sensitive Plant Communities

Plant communities within the project's API are typical of those found within the lower Willamette Valley. No plant communities observed are considered to be rare on either a global or regional scale (Kagen et al., 2004; Christy 2004). There would be no direct, indirect or cumulative impacts to sensitive plant communities, defined here as having ORNHIC global or state rankings of G1, G2, or G3 as a result of constructing either build alternative or any of the design options.

Impacts to wildlife and botanical resources are discussed concurrently because much of the wildlife impact is due to the loss of habitat that the botanical resources provide.

Alternative 1: No-Build

The No-Build Alternative would result in no direct impacts to biological resources. The SE 82nd Drive extension would be constructed through fully developed urban land that provides habitat for weakly territorial species that are tolerant of human disturbance. Most native vegetation has been eliminated, and much of the wildlife habitat consists of man-made structures. Exotic generalist species, such as rock doves, starlings, and house sparrows, are expected to be the most abundant species. The area does not provide for any wildlife dispersal or movement.

The Highway 212 eastbound climbing lane and SE 172nd Avenue (Foster Road to Highway 212) are located in primarily agricultural lands. The quality of wildlife habitat in this area is low due to the lack of structure (which usually provides cover and breeding habitat), as well as the high level of agricultural disturbance. Since the projects would improve existing roads, impacts would be confined along the edge of the roads that provide no wildlife habitat value.

Alternative 2: Build with Midpoint Interchange

Alternative 2 would affect a total of 122.1 acres of Metro's mapped upland wildlife habitat and riparian corridors (Figure 17). Impact areas by habitat class are listed in Table 15.

Table 15. Alternative 2 Impacts to Wildlife Habitat (Upland and Riparian)

Metro Mapped Habitat Type	Impacted Area (acres)
Upland Class A	8.7
Upland Class B	24.8
Upland Class C	22.8
Total Upland	**56.3**
Riparian Class I	22.6
Riparian Class II	19.2
Riparian Class III	2.8
Total Riparian	**44.6**
Total Impact	**100.9**

This discussion of wildlife impacts generally follows a northwest to southeast direction, beginning at SE 82nd Avenue and continuing along the alignment to its eastern terminus near SE 172nd Avenue.

SE 82nd Avenue

Improvements planned to SE 82nd Avenue near the northern terminus of the project would impact the large riparian/upland habitat complex that is located both east and west of SE 82nd Avenue (Figure 18). This area is mapped as Class A upland habitat and Class I riparian habitat. Two new bridges are planned in this area. One would connect the southern and northern sections of SE Ambler Road, just east of SE 82nd Avenue. This bridge would be constructed over the UPRR track and Mount Scott Creek, which in this area is the Mount Talbert to Three Creeks wildlife corridor. Here, cottonwood trees and willows provide a degree of cover for traveling wildlife and small mammals, together with nesting habitat for passerines (perching birds). Currently, the design of this bridge is not developed enough to know whether it would span the wildlife corridor, but it is likely that at least several piers would need to be constructed and all trees and shrubs would be removed through the bridge construction corridor.

The second bridge would be situated immediately west of SE 82nd Avenue and would be for the new on-ramp for southbound SE 82nd Avenue to eastbound on the proposed Sunrise Project highway. Proceeding north to south, this new bridge would impact the east edge of a forested wetland, and then cross over Philips Creek, the UPRR track, Mount Scott Creek (which is the Mount Talbert to Three Creeks wildlife corridor) and, finally, Dean Creek. The impact area includes the eastern edge of a large mosaic of upland and wetland habitat mapped as Type 1 Riparian Habitat and Class A Upland Habitat (Metro 2004). Impacts would be confined to the areas immediately adjacent to SE 82nd Avenue where wildlife values are currently compromised.

A wetland mitigation site constructed by ODOT is located just north of the I-205/SE 82nd Avenue interchange. This site would be partially filled. Impacts to this mitigation site are detailed in the Wetlands Technical Report for the Sunrise Project.

Mount Scott Creek Culvert Area

At Mount Scott Creek and I-205, new cut-and-fill slopes would be required to construct the new westbound Sunrise highway to the northbound I-205 on-ramp. The new on-ramp would be

constructed under the existing Sunnybrook off-ramp, resulting in new impacts to the narrowest segment of the Mount Talbert to Three Creeks wildlife corridor (Figure 18). Wildlife entering this area use the Mount Scott Creek riparian corridor while traveling from Mount Talbert to Three Creeks. Based on visible wildlife trails, it appears that some wildlife travel through the forested area along the southern bank of the creek, but Himalayan blackberry thickets in the understory make traveling through that area much more difficult. Wildlife trails are clearly evident through the open areas on the I-205 fill slope above the culvert. This open slope is where the new I-205 on-ramp would be constructed, potentially creating a complete barrier to wildlife movement.

The design is not yet sufficiently developed to know the full extent of the cuts and fills; however, the potential exists that slopes would extend to the edge of the Adventist Medical Building property. In such a case, fences around that property would force wildlife to either use the cut slope leading down to the new on-ramp or to turn around. The possibility exists that the wildlife corridor at this location could be severed.

Currently, the Sunnybrook off-ramp is higher in elevation than the wildlife corridor, and this difference in elevation provides a degree of cover for wildlife. The new cut-and-fill slopes for the proposed I-205 on-ramp would reverse this situation. Wildlife, if they could even access the area, would be forced onto the cut slope leading down to the new on-ramp, fully exposing them as they travel on the new cut slope. This situation would require construction of deer barriers along the proposed I-205 on-ramp to prevent deer from accessing the ramp and causing an obvious safety issue for the traveling public as well as any wildlife on the ramp.

Immediately south of the culvert, traveling wildlife are confined to an almost single-file path along the Sunnybrook off-ramp fill slope and a dense Himalayan blackberry thicket. The entire width of the corridor is only 20 to 30 feet wide. Wildlife stay close to the blackberry thicket, which allows the deer (and other wildlife) to be as far from the off-ramp as possible. In this area, wildlife currently 10 to 15 feet down the slope from the off-ramp. Alternative 2 would reverse this arrangement and expose wildlife to traffic for 100 feet or more as they travel southwest down to the KEX tower site. Although the slopes would be planted with native plants to provide cover in the future, it would take many years for the plants to grow large enough to fulfill this function.

Realignment of Lawnfield Road

Alternative 2 includes the realignment of Lawnfield Road (Figure 18), which would also be constructed in this area. This design feature would impact 2.6 acres of Metro's mapped upland and wetland habitats (Metro 2004). Impacts to the wetlands are discussed in greater detail in the Wetlands Technical Report.

Fill slopes for the Sunrise Project to northbound I-205 would meet the fill slopes for the realigned Lawnfield Road, creating a V-shaped, ravine-like condition with 2:1 (horizontal:vertical) slopes. Wildlife typically avoid long and narrow ravine-like passages because of the limited potential for escape from predators. The base should be at least 50 feet wide to accommodate wildlife passage.

The realigned Lawnfield Roadwould bisect a large, high-quality wetland complex located in and around the KEX radio tower site. This wetland complex contains both forested and emergent components and supports a plant community dominated by native wetland species. Wildlife likely utilize the wetland for forage and thermal refuge during the summer as they travel the Mount Talbert to Three Creeks corridor. Deer use of the forested area for bedding is clearly evident. Other urban wildlife such as raccoon and opossum; a variety of avifauna, including neotropical migrants; amphibians; and bats could all use the variety of habitats this wetland complex provides.

An approximately 400-foot-long bridge would be constructed through the forested area that would allow wildlife passage under the structure. The design of this bridge is not complete, but it is likely that at least several piers would need to be constructed and all trees and shrubs would be removed through the bridge construction corridor.

KEX Radio Tower Site

Continuing southwest along I-205, a new bridge would be constructed to carry the west-bound Sunrise Project highway to the northbound I-205 on-ramp over Dean Creek. North of the bridge, the ramp would be built on fill material. An approximately 450-foot-long retaining wall would be constructed to keep fill material out of the ditch that runs north of the fence that surrounds the KEX site. The ditch is heavily vegetated in areas with willows and blackberries, making it mostly impassable for deer and other large wildlife. In this area, wildlife currently use the road that accesses ODOT's stormwater treatment swales south of I-205 as their travel corridor. These swales would be relocated, and the road would not be reconstructed. The current design appears to place the retaining wall very close to the edge of the ditch, potentially adding another narrow constriction to the corridor. To allow for wildlife movement, the fill slopes should be steepened as much as possible and the wall placed as far from the ditch as possible.

Camp Withycombe Area

Continuing southeast, the alignment crosses the Northwest Pipe and Casing facility (a Superfund site), which is described in the Hazardous Materials Technical Report. This site offers little to no wildlife value. Metro (2004) has mapped a stream corridor in this area as Riparian Class II bordered by Upland Class B habitat. This stream corridor has been redirected through roadside ditches. The value of this resource has been severely compromised and currently provides little to no wildlife habitat.

The alignment then enters Camp Withycombe where it crosses a mosaic of maintained upland grasslands and emergent wetlands near the edge of the conifer forest. Because of the amount of activity within the Camp, these fields provide limited wildlife value; however, they do provide habitat for small rodents, which in turn provide raptor foraging opportunities. Land within Camp Withycombe was not mapped by Metro as providing riparian or upland habitats (Metro 2004) (Figure 18). The main Mount Talbert to Rock Creek wildlife corridor is generally north of this area through the large coniferous forest block currently owned by ODOT. Due to the closeness of these fields to the conifer forest, however, it is likely that deer traveling through the corridor occasionally use the fields for grazing. The planned multi-use path would be constructed in the area where forested and grassland habitat types converge. Loss of edge habitat reduces overall

habitat complexity and directly reduces habitat for edge species. Deer typically forage along edge habitat, and the multi-use path and proximity to the Sunrise Project would make it less likely that deer would venture out onto this forage area. The current design does not include lights for the path, which if included, would make wildlife even less likely to use the area.

Clackamas Bluffs

East of Camp Withycombe, the wildlife corridor extends along the escarpment where single-family housing is the dominant land use on the terrace and industrial land uses dominate along its base (Figure 19). This area is where the proposed single midpoint interchange would be constructed. Retaining walls would be built on the upslope (north) side of the Sunrise alignment to limit the extent of intrusion into the wildlife corridor. At the midpoint of the interchange, however, where the greatest intrusion would occur, the wildlife corridor would be narrowed from approximately 150 feet wide (horizontal distance) to approximately 75 feet wide – effectively reducing its width by one-half in this area. The lateral extent of impacts associated with the interchange is approximately 2,000 feet, though the width of the intrusion decreases as the ramps taper back into the Sunrise alignment. Lights would be installed at the interchange and along the proposed Sunrise alignment, thereby reducing the suitability of the corridor for nocturnal travel and making it even more unsuitable for species that are less tolerant of human activity.

The only difference between Alternatives 2 and 3 occurs in this area. Constructing a midpoint interchange (Alternative 2) would impact an additional 3.0 acres of Class B Upland Habitat that would not be affected if the interchange was not built (Alternative 3).

Continuing east of the interchange area, Alternative 2 would position the alignment close to the base of the escarpment (i.e., the southern third of the escarpment width) where Himalayan blackberry often forms dense, impassable thickets. Given the impassable vegetation and proximity to industrial activity, the impacted area (the southern and lowest part of the corridor) would be the least likely portion of the escarpment to be used by wildlife traveling through the area.

To construct the Sunrise Project and its associated retaining wall, all trees and shrubs would be removed immediately upslope of the areas permanently impacted. Though these areas would likely be replanted with native trees and shrubs, it would take many years for them to grow to maturity and provide the cover function currently provided by existing large trees on the escarpment. This additional temporal loss of habitat would functionally narrow the corridor for a number of years, thus decreasing the suitability of the corridor for species less tolerant of human activity.

As is already the case, areas adjacent to development are susceptible to invasion by invasive non-native plant species, such as Himalayan blackberry. This condition further degrades the habitat and the suitability of the area for wildlife to move through it.

As noted previously, the wildlife corridor follows the vegetated areas of the escarpment as it wraps northward around the terrace at SE 135th Avenue. Here, the wildlife corridor crosses SE 135th Avenue just to the north of Alternative 2's API and into wooded areas east of SE 135th Avenue north of the API.

SE 135th Avenue to Rock Creek

The Alternative 2 alignment crosses SE 135th Avenue and enters into a large scrub-shrub and emergent wetland/upland complex on undeveloped land west of SE 142nd Avenue. Here, the alignment impacts Riparian Class I and Riparian Class II habitats (Figure 19). This wetland/upland complex adds habitat complexity and additional browse species for wildlife traveling the Mount Talbert to Rock Creek corridor, which is located immediately to the north. It also provides habitat for small mammals which, in turn, provide a prey base for foraging raptors.

Within this large wetland/upland complex, Alternative 2 would require construction of an access road north of the Sunrise alignment westward from SE 142nd Avenue. Taken as a whole (the Sunrise alignment and the parallel access road to the north), Alternative 2 would bisect the wetland/upland complex, effectively severing this habitat from the forested area to the north.

Sieben Creek has been ditched along the western edge of these parcels. A new culvert would pass the creek under the Sunrise alignment. The culvert should comply with Oregon's fish passage rule and be large enough to include an earthen bench that enables small mammals and amphibians to pass through it.

The alignment crosses SE 142nd Avenue on a new bridge, approximately 18 feet above SE 142nd Avenue. To gain this elevation, the Sunrise alignment would be built on fill slopes. It is the lateral extent of the fill slopes that is responsible for much of the impact to wildlife habitat.

The alignment and associated fill slopes would completely fill the emergent wetland behind the EZ Storage units. Impacts associated with this fill are discussed in greater detail in the Wetlands Technical Report.

Continuing east, Alternative 2 would pass through open, undeveloped ground south of the main wildlife corridor. This area provides limited wildlife value because larger tracts of forested habitat are found immediately to the north. This area may provide habitat for small rodents and foraging habitat for raptors. It is in the area near the unnamed tributary to Rock Creek that the wildlife corridor and the proposed alignment begin to overlap again.

Between the unnamed tributary to Rock Creek and the Rock Creek riparian corridor, the wildlife corridor is limited to a narrow strip (less than 200 feet wide) of coniferous mixed-forest land situated between housing developments to the north and a mobile home court to the south. The alignment for Alternative 2 is primarily through the mobile home park, but it also affects the wildlife corridor. Through this area, the alignment is built up on fill slopes as it approaches the proposed new bridge over Rock Creek. Construction activities and the fill slopes would create at least a temporary impact to the wildlife corridor in this area. The banks of the fill slope would be planted with vegetation that would provide cover to wildlife using the corridor, but it would take several years for the plants to grow tall enough to provide cover for traveling wildlife. Consequently, wildlife may avoid the area for some time.

A new bridge would be constructed over Rock Creek. The area of the proposed crossing is steep, leading down to Rock Creek. The riparian corridor supports the mixed conifer plant community.

Rock Creek provides the last leg of the wildlife corridor to the Clackamas River corridor. The bridge itself would not impede wildlife passage along the Rock Creek riparian corridor given the height of the new bridge over Rock Creek.

Highway 212/224 Interchange

Construction of the proposed folded interchange would impact the entire wooded knoll that is north of the existing Highway 212/224 alignment. This knoll, mapped as Upland Class A and B habitat by Metro (2004) (Figure 19) supports the conifer and mixed forest habitat type and provides thermal cover, forage, and resting habitat for deer, coyote, and other small mammals (e.g., raccoon and opossum). The knoll also provides foraging, roosting, and nesting habitat for a variety of bats and avifauna, including neotropical migrants and native passerines. These functions would be lost. The ramps to the north of the proposed alignment impact agricultural fields that are farmed wetland in low-lying areas. A discussion of these wetland impacts is provided in the Wetlands Technical Report.

Continuing to the eastern terminus of the project, Alternative 2 impacts agricultural fields offering limited wildlife value and a very dense stand of young Douglas fir. The density of the trees within this lot limits its value to large wildlife, but the lot does provide habitat for small mammals and passerines.

South of the proposed interchange along Highway 224, access roads lead into an old rock quarry that is now being developed for single-family housing. This area provides no wildlife habitat.

Alternative 3: Build with No Midpoint Interchange

Alternative 3 follows the exact same alignment as Alternative 2 except that a midpoint interchange would not be constructed. Alternative 3 would impact a total of 119.1 acres of Metro's mapped upland wildlife habitat and riparian corridors (Figure 20). Impact areas by habitat class are listed in Table 16.

Table 16. Alternative 3 Impacts to Wildlife Habitat

Metro Mapped Habitat Type	Alternative 3 Areas of Impact (acres)
Upland Class A	8.7
Upland Class B	21.8
Upland Class C	22.8
Total Upland	**53.3**
Riparian Class I	22.6
Riparian Class II	19.2
Riparian Class III	2.8
Total Riparian	**44.6**
Total Impact	**97.9**

All impacts described under Alternative 2 would occur under Alternative 3 as well, with the exception that not building the interchange and its associated on-and off ramps reduce impacts to Upland Class B wildlife habitat along the Clackamas Bluffs by three acres (Figure 21). While

Alternative 2 would decrease the horizontal width of the corridor in the area of the interchange from approximately 150 feet wide (horizontal distance) to approximately 75 feet wide, Alternative 3 would result in a corridor approximately 100 feet wide in the same area. Table 17 compares the impacts to upland and riparian wildlife habitat resulting from the two build alternatives.

Table 17. Comparison of Impacts to Upland and Riparian Wildlife Habitat under Alternatives 2 and 3

Metro Mapped Habitat Type	Alternative 2 Areas of Impact (acres)	Alternative 3 Areas of Impact (acres)	Alternative 2 Compared to Alternative 3
Upland Class A	8.7	8.7	-
Upland Class B	24.8	21.8	+3.0
Upland Class C	22.8	22.8	-
Total Upland	**56.3**	**53.3**	**+3.0**
Riparian Class I	22.6	22.6	-
Riparian Class II	19.2	19.2	-
Riparian Class III	2.8	2.8	-
Total Riparian	**44.6**	**44.6**	**-**
Total Impact	***100.9***	***97.9***	***+3.0***

Design Options

Design Option A-2

Design Option A-2 would not include the realignment of Lawnfield Road (Figure 22). With this design element removed, impacts to upland and riparian habitats associated with the connector would not occur. Table 18 provides a comparison of the two build alternatives with and without Design Option A-2 over the entire length of the project.

Table 18. Comparison of Areas of Wildlife Impact for Design Option A-2 under Alternatives 2 and 3 (acres)

Metro Mapped Habitat Type	Alternative 2 with Design Option A-2	Difference Compared to Alternative 2	Alternative 3 with Design Option A-2	Difference Compared to Alternative 3	Alternative 2 Compared to Alternative 3
Upland Class A	8.7	-	8.7	-	-
Upland Class B	24.2	-0.6	21.2	-0.6	+3.0
Upland Class C	22.7	-0.1	22.7	-0.1	-
Total Upland	**55.6**	**-0.7**	**52.6**	**-0.7**	**+3.0**
Riparian Class I	20.7	-1.9	20.7	-1.9	-
Riparian Class II	19.2	-	19.2	-	-
Riparian Class III	2.8	-	2.8	-	-
Total Riparian	**42.7**	**-1.9**	**42.7**	**-1.9**	**-**
Total Impact	***98.3***	***-2.6***	***95.3***	***-2.6***	***+3.0***

Because this option removes a design element, its net effect on both build alternatives is identical. Design Option A-2 would reduce impacts to Metro's mapped upland wildlife habitat and riparian corridors by approximately 2.6 acres. This total includes 0.1 acre of Class A upland habitat, 0.5 acre of Class B upland habitat, and 2.0 acres of Class I riparian habitat. The mapped riparian habitat is the high-quality forested and emergent wetland complex located north and east of the KEX radio tower site. Additionally, there would be no V-shaped ravine because there would be no fill slopes for the connector.

The difference between Alternatives 2 and 3, both incorporating Design Option A-2, is still the impact to 3.0 acres of Upland Class B Habitat associated with building the midpoint interchange, which is not affected by this design option. Table 19 lists the impacts to upland and riparian habitats within Zone A.

Table 19. Impacts to Upland and Riparian Habitats in Zone A (acres)

Metro Mapped Habitat Type	Alternatives 2 and 3	Design Option A-2	Difference
Upland Class A	1.7	1.7	-
Upland Class B	1.0	0.5	-0.5
Upland Class C	9.9	9.9	-
Total Upland	**12.6**	**12.1**	**-0.5**
Riparian Class I	10.7	8.8	-1.9
Riparian Class II	8.2	8.2	-
Riparian Class III	1.9	1.9	-
Total Riparian	**20.8**	**18.9**	**-1.9**
Total Impact	***33.4***	***31.0***	***-2.4***

Design Option B-2

With Design Option B-2, a modified split interchange would be constructed rather than the grade-separated midpoint single interchange. This option only applies to Alternative 2 since Alternative 3 does not include a midpoint interchange. This design option extends across both the Zones B and C. Under this design option, eastbound travelers on the expressway would exit at SE 122nd Avenue and merge at SE 135th Avenue, whereas westbound travelers would exit at SE 135th Avenue and merge at SE 122nd Avenue. Table 20 provides a comparison of Alternative 2 with and without Design Option B-2 over the entire length of the project.

Table 20. Impacts to Wildlife Habitat under Alternative 2 with and without Design Option B-2 (acres)

Metro Mapped Habitat Type	Alternative 2 with Design Option B-2	Alternative 2 without Design Option B-2
Upland Class A	8.7	-
Upland Class B	20.9	-3.9
Upland Class C	23.9	+1.1
Total Upland	**53.5**	**-2.8**
Riparian Class I	24.1	+1.4
Riparian Class II	20.8	+1.6
Riparian Class III	2.8	-
Total Riparian	**47.7**	**+3.0**
Total Impact	***101.2***	***+0.2***

Impacts to upland and riparian habitats within Zones B and C are listed in Table 21.

Table 21. Impacts to Upland and Riparian Habitats in Zones B and C

Metro Mapped Habitat Type	Alternative 2	Design Option B-2	Difference
Upland Class A	0.0	0.0	-
Upland Class B	20.7	16.8	-3.9
Upland Class C	2.7	3.3	+0.6
Total Upland	**23.4**	**20.1**	**-3.3**
Riparian Class I	7.0	8.4	+1.4
Riparian Class II	6.6	8.2	+1.6
Riparian Class III	0.0	0.0	-
Total Riparian	**13.6**	**16.6**	**+3.0**
Total Impact	***37.0***	***36.7***	***-0.3***

Design Option B-2 largely moves the area of impact from the Clackamas Bluffs where Upland Class B habitat occurs to the wetland/upland complex between SE 135th Avenue and SE 142nd Avenue where Riparian Class I and II habitats occur (Figure 23).

The ramps west of SE 122nd Avenue would impact mowed fields at Camp Withycombe, as well as minor intrusions into the coniferous forest immediately west of the Clackamas Bluffs. The alignment then follows a path similar to Alternative 3 along the Clackamas Bluffs. Ramps east of SE 122nd Avenue would impact the large scrub-shrub and emergent wetland/upland complex on undeveloped land between SE 135th Avenue and SE 142nd Avenue and the emergent wetland east of SE 142nd Avenue.

The impacts would largely fall within the footprint of Alternative 3, with the westbound off-ramp located between the Sunrise alignment and the new access road that would be constructed north of the Sunrise Project from SE 142nd Avenue. The westbound on-ramp would result in a small additional amount of wetland impact in the southwest corner of the wetland complex. This area would be functionally isolated from the main wildlife corridor with either of the two build alternatives. Additional wildlife impacts associated with the westbound ramps would be minimal.

Design Option C-2

Two design options (C-2 and C-3) are under consideration for locating the alignment through the undeveloped parcels west of SE 142nd Avenue. Their respective impacts to Metro's mapped wildlife habitats are illustrated in Figure 24.

Design Option C-2, the "central alignment" option, would locate the Sunrise project closer to Highway 212/224 than either of the two build alternatives or Design Option C-3. Design Option C-2 would not require the parallel access road across the wetland complex west of SE 142nd Avenue, as both Alternatives 2 and 3 do, but it would require a road leading to the east from SE 142nd Avenue. This road would impact the southern half of the emergent wetland behind the EZ Storage facility.

Table 22 provides a comparison of the two build alternatives with and without Design Option C-2 and a comparison of Alternative 2 with Design Option C-2 to Alternative 3 with Design Option C-2.

Table 22. Comparison of Design Option C-2 Impacts to Wildlife Habitat under Alternatives 2 and 3 (acres)

Metro Mapped Habitat Type	Alternative 2 with Design Option C-2	Alternative 2 without Design Option C-2	Alternative 3 with Design Option C-2	Alternative 3 without Design Option C-2	Difference between Alternative 2 and Alternative 3 with Design Option C-2
Upland Class A	8.7	-	8.7	-	-
Upland Class B	20.2	-4.6	17.2	-4.6	+3.0
Upland Class C	23.2	+0.4	23.2	+0.4	-
Total Upland	**52.1**	**-4.2**	**49.1**	**-4.2**	**+3.0**
Riparian Class I	20.1	-2.5	20.1	-2.5	-
Riparian Class II	17.8	-1.4	17.8	-1.4	-
Riparian Class III	2.8	-	2.8	-	-
Total Riparian	**40.7**	**-3.9**	**40.7**	**-3.9**	**-**
Total Impact	***92.8***	***-8.1***	***89.8***	***-8.1***	***+3.0***

Impacts to upland and riparian habitats associated with Design Option C-2 within Zone C are listed in Table 23.

Table 23. Impacts to Upland and Riparian Habitats in Zone C (acres)

Metro Mapped Habitat Type	Alternatives 2 and 3	Design Option C-2	Difference
Upland Class A	0.0	0.0	-
Upland Class B	9.3	4.7	-4.6
Upland Class C	2.7	3.2	+0.5
Total Upland	**12.0**	**12.0**	**-4.1**
Riparian Class I	7.0	4.4	-2.6
Riparian Class II	6.6	5.2	-1.4
Riparian Class III	0.0	0.0	-
Total Riparian	**13.6**	**13.6**	**-4.0**
Total Impact	***25.6***	***25.6***	***-8.1***

Design Option C-2 reduces impacts to upland and riparian habitats when incorporated into either of the build alternatives. This option reduces impacts to mapped riparian areas (wetlands) by moving the proposed alignment closer to Highway 212/224 between SE 135th Avenue and Rock Creek. This movement reduces impacts to the large scrub-shrub/emergent wetland complex between SE 135th Avenue and SE 142nd Avenue. It would also minimize impacts to the emergent wetland behind the EZ Storage units by filling only approximately the southern third of the wetland rather than entirely filling the entire wetland as Alternative 2 would do.

By being closer to the existing alignment of Highway 212/224, Option C-2 would isolate a much smaller piece of the wetland complex from wildlife use, thereby maintaining the largest patch of contiguous habitat of all the design options under consideration for this area. Given that all of this land is privately held, there is no guarantee that it would not be developed in the future.

With Option C-2, impacts to the wildlife corridor along the Clackamas Bluffs would be slightly less than under the Alternatives 2 and 3 because the Sunrise alignment would not curve around the base of the escarpment just west of SE 135th Avenue as it does with the build alternatives. The impacts would be even less compared to Option C-3, which locates the Sunrise alignment farther to the north.

Design Option C-3

Design Option C-3, the "central modified follow the tree line" option, would locate the Sunrise Project farther to the north between SE 135th Avenue and SE 152 Avenue than either of the two build alternatives or Design Option C-2 would (Figure 24). By pushing the alignment farther north, Design Option C-3 would result in increased encroachment on the active wildlife corridor. Because the proposed alignment would be farther north on the slope, instead of down on the flatland, SE 142nd Avenue would be built up on fill slopes and cross over the Sunrise on a new overpass bridge instead of passing under it as would be the case with the Alternatives 2 and 3 and Design Option C-2. Fill slopes north of the proposed overpass would impact coniferous mixed forest habitat that currently serves as part of the wildlife corridor.

Table 24 provides a comparison of the two build alternatives with and without Design Option C-3 and a comparison of Alternative 2 with Design Option C-3 to Alternative 3 with Design Option C-3.

Table 24. Comparison of Design Option C-3 Impacts to Wildlife Habitat under Alternatives 2 and 3 (acres)

Metro Mapped Habitat Type	Alternative 2 with Design Option C3	Alternative 2 with Design Option C3 Compared to Alternative 2	Alternative 3 with Design Option C3	Alternative 3 with Design Option C-3 Compared to Alternative 3	Alt 2 with Design Option C-3 Compared to Alternative 3 with Design Option C3
Upland Class A	8.7	-	8.7	-	-
Upland Class B	39.2	+14.4	36.2	+14.4	+3.0
Upland Class C	22.3	-0.5	22.3	-0.5	-
Total Upland	**70.2**	**+13.9**	**67.2**	**+13.9**	**+3.0**
Riparian Class I	19.4	-3.2	19.4	-3.2	-
Riparian Class II	18.7	-0.5	18.7	-0.5	-
Riparian Class III	2.8	-	2.8	-	-
Total Riparian	**40.9**	**-3.7**	**40.9**	**-3.7**	**-**
Total Impact	***111.1***	***+10.2***	***108.1***	***+10.2***	***+3.0***

Impacts to upland and riparian habitats associated with Design Option C-3 within Zone C are listed in Table 25.

Table 25. Impacts to Upland and Riparian Habitats in Zone C (acres)

Metro Mapped Habitat Type	Alternatives 2 and 3	Design Option C-3	Difference
Upland Class A	0.0	0.0	-
Upland Class B	9.3	23.7	+14.4
Upland Class C	2.7	2.3	-0.4
Total Upland	**12.0**	**26.0**	**+14.0**
Riparian Class I	7.0	3.7	-3.3
Riparian Class II	6.6	6.2	-0.4
Riparian Class III	0.0	0.0	-
Total Riparian	**13.6**	**9.9**	**-3.7**
Total Impact	***25.6***	***35.9***	***+10.7***

Because of the northward curvature that Design Option C-3 introduces into the alignment, it would have greater impacts to wildlife resources than would the two build Alternatives or Design Option C-2. The northward curve would have greater impacts to the wildlife corridor immediately west of SE 135th because it would further pinch the corridor, reducing it to a width of about 50 feet (horizontal distance). In this same area, the two build alternatives and Design Option C-2 would leave the corridor approximately 100 feet wide.

Locating the Sunrise alignment along the tree line of the property east of SE 135th Avenue results in an additional 15.6 acres of impact to Upland Class B habitat compared to either of the two build alternatives. Fill slopes for the new SE 142nd Avenue overpass would impact coniferous mixed-forest habitat and would create a vertical barrier to wildlife movement, pushing the corridor farther north. Although the fill slopes could be revegetated to provide cover for wildlife, it would take many years for planted vegetation to grow large enough to provide this function. This design option severs the entire wetland complex from wildlife traveling the Mount Talbert to Rock Creek corridor, thereby removing their access to a different set of browse species than that found in coniferous-mixed-forest habitats. However, this entire wetland complex is subject to severance for wildlife passage, regardless, as it has been recently approved by Clackamas County for construction of a shopping center.

By moving the alignment to the north, this option also reduces impacts to wetlands (mapped as Riparian Class I and II habitats) in the large wetland complex west of SE 142nd Avenue.

Design Option C-3 would include construction of a stormwater treatment/detention facility in the palustrine emergent wetlands behind the EZ Storage facility.

Design Option D-2

In addition to the build alternatives, two design options are being considered for the Rock Creek junction (Figure 25). Design Option D-2, the folded diamond interchange through the knoll, would locate the interchange south of where it would sited under Alternatives 2 and 3. This would then locate the western approach to the intersection farther south than either of the build alternatives. With the approach to the interchange further south, this option completely avoids the narrow portion of the wildlife corridor between the housing development and the mobile home park.

Table 26 provides a comparison of the two build alternatives with and without Design Option D-2 and a comparison of Alternative 2 with Design Option D-2 to Alternative 3 with Design Option D-2.

Table 26. Comparison of Design Option D-2 Impacts to Wildlife Habitat under Alternatives 2 and 3

Metro Mapped Habitat Type	Alternative 2 with Design Option D2	Alternative 2 with Design Option D2 Compared to Alternative 2	Alternative 3 with Design Option D2 Impact Areas (acres)	Alternative 3 with Design Option D2 Compared to Alternative 3	Alt 2 with Design Option D2 Compared to Alternative 3 with Design Option D2
Upland Class A	9.1	+0.4	9.1	+0.4	-
Upland Class B	25.9	+1.1	22.9	+1.1	+3.0
Upland Class C	22.7	-0.1	22.7	-0.1	-
Total Upland	**57.7**	**+1.4**	**54.7**	**+1.4**	**+3.0**
Riparian Class I	23.3	+0.7	23.3	+0.7	-
Riparian Class II	19.0	-0.2	19.0	-0.2	-
Riparian Class III	1.9	-0.9	1.9	-0.9	-
Total Riparian	**44.2**	**-0.4**	**44.2**	**-0.4**	**-**
Total Impact	***101.9***	***+1.0***	***98.9***	***+1.0***	***+3.0***

Table 27 lists Impacts to upland and riparian habitats associated with Design Option D-2 within Zone D.

Table 27. Impacts to Upland and Riparian Habitats in Zone D (acres)

Metro Mapped Habitat Type	Alternatives 2 or 3	Design Option D-2	Difference
Upland Class A	7.0	7.4	+0.4
Upland Class B	3.1	4.2	+1.1
Upland Class C	10.1	10.0	-0.1
Total Upland	**20.2**	**21.6**	**+1.4**
Riparian Class I	5.0	5.6	+0.6
Riparian Class II	4.4	4.2	-0.2
Riparian Class III	0.9	0.0	-0.9
Total Riparian	**10.3**	**9.8**	**-0.5**
Total Impact	***30.5***	***31.4***	***+0.9***

Under this design option, the new Rock Creek Bridge would be located slightly south of its proposed location under either of the other two design options for this area.

The impact area for the interchange would remain essentially identical to the two build alternatives. The modified ramp design and improvements to Highway 212 and the eastern terminus would fit within the same footprint as described under Alternative 2, with similar wildlife impacts.

Design Option D-3

Design option D-3, the single-point diamond interchange, would locate the interchange through the knoll (Figure 25). This option would have the same eastbound approach to the interchange as the two build alternatives, as well as similar impacts to the narrow portion of the wildlife

corridor between the housing development and the mobile home park discussed under Alternative 2.

Table 28 provides a comparison of the two build alternatives with and without Design Option D-3 and a comparison of Alternative 2 with Design Option D-3 to Alternative 3 with Design Option D-3.

Table 28. Comparison of Design Option D-3 Impacts to Wildlife Habitat under Alternatives 2 and 3 (acres)

Metro Mapped Habitat Type	Alternative 2 with Design Option D3	Alternative 2 with Design Option D3 Compared to Alternative 2	Alternative 3 with Design Option D3	Alternative 3 with Design Option D3 Compared to Alternative 3	Alt 2 with Design Option D3 Compared to Alternative 3 with Design Option D3
Upland Class A	6.8	-1.9	6.8	-1.9	-
Upland Class B	24.8	-	21.8	-	+3.0
Upland Class C	23.2	+0.4	23.2	+0.4	-
Total Upland	**54.8**	**-1.5**	**63.5**	**-1.5**	**+3.0**
Riparian Class I	23.2	+0.6	23.2	+0.6	-
Riparian Class II	19.2	-	19.2	-	-
Riparian Class III	2.8	-	2.8	-	-
Total Riparian	**45.2**	**+0.6**		**+0.6**	**-**
Total Impact	***100.0***	***-0.9***		***-0.9***	***+3.0***

Table 29 lists impacts to upland and riparian habitats associated with Design Option D-3 within Zone D.

Table 29. Impacts to Upland and Riparian Habitat in Zone D

Metro Mapped Habitat Type	Alternatives 2 or 3 Zone D Impacts	Design Option D3 Zone D Impacts	Difference
Upland Class A	7.0	5.2	-1.8
Upland Class B	3.1	3.1	-
Upland Class C	10.1	10.5	+0.4
Total Upland	**20.2**	**18.8**	**-1.4**
Riparian Class I	5.0	5.6	+0.6
Riparian Class II	4.4	4.4	-
Riparian Class III	0.9	0.9	-
Total Riparian	**10.3**	**10.9**	**+0.6**
Total Impact	***30.5***	***29.7***	***-0.8***

Design Option D-2 impacts 2.8 acres more of upland habitat, while Design Option D-3 impacts 1.2 acres more riparian habitat. The additional upland impacts associated with Design Option D-2 occur along the east edge of Rock Creek's riparian corridor. Additional riparian impacts associated with Option D-3 occur to the east edge of Rock Creek's riparian corridor. Design Option D-3 results in slightly less impact to agricultural fields than under Alternatives 2 and 3.

Fish Resources

Types of Potential Impact

The project may affect fish resources primarily through three mechanisms:

- Direct impacts during construction
- Indirect impacts caused by riparian clearing and development
- Indirect operational impacts through changes in stream hydrology and water quality caused by stormwater runoff from increased impervious roadway surfaces

Direct impacts during construction may include direct harm to fish during in-water construction, or displacement of habitat or impedance of fish migration by in-water structures.

Indirect effects caused by the proposed action are defined as those occurring later in time or farther removed in distance, but still reasonably foreseeable. 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.

Indirect construction impacts include potential encroachment on vegetated, undeveloped riparian areas. Clearing, grading, and developing such areas would be likely to reduce riparian functions such as water temperature moderation, stream bank stabilization, runoff filtration, and contribution of woody debris for stream structure development and other organic matter that supports the aquatic trophic system. Indirect construction impacts also include potential discharge of excessive sediment into streams from cleared and graded areas.

The most significant potential project effect on fish resources will be changes to hydrology and water quality caused by increases in impervious road surface area. Therefore, the net increase in new impervious surface is the most useful measure for comparing potential impacts among the alternatives and design options. Stormwater runoff increases significantly in volume and intensity with increased impervious surface, causing increased level and/or duration of peak stream flows (Hanson et al. 2003). These hydrologic changes degrade aquatic habitats, particularly salmonid habitat, in a number of ways, such as the following:

- Displace gravel from spawning habitat areas
- Scour salmon eggs from the redds (spawning nests)
- Flush juvenile fish downstream from their rearing habitat
- Degrade the aquatic food base by altering the benthic community
- Accelerate channel erosion, typically degrading fish habitat structure

Increased impervious surface also typically reduces dry-season base flows by reducing stormwater infiltration and groundwater recharge. Reduced base flows can kill or injure fish directly by stranding, depleting dissolved oxygen, and increasing water temperature.

Stormwater runoff from impervious roadway surfaces can also carry toxic levels of automotive-derived pollutants, including petroleum-based compounds, as well as toxic levels of dissolved metals such as copper. Fuel, oil, and hydraulic fluid in stormwater runoff can result in toxic levels of polyaromatic hydrocarbons (PAHs) in receiving waters (Neff 1985).

Impervious Surface

As described above, increase in impervious surface is the most useful quantity in comparing potential project impacts to fish. Table 30, which was developed for this project's Water Quality Technical Report, compares the new impervious surface area created among all the proposed permutations of build alternatives and design options. As this table indicates, Design Options A, D, D-2, and D-3 would have the most potential for adverse effects on fish.

Table 30. New Impervious Area Added to Each Drainage Basin by Design Option (acres)

Design Option	Sieben Basin	Cow Basin	Dean Basin	Rock Basin	Total New Impervious Area
A	–	5.5	32.9	–	38.4
A-2	–	5.5	27.9	–	33.4
B (Alt. 2)	–	27.0	–	–	27.0
B (Alt.3)	–	17.9	–	–	17.9
B-2 (Alt. 2)	–	30.9	–	–	30.9
C	10.2	5.6	–	4	19.8
C-2	9.8	5.7	–	4	19.5
C-3	11.2	6.3	–	4	21.5
D	–	–	–	37.2	37.2
D-2	–	–	–	37.4	37.4
D-3	–	–	–	38.0	38.0

Table 31 (also from the Water Quality Report) identifies which combinations of design options would produce the most and the least overall project impact. Note that Alternative 2 would have more potential impact to water resources than Alternative 3 regardless of which design options are chosen.

Table 31. Total New Impervious Area for Alternative 2 and Alternative 3 for the Greatest and Least New Impervious Area

	Hydrologic Impact	Design Option Scenario	Total No. of Impervious Acres Added
Alternative 2	Highest	A, B-2 (Alt. 2), C-3, D-3[1]	128.8
	Lowest	A-2, B (Alt. 2), C-2, D	117.1
Alternative 3	Highest	A, B (Alt. 3), C-3, D-3	115.8
	Lowest	A-2, B (Alt. 3), C-2, D[2]	108.0

[1] Highest potential impact scenario designated "altmax."
[2]Lowest potential impact scenario among build alternatives designated "altmin."

Table 32 lists the prospective percent increase in impervious surface by drainage subbasin. It compares project impacts between the highest impact and lowest impact alternative/design option scenarios cited in Table 31. As established in the project Water Quality Technical Report, the highest impact scenario is termed Altmax and the lowest impact scenario is designated Altmin.

Table 32. Percent Increase in Impervious Area in Acres

Drainage Basin	Altmin	Altmax
Dean Creek	85	99
Cow Creek	108	158
Sieben Creek	19	22
Rock Creek	15	15

Dissolved Copper

Some metals, particularly copper, are dissolved and concentrated in roadway runoff at levels that may cause toxicity to aquatic life in receiving waters. The National Marine Fisheries Service (NMFS) has indicated that dissolved copper may adversely affect salmonids in low concentrations. Copper is generated by vehicular traffic and is contained in stormwater runoff from roadways. In urban and urbanizing watersheds, the loading of dissolved copper to aquatic habitats is highly variable and depends on such factors as precipitation patterns, traffic density, and the site-specific hydrological characteristics of different watersheds. By interfering with the sensory organs of fish, dissolved copper may impair survival and reproductive success of exposed fish (Linbo et al. 2005).

Based on preliminary direction from ODOT, four general thresholds for adverse project effects on salmonids resulting from dissolved copper loading can be identified (ODOT 2006a):

1. The average daily traffic on the impervious surface in question is over 30,000 vehicles per day.

2. The calculated dissolved Copper in stormwater runoff from the new impervious surface is greater than or equal to 1 microgram per liter (parts per billion).

3. The area of new impervious surface (roadway or otherwise) to be created is at least 0.25 acre.

4. Listed fish species are present within 2 miles downstream of the project.

Both build alternatives meet criteria 1 through 4 above. The No-build alternative meets criteria 3 and 4 and may meet criteria 1 and 2.

The assessment of increase in impervious surface serves as the assessment of water quality effects. That assessment, in turn, serves as the basis for comparing the alternative/design option combinations described above. Dissolved copper, however, has been raised by ODOT and NMFS as an issue of particular concern, as described above.

Alternative 1: No-Build

Alternative 1 would have the least potential adverse effect on fish because it creates the least area of new impervious surface. Impacts would be concentrated in the Rock Creek basin, with a minor impact to Dean and Mount Scott Creeks and no impact to Sieben, Cow, or Graham Creeks.

Alternative 2: Build with Midpoint Interchange

Alternative 2 would have the greatest potential adverse effect on fish because it creates the largest net increase in impervious surface, regardless of which design options are chosen (Table 31). Alternative 2, incorporating Design Options A, B-2, C-3, and D-3 constitutes the maximum potential impact scenario, adding 128.8 acres of new impervious surface area (Table 31). This addition would create major increases in impervious surface in the Dean Creek and Cow Creek basins, and more moderate increases in the Rock Creek and Sieben Creek basins (Table 32).

Alternative 3: Build with no Midpoint Interchange

Although Alternative 3 creates less new impervious surface than Alternative 2, the differences are moderate (Table 31). Alternative 3 with design options A-2, B, C-2, and D-2 would have the least potential adverse effect of any build alternative because it would create the smallest area of impervious surface. For the Rock Creek drainage basin, which retains the most fish resources among API Creeks, Alternatives 2 and 3 have similar impacts (Table 30). Most of the difference in impact lies in the Cow Creek basin at Design Option B, where Alternative 3 would create 9.1 fewer acres of impervious surface than Alternative 2, and 13 fewer acres than Design Option B-2 (Table 30).

Cumulative Effects

Cumulative effects result from the incremental impacts to the environment of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non-federal) or individual undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time. The cumulative actions anticipated to occur within the project area are described below.

Highways and Arterial Road Facilities

The following list of road projects are ones that are expected or are assumed to be built over the next 20 years. These projects generally will be built following the existing alignments of major roads in the Sunrise Project area. The expansion of these roads is assumed to primarily affect adjacent land uses, many of which are currently undeveloped lands, in farm /forest uses, or minimal residential development. Closer to the Sunrise Project, these roads are located in areas that are substantially developed. The expansion of these roads is assumed to require corresponding expansion of the existing rights-of-way and the associated impacts would be to adjoining land uses. It is assumed the expanded roads would be widened equally along each side, minimizing impacts to adjoining land uses.

- Widen SE 82nd Drive between Lawnfield Road and Highway 212/224
- Improve Highway 212 connection to Mather Road via SE 102nd Avenue and Industrial Way
- Create a new northerly extension of Highway 224 at Rock Creek Junction that curves east to connect to SE 162nd Avenue and SE 172nd Avenue
- Widen SE 172nd Avenue between Foster Road and Highway 212
- Widen Highway 224 between Rock Creek Junction and Carver Bridge
- Widen Carver Bridge to five lanes
- Improve SE 82nd Drive, Gladstone to Highway 212/224
- Extend Sunnybrook Boulevard, SE 82nd Avenue to Harmony Road

The road projects listed below are located predominantly along existing road facilities in the Damascus/Boring Concept Plan Area. It is assumed that they will be constructed as major arterials to serve this area over the next 20 years regardless of the Sunrise project and that the impacts to the adjoining land uses will be minimized to the greatest extent practicable.

- SE 242nd Avenue – Highway 212 to Palmquist Road
- Highway 212 – Rock Creek to SE 257th Avenue
- Sunnyside Road extension – SE 172nd Avenue to SE 242nd Avenue
- SE 232nd Avenue extension – Highway 212 to Borges Road.
- 190th Avenue extension – Tillstrom Road to SE 172nd Avenue

Road projects for the area south of the Clackamas River and east of Oregon City are identified below. This area has been identified as a probable location of an expansion of the regional UGB in 15 to 20 years. All of these facilities follow existing road corridors and are assumed to be major arterials except for the new crossing of the Clackamas River, which connects to Forsythe Road. The impact of this new arterial connection cannot be estimated at this time due to lack of information. It is assumed that these projects would be built regardless of the Sunrise project.

- Gronlund Road
- Bradley Road
- Forsythe Road
- Holcomb Boulevard
- Clackamas River Drive
- Highway 213 (south of I-205)
- A new crossing of the Clackamas River connecting the I-205/Gladstone interchange with Clackamas River Drive

The road projects and assumed road facilities discussed in this section are all indirectly related to the Sunrise Project; however they are not necessarily dependent on the decision as to whether or not the Sunrise Project is constructed. The projects will provide much of the needed transportation infrastructure needed to support future growth in the Sunrise Project area and in the new urban areas to the east and the south. By themselves, these projects will not be able to meet all of the transportation needs in the southeast urban quadrant of the region. It is anticipated that regional freight traffic movement will be concentrated on these roads. Such truck movements will be impacted by the future volumes of residential traffic using the arterial road system.

The main impacts to fish and wildlife associated with these road projects include the direct loss of habitat, bisecting of wildlife corridors, and increased impervious surface within the watershed. It is assumed that these road projects would comply with state water quality standards for detention/retention and water quality treatment existing at the time of construction. Each project will undergo an environmental impacts assessment prior to design and construction with impacts and mitigation actions identified.

Transit-Related Projects: Two transit projects are expected to provide an increased level of transit service in the vicinity of the Sunrise Project: the I-205 Light Rail extension, and the new bus routes connecting the Oregon City Transit Center with Carver and the Clackamas Town Center Transit Center. Impacts to fish, wildlife, and botanical resources associated with the I-205 Light Rail project are described in the environmental impact statement for that project. No additional impacts are anticipated to these resources from an expanded bus line network. New bus lines would presumably use existing facilities and not result in additional impacts to fish, wildlife, and botanical resources. They may benefit these resources by slowing the demand for additional new facilities.

Bicycle Network and Related Projects: Multi-use paths or future bike lanes and pedestrian facilities that are expected to be constructed along all future arterial streets (previously described in this report) would increase the opportunity for alternative forms of travel in the vicinity of the Sunrise Project and in the new urban areas to the south and east. These may benefit fish, wildlife, and botanical resources by slowing the demand for additional surface transportation facilities.

Parks and Recreation: Metro and the North Clackamas Parks and Recreation District will continue to establish new parks, greenspaces, natural resources areas, and trails or linear parks that have been identified as a part of the planned parks, trails and greenways systems. These

facilities typically offer a positive benefit to fish, wildlife, and botanical resources by providing additional or improved habitats.

Sewer Providers: Water Environmental Service (WES) will continue to construct new sewer lines to serve the new urban areas to the east and south of the Sunrise Project. WES recently constructed a new sewer trunk line next to Rock Creek and plans to construct sewer lines in SE 172nd Avenue as part of a road construction project in 2007 and 2008. These sewer projects are the first scheduled extensions of sewer service into the new urban areas east of the Sunrise Project. The continued expansion of the sewer system will support the developing urban land use pattern in the areas east of the Sunrise Project. Sewer projects built as part of a road construction project or built in existing road prisms do not constitute significant impacts to fish, wildlife, and botanical resources because these types of projects typically impact areas previously affected/altered by construction activities. Sewer projects that follow stream corridors can be very disruptive to the natural environment.

Water Providers: The Clackamas River Water District's will continue to bring water service to the growing urban area. This includes the District's proposed 6-million-gallon water reservoir to be located about 800 feet west of SE 152nd Drive above the bluff and near its eastern edge. The Sunrise Water Authority plans to put a new water treatment plant, a couple of wells, and a district office at the northwest of the intersection of SE 172nd Avenue and Armstrong Circle. The continued expansion of the water system will support the developing urban land use pattern in the areas east of the Sunrise Project. Water projects built as part of a road construction project or built in existing road prisms do not constitute significant impacts to fish, wildlife, and botanical resources because these types of projects impact areas previously affected by construction.

Oregon Military Department: Camp Withycombe plans to add new facilities to the camp in order to locate the new 41st Brigade headquarters and logistics center. There are also plans to realign the joint forces in a new Armed Forces Readiness Center by closing installations in the region. The impact of the expansion of Camp Withycombe cannot be estimated at this time because of insufficient information; however, wildlife habitats on the camp are already compromised due to the amount of activity on the camp.

Employers: Several planned expansions by existing employers are currently under way in areas in the vicinity of the Sunrise Project. These include expansions of the Clackamas Town Center and the planned creation of a Nurse Training Program at Clackamas Community College. Impacts from these planned expansions cannot be estimated at this time due to lack of information.

Providence Health System is planning to construct a medical center and hospital to the east of Rock Creek. This project is expected to have up to 5,000 employees and a building inventory of 1.6 million gross square feet. This site is expected to contain a 400- to 500-bed hospital and related inpatient facilities, a medical office, an outpatient facility, and up to 4,430 structured parking spaces. The facilities would be built in an area that is primarily in agricultural production. A large farmed wetland occurs at the western end of the property. It is not known whether this wetland would be adversely affected. Should impacts occur, Providence Health

System would be required to apply for permits from USACE and DSL. Full mitigation of wetland impacts and management of stormwater runoff to state water quality standards would be conditions of receiving permits from these agencies. The agricultural field provides limited wildlife habitat.

Future Residential Development: Residential development is expected to continue on the vacant lands in the vicinity of the Sunrise Project until all available sites are developed. Currently, there are three major new residential projects in the development phase in the vicinity of the Sunrise Project. Windswept Waters is a 192-lot subdivision located between Highway 224 and the Clackamas River, south of the Rock Creek intersection and north of Carver. At the time of this report, the site is under construction. River Rim is the site of 144 single-family town houses on residential lots located on the western edge of Highway 224, approximately 1,000 feet south of the Highway 212/224 intersection. Wentzel Park Estates is a 76-lot planned unit development at 14830 SE 142nd Avenue. This subdivision is currently under construction. There are also scattered areas of residential construction in subdivisions that were created a few years ago in the areas around the Sunrise Project.

New urban areas to the south and the east of the Sunrise Project are expected to begin development as early as 3 to 5 years from now. These areas are expected to continue to develop over the next 20 years as sewer service is extended to them. The timing and the way in which this development occurs can have profound effects on fish, wildlife, and botanical resources. Should all privately held land be fully developed, there is a real possibility that the wildlife Mount Talbert to Rock Creek wildlife corridor could be severed.

Zoning Changes: There are two types of zone changes that are expected to occur in the vicinity of the Sunrise Project: individual development application and large-scale legislative rezoning. The City of Happy Valley and the City of Damascus are currently working on large legislative rezoning in the East Happy Valley Comprehensive Plan Area and in the entire City of Damascus. These legislative zone changes are expected to be completed during the next 2 to 5 years. The results of these processes will be a set of public policies to guide the future development of the land that was brought into the UGB in 2002.

There is only one development application zone change currently in process in the vicinity of the Sunrise Project. Clackamas County has approved a zone change from Industrial to Commercial at 15251 SE 142nd Avenue. This approval was subject to a number of conditions, including the adoption of an acceptable land use hearing order. The contents of this order have been under negotiation for some time now. Once a final order is adopted, the appeal period will begin. If no appeals are made, then the zone change will be final. The site of the proposed zone change contains both local and jurisdictional wetlands. This land use action has not been finalized as of the writing of this report, and therefore potential impacts to fish and wildlife cannot be assessed.

Summary of Permits Required

OAR Division 415 635-415-000 through 635-415-0025 Fish and Wildlife Habitat Mitigation Policy

The purpose of the Fish and Wildlife Habitat Mitigation Policy is to further the Wildlife Policy (ORS 496.012) and the Food Fish Management Policy (ORS 506.109) of the State of Oregon

through the application of consistent goals and standards to mitigate impacts to fish and wildlife habitat caused by land and water development actions. It is the policy of the Oregon Department of Fish and Wildlife to require or recommend, depending upon the habitat protection and mitigation opportunities provided by specific statutes, mitigation for losses of fish and wildlife habitat resulting from development actions. Priority for mitigation actions shall be given to habitat for native fish and wildlife species. Mitigation actions for nonnative fish and wildlife species may not adversely affect habitat for native fish and wildlife.

Fish and Wildlife Coordination Act of 1958 (Public Law 85-624)
The Fish and Wildlife Coordination Act provides for equal consideration of wildlife conservation in coordination with other features of water resource development programs. The Act requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the USFWS and state fish and wildlife agency through consultation directed toward the prevention of fish and wildlife losses and development/enhancement of those resources.

Endangered Species Act of 1973 (Public Law 93-205)
The ESA provides for the protection of animal and plant species currently in danger of extinction (endangered) and those species that may become so in the near future (threatened). Section 7 of the Act sets forth the procedural requirements to ensure that federal actions do not adversely impact threatened or endangered species or their critical habitats. First, a determination is made whether the project area contains any listed species, and then a biological assessment of impacts on listed species is made. A copy of the biological assessment is transmitted to the USFWS or NMFS office having jurisdiction. If a "may affect" determination is made, a request to enter into formal consultation accompanies the biological assessment.

Endangered Species Act, Section 7 Consultation and Biological Assessment
Section 7 of the Endangered Species Act (ESA) directs all federal agencies to ensure that any actions they fund, permit, or authorize are not likely to jeopardize a listed species or destroy or adversely modify critical habitat. The National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS) are the two federal agencies that determine ESA compliance. NOAA Fisheries has jurisdiction over ESA-listed anadromous fish species and USFWS has jurisdiction over ESA-listed resident fish, terrestrial wildlife, and plant species. Since ESA-listed anadromous fish species occur in the project vicinity consultation with NMFS regarding project impacts to listed species would be necessary.

Migratory Bird Treaty Act
The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions among the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. During the proposed project, migratory birds would be protected in accordance with the MBTA.

Federal Clean Water Act Section 404

Any alternative involving work below the Ordinary High Water Mark (OHWM) of any on-site stream or wetland will require a Federal Clean Water Act Section 404 permit. The 404 permit is administered by the U.S. Army Corps of Engineers (USACE) and is processed by one of two paths: Individual Permit or Regional General Permit, depending on project design and the area and volume of waterway impact. The USACE has no time limitations for review of individual Clean Water Act Section 404 permits, but typically arrives at a permit decision within six to ten months. Permit review may be simplified if the project qualifies for the Section 404 Regional General Permit.

State of Oregon Removal/Fill Law

State of Oregon Removal/Fill law requires a permit for impacting waters of the State of Oregon. The Removal/Fill permit is administered by the Oregon Department of State Lands (DSL) and is processed by one of two paths: Individual Permit or General Authorization, depending on project design and the area and volume of waterway impact. For a standard individual Removal/Fill permit, DSL will perform a completeness review within 30 days, and will issue a permit decision within 90 days following receipt of a complete application.

OAR Fish Passage Rules

Oregon Fish Passage Rules (OAR 635-412-0010 through 0040) generally require upstream and downstream passage at all artificial obstructions in waters currently or historically supporting migratory native fish. The Rules are "triggered" when a change in the permit for the obstruction occurs, such as for new construction, reconstruction, replacement, relicensing, reauthorization, or new water rights. The rules allow for mitigation or waivers on a case by case basis.

State of Oregon Endangered Species Act

The Oregon Endangered Species Act (1987) as amended in 1995 gave the Oregon Department of Agriculture (ODA) responsibility and jurisdiction over threatened and endangered plants, and the Oregon Department of Fish and Wildlife's (ODFW) responsibility for threatened and endangered fish and wildlife. The state ESA requires state agencies to develop programs for the management and protection of endangered species on state lands. For threatened species, state agencies are required to comply with survival guidelines adopted by the Oregon Fish and Wildlife Commission.

National Pollutant Discharge Elimination System

As authorized by the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. In most cases, the NPDES permit program is administered by the Oregon Department of Environmental Quality (ODEQ). ODOT currently has an NPDES 1200-CA permits issued by ODEQ for public construction activities. This project would need to comply with the requirements contained within the NPDES 1200-CA permit.

Magnuson-Stevens Fishery Conservation and Management Act

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act [MSA]) to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in Federal fishery management plans. EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Pacific Fisheries Management Council (PFMC) has recommended an EFH designation for the Pacific salmon fishery that would include those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation).

Section 305(b) of the MSA directs Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. 600.810). Section 305(b) also requires NOAA Fisheries to recommend measures that may be taken by the action agency to conserve EFH.

Mitigation Measures

Wildlife and Botanical Resources

Mitigation measures are provided separately for wildlife and botanical resources and for fish resources. Mitigation efforts for wildlife and botanical resources are inextricably linked because of the habitat values that botanical resources provide. Because there are no sensitive plant impacts, no mitigation measures related to sensitive plants are required.

Mitigation measures described here are based on ODOT's Wildlife Corridor Enhancement and Mitigation Strategy (Wildlife Strategy). The Wildlife Strategy was developed in conjunction with local resource and regulatory agencies and the Portland Audubon Society. The goal of the Wildlife Strategy is to minimize project-related impacts to wildlife corridors by enhancing and preserving these corridors using a combination of project design, traffic control measures, and permanently protecting the corridors through conservation easements or fee acquisition of properties along the corridors.

Minimization and Avoidance Measures

All Areas

To the maximum extent possible, construct free-span bridges over creeks to provide wildlife passage and meet NMFS goals. Where free-span bridges are not practical, install oversized culverts that allow for passage of smaller mammals and amphibians as well as fish.

SE 82nd Avenue

Retain mature trees and limit disturbance to the Mount Scott Creek riparian corridor while constructing the new bridge that connects the southern and northern sections of SE Ambler Road over Mount Scott Creek and the Mount Talbert to Three Creeks wildlife corridor. Limit number of piers in the crossing of Mount Scott Creek south of SE Ambler Road.

Mount Scott Creek Culvert Area

The goal of any mitigation effort in this area is to preserve the wildlife corridor between Mt. Talbert. Three options would meet this goal.

The first option is to replace the existing Mount Scott Creek culvert with a new bridge that both allows fish and wildlife passage. The second option would be to construct a separate terrestrial wildlife culvert under I-205 near the existing culvert. This culvert could be day-lighted in the medium of I-205 making it a more appealing passage than a long tunnel that would likely not be used. Partial funding for structures such as these may be available through the Transportation Enhancement program. This program provides federal highway funds for projects that strengthen the cultural, aesthetic, or environmental value of transportation systems. The funds are available for twelve transportation enhancement activities specifically identified in the Transportation Equity Act for the 21st Century (TEA-21). One such activity is environmental mitigation to reduce vehicle-caused wildlife mortality while maintaining habitat connectivity.

The third option would be to maintain the wildlife passage corridor from Mount Scott Creek to the Three Creeks area via Dean Creek. To do this, additional land would need to be secured to provide at minimum 50-foot wide corridor through native vegetation. Himalayan blackberry is common in this area and any corridor should be generally clear of this species to maintain a viable passage. Evergreen natives, such as Douglas fir and Ponderosa pine, should be on planted on exposed slopes to provide immediate screening for wildlife. Trees should be at least 6 feet tall. Intersperse a variety of native shrubs to augment screening. Installing and maintaining plants on slopes such as these can be problematic, so strict planting and maintenance specifications (such as providing irrigation) must be included in any landscape construction contract.

Lanwfield Road Realignment

- Steepen fill slopes to the maximum extent practicable. Create a level, 50-foot-wide path through the area where fill slopes from the proposed new on-ramp meet fill slopes from the realigned Lawnfield Road. Densely plant slopes with evergreen natives, such as Douglas fir and Ponderosa pine, to provide immediate screening for wildlife. Trees should be at least six (6) feet tall. Intersperse a variety of native shrubs to augment screening.

- Maintain wildlife passage to forested wetland northeast of the KEX radio tower site.

- Limit temporary construction impacts and permanent footprint through forested wetland.

KEX Radio Tower Site

To allow for wildlife movement, steepen the fill slopes as much as possible and locate the retaining wall as far from the ditch as possible. Maintain a 50-foot-wide wildlife corridor north

of the ditch along the north fence of the KEX radio tower site. Densely plant slopes with evergreen natives, such as Douglas fir and Ponderosa pine, to provide immediate screening for wildlife. Trees should be at least 6 feet tall. Intersperse a variety of native shrubs to augment screening.

Camp Withycombe Area

Relocate multi-use path outside of the edge habitat between the conifer forest and pastures of Camp Withycombe.

Clackamas Bluffs

- Construct retaining walls along the upslope (north) side of the Sunrise Project to limit the extent of intrusion into the wildlife corridor.

- Densely plant all exposed slopes with evergreen natives, such as Douglas fir and Ponderosa pine, to provide immediate screening for wildlife. Trees should be at least 6 feet tall. Intersperse a variety of native shrubs to augment screening.

- Establish native groundcover in an effort to exclude Himalayan blackberry.

- Direct lighting to paved surfaces only. Shield lighting from the wildlife corridor along the escarpment.

- Remove Himalayan blackberry where it remains along escarpment following construction.

SE 135th Avenue to Rock Creek

- Provide for small mammal and amphibian passage in the new Sieben Creek culvert. The culvert should be large enough to include an earthen bench that allows small mammals and amphibians to pass through it.

- Steepen fill slopes or build retaining walls to limit extent of impacts to wetland, riparian, and upland habitats.

- Between the unnamed tributary to Rock Creek and the Rock Creek riparian corridor, reduce impact to the wildlife corridor between the single-family housing subdivision and the mobile home court by steepening fill slopes or building retaining walls. Plant all exposed slopes with evergreen natives, such as Douglas fir and Ponderosa pine, to provide immediate screening for wildlife. Trees should be at least 6 feet tall. Intersperse a variety of native shrubs to augment screening.

Highway 212/224 Interchange

- Provide for small mammal and amphibian passage in the new culverts for Trillium Creek and its unnamed tributary. The culverts should be large enough to include an earthen bench that allows small mammals and amphibians to pass through it.

Traffic Control Measures

Consider reducing traffic speed by reducing speed limits at the corridor crossings or installing speed bumps in the roads prior to crossing the wildlife corridors. Traffic control measures and wildlife crossing signs should be installed at the following locations:

- Mather Road south of Mount Talbert
- SE 135th Avenue
- SE 142nd Avenue
- SE 152nd Avenue

ODFW has confirmed wildlife trails on either side of each of these roads (ODOT 2005a Appendix A).

Wildlife Corridor Preservation

This project has the potential to preserve key parcels of the wildlife corridors in perpetuity through the fee acquisition or easement of key sections of parcels along the length of the project.

Several "pinch points" exist along the length of the project. These include the area at the upstream end of the Mount Scott Creek culvert under I-205; south of Mather Road near Mount Talbert (outside the project's API); the Clackamas Bluffs; and the narrow area north of the mobile home park immediately west of SE 152nd Avenue. Mitigation measures are recommended for each of these areas (Figure 26).

A major mitigation action would be to replace the existing Mount Scott Creek culvert with a new structure that would allow both fish and wildlife passage or construct a new structure that allows wildlife passage (Figure 27). This action would provide a much more direct route for wildlife traveling between Mount Talbert and the Three Creeks area and allow wildlife access to large tracts of Riparian Class I and Upland Class A habitats along Mount Scott Creek immediately west of I-205. Partial funding for such a structure may be available through the Transportation Enhancement program. This program provides federal highway funds for projects that strengthen the cultural, aesthetic, or environmental value of transportation systems. The funds are available for 12 transportation enhancement activities specifically identified in the Transportation Equity Act for the 21st Century (TEA-21). One such activity is environmental mitigation to reduce vehicle-caused wildlife mortality while maintaining habitat connectivity.

The Clackamas Education Service District recently purchased two parcels that would be affected by the realignment of Lawnfield Road (22E04 00203 and 22E04 00204) (Figure 27). These parcels are situated north and east of the KEX Radio Tower site. These parcels contain high-quality forested and emergent wetlands that provide a variety of wildlife habitats. The forested and emergent wetland portions of these parcels outside the project's API should also be permanently protected by a conservation easement. These areas provide forage, thermal refuge, and bedding area as wildlife travel the Mount Talbert to Three Creeks corridor. Other urban wildlife, such as raccoon and opossum; a variety of avifauna, including neotropical migrants; amphibians; and bats could all use the variety of habitats this wetland complex provides.

Several key parcels of the corridor are in public ownership but not permanently protected for the valuable wildlife benefits they provide. ODOT purchased a 120-acre forested parcel (22E10 00601) north of Camp Withycombe in 1992 for $4.1 million in anticipation of constructing the Sunrise Project (Figure 28). This parcel will only be slightly impacted by the project, leaving a large tract of Class B upland habitat intact. ODOT's purchase of this parcel should be recognized as a form of advance mitigation for impacts to wildlife habitat, and the areas not impacted by the project should be permanently be protected.

Clackamas County recently purchased the two parcels (22E10 00900 and 22E10AD 03800) immediately east of ODOT's forested parcel in anticipation of constructing the Sunrise Project (Figure 28). These two parcels form the western entrance to the Clackamas Bluffs portion of the corridor. The northern portions of these parcels are outside the project's API and should be permanently protected by a conservation easement. Had these parcels not been purchased in their entirety and the northern portions outside the API been developed, the corridor would have been severed.

A potential significant constriction of the Mount Talbert to Rock Creek wildlife corridor exists at the southern flank of Mount Talbert. Clackamas County Water Authority owns the parcel directly south of Mather and Mount Talbert (Figure 28). The eastern portion of this parcel should be permanently protected by a conservation easement. Privately held undeveloped land that is zoned R10 and R20 (22E03CC 00200 and 22E10 00700) occurs immediately south of the Clackamas County Water Authority parcel. These parcels are used by wildlife traveling between Mount Talbert and the large parcel owned by ODOT north of Camp Withycombe. Should these parcels be fully developed, the wildlife corridor through this area would be severed. Because the parcels lie outside the project's API, funding sources would have to be identified for these conservation easement purchases. Potentially, funding may be available through the Transportation Enhancement program.

The amount of impact to the undeveloped area north of the mobile home park immediately west of SE 152nd Avenue (22E12B 03606) depends on the build alternative or design option selected. Alternatives 2 and 3 directly impact this parcel while Design Options D-2 and D-3 would miss it. As a mitigation action to preserve the integrity of the Mount Talbert to Rock Creek wildlife corridor, this parcel should be purchased in its entirety and areas not impacted by construction permanently protected by a conservation easement or other such vehicle (Figure 29).

In most cases, the Sunrise Project impacts the parcels identified for protection. Right-of-way will have to be secured for the project to be constructed. However, in a few instances (such as south of Mount Talbert), the Sunrise Project has no direct impact, but securing an easement is critical to achieving the overall goal of preserving and protecting the corridors. Table 33 lists properties for which securing additional rights-of-way or conservation easements would be of considerable benefit in preserving the wildlife corridors. Since different design options create their own set of impacts and opportunities, the table presents the preservation needs by alternative and design option. Properties identified as "High Priority" are those parcels which securing additional land is necessary to preserve the wildlife corridors. Properties identified as "Medium Priority" are those parcels which securing additional land increases the overall value to the corridor, but are not absolutely necessary to preserve a continuous corridor. Properties identified as "Low

Priority" add a decreasing amount of value to the functionality of the corridor and could be purchased if sufficient funds is available for wildlife corridor preservation.

Fish Resources

New culverts and culvert modifications will comply with state regulations. Some existing culverts may need replacement in order to comply with ODFW fish passage requirements. These requirements will ensure that the new or replacement culverts do not create conditions that prevent fish passage. In several instances, existing culverts appear to create such a barrier. In some locations, fish passage waivers may be obtained if providing passage creates no benefit or would not provide access to usable habitat.

The most effective mitigation measures to reduce unavoidable impacts to fish will be to provide as much water quality treatment as possible through infiltration. Where that is not feasible, mitigation will include collection, detention, and treatment of runoff from new, as well as existing, impervious surfaces, particularly roadway surfaces. The Water Quality Technical Report for the Sunrise Project anticipates that stormwater detention facilities would be designed to comply with NMFS standards. These standards require that the duration of post-project stormwater runoff discharge matches the pre-project discharge rates from 50 percent of the 2-year peak flow up to the 50-year peak flow. The project would also be required to meet Clackamas County stormwater requirements for stormwater detention sufficient to reduce the 25-year 24-hour post-development runoff rate to match the 2-year 24-hour pre-development discharge rate, and to reduce the 2-year 24-hour post-development discharge rate to one-half of the 2-year 24-hour pre-development discharge rate. This level of stormwater control would reduce the unavoidable physical adverse impacts to stream channels and aquatic habitat.

Water quality treatment facilities would also be designed to comply with NMFS and Clackamas County requirements. This consists of providing water quality treatment for 72 percent of the 2-year 24-hour storm event, and it is estimated to remove 70 percent of particulate pollutants and as high a proportion of soluble pollutants, including dissolved copper, as possible.

Table 33. Wildlife Corridor Properties

Location	Parcel number	Owner Name	Alt. 2 Priority	Alt. 3 Priority	Option A-2 Priority	Option B-2 Priority	Option C-2 Priority	Option C-3 Priority	Option D-2 Priority	Option D-3 Priority
Mount Scott Creek Culvert Area (existing pinch-point)	22E04A00190	Kaiser Foundation	Low	Low	Low					
	22E0400208	Portland Adventist Medical Center	High	High	High					
	22E0400203	Western Oregon Conf. Association of Seventh Day Adventists			High					
	22E0400204	Western Oregon Conf. Association of Seventh Day Adventists			High					
Dean Creek to Mount Scott Creek between I-205 and SE 82nd Ave.	22E04B01980	PCC Structurals Incorporated	Low	Low						
	22E04B06000	Costco Wholesale Corp	Low	Low						
	22E04B01801	State of Oregon	Low	Low						
	22E04B01102	Clackamas County	Low	Low						
Connects Mount Talbert to Large ODOT Parcel North of Camp Withycombe	22E03CD00501	Rosemary Anne & Dennis Lee Fox	High	High						
	22E03CC00100	Sunrise Water Authority	High	High						
	22E03CC00200	Susan Whitman	High	High						
	22E1000700	Keller Russel Don L Trust	High	High						
	22E03CD00163	Highland Summit Owners Association	High	High						
Clackamas Bluffs East of ODOT Property to SE 135th Ave.(Hubbard Drive)	22E10AD03608	Robert L Bocci	High	High		Medium				
	22E10AD03708	Aleksandr Krovalev	High	High		Medium				
	22E11BC02600	John A Graf	High							
	22E11BD01500	David L & Valerie J Harjo	Low	Medium		Medium				
	22E11BD01600	David Russell & Judith Mcelroy	Low	Medium		Medium				
	22E11BD01700	Donald Andrew Berquist	Low	Medium		Medium				
	22E11BD01800	Larry C Lubcke	Low	Medium		Medium				
	22E11BD01900	Karen L & Matthew D Lyons	Low	Medium		Medium				

	22E11BD02000	Annette M Johnson	Low	Medium		Medium				
	22E11BD00100	Stone Ridge Apartments Llc	High	High		High				
	22E11AC02300	Hubbard Terrace Homeowners Association	High	High		High				
SE 135th Ave. to SE 142nd Ave,	22E11A00800	Andre Iseli	High	High			High	High		
	22E11A01300	Terry W Emmert	High	High			High			
	22E11A00600	Andre Iseli	High	High			High			
	22E11AC02700	Donald and Myra Hines	High	High			High	High		
	22E11AC02790	Donald and Myra Hines	High	High			High	High		
	22E11AC02800	Donald and Myra Hines	High	High			High	High		
	22E11AC03700	Howards Estates Homeowners Association	High	High			High	High		
	2211A00903	Dave and Linda Obrist	High	High			High	High		
	22E11A00700	Terry W Emmert	High	High			High			
SE 142nd Ave. to Rock Creek	22E12B02700						High	High		
	22E12B02900						High	High		
	22E12B02902						High	High		
	22E12B03100	Outback Properties					High			
	22E12B03000	SCCO Llc					High			
	22E12B03501	Clackamas County Development Agency					High			
	22E12B03609	Terry W Emmert					High			
	22E12B03601	Terry W Emmert					High	High		High
	22E12B03606	R&D Management Llc	High	High			High	High	High	High
	22E12B04101	R&D Management Llc	High	High			High	High	High	High
	22E12A00800	Bradley Gilbert	Medium	Medium			Medium	Medium	Medium	Medium

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ACRONYMS AND ABBREVIATIONS

API	Area of Potential Impact
C	Candidate
ESA	Endangered Species Act
ESU	evolutionary significant unit
FHWA	Federal Highway Administration
I-205	Interstate 205
LE	Listed Endangered
LT	Listed Threatened
MBTA	Migratory Bird Treaty Act
NCHRP	National Cooperative Highway Research Program
NMFS	National Marine Fisheries Service
NEPA	National Environmental Policy Act
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OESA	Oregon Endangered Species Act
ONHP	Oregon Natural Heritage Program
ORNHIC	Oregon Natural Heritage Information Center
RTP	Regional Transportation Plan
SOC	Species of Concern
STIP	Statewide Transportation Improvement Program
UGB	urban growth boundary
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WES	Water Environmental Services

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