

Terrestrial Biological Resources Technical Report

Highway 62 Corridor Solutions Project

March 14, 2008

ODOT

Prepared by: Kristen Currens, Mason, Bruce & Girard, Inc.

Reviewed by: Ken Cannon, ODOT

The preparation of this report was financed in part by the U.S. Department of Transportation, Federal Highway Administration. The opinions, findings and conclusions expressed in this report are not necessarily those of the U.S. Department of Transportation Federal Highway Administration.

TABLE OF CONTENTS

S. EXECUTIVE SUMMARY	S-1
S.1 Introduction	S-1
S.2 Affected Environment	S-1
S.3 Environmental Consequences.....	S-3
S.4 Potential Mitigation	S-4
1. INTRODUCTION.....	1-1
1.1 Purpose and Need	1-1
1.1.1 Introduction.....	1-1
1.1.2 Purpose of the Project	1-1
1.1.3 Need for the Project	1-1
1.1.3.1 System Linkage.....	1-3
1.1.3.2 Traffic Volumes	1-3
1.1.3.3 Intersection Operations	1-3
1.1.3.4 Safety	1-4
1.1.3.5 Multimodal Opportunities.....	1-5
1.2 Alternatives Considered.....	1-5
1.2.1 No-Build Alternative.....	1-8
1.2.1.1 Projects included in the No Build Alternative	1-8
1.2.2 Build Alternative: Bypass	1-9
1.2.2.1 Segment 1: Interstate 5 to Commerce Drive (Figures 1.6 and 1.7)	1-10
1.2.2.2 Segment 2: Commerce Drive to Antelope Road (Figure 1.8).....	1-14
1.2.2.3 Segment 3: Antelope Road to Northern Terminus (Figure 1.9)	1-16
2. METHODS	2-1
2.1 Introduction.....	2-1
2.2 Related Federal, State and Local Regulations	2-1
2.2.1 Federal Regulations	2-1
2.2.1.1 The National Environmental Policy Act.....	2-1
2.2.1.2 The Clean Water Act and Endangered Species Acts	2-2
2.2.1.3 The Bald and Golden Eagle Protection Act	2-4
2.2.1.4 The Migratory Bird Treaty Act.....	2-4
2.2.1.5 Executive Order on Invasive Species.....	2-4
2.2.2 State Regulations	2-4
2.2.2.1 Oregon Removal – Fill Law.....	2-4
2.2.2.2 Oregon Endangered Species Act.....	2-5
2.2.2.3 Oregon Noxious Weed Law.....	2-5
2.2.3 Local Regulations	2-5
2.3 Data Collection and Documentation.....	2-6
2.3.1 Bald Eagle.....	2-7
2.3.2 Vernal Pool Fairy Shrimp	2-7
2.3.3 Threatened, Endangered and Candidate Plants.....	2-8
2.3.4 Vegetation Communities	2-9
2.3.5 Wildlife Habitat	2-10

2.3.6 Noxious Weeds	2-10
2.4 Affected Environment Profile.....	2-11
2.5 Impact Assessment.....	2-12
2.6 Potential Mitigation Measures	2-13
3. AGENCY COORDINATION AND INVOLVEMENT	3-1
4. AFFECTED ENVIRONMENT	4-1
4.1 Affected Environment Profile.....	4-1
4.2 Overview of Natural Resources	4-17
4.2.1 Threatened or Endangered Wildlife Species.....	4-17
4.2.1.1 Bald Eagle	4-17
4.2.1.2 Vernal Pool Fairy Shrimp	4-18
4.2.2 Threatened, Endangered and Candidate Plant Species	4-19
4.2.2.1 Cook’s Lomatium	4-19
4.2.2.2 Large-flowered Woolly Meadowfoam.....	4-19
4.2.2.3 Southern Oregon Buttercup	4-19
4.2.2.4 Coral-seeded Allocarya.....	4-20
4.2.3 Vegetation Communities	4-20
4.2.3.1 Developed Areas	4-20
4.2.3.2 Grassland.....	4-21
4.2.3.3 Mound/Vernal Pool Complex	4-21
4.2.3.4 Riparian.....	4-22
4.2.4 Wildlife Resources/Wildlife Habitat.....	4-22
4.2.4.1 Developed Areas	4-23
4.2.4.2 Grassland Areas	4-23
4.2.4.3 Mound-Vernal Pools	4-24
4.2.4.4 Riparian Areas.....	4-24
4.2.5 Noxious Weed Species	4-25
4.3 Specific Elements Affected.....	4-25
4.3.1 Segment 1 (Interstate 5 to Commerce Drive)	4-25
4.3.1.1 Threatened and Endangered Wildlife Species	4-25
4.3.1.2 Threatened, Endangered and Candidate Plant Species	4-26
4.3.2 Segment 2: (Commerce Drive to Antelope Road).....	4-26
4.3.2.1 Threatened and Endangered Wildlife Species	4-26
4.3.2.2 Threatened, Endangered and Candidate Plant Species	4-26
4.3.2.3 Vegetation Communities.....	4-26
4.3.2.4 Wildlife Habitat.....	4-27
4.3.2.5 Noxious Weed Species.....	4-27
4.3.3 Segment 3 (Antelope Road to Dutton Road)	4-27
4.3.3.1 Threatened and Endangered Wildlife Species	4-27
4.3.3.2 Threatened, Endangered and Candidate Plant Species	4-27
4.3.3.3 Vegetation Communities.....	4-28
4.3.3.4 Wildlife Habitat.....	4-28
4.3.3.5 Noxious Weed Species.....	4-28
5. ENVIRONMENTAL CONSEQUENCES.....	5-1
5.1 Direct Impacts and Construction Impacts.....	5-1
5.1.1 No-Build Alternative.....	5-1
5.1.2 Bypass Alternative	5-2

5.1.2.1	Segment 1 – Interstate 5 to Commerce Drive	5-3
5.1.2.2	Segment 2 – Commerce Drive to Antelope Road.....	5-6
5.1.2.3	Segment 3 – Antelope Road to Northern Terminus.....	5-11
5.2	Indirect Impacts and Cumulative Impacts	5-17
5.2.1	No-Build Alternative.....	5-17
5.2.2	Bypass Alternative	5-17
6.	POTENTIAL MITIGATION MEASURES	6-1
6.1	Direct Impacts and Construction Impacts.....	6-1
6.1.1	Vernal Pool Fairy Shrimp	6-1
6.1.2	Threatened, Endangered and Candidate Plants.....	6-2
6.1.3	Vegetation Communities	6-3
6.1.4	Wildlife Resources/Wildlife Habitat.....	6-4
6.1.5	Noxious Weed Species	6-5
6.2	Indirect and Cumulative Impacts.....	6-5
7.	REFERENCES.....	7-1

TABLES

Table S.1	Direct Impacts to Natural Resources within the Bypass Alternative Options, Highway 62 Corridor Solutions Project	S-7
Table 1.1	Signalized Intersection Operations for Crater Lake Highway (ORE 62)	1-4
Table 1.2	Crash Rates for Crater Lake Highway	1-5
Table 1.3	Related Projects in the Rogue Valley MPO 2005 Regional Transportation Plan.....	1-9
Table 2.1	Summary of Potential Federal and State and Local Regulatory Requirements	2-2
Table 2.2	Noxious Weeds of Jackson County Listed by the Oregon Department of Agriculture	2-11
Table 5.1	Approximate Direct Impacts to Natural Resources within the Bypass Alternative Options, Highway 62 Corridor Solutions Project	5-17

FIGURES

Figure 1.1	Vicinity Map	1-2
Figure 1.2	No Build and Build Alternatives.....	1-7
Figure 1.3	Typical Cross Section of Highway 62 (Existing Conditions).....	1-8
Figure 1.4	Typical Cross Section of the Bypass Alternative	1-10
Figure 1.5	Bypass Alternative	1-11
Figure 1.6	Alternatives Considered Option 1A.....	1-12
Figure 1.7	Alternatives Considered Option 1B.....	1-13
Figure 1.8	Alternatives Considered Segment 2.....	1-15
Figure 1.9	Alternatives Considered Segment 3.....	1-17
Figure 4.1	Project Study Area / Proposed Footprint	4-3
Figure 4.2a	Vernal Pools/Mound-Vernal Pool Complexes/Vernal Pool Critical Habitat Segment 1.....	4-5
Figure 4.2b	Vernal Pools/Mound-Vernal Pool Complexes/Vernal Pool Critical Habitat Segment 2.....	4-7
Figure 4.2c	Vernal Pools/Mound-Vernal Pool Complexes/Vernal Pool Critical Habitat Segment 3.....	4-9
Figure 4.3a	Vegetation Communities/Wildlife Habitat and Rare Plants Segment 1	4-11
Figure 4.3b	Vegetation Communities/Wildlife Habitat and Rare Plants Segment 2	4-13
Figure 4.3c	Vegetation Communities/Wildlife Habitat and Rare Plants Segment 3	4-15

S. EXECUTIVE SUMMARY

S.1 Introduction

Implementation of the proposed Highway 62 Corridor Solutions Project could potentially impact several terrestrial biological resources including threatened and endangered terrestrial wildlife and plant species, vegetation communities, wildlife habitat and invasive plant species. Listed terrestrial wildlife species addressed for the Highway 62 Corridor Solutions Project are the vernal pool fairy shrimp (*Branchinecta lynchi*, federally-listed as threatened) and the bald eagle (*Haliaeetus leucocephalus*, state-listed as threatened). Listed botanical species addressed for this project include Cook's lomatium (*Lomatium cooki*, federal and state-listed as endangered), large-flowered wooly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora*, federal and state-listed as endangered), Southern Oregon buttercup (*Ranunculus austro-oreganus*, a state candidate species) and coral-seeded allocarya (*Plagiobothrys figuratus* ssp. *corallicarpus*, a federal species of concern and state candidate species). Vernal pool fairy shrimp, Cook's lomatium, and large-flowered wooly meadowfoam are known to occur within the project study area.

Between 1998 to 2000 and 2004 to 2007, Mason, Bruce & Girard (MB&G) personnel conducted a series of field investigations that have included rare plant and noxious weed surveys, mapping of vegetation communities, delineation of vernal pool complexes, wetland assessments, surveys for vernal pool fairy shrimp, surveys for general wildlife species and qualitative and quantitative habitat assessments for federally-listed wildlife species.

Five primary quantitative measures were used to assess the potential impacts of the Bypass Alternative on terrestrial biological resources. The project evaluation criteria included: acreage of vernal pools impacted; number of ESA-listed plant species or acres of habitat impacted; acres of habitat impacted classified by the U.S. Fish and Wildlife Service (USFWS) as vernal pool fairy shrimp critical habitat; number of enhancements to ESA-listed species; and number of enhancements to wildlife habitat. In addition, to achieve a balanced view of terrestrial biological resources that would be impacted by this project, acreage of vegetation communities and wildlife habitat, impacts to noxious weeds, and enhancements to vegetation communities were also analyzed.

S.2 Affected Environment

Analysis of existing records and agency databases indicates that the project study area has the potential to support bald eagle, vernal pool fairy shrimp, Cook's lomatium, large-flowered wooly meadowfoam, Southern Oregon buttercup and coral-seeded allocarya. In addition, field investigations documented the presence of four distinct vegetation communities and wildlife habitats along with noxious weed presence within the project study area. A discussion of the principal characteristics associated with each terrestrial biological resource is presented below.

Bald Eagle

The bald eagle is state-listed as threatened under the Oregon Endangered Species Act (OESA). The bald eagle is also protected from take under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250). Areas of mature black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are located in the riparian area surrounding Bear Creek in Segment 1, Option 1A that could potentially act as bald eagle roost trees. However, due to the high level of human activity and

disturbance surrounding Bear Creek (e.g., Interstate 5, industrial development), this area is not considered suitable bald eagle habitat. The remainder of the project study area consists of open grasslands and developed areas, which do not provide habitat for bald eagles.

Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp (*Branchinecta lynchi*) are listed as threatened under the federal Endangered Species Act (ESA). Critical habitat has been designated and mapped by the USFWS for this species within the project study area in the vicinity of the southern terminus of Agate Road, at the intersection of Agate Road and Touvelle Road, and east of the intersection of Highway 62 and Hoover Avenue (August 6, 2003, 68 FR 46684).

In the summer of 1999, dry-season vernal pool fairy shrimp surveys were conducted within the vernal pools complexes located within the vicinity of the project study area by May Consulting, a subcontractor to MB&G for this project. These surveys documented the presence of eggs (formerly referred to as cysts) belonging to the genus *Branchinecta* in one pool within the vernal pool complex located north of Upton Creek and east of the Medco Haul Road. This vernal pool complex is located approximately 730 feet east of the current proposed footprint for Segment 2, Option 2A and 2B of the Bypass Alternative. Positive identification to the species level was not possible, but the external morphology of the specimen as well as the characteristics of the pool from which the egg was collected both suggested the egg belongs to a vernal pool fairy shrimp (May Consulting 1999). Surveys have not been conducted for vernal pool fairy shrimp within the current proposed footprint. Given the presence of vernal pool fairy shrimp adjacent to the proposed footprint, it is assumed that vernal pool fairy shrimp are currently present within other vernal pool complexes within the project study area.

Threatened, Endangered and Candidate Plant Species

Four species of rare plants were identified in pre-field reviews as potentially occurring within the project study area: Cook's lomatium, large-flowered wooly meadowfoam, Southern Oregon buttercup and coral-seeded allocarya. Two federally-listed endangered plant species, Cook's lomatium and large-flowered wooly meadowfoam, were located within the Segment 1 of the project study area in a vacant field within the vicinity of the proposed project footprint south of Commerce Road and west of Cardinal Avenue and Aviation Way (T37S, R1W, Section 7) between March and April 1999. These plants are part of the southernmost population of Cook's lomatium in the Agate Desert and are therefore genetically important (Friedman, 2007). The species' presence was reconfirmed in 2004 and 2007; however, site disturbances after 1999 may have reduced the number of individuals at this location. No coral-seeded allocarya or Southern Oregon buttercup was located within the project study area. In addition, unsurveyed habitat for rare plant species also exists within Segments 2 and 3. These areas will be surveyed for rare plants in spring 2008.

Vegetation Communities

Several distinct vegetation communities were identified within the project study area. These vegetation communities include developed urban areas, dry grasslands common to the Agate Desert Region, unique mound-vernal pool complexes and the riparian borders of several streams flowing through the project study area.

Wildlife Resources/Wildlife Habitat

Wildlife habitat within the project study area may be defined by vegetation cover type. Each vegetation community is considered to be a distinct wildlife habitat, supporting a specific group of

wildlife species. In general terms, the developed areas within the project study area would provide the lowest quality habitat for wildlife given the extensive impervious surfaces and lack of vegetation and natural cover in these areas. The same may be said for grassland areas where annual mowing or grazing can limit cover. Certain areas of grassland not routinely disturbed provide fair habitat to species adapted to open fields and the absence of forest structure. While occupying a large area of the project study area, the grassland community does not provide a high diversity of herbaceous vegetation capable of supporting a wide variety of wildlife species. The mound-vernal pool complex is a unique and necessary habitat for several species such as vernal pool fairy shrimp and rare plant species. The riparian community provides relatively good habitat for wildlife and has a higher importance in the project study area due to its diversity of habitats and limited coverage in the project study area.

Noxious Weed Species

Noxious weed species dominate many areas of the herbaceous groundcover within the project study area. The dominant noxious weed species identified in the project study area are diffuse knapweed (*Centaurea diffusa*), yellow starthistle (*Centaurea solstitialis*), poison hemlock (*Conium maculatum*), field bindweed (*Convolvulus arvensis*), purple loosestrife (*Lythrum salicaria*), reed canarygrass (*Phalaris arundinacea*), medusahead (*Taeniatherum caput-medusae*) and puncturevine (*Tribulus terrestris*). Noxious weeds are common to all vegetation communities within the project study area. At any location within the project study area, estimates of percent cover for noxious weeds can be as high as 50 to 75 percent. The average percent cover for noxious weeds within the project study area is approximately 40 percent when compared to the overall coverage of other species comprising the herbaceous groundcover. The widespread presence of noxious weed species within the project study area can be attributed to past land development practices and agricultural activities.

S.3 Environmental Consequences

Direct Impacts and Construction Impacts (Table S-1)

No direct or construction impacts to bald eagles would be expected if the Bypass Alternative or any of its Options were chosen due to the lack of bald eagle habitat within the proposed footprint. No enhancements to bald eagle habitat within the proposed footprint are expected if this alternative is chosen.

Selection of the Bypass Alternative would result in direct impacts to vernal pool fairy shrimp in the form of fill and disturbance to vernal pools and mound-vernal pool complex habitat in all three Segments and their respective Options. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected. However, selection of the Bypass Alternative would require conservation mitigation in the form of vernal pool creation in the Medford area, which would potentially provide additional habitat for vernal pool fairy shrimp.

Individuals of Cook's lomatium and large-flowered wooly meadowfoam would be directly impacted in both Options within Segment 1 of the Bypass Alternative. Potential habitat for Cook's lomatium, large-flowered wooly meadowfoam, coral-seeded allocarya, and Southern Oregon buttercup exists in Segments 2 and 3 that was not surveyed for rare plants due to the timing of project design changes. These areas will be surveyed for rare plants in spring 2008. No enhancements to threatened, endangered or candidate species are expected if the Bypass Alternative is chosen. However, selection of the Bypass Alternative would require conservation mitigation in the form of vernal pool

creation in the Medford area, which would potentially provide additional habitat for several threatened, endangered and candidate plant species.

Direct impacts and construction impacts would occur to vegetation communities and similarly to wildlife habitat in all Segments and Options of the Bypass Alternative. These impacts would be those associated with clearing, grading, construction, and continued use of planned roadways within the proposed footprint of the Bypass Alternative. In addition, fragmentation and subdivision of existing natural vegetation communities and wildlife habitat would occur with selection of the Bypass Alternative and any of its Options.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if the Bypass Alternative and any of its Options are chosen. However, selection of the Bypass Alternative would require conservation mitigation and permanent conservation easements in the Medford area, which would potentially provide improved wildlife habitat and vegetation community restoration.

The implementation of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within all Segments and Options of the project footprint. Given the already extensive coverage of noxious weeds in the project footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Indirect and Cumulative Impacts

Overall, rare plant species and vernal pool fairy shrimp may be indirectly and cumulatively impacted through alteration of the typical hydrological regime found in vernal pools if the Bypass Alternative is selected. All biological terrestrial resources may be indirectly and cumulatively impacted by future improvements in local traffic patterns, which will likely increase the pace of future commercial, industrial and residential development in the proposed footprint. Additional development could result in future losses to habitat within the proposed footprint.

S.4 Potential Mitigation

The optimal mitigation measure for impacts to terrestrial biological resources is avoidance wherever possible. In areas where impacts are unavoidable, minimization and restoration measures would have to be implemented. To minimize direct and construction related impacts to terrestrial resources, the project would follow ODOT standard specifications and Best Management Practices (BMPs) for erosion and sediment control, wetland protection, site restoration and planting. The following is a summary list of the principal terrestrial mitigation measures that would be employed for all Options of the Bypass Alternative:

Vernal Pool Fairy Shrimp

- Secure the necessary U.S. Army Corps of Engineers (Corps) and Oregon Department of State Lands (DSL) permits to allow the necessary permanent filling and temporary disturbance of vernal pools. Work with the agencies to develop adequate vernal pool protection and mitigation measures.
- Establish new habitat and restore existing habitat in areas that would not be developed or disturbed.
- Clearly identify all vernal pools in the field prior to construction. Establish exclusion zones around vernal pools to be preserved to restrict equipment encroachment during construction.

Threatened, Endangered and Candidate Plant Species

- Establish Special Management Areas (SMAs) within the new right-of-way to protect listed plant populations following construction.
- Establish exclusion zones around rare plant populations and suitable habitat to be preserved to restrict equipment encroachment during construction.

Vegetation Communities

- Improve degraded vegetation communities along the project alignment by removing noxious weeds and introducing new plantings of native species. Remove trash and debris as needed.
- Locate equipment staging areas and construction material stockpiles in existing developed areas away from vegetation communities. Staging in previously cleared and disturbed areas would minimize additional clearing, grubbing, and related disturbance impacts to vegetation communities. Clearly identify equipment staging areas in the field prior to construction.
- During initial grading operations, strip and stockpile topsoil for landscaping and other mitigation projects. As appropriate, salvage and replant native tree and shrub plant material along the project alignment. Store all stockpiled material away from mound-vernal pool complexes, riparian and aquatic communities.
- Monitor all new mitigation and landscaped areas until fully established. Provide irrigation as required to landscaped areas to ensure survival of new plantings. Establish minimum survival rate for all new plant materials.

Wildlife Habitat

- Improve degraded wildlife habitat along the project alignment with new plantings of native species. Introduce native shrub and tree species that provide cover and food sources for wildlife during landscaping. Design landscaping to avoid aviation/wildlife conflicts and communicate openly with the Medford International Airport regarding landscape plans.
- Replace lost wildlife habitat along shoulders and roadway embankments by landscaping with native species. Match species diversity and density of new plantings with existing native habitats along roadway alignment.

- Add wildlife crossing signs (elk, deer) to appropriate areas along completed alignment.

Noxious Weed Species

- Identify and map Oregon Department of Agriculture (ODA) listed 'A' and 'B' listed weeds within the proposed footprint. Develop a strategy to remove, control and prevent the spread of noxious weeds prior to the start of construction activities.
- Monitor the finished Bypass Alternative alignment to ensure that noxious weeds do not regain their foothold in the area. The monitoring period should be long enough to ensure establishment of all new mitigation and landscape areas. Set appropriate thresholds for invasive cover along with an adaptive management plan, to ensure that appropriate actions are taken to ensure success.

**Table S-1
Direct Impacts to Terrestrial Natural Resources within the Bypass Alternative Options, Highway 62
Corridor Solutions Project**

Terrestrial Resource	Segment 1 – Interstate 5 to Commerce Drive		Segment 2 – Commerce Drive to Antelope Road		Segment 3 – Antelope Road to Northern Terminus	
	Option 1A: Split Diamond with Interstate 5 Connection	Option 1B: Highway 62 Connection	Option 2A: Western Alignment	Option 2B: Eastern Alignment	Option 3A: Dutton Road A	Option 3B: Dutton Road B
Vernal Pools	0.23acre	0.22 acre	0.93 acre	0.35 acre	0.51 acre	1.52 acres
Vernal Pool Fairy Shrimp Critical Habitat	0 acre	0 acre	0 acre ¹	0 acre ¹	0 acre ¹	0 acre ¹
Developed Area Community/Habitat	37.00 acres	35.05 acres	56.71 acres	63.93 acres	40.89 acres	35.86 acres
Grassland Community/Habitat	14.41 acres	16.20 acres	75.97 acres	72.00 acres	49.51 acres	36.58 acres
Mound-Vernal Pool Complex Community/Habitat	0 acre	0 acre	23.75 acres	5.60 acres	10.80 acres	12.94 acres
Riparian Community/Habitat	7.54 acres	0.87 acre	4.48 acres	4.17 acres	0 acre	0.52 acre
Total Vegetation Community/Wildlife Habitat	58.95 acres	52.12 acres	160.91 acres	145.70 acres	101.20 acres	187.10 acres
Large-flowered woolly meadowfoam	Approximately 490 individuals	Approximately 490 individuals	0	0	0	0
Cook's lomatium	Approximately 250 individuals	Approximately 250 individuals	0	0	0	0
Potential large-flowered woolly meadowfoam, Cook's lomatium, and coral-seeded allocarya habitat not surveyed	0 acre	0 acre	0 acre	0 acre	0.30 acre	9.85 acres
Potential Southern Oregon buttercup habitat not surveyed	0 acre	0 acre	5.19 acres	5.19 acres	0.37 acre	33.21 acres

Source: *Mason, Bruce & Girard, 2007*

¹Vernal pool fairy shrimp critical habitat has been mapped within the project footprint for this Option by the USFWS. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat that is traversed by the project footprint for this Option. Therefore, this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. See Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

1. INTRODUCTION

1.1 Purpose and Need

1.1.1 Introduction

For several years, the Oregon Department of Transportation (ODOT), the Rogue Valley Metropolitan Planning Organization (RVMPO) Policy Committee and the City of Medford have recognized that the segment of Highway 62 between Interstate 5 (I-5) and White City has had increasing traffic, congestion, and safety problems. This segment of Highway 62, also known as Crater Lake Highway, is heavily developed with commercial uses.

In 1997, ODOT formed a Solutions Team to evaluate ways to improve transportation in the Highway 62 corridor. The original study area included the Highway 62/Interstate 5 interchange in Medford and continued northeast to White City. Due to funding constraints, this original study area was divided into two phases: Phase I was limited to the Highway 62/ Interstate 5 interchange and Phase II included the segment of Highway 62 from the Highway 62/ Interstate 5 interchange through White City. Figure 1.1 is a vicinity map showing the location of the Highway 62 corridor.

An Environmental Assessment (EA) was completed in September 2001 for Phase I, described as the Highway 62/ Interstate 5 Interchange (North Medford Interchange). Based on an evaluation of the project impacts, the Federal Highway Administration (FHWA) concluded that the project would not significantly alter the environment. Therefore, no Environmental Impact Statement was required and a Finding of No Significant Impact (FONSI) was issued. Improvements for Phase 1 have been completed and are in operation.

This technical report has been compiled as part of the environmental analysis for Phase II. An alternatives analysis was conducted to identify potential solutions to the transportation problems associated with the segment of Highway 62 between Interstate 5 in Medford and Dutton Road in White City. Following the publication of the Draft Environmental Impact Statement (DEIS) and the receipt of public comments, a preferred alternative will be selected.

1.1.2 Purpose of the Project

The purpose of the proposed action is to address current and future highway capacity needs, improve intersection operations and provide enhanced transportation safety and multimodal opportunities in the Highway 62 corridor from Interstate 5 in Medford north to Dutton Road in White City.

1.1.3 Need for the Project

Highway 62 serves an important role in the state's transportation network. However, increasing traffic volumes are causing congestion and delays, and safety statistics show that some parts of Highway 62 exceed statewide crash rates. In addition, there are limited provisions for multimodal operations on Highway 62.

Vicinity Map

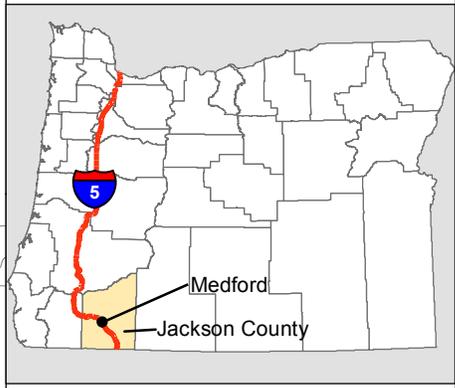
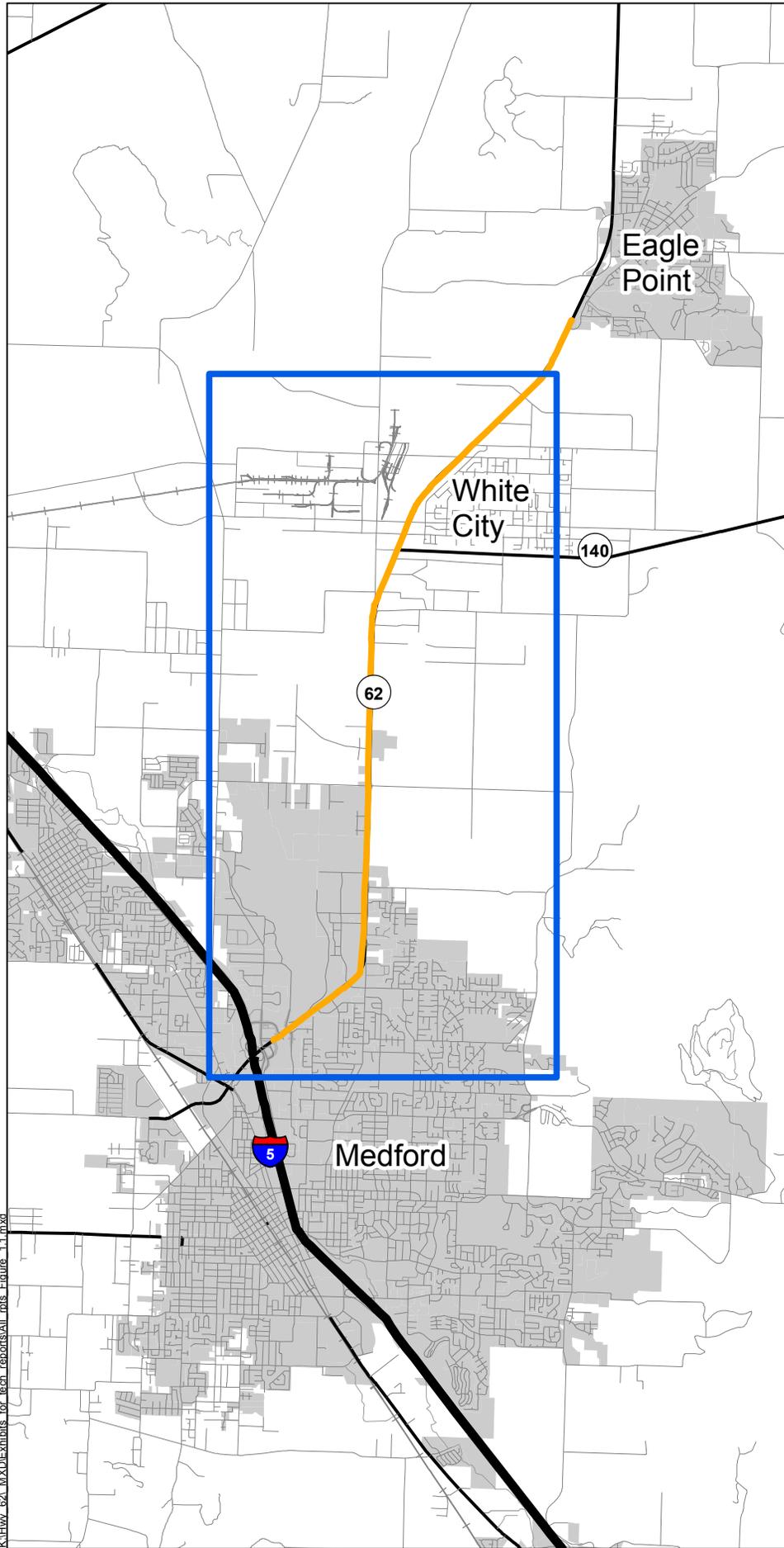
Figure 1-1
January 2008



Map Features

-  Highway 62
-  Project Vicinity
-  City Limits

Source: Jackson County GIS



K:\Hwy_62_MXD\Exhibits_for_tech_reports\All_rats_Figure_1-1.mxd

1.1.3.1 System Linkage

The Highway 62 Corridor is a vital part of the state's transportation network. According to the 1999 Oregon Highway Plan (OHP), the segment of Highway 62 from Interstate 5 and Highway 140 is designated as part of the Statewide National Highway System (NHS). This NHS designation is in recognition of the vital role that Highway 62 plays in the economic well-being of the Rogue Valley and the State of Oregon. The section of Highway 62 from Delta Waters northward is further classified as an Expressway. The Expressway classification reflects the need for this portion of the corridor to provide local and regional mobility as well as connections to large urban areas and major tourism and recreational areas.

The Highway 62 Corridor currently functions as a major interurban and interregional facility, connecting the City of Medford and rapidly developing communities to the north. The corridor also serves as the primary route to regionally important recreation areas, including the Rogue River National Forest and Crater Lake National Park.

As a primary State and regional route, the Highway 62 Corridor has experienced a substantial increase in traffic and this trend is expected to continue. As a result, key portions of the corridor are experiencing increased congestion, causing significant deterioration in capacity along the corridor and at key intersections. This in turn has led to a decline in corridor safety. These conditions have reduced the highway's ability to meet the demands of the Expressway classification.

1.1.3.2 Traffic Volumes

In 2004, the segment of Highway 62 between Interstate 5 and White City had an average daily traffic count of over 46,000 vehicles. As a point of reference, the section of Interstate 5 through Medford has a similar average daily traffic count. In the next twenty years, traffic volumes on Highway 62 are expected to increase to approximately 70,000 vehicles per day.

Since 1990, population growth in both Jackson County and the City of Medford has exceeded the statewide average. Official population projections show that this trend will continue at the same comparative rate, with much of that new growth occurring in the area to the north of Medford. The increase in population has caused an increase in traffic volumes, and these volumes are expected to continue to increase as the area's population increases.

Increasing traffic volumes and congestion along Crater Lake Highway are an ongoing concern. Rising traffic volumes have caused congestion and have reduced speeds on the highway in recent years; the resulting increase in travel times has been costly for commerce and individuals.

1.1.3.3 Intersection Operations

Increased congestion in the Highway 62 corridor has caused lengthy delays that occur more frequently and last for increasingly longer periods. That is, "rush hour" conditions are no longer limited to morning and evening commute periods; in some parts of the corridor, traffic congestion begins early and exists for much of the day.

As a result of corridor congestion, operations at key intersections are experiencing diminished performance, which result in excessive traffic queuing and significant delay at signalized

intersections. This is leading to decreases in local and regional mobility. To determine the performance of an intersection, ODOT uses volume to capacity (v/c) ratio standards while Medford and Jackson County use level of service (LOS) standards. Currently five of the eleven signalized intersections in the study area do not meet applicable mobility standards. In addition, several of the non-signalized intersections do not meet mobility standards. Table 1.1 presents the performance measures for the signalized intersection within the project study area.

Table 1.1 Signalized Intersection Operations for Crater Lake Highway (ORE 62)

Signalized Intersections	Existing Conditions		Future No-Build	
	V/C Ratio	LOS	V/C Ratio	LOS
Poplar Drive & Highway 62 ¹	0.84	----		
Delta Waters & Highway 62 ²	1.08	----		
Delta Waters & Crater Lake Avenue ³	----	LOS E		
Cardinal Avenue & Highway 62 ³	0.92	----		
Vilas Road & Highway 62 ³	0.86	----		
Highway 140 & Highway 62 ³	0.83	----		
Antelope Road & Highway 62 ³	0.90	----		
Avenue G & Highway 62 ³	0.71	----		
Antelope Road & Table Rock Road ²	----	LOS C		
Vilas Road & Table Rock Road ²	----	LOS C		
Biddle Road & Table Rock Road ²	----	LOS B		

Source: JRH Engineering

V/C = Volume to Capacity describes the capability of an intersection to meet volume demand based upon the absolute maximum number of vehicles that could be served in an hour.

LOS = Level of Service is based on average delay and is measured in seconds per vehicle per hour and translated into a grade or level of service for each intersection. LOS ranges from A to F with A indicating the desirable condition and F indicating the most unacceptable condition.

¹ Mobility standard for this intersection is a v/c ratio of 0.85

² Mobility standard for this intersection is LOS D

³ Mobility standard for this intersection is a v/c ratio of 0.80

Bold italics show intersections that don't meet mobility standard

1.1.3.4 Safety

A long history of crash and congestion issues, in addition to the highway's no longer meeting the prescribed mobility standards, led to the initial Highway 62 Corridor Solutions project in 1998. Recent data show that there were 456 reported crashes on Highway 62 between Interstate 5 and White City from the year 2000 through 2003. Crash rates on Highway 62 exceed statewide rates for similar facilities between Poplar Drive and Delta Waters Road, and also between Corey Road and Antelope Road. In order to improve safety conditions, ODOT has reduced the speed limit and increased signage. This current project is a further step towards reducing crash rates and enhancing safety.

The crash data was analyzed using ODOT's Safety Priority Index System (SPIS). The SPIS is a method for identifying potential safety problems on state highways and is recognized as an effective problem identification tool for evaluating state highways for segments with higher than average crash histories. Table 1.2 compares the Highway 62 crash rate to the statewide rate for similar facilities.

Table 1.2 Crash Rates for Highway 62

Corridor Segment	Milepost	Statewide Crash Rate	ORE 62 Crash Rate	Exceeds Statewide Rate
Poplar Drive to Delta Waters Road	0.87 to 1.89	2.71	2.98	Yes
Delta Waters Road to Cardinal Avenue	1.90 to 2.30	2.71	1.16	No
Cardinal Avenue to Coker Butte Road	2.31 to 3.50	2.71	0.18	No
Coker Butte Road to Vilas Road	3.51 to 4.0	2.71	2.38	No
Vilas Road to Corey Road	4.01 to 5.41	2.71	0.44	No
Corey Road to Highway 140	5.42 to 6.03	0.80	1.25	Yes
Highway 140 to Antelope Road	6.04 to 6.36	0.80	2.60	Yes
Antelope Road to Avenue G	6.37 to 7.17	0.80	0.54	No

Source: JRH Engineering

1.1.3.5 Multimodal Opportunities

Provisions for pedestrians, bicyclists, and transit on Highway 62 are minimal. Currently, only 21% of the corridor has sidewalks, and these sidewalks are not contiguous. Signalized intersections do include pedestrian signals and crosswalks, but the highway's width and the volume of traffic turning onto the highway both impede pedestrian safety.

Bicycle lanes are signed and striped on Highway 62 between Poplar Drive and Vilas Road. North of Vilas Road there are wide shoulders that exceed the minimum width necessary for bicyclists, but that are not specifically marked for bicycles. Regardless, the bicycle lanes and shoulders are located directly adjacent to a high volume of high-speed vehicles; they are often full of gravel tracked from unpaved parking lots and they are not designed to minimize conflicts with turning vehicles.

During the mid-1990s, the Medco Haul Road was paved and signed as a temporary bicycle and pedestrian path. The State of Oregon acquired the Medco Haul Road to accommodate potential long-range needs for roads and highways. This multi-use path parallels Highway 62, to the west, for approximately 40% of the length of the corridor. The Medco Haul Road multi-use path does not provide a direct connection to Highway 62 between Poplar Drive and Vilas Road. As a result, the path does not provide or promote existing modal connections or provide adequate access for the path users to the businesses adjacent to the highway.

The Rogue Valley Transportation District (RVTD) currently runs two bus routes on portions of Highway 62: route 1 (Airport/Biddle Road) and route 60 (White City). Route 1 runs from downtown Medford to the Medford International Airport via Highway 62 between Poplar Drive and Biddle Road. Route 60 runs from Medford to White City, using Highway 62 between Cardinal Avenue and the Veterans Administration Domicile. RVTD's financially constrained plans would increase the frequency of existing bus routes, but would not change or add new routes.

1.2 Alternatives Considered

Work began in August of 2004 on the development of a wide range of transportation solutions for the Highway 62 Corridor, from Interstate 5 north to Dutton Road in White City. Initially the project evaluated a range of 25 possible solutions in the Highway 62 Corridor. The study area was bounded

by Table Rock Road to the west, Foothills Parkway to the east, Interstate 5 to the south and Dutton Road to the north. It also included east/west alternatives that connected Highway 62 and the INTERSTATE 5 corridors via a west extension of Highway 140. Each of these solutions was evaluated for how well it met the project goals and objectives, whether it was feasible, and most importantly, whether it would reduce congestion on Highway 62. Through a series of Project Development Team (PDT), Citizens Advisory Committee (CAC), and public meetings as well as the use of the project Purpose and Need statement and Goals and Objectives as filtering tools, the wide range of alternatives was reduced to four possible build solutions:

- The Bypass Alternative (with North and South Terminus Options)
- The Existing Highway 62 Build Alternative
- The Texas Turnaround
- A Couplet System

Further technical analysis was conducted and the four alternatives were evaluated using the Project's Evaluation Criteria (Goals, Objectives and Measurement Criteria). Through a series of PDT / CAC and additional public meetings, the Existing Highway 62 Build, the Texas Turnaround and the Couplet alternatives were eliminated from further evaluation. The Existing Highway Build and the Texas Turnaround alternatives were eliminated due to the excessive social and economic impacts associated with each alternative. The Couplet System was eliminated due to future traffic operations failures.

In late 2006 both the PDT / CAC voted to evaluate one Build Alternative -- the Bypass Alternative -- and the No-Build Alternative in the Draft Environmental Impact Statement (DEIS) (See Figure 1.2). This action was supported by the Medford City Council and at several public meetings in which the public was asked to express a preference. In 2007 a series of discussions were held with targeted members of the general public and regulatory agencies. The result of those discussions led to a series of concept refinements and options for the Bypass Alternative. These refinements and options are described in detail in Section 1.2.2 Build Alternative: Bypass.

No Build and Build Alternatives

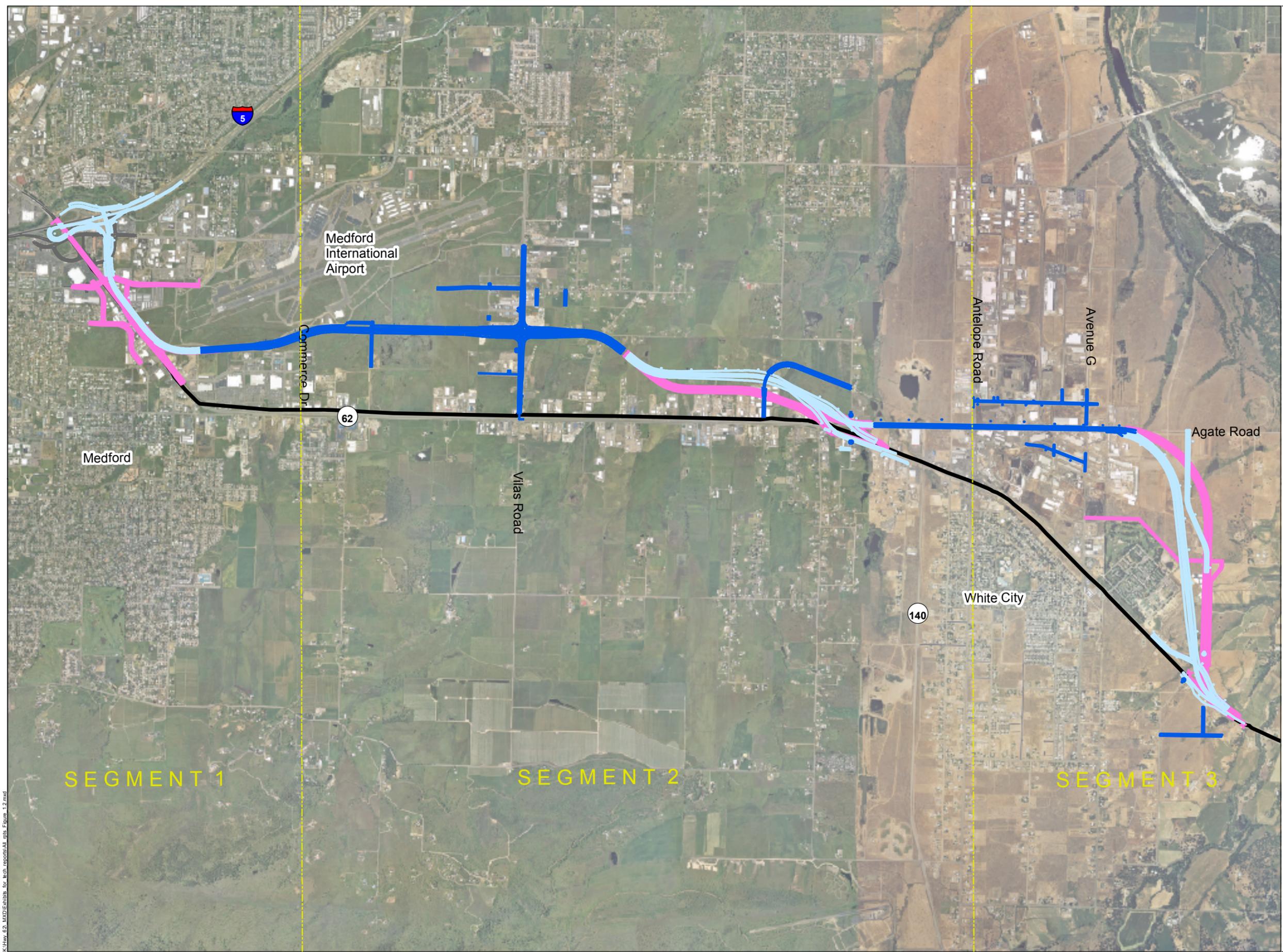
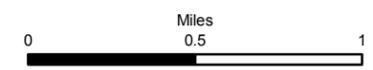
Figure 1-2
October 2007



Map Features

- No Build
- Common to Both Build Options
- A Options
- B Options

Source: Jackson County GIS



X:\high_62_MAD\EMH\GIS\tech_report\AI\gifs\Figure_1.2.mxd

1.2.1 No-Build Alternative

The No-Build Alternative would result in no improvements or modifications to the existing Highway 62 corridor other than those that are already committed and funded in the Rogue Valley RTP. In its current configuration, the footprint of the Highway 62 Corridor is approximately 80 feet in width and consists of two 10-foot shoulders, four 12-foot travel lanes and a 10-foot center lane that functions as a continuous left turn lane. (See Figure 1.3).

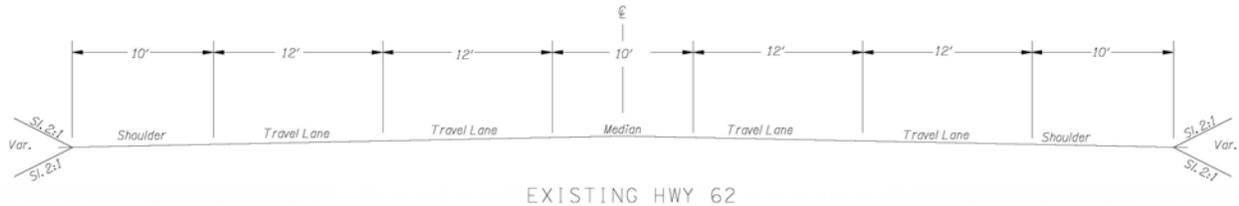


Figure 1.3: Typical Cross Section of Highway 62 (existing conditions)

1.2.1.1 Projects included in the No Build Alternative

Table 2.1 lists projects included in the Rogue Valley MPO 2005 Regional Transportation Plan (RTP) that are in the Highway 62 Corridor study area. The RTP categorizes projects into three timeframes: Short (2005-2009), Medium (2010-2015), and Long (2016-2030). Because the “Long” timeframe is outside the project’s planning horizons, only projects categorized in the “Short” and “Medium” timeframes are included in Table 1.3.

Table 1.3 Related Projects in the Rogue Valley MPO 2005 Regional Transportation Plan

Project	Description	Timeframe
517	Delta Waters Rd., Provincial St. to Foothill Rd. Widen to add continuous turn lane with bike lanes and sidewalks	short
534	Owens Dr., OR 62 to Springbrook Rd. New 5-lane street from OR 62 to Springbrook Rd., re-align Crater Lake Ave.	short
535	Lear Way, Commerce Rd. to Coker Butte Rd. Construct new three lane street with bike lanes and sidewalks	short
539	OR 62 at Delta Waters Rd. Minor intersection reconfiguration to add turning lane(s)	short
551	Springbrook Rd., Cedar Links Rd. to Delta Waters Rd. Widen to add continuous turn lane with bike lanes and sidewalks	medium
557	Crater Lake Ave., Delta Waters Rd. to Owens Dr. Widen to add continuous turn lane with bike lanes and sidewalks	medium
558	Coker Butte Rd., OR 62 to E. of Crater Lake Ave. Move Coker Butte Rd. north, re-align Crater Lake Ave., add signals	medium
562	Crater Lake Ave. at Delta Waters Rd. Minor intersection reconfiguration to add turning lane(s)	medium
801	Agate Rd., OR 62 to Ave. G New three lane industrial collector	short
802	Agate Rd. and Antelope Rd. Install new traffic signal	short
803	Antelope Rd., Table Rock Rd. to 7th St. Widen to five lanes with bike lanes and sidewalks	short
804	Atlantic Ave., Ave. A to Ave. G New three lane urban major collector	short
806	Ave. G, OR 62 to Atlantic New three lane urban major collector	short
807	Ave. H, Wilson Way to WCUCB New two lane urban minor collector	short
809	Foothill Rd., Corey Rd. to Atlantic St. New two lane rural major collector	short
811	Table Rock Rd., Biddle Rd. to Wilson St. Widen to five lanes with bike lanes, sidewalks	short
812	Table Rock Rd., Wilson St. to Antelope Rd. Widen to five lanes with bike lanes, sidewalks	short
814	Wilson Way, Ave. H to Dutton Rd. Urban upgrade in WCUCB / rural outside WCUCB	short
818	Leigh Way, Agate Rd. to Antelope Rd. New three lane street w/shoulder bikeway	medium
821	Table Rock Rd., Bear Creek to Biddle Rd. Widen to add continuous turn lane with bike lanes and sidewalks	medium
822	Table Rock Rd. at Wilson Rd. New traffic signal	medium

Source: *Regional Transportation Plan (RVMPD: 2005)*

1.2.2 Build Alternative: Bypass

The Bypass Alternative would be a corridor to the west of existing Highway 62. It would utilize existing roads (Highway 62 and Agate Roads) as well as an abandoned rail corridor (Medco Haul Rail Road). The general design characteristics would include four 12-foot travel lanes, a 10-foot center median and 8-foot shoulders with full access control (See Figure 1.4). Permanent right-of-way limits would vary according to roadway geometry.

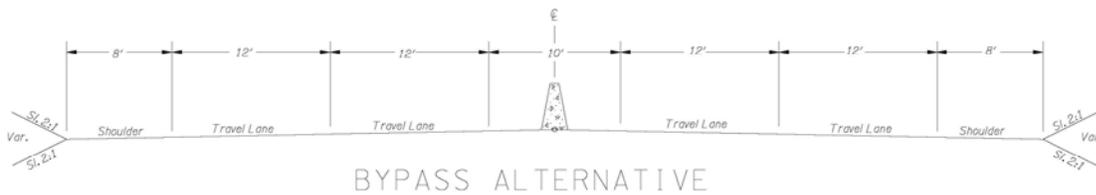


Figure 1.4: Typical Cross Section of the Bypass Alternative

For the purposes of analysis, the Bypass Alternative is divided into three segments, numbered from south to north, and each segment has two design options. The design options are interchangeable: for example, Option A in Segment 1 can be used with either Option A or Option B in Segment 2. The same goes for other options in other segments. All three segments and their design options are shown in Figure 1.5. The limits of each segment and the design options for each segment are:

Segment 1: Interstate 5 to Commerce Drive

- Option 1A: Split Diamond with Interstate 5 Connection
- Option 1B: Highway 62 Connection

Segment 2: Commerce Drive to Antelope Road

- Option 2A: Western Alignment
- Option 2B: Eastern Alignment

Segment 3: Antelope Road to Northern Terminus

- Option 3A: Dutton Road A*
- Option 3B: Dutton Road B

1.2.2.1 Segment 1: Interstate 5 to Commerce Drive (Figures 1.6 and 1.7)

Located at the south terminus of the project area, this segment would utilize either existing Highway 62 or Hilton Drive (depending on the Design Option) to a point just south of the Medford International Airport and the intersection of Highway 62 and Delta Waters Road. At this point the alignment would turn north and follow the old Medco Haul Road alignment past Commerce Drive.

Option 1A: Split Diamond with Interstate 5 Connection (Figure 1.6)

The southern terminus of Option 1A would be at an intersection with Interstate 5, just north of the existing Highway 62. Option 1A would consist of a split diamond interchange at the intersection of Interstate 5, the existing Highway 62, and the new bypass (Interstate 5 Exit 30) and would allow for directional movements between the three roads. The interchange would incorporate the existing ramps at Exit 30 and add an additional northbound onramp to Interstate 5 and additional southbound

* Option 3A is the alignment that is located closer to the Veterans Administration Domiciliary, while 3B is the alignment that would be located on Dutton Road.

Bypass Alternative

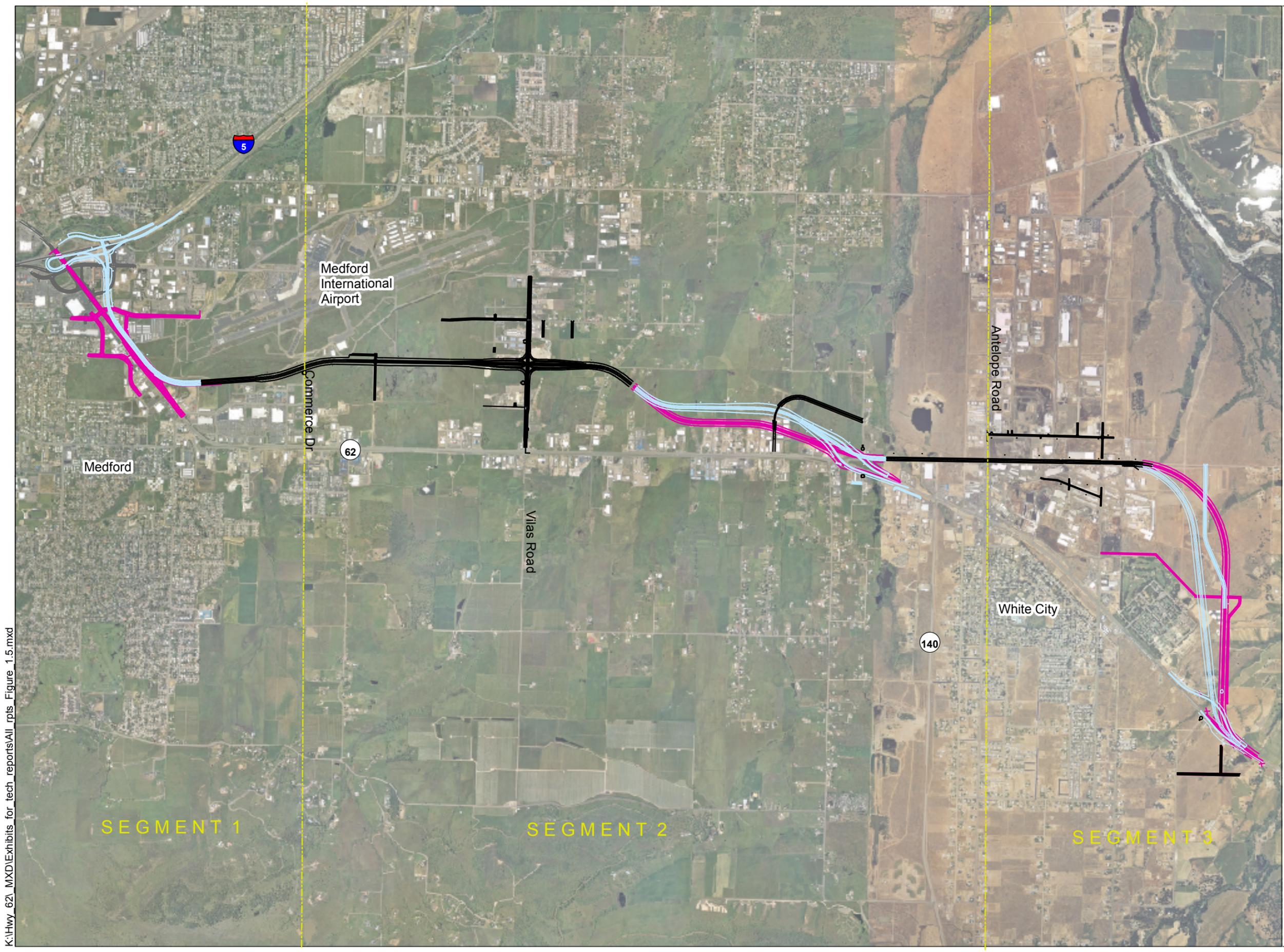
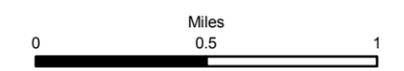
Figure 1-5
October 2007



Map Features

- Common to Both Build Options
- A Options
- B Options

Source: Jackson County GIS



K:\Hwy 62\MXD\Exhibits for tech_reports\All_rpts_Figure 1.5.mxd

Alternatives Considered Option 1A

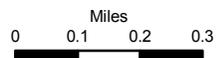
Figure 1-6
October 2007



Map Features

 Option 1A

Source: Jackson County GIS



Alternatives Considered Option 1B

Figure 1-7
October 2007



Map Features

 Option 1B

Source: Jackson County GIS



off ramp from Interstate 5. The Bypass Alternative, located north of and completely separate from the existing Highway 62, would be elevated and would cross over Biddle, Hilton, and Bullock Roads then return to ground level and run along the north side of the existing Highway 62. It would pass just south of the Medford International Airport before turning north to follow the Medco Haul Road alignment north past Commerce Drive.

Option 1B: Highway 62 Connection (Figure 1.7)

This design option would use a portion of the Existing Highway 62 as its south terminus at Interstate 5. The existing Highway 62 alignment, from Interstate 5 to a point just west of the intersection of Delta Waters Road, would be rebuilt as an access-controlled four lane facility with a grade separated over-crossing of Poplar Drive. Portions of Bullock Road, Poplar Drive, Hilton Road (south of Highway 62), Corona Avenue, and Skypark Drive would be rebuilt to provide access to parcels along the access-controlled portion of the highway. A directional interchange would be located between Bullock and Delta Waters Roads allowing movements between the new Bypass and the existing Highway 62. At this interchange, the new Bypass would turn north and follow the Medco Haul Road past Commerce Drive.

1.2.2.2 Segment 2: Commerce Drive to Antelope Road (Figure 1.8)

This segment follows the existing Medco Haul Road alignment to a point north of Justice Road where it turns to the east to join Agate Road. In this segment, existing Commerce Drive would go under the Bypass Alternative. In the future, the City of Medford will extend Coker Butte Road over the Bypass Alternative to provide access to the parcels adjacent to the Medford International Airport. When this project is constructed, Commerce Drive will end in a cul-de-sac, just east of the Bypass Alternative. Both the Coker Butte overcrossing and associated access roads are not considered part of this project. The Bypass Alternative would cross over Vilas Road where there would be a fully directional “Single Point Urban Interchange” (SPUI) with the Bypass Alternative and Vilas Road. There would be access restrictions on a segment of Vilas Road near the interchange, and as a result Industry and Enterprise Drives would be extended and new roads would be constructed off of the east side of Peace Lane to provide access to parcels along the access-restricted segment of Vilas.

North of the Vilas Road interchange, the Bypass Alternative would cross over Justice Road and jog to the east twice and then be located on the existing Agate Road alignment. Between Justice Road and Agate Road, there are two design options for the location of the Bypass Alternative, as described below. Under both design options, there would be a directional interchange with the Bypass Alternative and existing Highway 62 in the vicinity of the current intersection of Agate Road and the existing Highway 62. Gregory Road would terminate in a cul-de-sac just west of its current intersection with Agate Road, and would also terminate in a cul-de-sac just east of its current intersection with the existing Highway 62. An existing dirt road on the Medco Haul Road alignment would be improved from Gregory Road southward, and would curve to intersect with the existing Highway 62 at the Lotus Lane intersection. This new access road would cross over the Bypass Alternative.

Alternatives Considered Segment 2

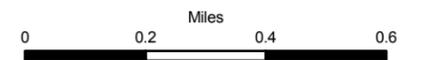
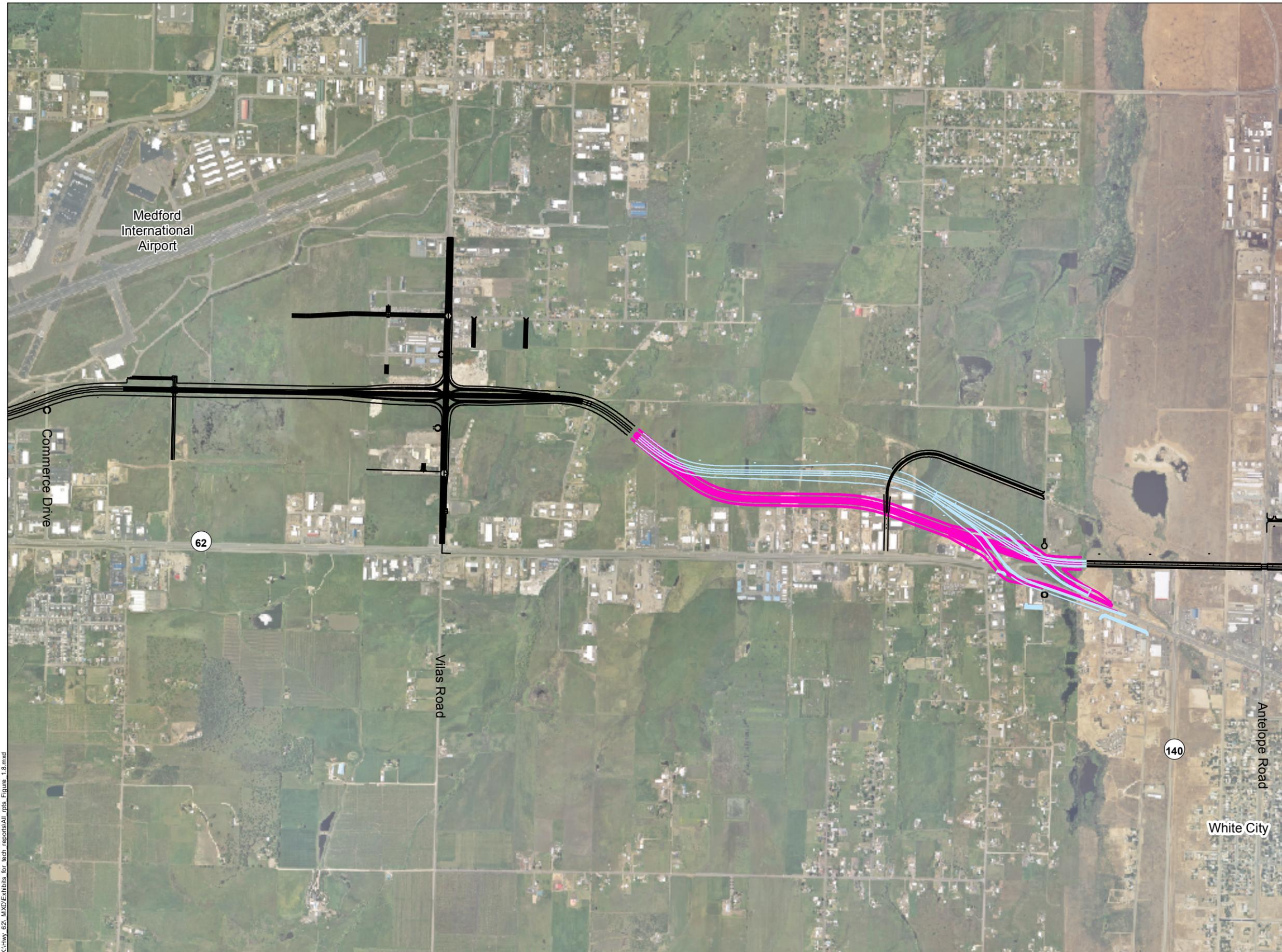
Figure 1-8
October 2007



Map Features

- Common to Both Options
- Option 2A
- Option 2B

Source: Jackson County GIS



Option 2A: Western Alignment

North of Justice Road, Option 2A would turn slightly to the east and then parallel the existing Highway 62, being located approximately 700 feet to the west of the existing highway. After crossing under the new extension of Gregory Road, the Bypass Alternative would again turn east and would join the existing alignment of Agate Road.

Option 2B: Eastern Alignment

North of Justice Road, Option 2B would turn to the east and then parallel the existing Highway 62, being located approximately 500 feet to the west of the existing highway. After crossing under the new extension of Gregory Road, the Bypass Alternative would turn very slightly to the east and would join the existing alignment of Agate Road.

1.2.2.3 Segment 3: Antelope Road to Northern Terminus (Figure 1.9)

In this segment, the Bypass Alternative would use the existing alignment of Agate Road. From the directional interchange in Segment 2 to a point just south of Avenue G, the Bypass Alternative would replace Agate Road. North of Avenue G, Agate Road would exist as it currently does. The Bypass Alternative would be at-grade after the directional interchange in Segment 2 and then would gradually rise up with an over-crossing of Antelope Road. The alignment would be elevated on fill until the over crossing at Avenue G, where it would be on an elevated structure. After crossing over Avenue H, the Bypass Alternative would turn east, return to grade, and intersect with the existing Highway 62 in the vicinity of Dutton Road. The Bypass Alternative would reconnect with the existing Highway 62 with a directional interchange. There are two design options for the location of the Bypass Alternative between Agate Road and the north terminus, as described below. Under both design options, Antelope Road, Avenue G, and Avenue H would remain open. Some portions of Avenue F, Avenue G, 11th Street, and 14th Street would be improved to provide access to parcels east and west of the Bypass Alternative (See Figure 1.9).

Option 3A: Dutton Road A

Under design option 3A, the Bypass Alternative would turn to the east immediately after crossing over Avenue H. It would be located to the south of Dutton Road, and would head east and slightly north to the intersection with the existing Highway 62. Dutton Road would be terminated in cul-de-sacs on the west and east sides of the existing Highway 62. Alternate access to the segment of Dutton Road west of Highway 62 would be provided by extending Dutton Road westward to Agate Road.

Option 3B: Dutton Road B

Under design option 3B, the Bypass Alternative would turn east after crossing over Avenue H. The radius of this curve would be much larger than under option 3A, and the Bypass Alternative would end up on the Dutton Road alignment until the intersection with the existing Highway 62. Dutton Road would be displaced, and access would be provided with a new road on the north side of the Bypass Alternative. This road would cross over the Bypass Alternative at the point where Dutton Road now ends, and would continue south along the edge of the VA Domicile and connect to Avenue G.

Alternatives Considered Segment 3

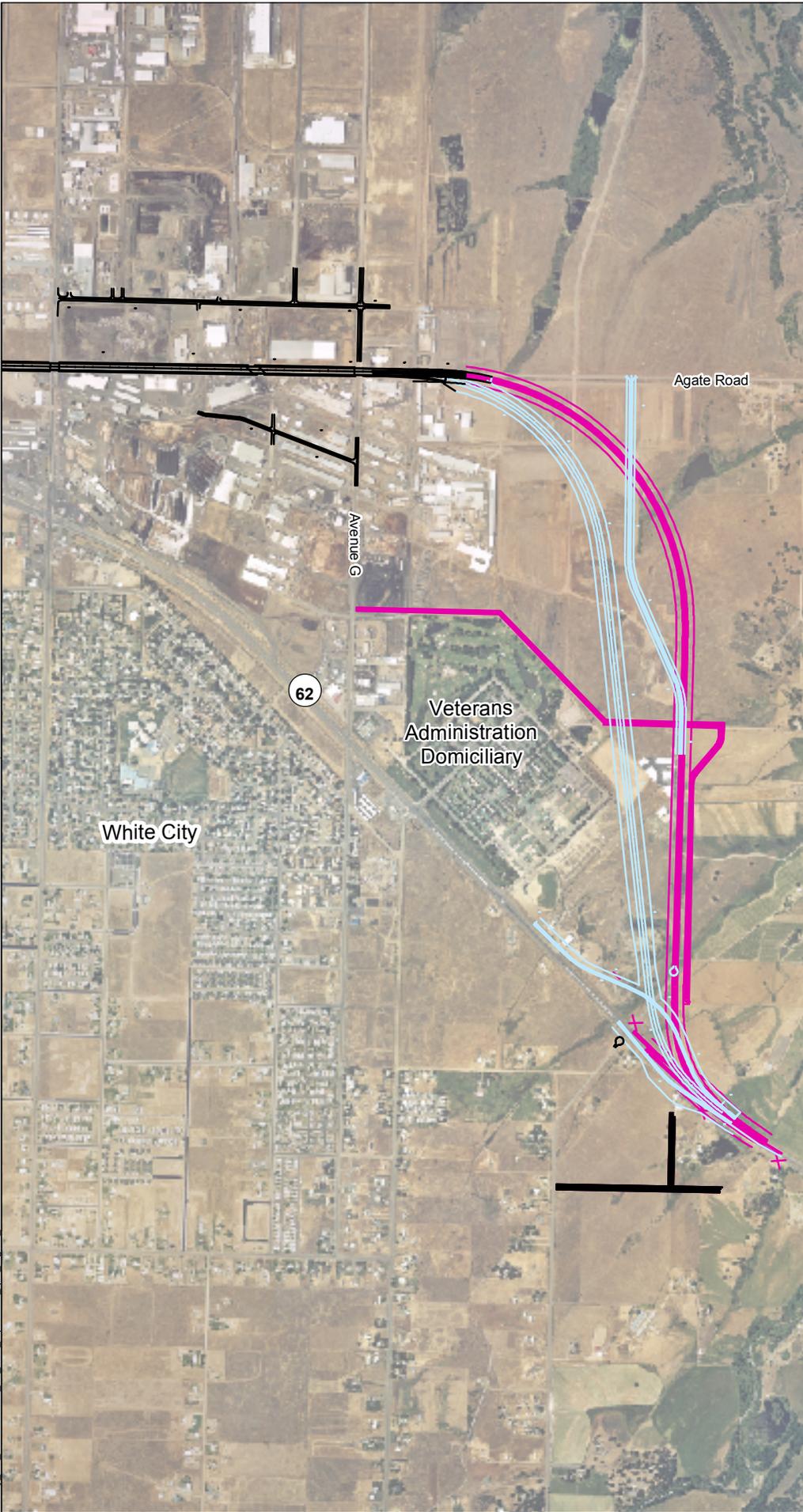
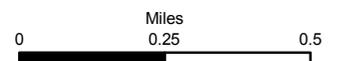
Figure 1-9
October 2007



Map Features

-  Common to Both Options
-  Option 3A
-  Option 3B

Source: Jackson County GIS



2. METHODS

2.1 Introduction

Documentation of current baseline environmental conditions for the Highway 62 Corridor Solutions Project required general literature-based research, a review of applicable federal and state regulations, personal communication with regulatory agency biologists and a series of site visits to inventory natural resources. Principle natural resources addressed by this document include threatened and endangered terrestrial wildlife and plant species, general vegetation communities and wildlife habitat and invasive plant species. Listed terrestrial wildlife species discussed consist of the bald eagle (*Haliaeetus leucocephalus*) and vernal pool fairy shrimp (*Branchinecta lynchi*). Listed botanical species addressed include Cook's lomatium (*Lomatium cooki*, federal and state-listed as endangered), large-flowered woolly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora*, federal and state-listed as endangered), Southern Oregon buttercup (*Ranunculus austro-oreganus*, a state candidate species) and coral-seeded allocarya (*Plagiobothrys figuratus* ssp. *corallicarpus*, a federal species of concern and state candidate species). The following sections provide a summary of the principle environmental regulations applicable to terrestrial biological resources and a discussion of the methods used to identify existing threatened and endangered species within the project study area.

2.2 Related Federal, State and Local Regulations

Implementation of the Highway 62 Corridor Solutions Project is governed by multiple federal and state laws due to the use of federal funding, established permit requirements and the use of state-owned lands for project development. Nearly all of these regulations require baseline surveys of biological resources to provide documentation of existing conditions and to facilitate an accurate assessment of potential project-related impacts. The information from these surveys is also used to provide regulatory agencies with the necessary information to make informed decisions about the project. Table 2-1 outlines the principle natural resource regulations and responsible agency that govern planning, data collection and decision making for this project.

2.2.1 Federal Regulations

The primary federal regulations that would govern the Highway 62 Corridor Solutions Project relative to terrestrial environmental resources are the National Environmental Policy Act, the Clean Water Act, the Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Executive Order on Noxious Weeds. A brief description of each of these regulations is provided below.

2.2.1.1 The National Environmental Policy Act

The National Environmental Policy Act (NEPA) provides an interdisciplinary framework for federal agencies to ensure that environmental factors and potential impacts are taken into account to prevent adverse damage to the environment from human actions. A key concept of NEPA is the requirement that every federal agency prepare an Environmental Impact Statement (EIS) for major actions that may significantly affect the quality of the environment. The EIS is required to provide detailed descriptions of the environmental impacts of a proposed project and its alternatives, as well as measures for mitigating significant adverse impacts (Bass and Herson 1993).

Table 2-1 Summary of Potential Federal and State and Local Regulatory Requirements

Regulation/Permit	Responsible Agency	Resource Studies	Regulated Resources
Federal			
National Environmental Policy Act (NEPA)	Federal Highway Administration (FHWA)	NEPA EIS addressing natural resource conditions, impacts and mitigation	All
Clean Water Act (CWA) Section 404 Individual Permit; Section 10 (Rivers and Harbors Act)	U.S. Army Corps of Engineers (Corps)	Wetland assessment and delineation studies; wetland functional assessment and impact analysis; mitigation plan; and alternatives analysis	Waters of the U.S., including wetlands and vernal pools
Federal Endangered Species Act (ESA)	National Marine Fisheries Service (NMFS); U.S. Fish and Wildlife Service (USFWS)	Biological Assessment addressing project impacts to listed species, species proposed for listing and candidate species	Vegetation, wildlife, and fisheries
Fish and Wildlife Coordination Act	USFWS; NMFS; Oregon Department of Fish and Wildlife (ODFW)	Agency consultation; identify impacts to fish and wildlife resources; recommend mitigation measures	Vegetation, wildlife, and fisheries
Bald and Golden Eagle Protection Act	U.S. Department of the Interior	Identify impacts to bald and golden eagles	Wildlife
Federal Migratory Bird Treaty Act (MBTA)	USFWS	Identify impacts to migratory birds	Wildlife
Executive Order (EO) 13112 on Invasive Species	Invasive Species Council	Identify listed noxious weeds and control their spread	Vegetation
State			
Oregon Removal – Fill Permit	Oregon Department of State Lands (DSL)	Wetland assessment and delineation studies; wetland functional assessment and impact analysis; mitigation plan; and alternatives analysis	Waters of the state including wetlands and vernal pools
Oregon State ESA	ODFW; Oregon Department of Agriculture (ODA)	Identify project impact to state-listed and candidate species	Vegetation, wildlife, and fisheries
CWA Section 401 Water Quality Certification	Oregon Department of Environmental Quality (ODEQ); U.S. Environmental Protection Agency (EPA)	Assess project compliance with state water quality standards; implement mitigation measures	Rivers, streams, and other bodies of water
Oregon Noxious Weed Law ORS 570.510	Oregon Department of Agriculture (ODA)	Identify listed noxious weeds and control their spread	Vegetation
Local			
City of Medford Riparian Corridor Ordinance	City of Medford	Identifies permitted and banned activities within riparian corridors	Rivers, streams, and associated riparian areas

2.2.1.2 The Clean Water Act and Endangered Species Acts

In addition to NEPA, the primary federal natural resource regulatory approvals that would be required for the Highway 62 Corridor Solutions Project include a Clean Water Act (CWA) Section 404 wetland fill permit and Section 7 consultation under the federal Endangered Species Act (ESA). Section 404 of the CWA regulates the discharge of dredged or fill materials into waters of the U.S. (waterways), which include wetlands, vernal pools and other waterbodies. Since elements of the Bypass Alternative would cross several creeks, impacts to both wetlands and non-wetland waterways must be analyzed. Applicants for 404 permits must demonstrate that all wetland and waters impacts have been avoided to the extent practicable and that unavoidable impacts are

compensated. In accordance with NEPA and Section 404(b)(1) guidelines, an alternatives analysis must also be prepared which presents alternatives in a comparative fashion, allowing the reader to discriminate between the effects of different Options of the Bypass Alternative on the environment.

In Oregon, permit applications for impacts to wetlands and waters are jointly filed with the U.S. Army Corps of Engineers (Corps; Section 404 permit) and the Oregon Division of State Lands (DSL; Oregon Removal – Fill permit). In addition, a Section 404 permit application would trigger ESA review by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS); coordination with state and federal fish and wildlife agencies; CWA 401 Water Quality Certification from the Oregon Department of Environmental Quality (DEQ); and clearances from the State Historic Preservation Office (SHPO).

As required by Section 7 of the federal ESA, consultation with the NMFS and USFWS would be initiated to assess potential impacts to listed threatened or endangered species or their habitat(s) that could result from the Bypass Alternative. It is anticipated that several terrestrial wildlife and plant species could be affected by the proposed Bypass Alternative.

For federally-listed animal species, the federal ESA Section 9(1) states: “it is unlawful for any person subject to the jurisdiction of the United States to (B) take any such species within the United States or the territorial sea of the United States or (G) violate any regulation pertaining to such species or to any threatened species of fish or wildlife listed pursuant to Section 4 of this Act and promulgated by the Secretary pursuant to authority provided by this Act.”

Section 9 (2) of the federal ESA states “with respect to any endangered species of plants listed pursuant to Section 4 of this Act, it is unlawful for any person subject to the jurisdiction of the United States to (B) remove and reduce to possession any such species from areas under federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law.”

Under the ESA, critical habitat is defined as "the specific areas within the geographic area occupied by a species on which are found those physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and specific areas outside the geographic area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species." For critical habitat, federal agencies must ensure that the proposed activities do not adversely modify critical habitat to the point that it would no longer aid in the species' recovery. In many cases, this level of protection is very similar to that already provided to species by the 'jeopardy standard'. Areas that are currently unoccupied by the species, but which are needed for the species' recovery, are protected by the prohibition against adverse modification of critical habitat. However, such unoccupied areas are rarely protected by the prohibition against jeopardizing the survival of the species (USFWS 2000).

Preparation of a Biological Assessment (BA) in accordance with Section 7 of the federal ESA would likely be required for the project because of the potential for impacts to listed species and/or their habitats. The BA would need to include an analysis of the alternatives and a description of all potential impacts to the species. A finding of effect on the species and its critical habitat would be presented for approval by NMFS and/or the USFWS. After review of the BA, NMFS and/or USFWS

would issue a Biological Opinion (BO) which would state whether the proposal would jeopardize the continued existence of the species or adversely affect their habitats.

2.2.1.3 The Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) provides for the protection of the bald eagle and the golden eagle by prohibiting the taking, possession and commerce of such birds. The bald eagle was delisted from the federal Endangered Species Act on June 29, 2007; however, continued protection of this species is afforded by the Bald and Golden Eagle Protection Act.

2.2.1.4 The Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (Title 16 Chapter 7 Subchapter II § 703) states: “it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture...any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof...”. This Act is applied to any native migratory bird and generally requires additional planning to avoid impacts to nesting migratory birds between March 15 and September 30 of each year.

2.2.1.5 Executive Order on Invasive Species

Executive Order (EO) 13112 on Invasive Species (February 12, 1999 64 FR 6183) requires federal agencies to prevent the introduction of noxious weeds; detect and control populations of such species in a cost-effective and environmentally-sound manner; monitor noxious weeds populations accurately and reliably; and provide for restoration of native species and habitat conditions in ecosystems that have been invaded. The EO is directed at controlling harmful, non-indigenous plants.

2.2.2 State Regulations

In Oregon, the principle state regulations that would require permit approval for impacts to biological resources are the CWA Section 401 Water Quality Certification, the Oregon Removal – Fill Law, and the Oregon ESA (Table 2-1). Section 401 Water Quality Certification is administered by the ODEQ and would be required to ensure compliance with water quality standards. A Section 404 permit application for wetland impacts would trigger review for Section Water Quality 401 Certification.

2.2.2.1 Oregon Removal – Fill Law

The Oregon Removal – Fill Law (ORFL) requires a permit for any removal or fill activities of 50 cubic yards or more in a waterway (including wetlands) of the state. An application for this permit is typically filed jointly with the Corps (as a Joint Permit Application) through the federal CWA Section 404 permitting process. The DSL review of the Joint Permit Application (JPA) would also include consultation with the Oregon Department of Fish and Wildlife (ODFW), ODEQ, the Department of Land Conservation and Development (DLCD), the City of Medford, and Jackson County.

2.2.2.2 Oregon Endangered Species Act

The Oregon ESA (OESA) gives the Oregon Department of Agriculture (ODA) and ODFW responsibility and jurisdiction over state threatened or endangered species. These agencies, in cooperation with the USFWS, carry out research and conservation programs for plant and animal species under the auspices of the federal ESA. In addition, the Oregon Natural Heritage Program (ONHP) plays a similar role in conservation efforts for invertebrate species. Federal ESA Section 7 consultation with the USFWS and NMFS includes coordination with ODA if federally-listed threatened or endangered plant species are identified within the potentially affected area.

For state-listed endangered or threatened wildlife species, Oregon Administrative Rule (OAR) 498.026 states: “(1) no person shall take, import, export, transport, purchase or sell, or attempt to take, import, export, transport, purchase or sell, any threatened species or endangered species, or the skin, hides or other parts thereof, or any article made in whole or in part from the skin, hide or other parts of any threatened species or endangered species.”

For state-listed threatened or endangered plants, OAR 603-073-0100 states “When land is state-managed, permission to introduce, take, or attempt to take a listed species is only allowed if the person is eligible for and obtains a written permit, or qualifies for a permit exception as described under sections (4) - (14) of this rule.”

2.2.2.3 Oregon Noxious Weed Law

ORS 570.510 noxious weed law states: “The state and the respective counties shall control any weeds designated as noxious by the state or the respective counties in any such county on land under their respective ownerships.” ORS 570.540 states “The State Highway Commission, the respective county courts, reclamation districts and municipalities shall destroy or prevent the spread or seeding of any noxious weed...on any land owned by them or constituting the right of way for any highway, county road, drainage or irrigation ditch, power or transmission line, or other purposes under their respective jurisdictions.”

2.2.3 Local Regulations

The City of Medford’s Riparian Corridor Ordinance (Ordinance) (Medford Land Development Code [MLDC] Section 10.920-10.928) was established in June 2000 as a means of implementing the goals and policies within the City’s General Land Use Plan and Comprehensive Plan. The Ordinance identifies those activities that are permitted within riparian areas (e.g., habitat restoration), as well as those activities that are permissible provided they meet certain conditions. For example, constructing a new road crossing through a riparian corridor may be allowed provided it is constructed in a manner that minimizes impacts and is consistent with other applicable state and federal laws (e.g., ORFL, CWA). The Ordinance also identifies those activities that are expressly prohibited within riparian corridors (e.g., dumping refuse or debris). Lastly, the Ordinance identifies situations that require the long-term maintenance and conservation of riparian corridors. Certain authorizations issued by the City require that a riparian corridor be protected in perpetuity by a conservation easement, deed restriction or other appropriate means.

2.3 Data Collection and Documentation

Given the long history of the Highway 62 Corridor Solutions Project, general data collection and review of existing published information has occurred at various times between 1998 and 2007. Initial data collection was initiated in 1998 for Phase I and Phase II of the original project proposal and continued with the development of a September 2001 Environmental Assessment (EA) for Phase I of the project. The development of this Technical Report is based, in part, upon information provided in the Threatened and Endangered Species Technical Report No. 2 prepared by Mason, Bruce and Girard, Inc. (MB&G) for Phase I and II of the original project (MB&G 2000). Information from the original Technical Report No. 2 was used as a preliminary data source and updated with the publication of the Biology: Terrestrial Baseline Existing Conditions Memorandum for the project (MB&G 2004).

During the preparation of this Technical Report, supplemental general data collection and review included analysis of existing natural resource reports (MB&G 2000, 2004), 7.5 minute USGS topographic maps (USGS1983a, 1983b, and 1983c), aerial photographs and the Jackson County soil survey (Johnson 1992). Also, the 2006 list of water bodies that failed to meet Clean Water Act standards (Oregon Department of Environmental Quality 2006) was reviewed to determine if any of the streams had water-quality concerns that might affect the distribution of wildlife.

In addition, the Oregon Natural Heritage Information Center (ORNHIC) and the USFWS species databases were accessed to determine known records (sightings) of listed or rare plant and wildlife species within and adjacent to the project study corridor (ONHP 2004, 2007; USFWS 1999, 2007). USFWS records showed the potential for multiple listed and candidate wildlife and plant species to occur within Jackson County. This list was then focused to the project study area by ORNHIC results, which show only localized records. The federally-listed and candidate species that appeared in both USFWS and ORNHIC searches and all state-listed and candidate species that appeared in the ORNHIC results were identified for survey. Species that were only listed on the USFWS search and were not surveyed for included Gentner's fritillary (*Fritillaria gentneri*, federal and state-listed endangered), Mardon's skipper (*Polites mardon*, a federal candidate species), Columbia spotted frog (*Rana luteiventris*, a federal candidate species), and streaked horned lark (*Eremophila alpestris strigata*, a federal candidate species). These species were not surveyed for due to lack of appropriate habitat within the project study area.

Data available from published sources was supplemented by personal communications with local biologists and managers at ODFW, ODOT, USFWS, and The Nature Conservancy (TNC). Individuals consulted for this project include Russell Peterson (USFWS Biologist), Craig Tuss (USFWS Field Supervisor), David Leal (USFWS/ODOT Liaison), Sam Friedman (USFWS Botanist), Steve Niemala (ODFW Biologist), Ken Cannon (ODOT Biologist), Ms. Molly Sullivan (TNC Botanist) and Dr. Kenton Chambers, Professor Emeritus, Department of Botany and Plant Pathology, and former Director of the Oregon State University (OSU) Herbarium.

Between 1998 and 2007, MB&G personnel conducted a series of field investigations and site visits that have included rare and noxious weed surveys, mapping of vegetation communities, delineation of vernal pool complexes, wetland assessments, surveys for vernal pool fairy shrimp, surveys for general wildlife species, and qualitative and quantitative habitat assessments for federally-listed wildlife species. Field visits to the project study area to collect data and confirm information from previous investigations were conducted in March 1998; March 23-29, April 12-16, and June 22-25, 1999; May 8-14, July 11-14, and August 15-16, 2000; June 28 and 29, 2004; April 13 and June 15,

2006; March 27-28, 2007; and September 4, 2007. An additional site visit is planned for spring 2008 to investigate previously unsurveyed rare plant habitat within the project footprint. The following sections provide details on the data collection procedures, regulatory agency contacts, and field surveys for each terrestrial resource discussed in this report. A discussion on life histories and habitat requirements for each threatened or endangered species and general biology for all other natural resources is presented in Section 4.1.

2.3.1 Bald Eagle

The pre-field review for the bald eagle included database searches and discussions with local experts. The Issacs and Anthony database (Issacs and Anthony 2006), the ORNHIC database (ORNHIC 2004, 2007), Russell Peterson with the USFWS (MB&G 2000) and Steve Niemala with the ODFW (ODFW 2007) were consulted to determine bald eagle presence within the project vicinity. Due to the lack of appropriate habitat, recent bald eagle sightings and known bald eagles nest sites, bald eagles are not expected in the vicinity of the project study area. As such, surveys for bald eagles were not considered necessary for the preparation of this Technical Report.

2.3.2 Vernal Pool Fairy Shrimp

As a preliminary step in assessing impacts to vernal pool fairy shrimp, all vernal pools occurring within the project's original project study area were field mapped in March 1998 by MB&G using Global Positioning System/Geographic Information System (GPS/GIS) equipment. The purpose of this mapping effort was to identify those pools that represented potential habitat for fairy shrimp and could potentially be impacted by the project's original Build Alternatives.

During 1999-2000, 67 vernal pools within 60 feet of the proposed cut or fill limits for the project's original two Build Alternatives were surveyed for large branchiopods (May Consulting 1999, MB&G 2000). These surveys did not include the vernal pools in the current project study area. However, the vernal pool complex north of Upton Creek and just west of the new extension for Lear Way (just east and adjacent to the current project study area) was surveyed. The surveys consisted of dry-season sampling (summer 1999) and wet-season sampling (fall 1999 through spring 2000) that were conducted in accordance with federal survey protocols in force at the time of survey (USFWS 1996). The dry-season sampling consisted of the collection of soil samples from each pool and sieving the material in search of fairy shrimp eggs (formerly referred to as cysts). The wet-season sampling consisted of dip-netting inundated pools in search of hatched fairy shrimp every two weeks between the times when the pools were first inundated in December 1999 until the last pool dried out in April 2000. All eggs and hatched invertebrates collected were subsequently identified in the laboratory (May Consulting 1999).

All vernal pool complexes identified during the 1998-2000 field work (May Consulting 1999, MB&G 2000) were revisited by MB&G staff on several occasions from 2004-2007 to confirm the continued presence of the vernal pools and to note any changes that might affect habitat quality for vernal pool fairy shrimp. However, no additional protocol surveys for vernal pool fairy shrimp were conducted for the project study area after 2000.

Due to the evolving design of the Bypass Alternative for the Highway 62 Corridor Solutions Project, the original vernal pools surveyed for vernal pool fairy shrimp in 1999 and 2000 are no longer included in the current project study area. As such, no additional surveys for vernal pool fairy shrimp were conducted as part of this Technical Report. However, since vernal pool fairy shrimp are known

to occur in the vicinity of the project study area (from the results of the 1999-2000 protocol surveys), all vernal pools within the current project study area that are assessed and/or described in this report are assumed to contain vernal pool fairy shrimp.

2.3.3 Threatened, Endangered and Candidate Plants

Given the long history of the project, rare plant surveys were conducted within and adjacent to the project study area by MB&G botanists in March 23 – 29, April 12 – 16, and June 22 – 25, 1999; June 28-29, 2004; April 13 and June 15, 2006; and March 27 - 28, 2007. An additional site visit is planned for spring 2008 to investigate previously unsurveyed rare plant habitat within the project footprint.

Endangered, threatened and candidate plant species identified as potentially occurring within the project study area, as shown on both the ORNHIC and USFWS species lists, include Cook's lomatium (*Lomatium cooki*, federal and state-listed as endangered), large-flowered woolly meadowfoam (*Limnanthes floccosa* ssp. *Grandiflora*, federal and state-listed as endangered), Southern Oregon buttercup (*Ranunculus austro-oreganus*, a state candidate species for listing), and coral-seeded allocarya (*Plagiobothrys figuratus* ssp. *Corallicarpus*, federal species of concern and a state candidate species for listing).

Two different survey methods were used to determine the presence or absence of the four plant species that potentially occur within the project study area. The first method included an intuitive controlled survey that was used for the Cook's lomatium and the large-flowered woolly meadowfoam. The intuitive controlled surveys for both species involved a thorough search of 100 percent of their suitable habitat (e.g., vernal pools and mound-vernal pool vegetation communities) when these species were most likely in flower. The second method consisted of a quick-check survey that was used for the Southern Oregon buttercup and coral-seeded allocarya. The quick-check surveys were also conducted during the flowering period of the target species and involved a quick traverse of the most likely habitat for each of these two species.

Reference specimens for the four plant species were observed prior to the surveys. Cook's lomatium and the large-flowered woolly meadowfoam were observed in flower at the Nature Conservancy (TNC) preserves near the junction of Table Rock and Antelope Roads, and the Southern Oregon buttercup was identified at another TNC preserve south of Newland Road. A TNC botanist, Ms. Molly Sullivan, confirmed MB&G's observations regarding identification characteristics and flowering periods (Sullivan 1999). The coral-seeded allocarya was observed at a site previously identified and included in the ONHP database approximately 5 miles north of the project study area. A specimen collected from the ONHP site was compared with those in the Oregon State University Herbarium, and Dr. Kenton Chambers, Professor Emeritus, Department of Botany and Plant Pathology, and former Director of the Oregon State University (OSU) Herbarium, confirmed MB&G's identification (Chambers 1999). These observations were used to familiarize the rare plant survey crew with the proper identification characteristics for each species. All plant surveys were conducted during the optimal season for identification of flowering and fruiting characteristics based upon available botanical information.

If a rare plant population was found during the surveys, the location of individual plants or clusters of plants were mapped with GPS equipment and the individuals were counted. A tally method was used to count the individuals. Each plant species tends to grow in small clumps of two to upwards of

thirty plants per clump. Initially a number of representative clumps were carefully counted to determine the average number of individuals per clump. The remainder of the area was then tallied by estimating the number of individuals in each clump based on the size of the clump.

Due to project design changes in late summer 2007 and the late spring to early summer flowering period of the four sensitive plants within the project study area, surveys for sensitive plant species were not conducted in several areas. Therefore, these four species are assumed to be present within the areas that were not surveyed. These areas include a proposed access road south of Vilas Road East between Airport Drive and Industry Drive; several small access driveways north of Vilas Road East; the area in Segment 3 Option 3B west of Dutton Road and north of Segment 3A and along the access road that borders the Veterans Administration Domicile between West Dutton Road and Avenue G; and the access road north of East Dutton Road, east of Highway 62. Southern Oregon buttercup was assumed to be present within all areas that were not surveyed for rare plants. Cook's lomatium, large-flowered woolly meadowfoam and coral-seeded allocarya are assumed to be present in all mound-vernal pool complex habitats within the areas not surveyed for rare plants.

2.3.4 Vegetation Communities

During the initial natural resource studies conducted for the project from 1998 to 2000, a vegetation cover type map was prepared based on the dominant vegetation types occurring in the project study area during this time period. The initial vegetation cover type map was prepared from an analysis of aerial photos, a field reconnaissance in March 1998, and information provided in the Jackson County Soil Survey (Johnson 1992) and other reports. The purpose of this cover type map was to identify major vegetation communities within the project study area. Field surveys conducted by MB&G in 1999 and 2000 focused on field-truthing the vegetation cover type map and identifying the general plant species composition within each community. In general, the mapping of vegetation communities was limited to broad vegetation classes or land use types such as developed land and grassland. Small inclusions of distinctly different vegetation communities up to approximately 0.50 acre within a larger vegetation class or land use type were not mapped separately and were not considered large enough to affect the analysis of impacts. For example, a small house site surrounded by large grassland fields would be considered too small an area to map as a separate community or land use type. Therefore, the house site would be included within the larger grassland community.

The principle survey method employed to map vegetation communities involved traversing, on foot, 100 percent of the proposed impact areas (footprint) for the Bypass Alternative within the project study area. The approximate limits of each vegetation community were identified through aerial photograph interpretation, confirmed through field observations and placed on project mapping. Specifically, the mound-vernal pool complex habitat type was mapped based on the presence of patterned ground and multiple vernal pools. Not all vernal pools are located within the mound-vernal pool complex habitat type within the Bypass Alternative. There are several scattered vernal pools that are either solitary or are not part of a visible patterned ground. In each of the vegetation communities within the ROW, the dominant plant species comprising the communities were identified and a general estimate of percent cover was made for each dominant species.

During the fieldwork conducted from 2004 - 2007, MB&G biologists updated the vegetation cover type map by noting any major changes to land cover or land use type within the project study area

that had occurred since the original mapping was conducted in 1999-2000. Overall, surveys for rare plants were conducted separately from the identification and mapping of plant communities.

2.3.5 Wildlife Habitat

Given the urban and agricultural nature of the project study area, it was determined that wildlife survey procedures would focus on identifying high value habitats available for native wildlife and noting the presence of individuals rather than using intensive survey and monitoring techniques for locally common species.

To facilitate fieldwork, wildlife habitats were first identified and categorized in accordance with major vegetation communities described in Section 4.1.3. Habitat boundaries were determined from aerial photographic interpretation and field survey confirmation. Following the mapping of major vegetation communities, wildlife biologists from MB&G traversed, on foot, the project study area to the maximum extent possible and made observations of the wildlife species encountered. Field observations were made on the presence, quality, and area of the habitats in the project study area. The field observations were made during all field studies conducted for the project (including those for rare plants, wetlands, vernal pools, etc.). Wildlife observed in the field was identified to species along with general notes on behavior noted at the time of observation.

2.3.6 Noxious Weeds

To meet the requirements of Executive Order (EO) 13112 for this project, MB&G conducted a series of botanical field studies within the project study area to identify plants listed in the Oregon Noxious Weed Policy and Classification System, as maintained by the Oregon Department of Agriculture (ODA). Surveys for noxious weeds listed for Jackson County (Table 2-2) were conducted concurrently with the rare plant surveys. General notes on species presence and location were made during the surveys. Due to the abundant presence of many of these species throughout the project study area, mapping of individual populations and quantity estimates for each species was not practical.

Table 2-2 Noxious Weeds of Jackson County Listed by the Oregon Department of Agriculture

Common name	Scientific name	Weed Class ¹
Bull thistle	<i>Cirsium vulgare</i>	B
Canada thistle	<i>Cirsium arvense</i>	B
Cutleaf teasel	<i>Dipsacus laciniatus</i>	B
Dalmatian toadflax	<i>Linaria dalmatica</i>	B
Diffuse knapweed	<i>Centaurea diffusa</i>	B
Dyer's woad	<i>Isatis tinctoria</i>	B
Gorse	<i>Ulex europaeus</i>	B, T
Himalayan blackberry	<i>Rubus armeniacus</i>	B
Houndstongue	<i>Cynoglossum officinale</i>	B
Italian thistle	<i>Carduus pycnocephalus</i>	B
Leafy spurge	<i>Euphorbia esula</i>	B, T
Meadow knapweed	<i>Centaurea pratensis</i>	B
Mediterranean sage	<i>Salvia aethiopsis</i>	B
Musk thistle	<i>Cardus nutans</i>	B
Puncturevine	<i>Tribulus terrestris</i>	B
Purple loosestrife	<i>Lythrum salicaria</i>	B, T
Rush skeletonweed	<i>Chondrilla juncea</i>	B, T

Source: www.weedmapper.org (ODA, 2007)

¹Weed Classes as defined by ODA:

B - These are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties.

T - These weeds represent an economic threat to the state of Oregon.

2.4 Affected Environment Profile

The Affected Environment Profile (Section 4) was compiled using background data collected for each species, field data, and GIS analysis of the field data. Principle resources assessed in the Affected Environment Profile were based on project evaluation criteria (Section 2.5). Several assumptions were used in the GIS data analysis and include the following:

- The project study area boundary for this report was based on right-of-way (ROW) data provided by Oregon Department of Transportation (ODOT), Harper-Leavitt Engineering, Inc. and URS Corporation plus an additional buffer. This project study area totals approximately 2,357 acres. This area was selected to give a broader landscape perspective to the data provided in the impact assessment (Section 5).
- The proposed impact area boundary for this report was based exclusively on ROW data provided by Oregon Department of Transportation (ODOT), Harper-Leavitt Engineering, Inc. and URS Corporation. This area assumes permanent impacts within the entire ROW.
- Vernal pool fairy shrimp are known to occur within the vicinity of the project study area based upon protocol surveys conducted in 1999 and 2000. However, more recent comprehensive surveys for this species within the vernal pool complexes that may be potentially impacted by the Bypass Alternative have not been conducted. Therefore, it is assumed that vernal pool fairy shrimp are present in each vernal pool and mound-vernal pool complex vegetation community addressed in this Technical Report.

- Critical habitat mapping for vernal pool fairy shrimp was based upon mapping prepared by the USFWS (USFWS 2003).
- Cook's lomatium, large-flowered wooly meadowfoam, coral-seeded allocarya, and Southern Oregon buttercup are known to occur within the vicinity of the project study area based upon surveys conducted between 1999 and 2007 by MB&G biologists. However, comprehensive surveys for these species have not been conducted within several areas added to the Bypass Alternative project design in late summer 2007. Therefore, it is assumed that these four species are present in the areas not surveyed. Specifically, it is assumed that Cook's lomatium, large-flowered wooly meadowfoam, and coral-seeded allocarya are present in each mound-vernal pool complex in the non-surveyed areas and Southern Oregon buttercup is assumed to be present throughout the entirety of the non-surveyed areas.
- General wildlife species affects were determined based on the vegetation communities (habitat) affected.

2.5 Impact Assessment

Impacts to resources were assessed by applying the appropriate project evaluation criteria, as defined during the alternatives analysis phase, to the affected environment profile of each Segment and Option for the Bypass Alternative. In the case of terrestrial resources, the project evaluation criteria included:

- Acreage of vernal pools impacted
- Number of ESA-listed plant species or acres of habitat impacted
- Acres of habitat impacted classified by the USFWS as vernal pool fairy shrimp critical habitat
- Number of enhancements to ESA-listed species
- Number of enhancements to wildlife habitat

In addition, to achieve a balanced view of terrestrial biological resources that would be impacted by this project, acreage of vegetation communities and wildlife habitat, impacts to noxious weeds, and enhancements to vegetation communities and wildlife habitat were also analyzed.

Quantitative impacts were calculated based on GIS analysis included high resolution aerial photography overlain with spatially referenced environmental resource data layers. Several assumptions were used in the GIS data analysis and include the following:

- The project study area boundary for this report was based on right-of-way (ROW) data provided by Oregon Department of Transportation (ODOT), Harper-Leavitt Engineering, Inc. and URS Corporation plus an additional subjective buffer. This area was selected to give a broader landscape perspective to the data provided in the impact assessment (Section 5).

- The proposed impact area boundary for this report was based exclusively on ROW data provided by Oregon Department of Transportation (ODOT), Harper-Leavitt Engineering, Inc. and URS Corporation. This area assumes permanent impacts within the entire ROW.
- Vernal pool fairy shrimp are known to occur within the vicinity of the project study area based upon protocol surveys conducted in 1999 and 2000. However, more recent comprehensive surveys for this species within the vernal pool complexes that may be potentially impacted by the Bypass Alternative have not been conducted. Vernal pools in the Medford area are located within a mound-vernal pool complex habitat type. Factors such as vernal pool hydrology are dependent on mounds adjacent to the vernal pools. Therefore, it is assumed that vernal pool fairy shrimp are present in each vernal pool addressed in this Technical Report and impacts are based on acreage of mound-vernal pool habitat along with individual vernal pool acreages included within the Bypass Alternative footprint.
- General wildlife species affects were determined based on the vegetation communities (habitat) affected. These results are presented in Section 5.1.
- Cook's lomatium, large-flowered wooly meadowfoam, coral-seeded allocarya, and Southern Oregon buttercup are known to occur within the vicinity of the project study area based surveys conducted between 1999 and 2007 by MB&G biologists. However, comprehensive surveys for these species have not been conducted within several areas added to the Bypass Alternative project design in late summer 2007 and that may be impacted by the Bypass Alternative. Therefore, it is assumed that these four species are present in the areas not surveyed. Specifically, it is assumed that Cook's lomatium, large-flowered wooly meadowfoam, and coral-seeded allocarya are present and would be impacted in each mound-vernal pool complex in the non-surveyed areas within the Bypass Alternative footprint. Similarly, it is assumed that Southern Oregon buttercup is present and would be impacted throughout the entirety of the non-surveyed areas within the Bypass Alternative footprint.

Indirect, cumulative, and construction impacts are discussed qualitatively in Sections 5.2 and 5.3. Because it is assumed that all impacts to the proposed footprint would be permanent, construction (temporary) impacts would be similar to direct impacts. Similarly, indirect and cumulative impacts addressed for this report are considered to be identical and are discussed together.

2.6 Potential Mitigation Measures

Potential mitigation measures, as discussed in Section 6.0, are based on the Oregon Department of Transportation (ODOT) Standard and Supplemental Specifications (ODOT 2002, ODOT 2006) and Best Management Practices (BMPs). Additional mitigation measures, specifically created for this project would likely be developed through additional consultation and coordination with regulatory agencies as project planning progresses.

3. AGENCY COORDINATION AND INVOLVEMENT

The development of this Technical Report is based upon several scoping meetings with regulatory agencies and coordination with wetland scientists and biologists from several federal and state regulatory agencies including ODOT, USFWS, Corps and DSL. The purpose of the scoping meetings and coordination was to determine the potential extent of terrestrial biological natural resources within the project study area and to confirm the level of documentation necessary to calculate potential impacts for the DEIS. Personal communications with these agency biologists are cited in the relevant sections of this report.

During the development of the initial Build Alternatives for the Highway 62 Corridor Solutions Project, a series of office briefings and site visits were held with representatives of federal and state regulatory agencies. Agency briefings and site visits were conducted on June 16, 1999 and June 7 and 8, 2000. The purpose of these briefings was to present information updates on the project, review project study area conditions and solicit agency comments on project issues related to endangered, threatened and candidate terrestrial species and vernal pools (MB&G 2000). During the June 2000 meeting, the vernal pool delineation and mapping conducted by MB&G was reviewed and an initial reconnaissance of the wetland and other terrestrial resources in the project study area was also made. Surveys conducted within the project study area in 2000 by MB&G were based upon results of that agency meeting and the location and extent of the original Build Alternatives for the project. A portion of the surveys conducted in 2000 focused on Phase 1 of the original project proposal to facilitate preparation of the September 2001 EA for Phase I (the North Medford Interchange). This included many sections of Segment 1 of the current project proposal.

When planning for Highway 62 Corridor Solutions Project re-started in mid-2004, a second agency scoping meeting was held on October 4, 2004 at the Jackson County Public Works Auditorium in White City, Oregon. The scoping meeting included a tour of the project study area. The purpose of the scoping meeting was to provide agency representatives with an update of the project and solicit initial comments and concerns of the project. The site visit component of the scoping meeting stopped at several locations to review wetland and vernal pool conditions, as well as known rare plant populations. The level of wetland and vernal pool delineation conducted until that time (from 1998 to 2004) was discussed. The agency representatives were also shown the vernal pool complex located north of Upton Creek and east of the recent extension of Lear Way where eggs of the vernal pool fairy shrimp were first identified in 1999 and 2000 protocol sampling.

Representatives attending the scoping trip included Debbie Timms (ODOT), Jerry Vogt (ODOT), Mike Arneson (ODOT), Ken Cannon (ODOT), John Renz (DLCD), David Leal (USFWS), Stephen Wille (USFWS), Sam Friedman (USFWS), Dan Van Dyke (ODFW), Nick Fortey (FHWA), Susan Sturges (Corps), Mike McCabe (DSL), Mark Hynson (MB&G), and John Lloyd (MB&G).

In addition to the 2004 agency scoping meeting, there was also a May 3, 2007 field meeting that was held in Medford with Collaborative Environmental and Transportation Agreement for Streamlining (CETAS) members to review the project. Attendees included Ken Cannon (ODOT), Brad Livingston (ODOT), Jerry Marmon (ODOT), Jim Collins (ODOT), Tom Loynes (NMFS), Jon Germond (ODFW), Art Martin (ODFW), David Leal (USFWS), Russ Klassen (DSL), Dominic Yballe (ACOE), Michael Turaski (ACOE), Michelle Eraut (FHWA), Yvonne Vallette (EPA) and Terry Kearns (URS).

The surveys conducted to date for the Bypass Alternative and assessment of impacts were based upon the aforementioned agency meetings. In addition, the assessment of impacts is also based upon ODOT's coordination with the CETAS Team.

During the development of this report, several federal and state regulatory agencies were consulted to determine the potential extent of sensitive natural resources within the project study area. MB&G requested information about the presence of federally listed and candidate species within the project study area from the U.S. Fish and Wildlife Service (USFWS 1999, 2007). In addition, the presence of species considered endangered, threatened, or candidate by ODFW and the ODA was assessed through a query of the ORNHIC database (ONHP 2004, 2007). Ken Cannon, ODOT Region 3 Biologist, provided a technical review of this report in December 2007.

Data available from published sources was supplemented by personal communications with local biologists and managers at ODFW, ODOT, USFWS, and The Nature Conservancy (TNC). Individuals consulted for this project include Russell Peterson, USFWS Biologist, Craig Tuss, USFWS Field Supervisor, David Leal, USFWS ODOT Liaison, Sam Friedman, USFWS Botanist, Steve Niemala ODFW Biologist, Ken Cannon, ODOT Biologist, Ms. Molly Sullivan, TNC Botanist, and Dr. Kenton Chambers, Professor Emeritus, Department of Botany and Plant Pathology, and former Director of the OSU Herbarium.

4. AFFECTED ENVIRONMENT

4.1 Affected Environment Profile

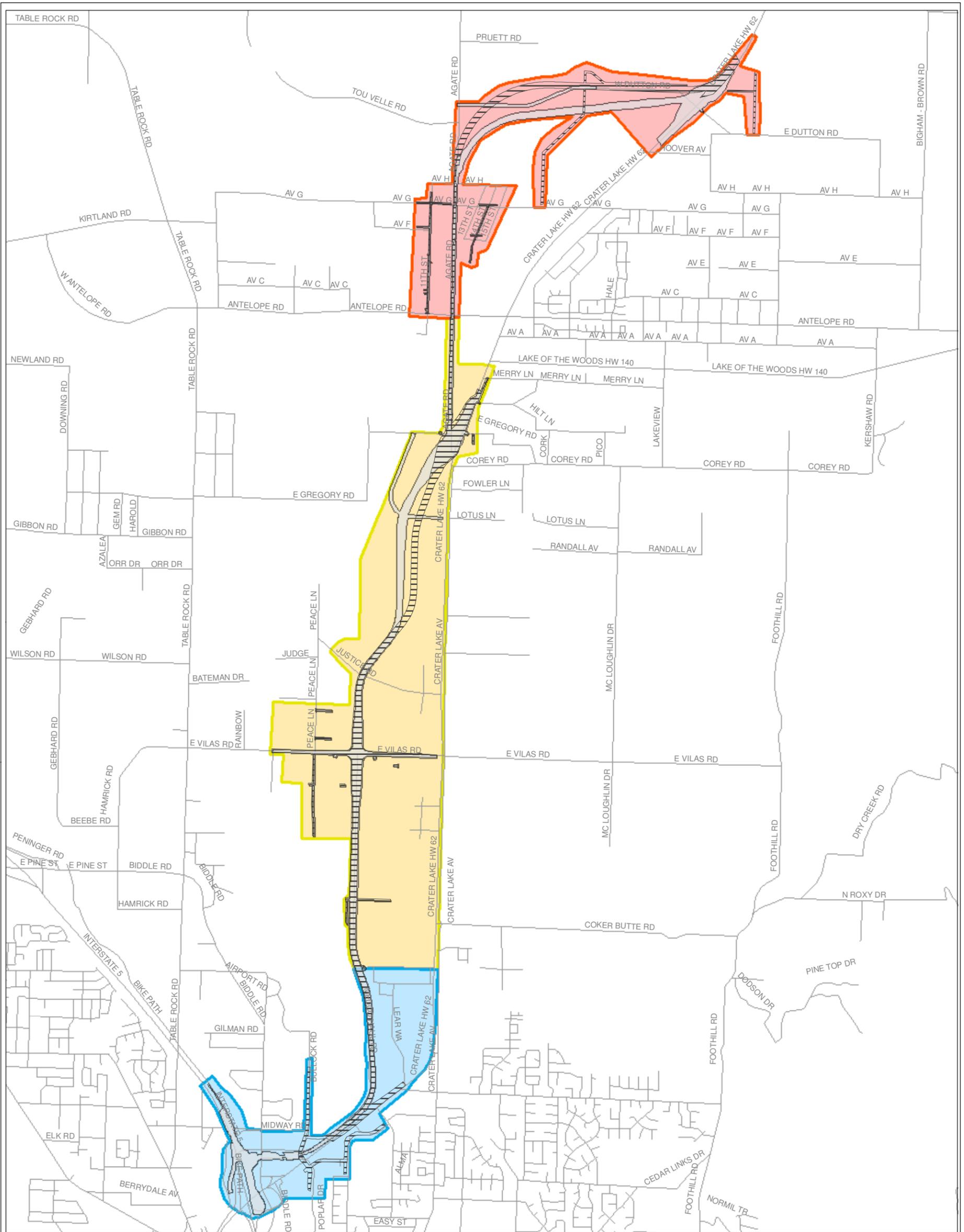
In order to provide the reader with a broad-scale understanding of the resources present within and adjacent to the proposed Bypass Alternative, a single *project study area* was established that encompasses all Segments and Options for the Bypass Alternative, as well as large portions of the existing Highway 62 corridor. Not all resources within the project study area would be affected or impacted by the Bypass Alternative; rather the purpose of the project study area is to provide a broader context for discussing the impacts on resources that may be expected to result from implementing the Bypass Alternative (Section 5.).

The project study area established for this Technical Report is shown in Figure 4-1 and totals approximately 2,357 acres. Starting from the south at the interchange of Interstate 5 and the existing Highway 62, the project study area boundary extends east to Whittle Avenue and then north along the east side of the existing Highway 62. At Leigh Way, the boundary extends west to Agate Road and then angles north along Agate Road until deviating from Agate Road at its intersection with Touvelle Road. The boundary then continues overland in a northeasterly direction until it crosses the existing Highway 62 just north of Andries Way, with an extension projecting south along the western edge of the Veterans Administration Domicile. The project study area continues north along the existing Highway 62, until it reaches the Segment 3 terminus located south of the existing Highway 62 crossing of Antelope Creek.

The western boundary of the project study area extends from the Segment 3 south along the existing Highway 62, then west along West Dutton Road, and then southwest until it meets Agate Road. From here, the boundary extends south along the west side of Agate Road, then west at East Gregory Road to the old Medco Haul Road. At the point where the Medco Haul Road strikes Peace Lane, the boundary angles south and then to the southwest to include Vilas Road. The westernmost edge of the boundary in this section of the project study area is Rainbow Drive. South of Rainbow Drive and Vilas Road, the project study area extends overland to the Medco Haul Road and southward along the Medco Haul Road and the eastern boundary of the Medford International Airport to a point just north of the existing Highway 62 corridor. Here the project study area includes a small portion of Bullock Road and angles west to the Interstate 5 interchange with the existing Highway 62 (Segment 1).

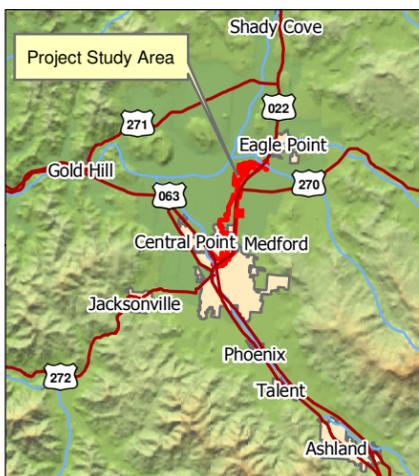
Within the project study area, the proposed footprint for each Segment and Option of the Bypass Alternative was used to determine anticipated environmental impacts (Section 5.). Refer to Figure 4-1 for a map indicating the limits of project study area and the proposed footprint of all Segments and Options for the Bypass Alternative.

The principle terrestrial resources documented in this Technical Report are threatened and endangered wildlife (bald eagle and vernal pool fairy shrimp), threatened and endangered plants (Cook's lomatium, large-flowered wooly meadowfoam, Southern Oregon buttercup, and coral-seeded allocarya), vegetation communities, wildlife habitat and noxious weeds. Further details for each of these natural resources are described in the following section. Natural resources found within the proposed project study area are described in Section 4.2 and presented in Figures 4-2a, 4-2b, 4-2c, 4-3a, 4-3b and 4-3c.



**Project Study Area/
Proposed Footprint**

Figure 4-1
February 2008

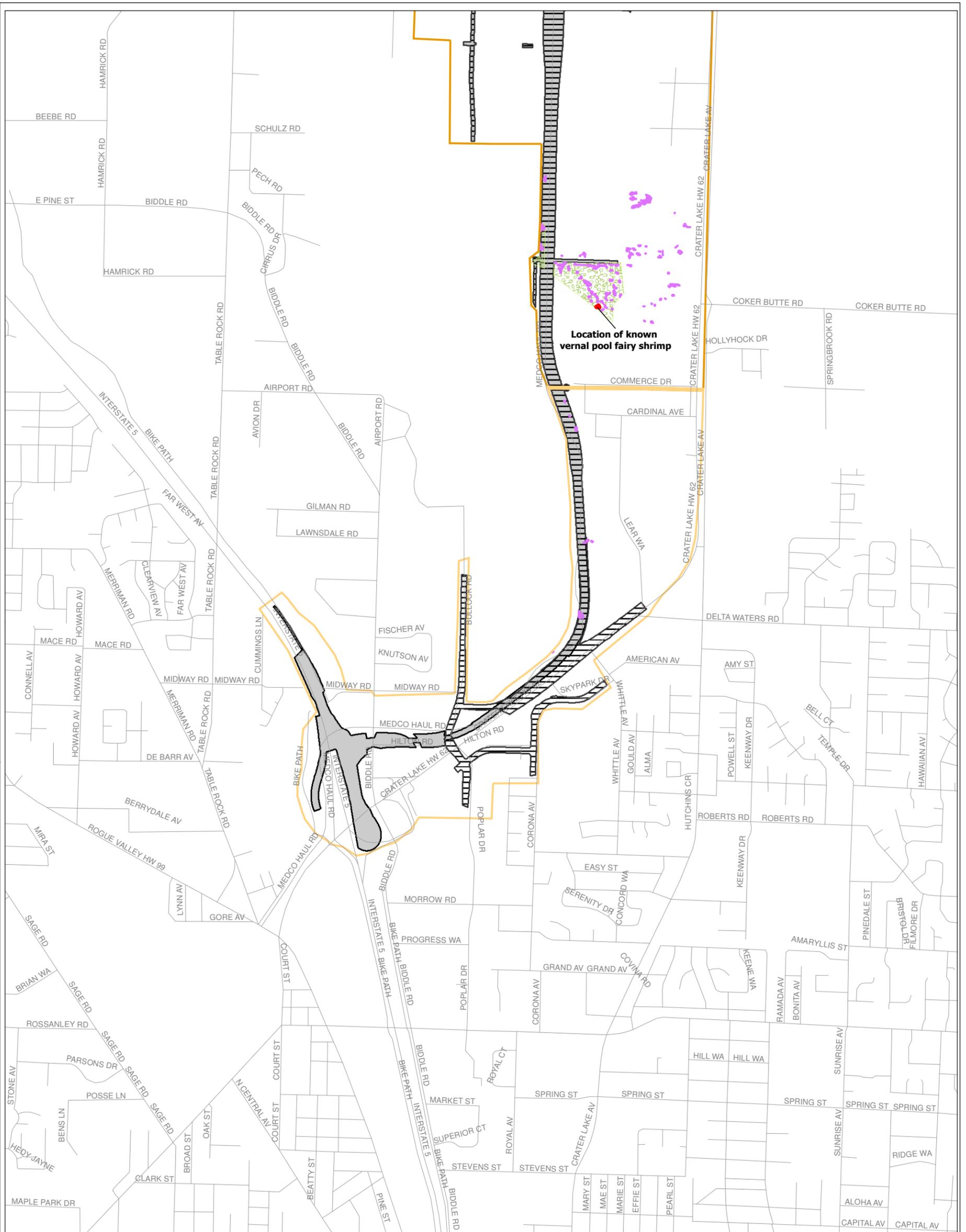


Map Features

-  Option A ROW
-  Option B ROW
-  Streets
-  PSA Segment 1
-  PSA Segment 2
-  PSA Segment 3

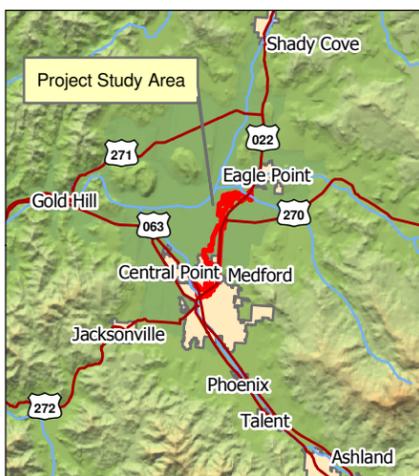
Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.





**Vernal Pools/
Mound-Vernal Pool Complexes/
Vernal Pool Critical Habitat
Segment 1**

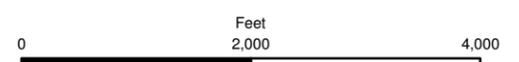
Figure 4-2 a
February 2008



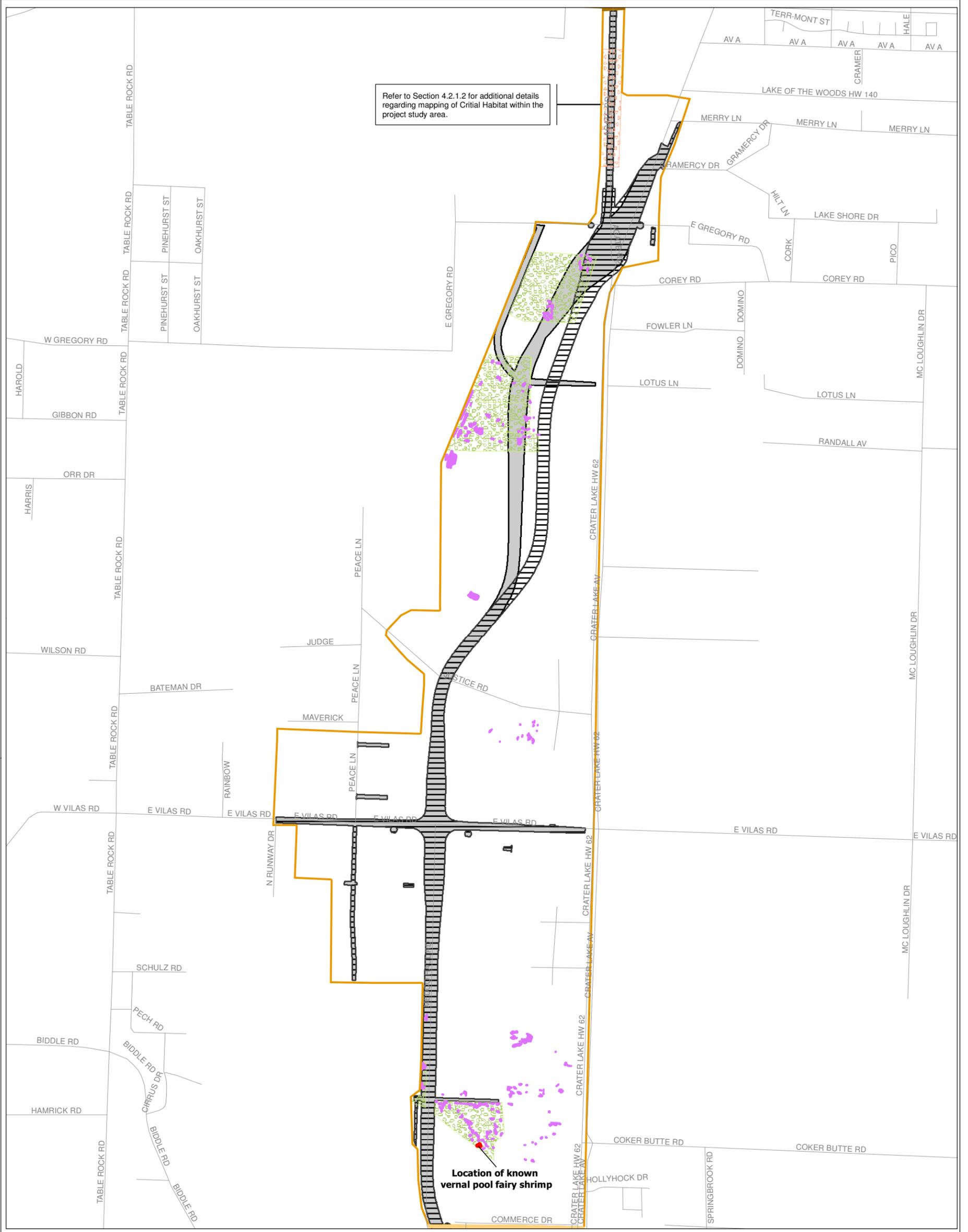
Map Features

	Streets		PSA Segment 1
	Vernal Pool		PSA Segment 2
	Vernal Pool Critical Habitat		PSA Segment 3
	Mound-Vernal Pool Complex		Option A ROW
	Vernal Pool CVP-30		Option B ROW

Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.



Refer to Section 4.2.1.2 for additional details regarding mapping of Critical Habitat within the project study area.



Location of known vernal pool fairy shrimp

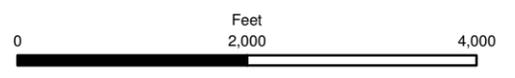
Vernal Pools/ Mound-Vernal Pool Complexes/ Vernal Pool Critical Habitat Segment 2

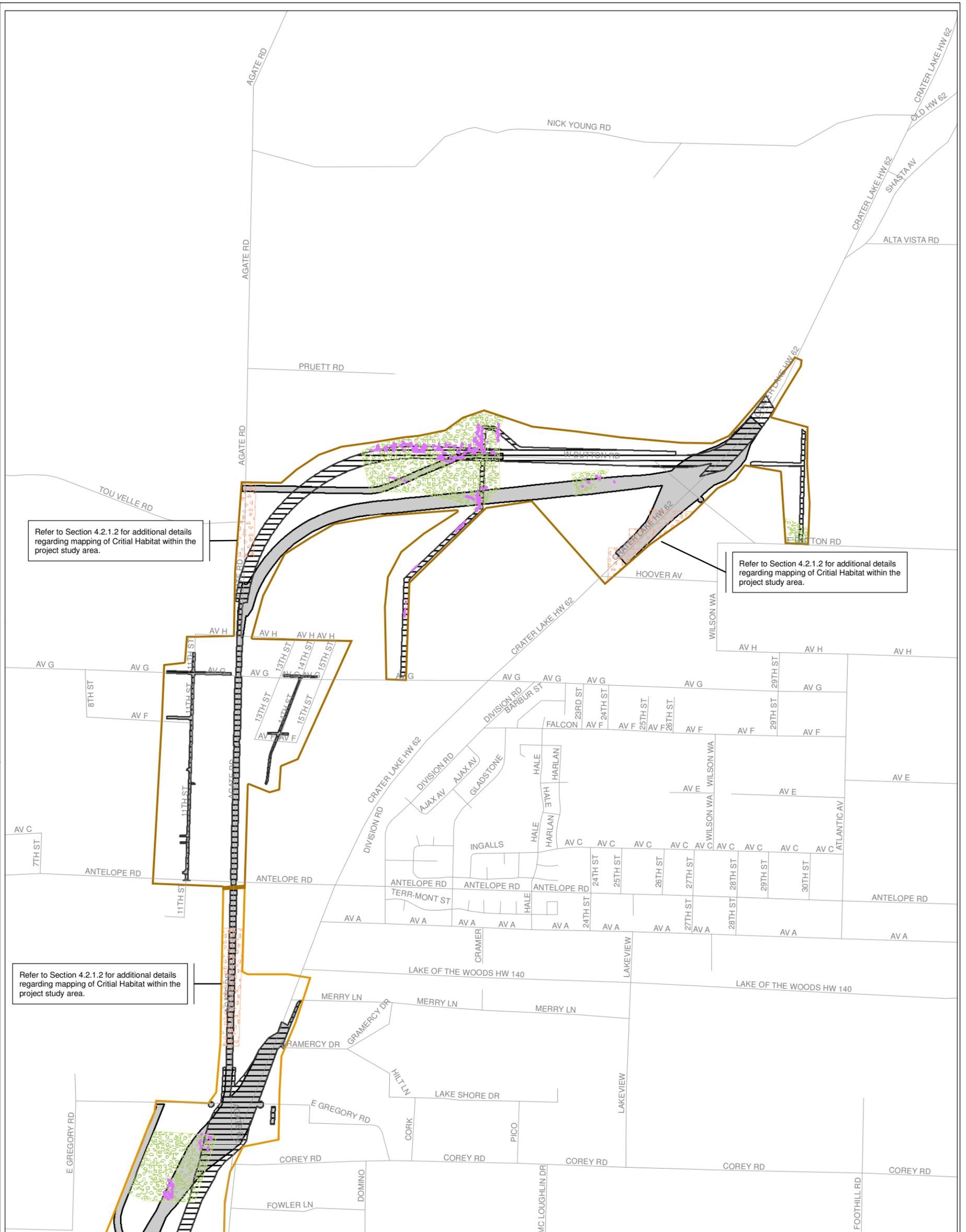
Figure 4-2b
February 2008



Map Features			
	Streets		PSA Segment 1
	Vernal Pool		PSA Segment 2
	Vernal Pool Critical Habitat		PSA Segment 3
	Mound-Vernal Pool Complex		Option A ROW
	Vernal Pool CVP-30		Option B ROW

Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.





Refer to Section 4.2.1.2 for additional details regarding mapping of Critical Habitat within the project study area.

Refer to Section 4.2.1.2 for additional details regarding mapping of Critical Habitat within the project study area.

Refer to Section 4.2.1.2 for additional details regarding mapping of Critical Habitat within the project study area.

**Vernal Pools/
Mound-Vernal Pool Complexes/
Vernal Pool Critical Habitat
Segment 3**

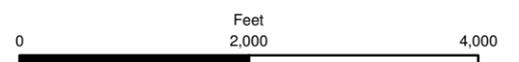
Figure 4-2 c
February 2008

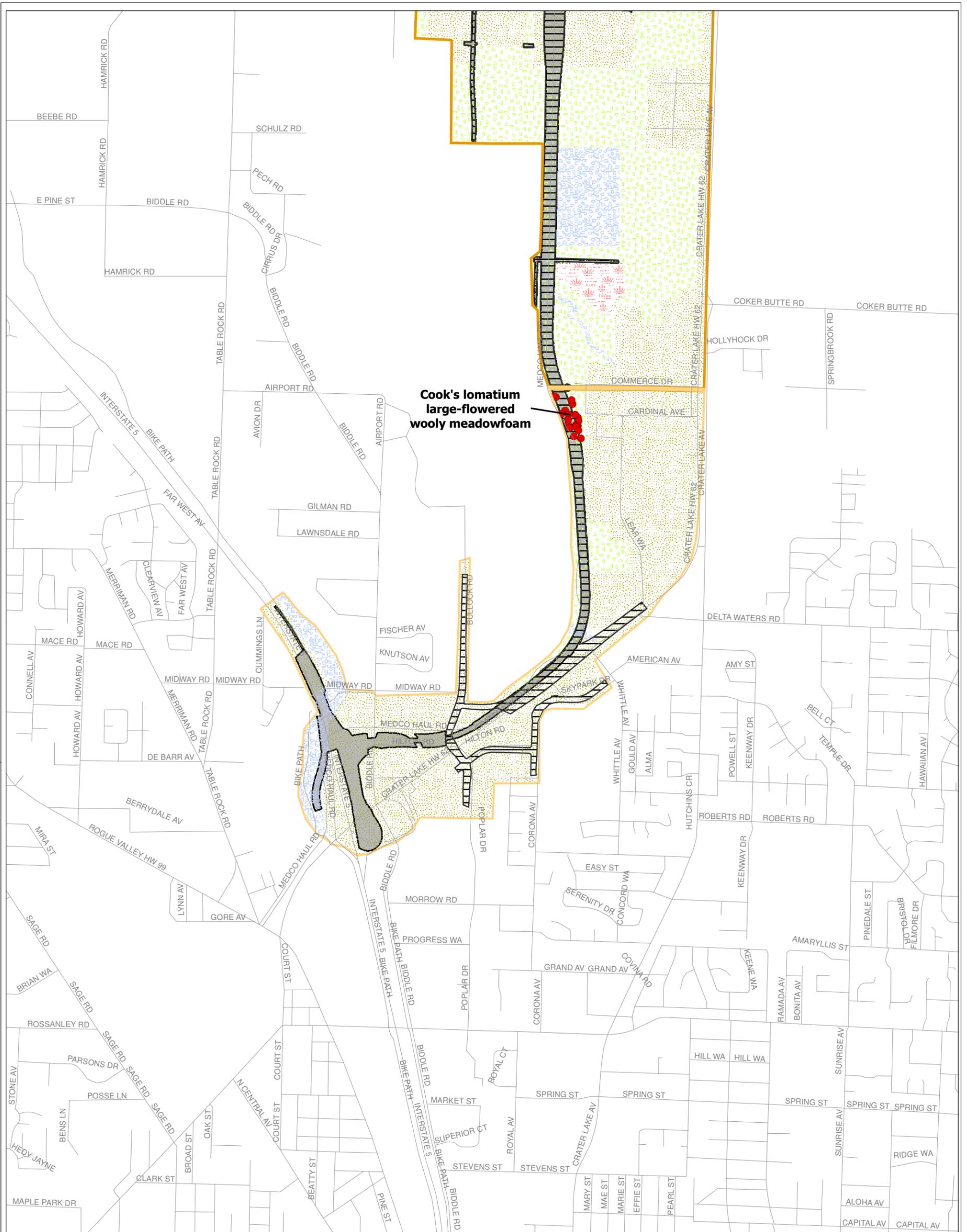


Map Features

- Streets
- Vernal Pool
- Vernal Pool Critical Habitat
- Mound-Vernal Pool Complex
- Vernal Pool CVP-30
- PSA Segment 1
- PSA Segment 2
- PSA Segment 3
- Option A ROW
- Option B ROW

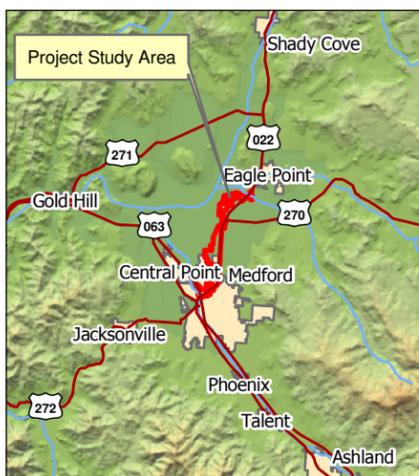
Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.





**Vegetation Communities/
Wildlife Habitat and
Rare Plants
Segment 1**

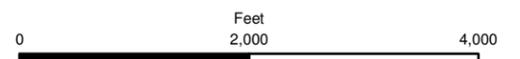
Figure 4-3 a
February 2008

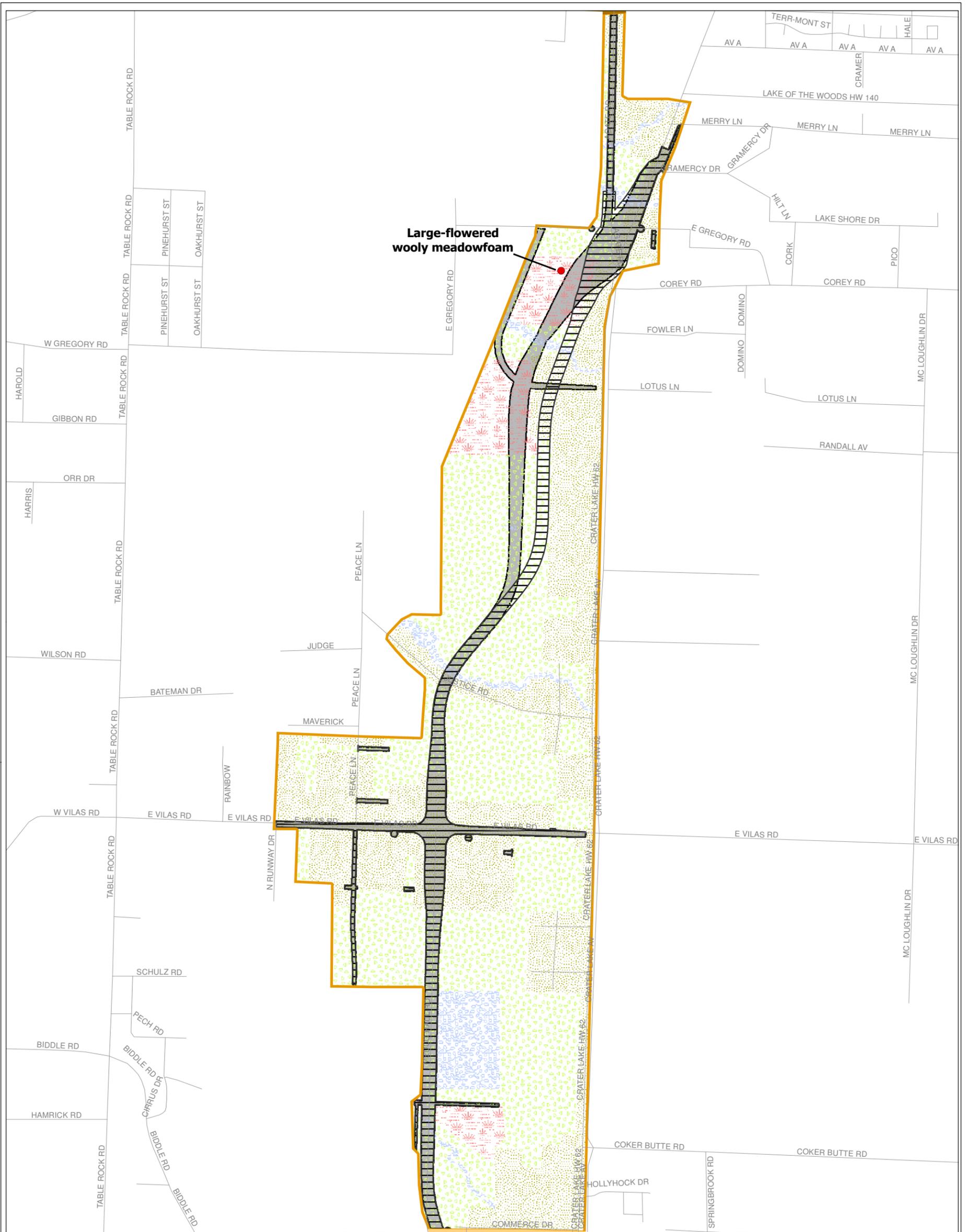


Map Features

- Disturbed Area
- Grassland
- Riparian
- Mound-Vernal Pool Complex
- Rare Plants
- PSA Segment 1
- PSA Segment 2
- PSA Segment 3
- Option A ROW
- Option B ROW
- Streets

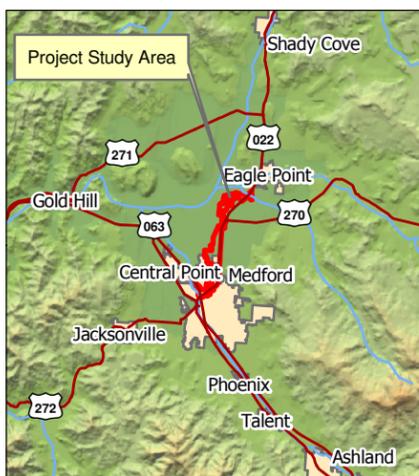
Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.





Vegetation Communities/ Wildlife Habitat and Rare Plants Segment 2

Figure 4-3 b
February 2008

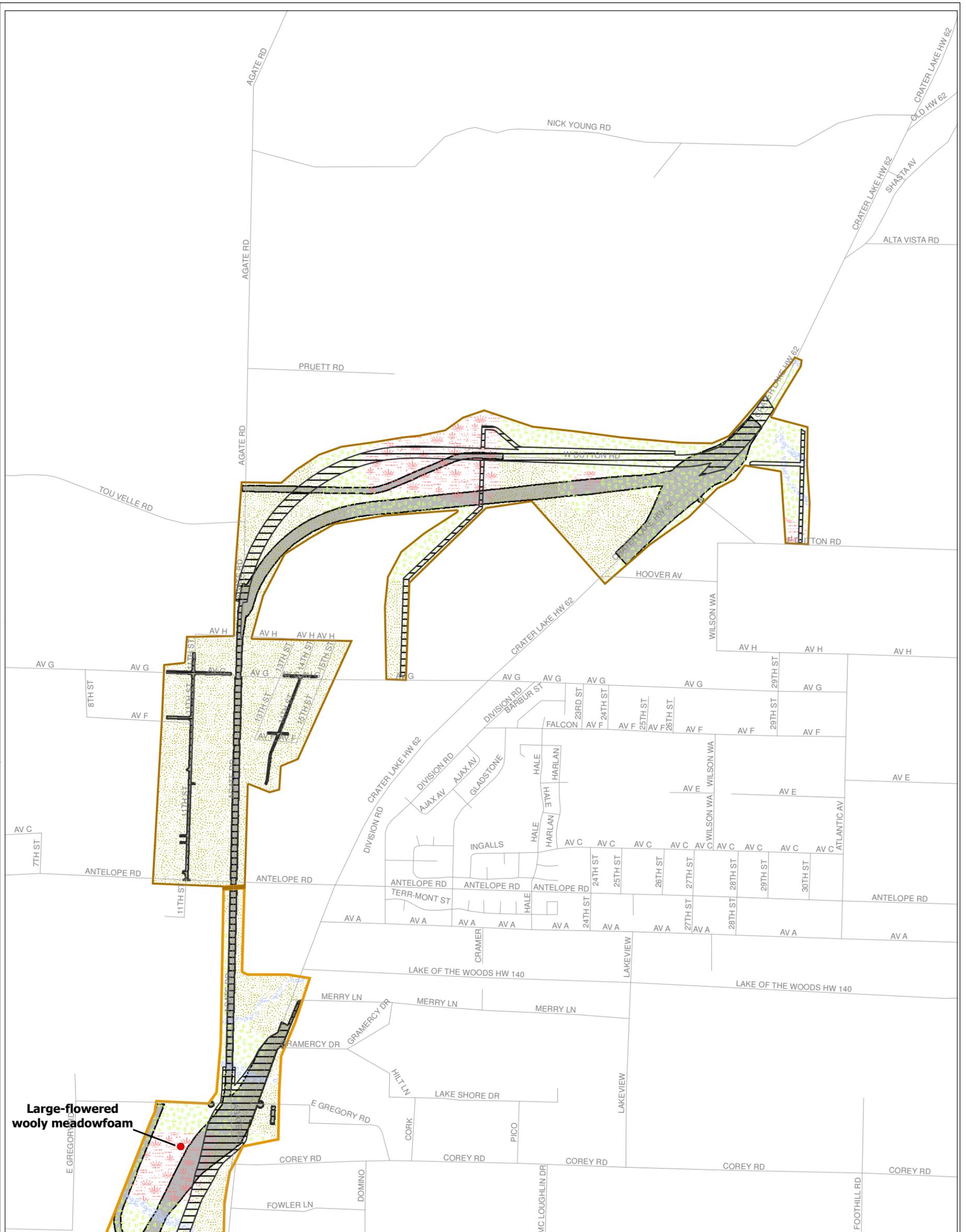


Map Features

- | | | | |
|--|---------------------------|--|---------------|
| | Disturbed Area | | PSA Segment 1 |
| | Grassland | | PSA Segment 2 |
| | Riparian | | PSA Segment 3 |
| | Mound-Vernal Pool Complex | | Option A ROW |
| | Rare Plants | | Option B ROW |
| | | | Streets |

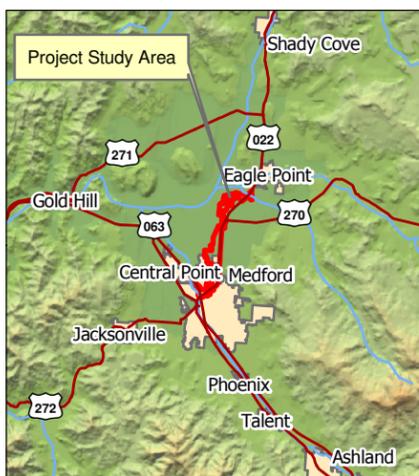
Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.





**Vegetation Communities/
Wildlife Habitat and
Rare Plants
Segment 3**

Figure 4-3 c
February 2008



Map Features

- | | | | |
|--|---------------------------|--|---------------|
| | Disturbed Area | | PSA Segment 1 |
| | Grassland | | PSA Segment 2 |
| | Riparian | | PSA Segment 3 |
| | Mound-Vernal Pool Complex | | Option A ROW |
| | Rare Plants | | Option B ROW |
| | | | Streets |

Source: Inset map highway, city and river from ESRI 2006 data DVD. Shaded relief image created by Mason, Bruce & Girard, Inc.



4.2 Overview of Natural Resources

4.2.1 Threatened or Endangered Wildlife Species

Analysis of existing records and agency databases indicate that the project study area has the potential to support two species of wildlife listed as threatened or endangered: bald eagle and vernal pool fairy shrimp (ORNHIC 2004, 2007; USFWS 1999, 2007). Habitat degradation and increasing commercial and residential development has generally limited the presence of additional endangered, threatened or candidate species within the project study area.

4.2.1.1 Bald Eagle

The bald eagle is state listed as threatened under the Oregon Endangered Species Act (OESA). The bald eagle is also protected from take under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250).

Bald eagles are found throughout the Pacific Northwest in close association with freshwater, estuarine, and marine ecosystems that provide abundant prey and functional habitat for nesting and communal roosting (Watson et al. 1991). Breeding territories are typically located within 1 mile of permanent water in predominantly coniferous, variably-aged forest stands with old growth structural components (Stalmaster 1987). Bald eagles have a relatively large home range (1.3 - 4.3 square miles [mi^2]) in the Pacific Northwest (Watson 2002) and will forage throughout this area. Bald eagles perch on, hunt from and nest in tall coniferous and deciduous trees located near water. Bald eagle pairs in Oregon often have alternate nests in their territories that are used in different years (Anthony and Isaacs 1981).

Bald eagles winter along lakes, streams and rivers. Their concentrations reflect winter food sources, although perch availability and level of human disturbance are also important (Stalmaster 1980, Steenhof 1978, USFS 1977). If sufficient winter food sources are available around a nest site, the nesting pair may remain in the area throughout the winter (Swenson et al. 1986). Fish, waterfowl and carrion are important winter food sources for bald eagles (USFWS 1986). Most eagles that breed in Oregon winter in the vicinity of their nests (Garrett et al. 1988).

Bald eagles nest in tall, open trees near the water's edge and frequently reuse nests year after year. Nesting behaviors typically begin in January, with egg laying and incubation occurring in February and March (Isaacs et al. 1983). Young are reared throughout April, May and June. Fledging occurs in July and August. Disturbances during the nesting period may result in increased energy expenditure from avoidance flights, and decreased energy intake due to interference with feeding activities (Knight 1984). If bald eagles are displaced while foraging to feed their young, then their chance of nest failure is increased. Distance to disturbance is the most important factor affecting the influence of human disturbance on bald eagles (Grubb and King 1991). However, their tolerance of loud noises appears to increase if the source is concealed from view by vegetation (Stalmaster and Newman 1978, Steenhof 1978).

Areas of mature black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are located in the riparian area surrounding Bear Creek in Segment 1, Option 1A of the Bypass Alternative that could

potentially act as bald eagle roost trees. However, due to the high level of human activity and disturbance surrounding Bear Creek (e.g., Interstate 5, industrial development), this area is not considered suitable bald eagle habitat. The remainder of the project study area consists of open grasslands and developed areas, which do not provide habitat for bald eagles.

4.2.1.2 Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp (*Branchinecta lynchi*) are listed as threatened under the federal ESA. Critical habitat has been designated and mapped by the USFWS for this species within the project study area in the vicinity of the southern terminus of Agate Road, the intersection of Agate Road and Touvelle Road, and east of the intersection of Highway 62 and Hoover Avenue (August 6, 2003, 68 FR 46684). Portions of this mapped critical habitat occur in Segments 2 and 3 of the Bypass Alternative. Vernal pool fairy shrimp are currently known to occur in vernal pools, often less than 0.05 acre in size, in the southern and central valleys of California and the Agate Desert surrounding Medford in Oregon.

Within the project study area, the vernal pools are generally disturbed and degraded to some degree and are dominated by non-native plant species as soon as water in the pools evaporates in late spring. Farming practices, grazing, introduction of non-native plant species, development and trash dumping have all impacted vernal pool quality in the project study area.

The life history for vernal pool fairy shrimp is entirely dependent on the cyclical presence and absence of water in vernal pools. Eggs from the previous year hatch as rain begins to fall and vernal pools fill with water as early as mid-December. Vernal pool fairy shrimp feed on algae, bacteria, protozoa, rotifers and detritus before reproducing and dropping their eggs before the pools dry in early spring. Average age to maturity ranges from 18-41 days. Desiccated eggs rest in the dry bottoms of the vernal pools until rain falls again in the winter (September 19, 1994, 59 FR 48136).

In the summer of 1999, dry-season vernal pool fairy shrimp surveys were conducted within the vernal pools complexes located within the vicinity of the project study area by May Consulting, a subcontractor to MB&G for this project. These surveys documented the presence of eggs identified as belonging to the genus *Branchinecta* in one pool within the vernal pool complex located north of Upton Creek and west of new extension for Lear Way. This vernal pool complex is located approximately 730 feet east of the current proposed footprint within Segment 2, Options 2A and 2B of the Bypass Alternative and is within the project study area. Positive identification to the species level was not possible, but the external morphology of the specimen as well as the characteristics of the pool from which the egg was collected both suggested the egg belongs to a vernal pool fairy shrimp (May Consulting 1999). Since the 1999 survey, the vernal pool complex north of Upton Creek where the *Branchinecta* eggs were identified stands out as one of the best quality vernal pool habitats in the vicinity of the project. This vernal pool complex remains relatively unchanged from 1999, although a new roadway (the extension of Lear Way) has been constructed along the eastern perimeter of the complex. Several of the pools in this complex are deep and wide, although these pools have also been disturbed as evident by noxious weed encroachment. Given the current condition of the complex, it is assumed that vernal pool fairy shrimp are present within this and other vernal pool complexes within the project study area.

Three areas within the project study area have been mapped by the USFWS as vernal pool shrimp critical habitat: Agate Road north of the existing Highway 62 intersection; Agate Road centered on

Touvelle Road; and the existing Highway 62 alignment just south of the West Dutton Road (Figures 4-2b and 4-2c). Although these areas are federally-designated as critical habitat for vernal pool fairy shrimp, the primary constituent elements of critical habitat as established by the USFWS are lacking in these mapped areas. Primary constituent elements of critical habitat for vernal pool fairy shrimp are based on the presence of vernal pools that contain organic food sources and inorganic debris for shelter (50 CFR 17.97). Based on field investigations, these mapped areas lack the characteristic vernal pools required for critical habitat identified by the USFWS. Areas mapped as critical habitat within the project study area have all been disturbed and include road shoulders, active pasture, and vacant land. As such, it is apparent that vernal pool critical habitat does not exist within the project study area.

4.2.2 Threatened, Endangered and Candidate Plant Species

Four species of rare plants were identified in pre-field reviews as potentially occurring within the project study area: Cook's lomatium, large-flowered wooly meadowfoam, Southern Oregon buttercup and coral-seeded allocarya. Distribution and habitat requirements for each species are discussed below.

4.2.2.1 Cook's Lomatium

Cook's lomatium is listed as endangered under both the federal ESA and the OESA. Cook's lomatium is only known to occur within the Agate Desert, an area located on the floor of the Rouge River basin north of Medford, and French Flat in the Illinois Valley near the Siskiyou Mountains in Oregon. In general, this species prefers vernal pool edges or other seasonally wet habitats. The Agate Desert lomatium typically flowers between March and April and is distinguished from other lomatium species by its pale yellow flowers and the narrow shape of the leaf-like structures (bracts) below the flowers (May 15, 2000, 65 FR 30941-30952).

4.2.2.2 Large-flowered Wooly Meadowfoam

The large-flowered wooly meadowfoam is listed as endangered under the both the federal ESA and the OESA. Large-flowered wooly meadowfoam is only known from the Agate Desert in Jackson County, Oregon. This species prefers to grow within the inner, wetter ring of vernal pools and flowers between April and May. This plant gets its name from its densely wooly flower parts. The large-flowered wooly meadowfoam is distinguished from other meadowfoams by two rows of hairs at the base of each petal (May 15, 2000, 50 DFR Part 17 30941).

4.2.2.3 Southern Oregon Buttercup

The Southern Oregon buttercup is not federally-listed and is a state candidate for listing under the OESA. Oregon buttercup is only known to occur in central Jackson County, Oregon. This species prefers damp or dry grassy loam slopes between 150 and 200 feet in elevation and is known to flower from mid-April to late May. This species is distinguished from other buttercups by its purple veins on the undersides of the petals (Meinke, 1982).

4.2.2.4 Coral-seeded Allocarya

The coral-seeded allocarya is federally-listed as a species of concern and is state-listed as a candidate species under the OESA. Coral-seeded allocarya has only been found in Jackson and Josephine Counties in Oregon. This species is associated with seasonal creeks and vernal pool habitats between 150 and 200 feet in elevation and flowers from June to July. The coral-seeded allocarya looks very similar to other allocarya species and is only distinguished by the deeply and irregularly ridged nutlets and larger flowers when compared to other species of allocarya in southwestern Oregon (Meinke, 1982).

4.2.3 Vegetation Communities

The Highway 62 Corridor Solutions Project study area is located in the Rogue River Valley extending from Medford northeast to the northern portion of White City, Oregon (Figure 1-1). The total area encompassed by the project study area boundary is approximately 2,357 acres. The terrain is relatively flat, being formed primarily by erosional forces of the Rogue River and nearby tributaries. Elevations within the project study area range from 1340 ft above mean sea level in the vicinity of the Medford International Airport to 1280 ft along Whetstone Creek in the northern portion of the project study area. Slopes throughout the project study area are generally less than 5 percent (USGS, 1983a, 1983b, and 1983c). Principle soil types include Agate-Winlo complex, Coker clay, Cove clay, Medford silty clay loam, Phoenix clay and Padigan clay (Johnson 1992). Mean annual maximum temperature is 67.2°F and mean annual minimum temperature is 41.1°F; mean annual precipitation is 18.9 in. Weather often follows the pattern of hot, dry summers and cool, wet winters; precipitation falls mainly as rain (WRCC 1998).

Several distinct vegetation communities were identified within the project study area. These vegetation communities include developed urban areas, dry grasslands common to the Agate Desert Region, unique mound-vernal pool complexes and the riparian borders of several streams flowing through the project study area. While developed urban areas are not considered natural vegetation communities, this designation is a simple way to classify urban areas that have a mix of commercial and residential development, vacant lots, manicured lawns, and isolated fields or open spaces that are too small to map out separately. Overall, commercial and light industrial development, agricultural practices and other land disturbance have heavily influenced vegetative patterns across the landscape, and many of the natural vegetation communities are highly fragmented by urban development. A more detailed description of each vegetation community within the project study area is provided below.

4.2.3.1 Developed Areas

Developed land consisting of commercial, residential and industrial developments is one of the most common community types within the project study area. Commercial and industrial development is concentrated along the existing Highway 62 alignment, especially south of Commerce Drive to Interstate 5. In addition, heavy industrial development exists in the northern portion of the project study area in the vicinity of White City between the existing Highway 62 and Agate Road. These areas support little or no vegetation, except for small areas landscaped with primarily non-native plants, and include extensive areas of impervious surfaces such as parking lots and sidewalks. Some residential areas in the vicinity of Vilas Road contain fields and lawns dominated by non-native grasses such as Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pratense*).

4.2.3.2 Grassland

Grasslands comprised of various native and non-native herbaceous species is one of the most prevalent vegetation community types within the project study area. This vegetation community occurs on vacant urban lots and agricultural lands throughout the project study area, particularly along the old Medco Haul Road from Commerce Drive to Whetstone Creek. Vacant lots within the project study area support a highly altered grassland community dominated by non-native plant species including medusahead, chickory (*Cichorium intybus*), teasel (*Dipsacus fullonum*) and yellow star-thistle. Construction debris and bare compacted soil are also common on vacant lots.

Agricultural lands within the project study area that support grassland communities are generally used for grazing or hay production, and are dominated by a mix of native and non-native species. Dominant species on agricultural land include non-native species such as Kentucky bluegrass, timothy, and red clover (*Trifolium pratense*) and native species such as California danthonia (*Danthonia californica*) and slender wheatgrass (*Elymus trachycaulus*).

4.2.3.3 Mound/Vernal Pool Complex

Vernal pools are unique ephemeral wetland ecosystems that form in shallow depressions within gently undulating landscapes. They are typically underlain by bed rock or a duripan (hardpan) soil layer that restricts the downward movement of water through the soil profile. The pools become inundated by local hydrology during the fall/winter rainy season and dry out during the late spring and summer through evapotranspiration. This alternation between inundation and drought greatly limits the flora and fauna species that are able to inhabit vernal pool habitat. As a result, many plant and wildlife species inhabiting vernal pools are endemic, with several being listed as threatened or endangered under the federal ESA (Williamson et. al, 2005).

Vernal pool complexes account for the second smallest land cover within the project study area. There are three major mound-vernal pool complexes within the project study area: between the Medco Haul Road and the existing Highway 62 just north of Upton Creek; north and south of Whetstone Creek; and west of the terminus of West Dutton Road and east of Agate Road. In addition, there are scattered vernal pools throughout the vicinity of the project study area. Vernal pools provide habitat for the federally-listed vernal pool fairy shrimp. In addition, vernal pool complexes provide habitat for two endangered plant species, Cook's lomatium and large-flowered wooly meadowfoam. However, the majority of vernal pools within the project study area is disturbed and degraded and is typically dominated by non-native plant species as soon as water in the pools evaporates. All of the vernal pools in the project study area have been degraded by the invasion of non-native plants, grazing, road construction and illegal trash dumping.

The best quality vernal pools in the vicinity of the project study area occur within a complex located on a parcel of land just west of a new extension of Lear Way northeast of Upton Creek and north of Commerce Drive. This complex, located approximately 730 feet from the proposed footprint (impact area) of Segment 2 of the Bypass Alternative and within the project study area, includes a vernal pool that contains eggs identified as belonging to the genus *Branchinecta* (May Consulting 1999). This vernal pool was mapped a vernal pool 6C VP30 during MB&G's initial 1998 mapping of vernal pool resources within the project study area. Several of the pools in this complex are deep and wide, although these pools have also been disturbed as evident by noxious weed encroachment. Refer to Figure 4-2b for the location of this vernal pool complex. In addition, a mound-vernal pool complex

located west of the terminus of West Dutton Road is one of the least disturbed complexes within the project study area.

4.2.3.4 Riparian

Riparian plant communities typically occur in narrow bands along the majority of the perennial streams within the project study area, although they have been highly altered by human activity. Riparian plant communities include dense shrub and herbaceous communities dominated by Himalayan blackberry, reed canarygrass, purple loosestrife, sedge (*Carex* spp.), rush (*Juncus* spp.), cattails (*Typha* spp.) and poison hemlock (*Conium maculatum*); and, at several locations, mixed stands of Pacific willow (*Salix lucida* ssp. *lasiandra*), black cottonwood and Oregon ash (*Fraxinus latifolia*). Several areas support mature black cottonwood stands such as lands adjacent to Bear Creek and several forested wetlands within historic borrow pits east of the Medco Haul Road and south of Commerce Drive. In many cases, channelization, extensive rip-rapping of stream banks and ongoing human disturbance (e.g., mowing of lawns and fields) have completely eliminated streamside vegetation. This community accounts for the smallest vegetation community type within the project study area.

4.2.4 Wildlife Resources/Wildlife Habitat

The Rogue River Valley is home to a variety of mammals, birds, reptiles and amphibians. The ability of any specific area within the valley to provide habitat for wildlife is dependent upon many factors such as available food, cover and water. The relative abundance or lack of these resources in relation to each species' particular requirements would, in part, determine the species composition and distribution of a particular area. In addition, the types of vegetation communities present, the size, shape and complexity of the habitat(s), and the surrounding land uses would further interact to determine the success of various wildlife species at the location being considered. Some wildlife species have demonstrated great adaptability and tolerance to human activity; others are less able to tolerate such activities.

Wildlife habitat within the project study area may be broadly defined by vegetation cover type. Each vegetation community is considered to be a distinct wildlife habitat, supporting a specific group of wildlife species. Most wildlife species would typically be found in one or perhaps two of the vegetation communities, although some habitat generalists (e.g., the red-tailed hawk [*Buteo jamaicensis*], coyote [*Canis latrans*] and deer mouse [*Peromyscus* sp.]) may be found in nearly all of the vegetation communities. Of special note for the Highway 62 Corridor Solutions Project is the presence of the Ken Denman State Wildlife Management Area (SWMA) adjacent to the northern portion of the project study area. The Hall Tract Unit of the SWMA is located north of Gregory Road and borders the proposed footprint for Segment 3 of the Bypass Alternative along west side of Agate Road. The Northern Little Butte Creek, Modoc, and Military Slough Units of the SWMA would be completely avoided by the project. This wildlife management area consists of numerous impoundments of Whetstone Creek and provides habitat for migratory and resident waterfowl, migrating shorebirds and neotropical migrants.

All the vegetation communities within the project study area have been fragmented and degraded by past land use practices which have reduced the overall quality of the wildlife habitat these communities provide. In general terms, the developed areas within the project study area provide the lowest quality habitat for wildlife given the extensive impervious surfaces and lack of vegetation and

natural cover in these areas. The same may be said for grassland areas where annual mowing or grazing can limit cover. Certain areas of grassland not routinely disturbed provide fair habitat to species adapted to open fields and the absence of forest structure. While occupying a large portion of the project study area, the grassland community does not provide a high diversity of herbaceous vegetation capable of supporting a wide variety of wildlife species. The mound-vernal pool complex is a unique and necessary habitat for several species such as vernal pool fairy shrimp and rare plant species. The riparian community provides relatively good habitat for wildlife and has a higher importance in the project study area due to its diversity of habitats and limited coverage in the project study area.

A qualitative description of the wildlife habitat potential and the wildlife species observed for each vegetation community is given below.

4.2.4.1 Developed Areas

Developed areas within the project study area are largely lacking in the diversity of cover and habitat that natural vegetated areas provide. Most of the habitat afforded by this cover type is provided by building structures, parking lots, small vacant lots and the minimal vegetation introduced by landscaping. Some berry producing trees and shrubs common to landscaping such as cherry (*Prunus* sp.), western juniper (*Juniperus occidentalis*) and mountain ash (*Sorbus* sp.) can provide scattered and intermittent food sources for wildlife. Animals such as the raccoon (*Procyon lotor*), opossum (family *Didelphidae*), deer mouse, house mouse (non-native) (*Mus musculus*), gopher snake (*Pituophis catenifer*), common garter snake (*Thamnophis sirtalis*), Pacific tree frog (*Hyla regilla*), red-tailed hawk, northern harrier (*Circus cyaneus*), Steller's jay (*Cyanocitta stelleri*) and a large number of songbirds, particularly swallows (family *Hirundinidae*) and chickadees (family *Paridae*), may be found in developed areas. Many bats rely on residential and commercial structures for roosting and rearing sites. Large colonies of Mexican free-tailed bats (*Tadarida brasiliensis*) have been found at the Veterans Administration Domicile in White City (City of Medford 1987, Campos pers. comm. 1998).

Mammal species commonly observed directly or by sign by project team biologists within developed portions of the project study area were limited to raccoon and black-tailed jackrabbit (*Lepus californicus*). Avian species observed consist of American robin (*Turdus migratorius*), house finch (*Carpodacus mexicanus*), turkey vulture (*Cathartes aura*), European starling (*Sturnus vulgaris*) and several species of gulls (*Larus* sp.).

4.2.4.2 Grassland Areas

Much of the land within the project study area that is characterized as grassland is used for grazing by livestock or for the production of hay. Due to such agricultural activities, much of the area is open with little or no tree or shrub cover. Food sources for herbivorous wildlife species can sometimes be limited, particularly when a field is mown for hay or is heavily grazed. Many of the species commonly found within this vegetation community would have to be tolerant of such activities.

Grasslands provide habitat and foraging opportunities to birds, including ring-necked pheasants (*Phasianus colchicus*), California quail (*Callipepla californica*), red-tailed hawks, northern harriers, turkey vultures and black-billed magpies (*Pica pica*). In addition, mammals such as coyotes, red fox (*Vulpes vulpes*), badgers (*Taxidea taxus*), meadow voles (*Microtus pennsylvanicus*), California

ground squirrels (*Spermophilus beecheyi*), pocket gophers (family *Geomyidae*), black-tailed deer (*Odocoileus hemionus hemionus*) and a variety of bats would utilize grasslands. Reptiles and amphibians found in the grasslands of the project study area include the western fence lizard (*Sceloporus occidentalis*), southern and northern alligator lizard (family *Anguinae*), common garter snake, gopher snake, western toad (*Bufo boreas*), Pacific tree frog and rough-skinned newt (*Taricha granulosa*) (City of Medford 1987, Csuti et al. 1997).

Species commonly observed directly or by sign within this community by MB&G biologists during the various field studies conducted for the project include black-tailed jackrabbit, coyote, meadow vole, mule deer (*Odocoileus hemionus*) and raccoon. Avian species observed included red-tailed hawk, killdeer (*Charadrius vociferous*), western meadowlark (*Sturnella neglecta*), American crow (*Corvus brachyrhynchos*), turkey vulture, European starling, American robin, American kestrel (*Falco sparverius*), ring-necked pheasant, mourning dove (*Zenaida macroura*) and American goldfinch (*Carduelis tristis*). Reptile observations were limited but included sightings of the common garter snake and gopher snake.

4.2.4.3 Mound-Vernal Pools

Mound-vernal pool habitat provides a unique habitat for several wildlife species. Vernal pool fairy shrimp are currently listed as threatened by the USFWS under the federal ESA and are endemic to vernal pools. Vernal pool fairy shrimp are known to occur within the Medford, Oregon area (September 19, 1994, 59 FR 48136). Vernal pools adjacent to the proposed footprint of Segment 2 of the Bypass Alternative were sampled for the presence of vernal pool fairy shrimp in 1999-2000 and the results are described in Section 4.2.1.2.

The pastures and grasslands surrounding the vernal pool complexes offer the same habitat potential as the grassland vegetation community. Wildlife species which commonly utilize the pool portion of this community include western meadowlark, mourning dove, savanna sparrow (*Passerculus sandwichensis*), vesper sparrow (*Pooecetes gramineus*), greater yellowlegs (*Tringa melanoleuca*) and other wintering shorebirds, red-tailed hawk, merlin (*Falco columbarius*), deer mouse, California meadow vole and gopher snake. During the winter months, the temporary ponding of the vernal pools can provide temporary habitat for waterfowl and wintering shorebirds (Csuti et al. 1997, Marshall 1992).

In general, the species observed by MB&G biologists within this community were similar to those observed in the grassland community. During periods of vernal pool inundation, several pairs of mallards (*Anas platyrhynchos*) were observed resting and feeding in some of the larger pools. Bullfrog (*Rana catesbeiana*) tadpoles (non-native) were also observed in some pools.

4.2.4.4 Riparian Areas

The riparian vegetation communities along the creeks and streams of the project study area contain habitat for animals such as Pacific shrew (*Sorex pacificus*), vagrant shrew (*Sorex vagrans*), water shrew (*Sorex paulustris*), marsh shrew (*Sorex bendirii*), California myotis (*Myotis californicus*), little brown myotis (*Myotis lucifugus*), woodrat (*Neotoma* sp.), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), western pond turtle (*Clemmys marmorata*), western aquatic garter snake (*Thamnophis atratus*), rough-skinned newt, salamanders (family *Salamandridae*), red-legged frog (*Rana aurora*), Pacific tree frog and bullfrog (non-native). Birds

found in this vegetation type would include belted kingfisher (*Megaceryle alcyon*), marsh wren (*Cistothorus palustris*), green heron (*Butorides virescens*), mallard, osprey (*Pandion haliaetus*), killdeer, swallows and chickadees (City of Medford 1987, Csuti et al. 1997, Marshall 1992).

Wildlife species observed directly or by sign in the Bear Creek riparian area included raccoon, muskrat, mallard, belted kingfisher, Canada goose (*Branta canadensis*), great blue heron (*Ardea herodias*) and common merganser (*Mergus merganser*). No salamanders or amphibians were observed along Bear Creek. Other riparian and aquatic areas within the project study area contain small expanses of open water and observations of waterfowl were limited or non-existent. Species commonly observed in such areas consisted of salamanders, bullfrogs and a wide variety of insects such as dragonflies (Infraorder Anisoptera). Red-wing blackbirds (*Agelaius phoeniceus*) are common in nearly every wetland and riparian area.

4.2.5 Noxious Weed Species

Noxious weed species dominate many areas of the herbaceous groundcover within the project study area. The dominant noxious weed species identified in the project study area are diffuse knapweed, yellow starthistle, poison hemlock, field bindweed (*Convolvulus arvensis*), purple loosestrife, reed canarygrass, medusahead and puncturevine. Noxious weeds are common to all vegetation communities within the project study area. At any location within the project study area, estimates of percent cover for noxious weeds can be as high as 50 to 75 percent. The average percent cover for noxious weeds within the project study area is approximately 40 percent when compared to the overall coverage of other species comprising the herbaceous groundcover. The widespread presence of noxious weed species within the project study area can be attributed to past land development practices and agricultural activities. Landscaping practices in developed areas generally limit the presence and percent cover of noxious weeds in these areas.

4.3 Specific Elements Affected

This section addresses natural resources identified within each segment of the overall project study area, which encompasses the proposed project footprint and immediate surrounding areas totaling approximately 2,357 acres. Refer to Figures 4-2a, 4-2b and 4-2c and 4-3a, 4-3b and 4-3c for a visual representation of the natural resources located within the project study area.

4.3.1 Segment 1 Interstate 5 to Commerce Drive

4.3.1.1 Threatened and Endangered Wildlife Species

Bald Eagle

Several trees suitable as perching and hunting habitat for bald eagles are present along Bear Creek within this portion of the Highway 62 Corridor Solutions Project study area. Due to high human activity and the developed nature of this area (e.g., Interstate 5), it is highly unlikely that bald eagles would utilize these trees. As such, bald eagles would not be affected in this segment of the project study area.

Vernal Pool Fairy Shrimp

Minimal vernal pool fairy shrimp habitat is present within Segment 1. Vernal pools were located and mapped during field surveys in 1998 and several scattered and isolated pools are situated just west of

the Medco Haul Road to the north of Lone Pine Creek. Others are located outside of the project study area on property currently owned by the Medford International Airport. All of these pools have been heavily disturbed by dumping, mowing or development. No federally designated vernal pool fairy shrimp critical habitat exists within this Segment of the project.

4.3.1.2 Threatened, Endangered and Candidate Plant Species

Two federally-listed endangered plant species, Cook's lomatium and large-flowered wooly meadowfoam, are located within the Segment 1 of the project study area. Approximately 41 patches of the large-flowered wooly meadowfoam totaling approximately 800 individuals and two patches of Cook's lomatium totaling approximately 500 individuals were located in a vacant field south of Commerce Road and west of Cardinal Avenue and Aviation Way (T37S, R1W, Section 7).

4.3.2 Segment 2: Commerce Drive to Antelope Road

4.3.2.1 Threatened and Endangered Wildlife Species

Bald Eagle

No bald eagles are known to nest, nor was habitat observed, within this Segment of the project study area. The closest known bald eagle nest location is more than 3 miles to the north of the project study area.

Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp habitat is located within Segment 2 of the project study area. Vernal pools were originally located and mapped during field surveys conducted in 1998, although all of these pools have been heavily disturbed. A vernal pool mitigation site is located within the project study area north of Whetstone Creek between the Medco Haul Road and the existing Highway 62. This mitigation site is comprised of pools that were created in 2003 as part of an enforcement action.

Critical habitat for vernal pool fairy shrimp has been mapped within this Segment by the USFWS. See Section 4.2.1.2 for additional information regarding critical habitat mapped within the project study area.

4.3.2.2 Threatened, Endangered and Candidate Plant Species

One individual large-flowered wooly meadowfoam is located within the project study area approximately 100 ft west of the proposed footprint for Segment 2 of the Bypass Alternative. This individual is located west of the existing Highway 62 alignment, east of the Medco Haul Road and south of Gregory Road within a mound-vernal pool complex. In addition, unsurveyed habitat for rare plant species also exists within this Segment. These areas will be surveyed for rare plants in spring 2008.

4.3.2.3 Vegetation Communities

The primary vegetation community within Segment 2 is the grassland community which occurs in large contiguous expanses within this portion of the project study area. Several riparian areas including the Swanson and Upton Creek corridors and vernal pool complexes provide a small

amount of vegetation community diversity. This Segment contains the second smallest amount of the developed area community type within the project study area.

4.3.2.4 Wildlife Habitat

The grassland habitat type is the primary wildlife habitat within Segment 2. Large contiguous expanses of this community type exist within this Segment; however, the presence of many roadways adds to the fragmented landscape. Several riparian corridors and vernal pool complexes provide a small amount of habitat diversity. This Segment contains the second smallest amount of the developed area habitat community type within the project study area.

4.3.2.5 Noxious Weed Species

Noxious weed species are prevalent throughout this section of the project study area, as they are throughout the Medford area. Dominant species in Segment 2 are common to the entire project study area and include yellow starthistle, field bindweed, field dodder, reed canarygrass, medusahead and puncturevine. The average percent cover for noxious weeds within this segment of the project study area is approximately 50 percent when compared to the overall coverage of other species comprising the herbaceous groundcover. This percent cover estimate is higher than that of Segment 1 due to more limited control of noxious weeds outside of landscaped areas. The widespread presence of noxious weed species within this segment can be attributed to land use practices.

4.3.3 Segment 3 Antelope Road to North Terminus

4.3.3.1 Threatened and Endangered Wildlife Species

Bald Eagle

No bald eagles are known to nest, nor was habitat observed, within this Segment of the project study area. The closest known bald eagle nest location is more than 3 miles to the north of the project study area.

Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp habitat is present within Segment 3, mainly west of the western terminus of West Dutton Road and north of the existing industrial lands of White City. All of these pools have been disturbed by industrial development, historic storage of logs on vacant land or agricultural practices, however the complex located west of the terminus of West Dutton Road is one of the least disturbed in the project study area. Critical habitat for vernal pool fairy shrimp has been mapped within this Segment by the USFWS. See Section 4.2.1.2 for additional information regarding critical habitat mapped within the project study area.

4.3.3.2 Threatened, Endangered and Candidate Plant Species

No threatened, endangered, or candidate plant species are located within the Segment 3 of the Highway 62 project study area. However, unsurveyed habitat for rare plant species exists within this Segment. These areas will be surveyed for rare plants in spring 2008.

4.3.3.3 Vegetation Communities

The primary vegetation community within Segment 3 is the grassland community and is primarily located north and south of the White City industrial area. Large contiguous expanses of this community types exist within this Segment of the project study area. Grassland areas are separated by a large area of disturbed vegetation community around the industrial developments of White City. Segment 3 has one of the least disturbed and largest mound-vernal pool complex of all three Segments of the project study area. This mound-vernal pool complex is located west of the western terminus of West Dutton Road. Several riparian corridors including Whetstone Creek add to the vegetation community diversity.

4.3.3.4 Wildlife Habitat

The primary vegetation community within Segment 3 is the grassland community. Grassland communities are located north and south of White City and in the vicinity of the Ken Denman Wildlife Refuge. Large contiguous expanses of these community types exist within this Segment; however, the presence of many roadways adds to the fragmented landscape. The developed area community is primarily associated with industrial development around White City. Several riparian corridors including Whetstone Creek and vernal pool complexes add to wildlife habitat diversity.

4.3.3.5 Noxious Weed Species

Noxious weed species are prevalent throughout this Segment of the project study area, especially in the vicinity of heavily disturbed areas such as roadways and existing commercial and industrial development. Dominant noxious weeds in Segment 3 are common to the entire project study area and include yellow starthistle, field bindweed, field dodder, reed canarygrass, medusahead and puncturevine. The average percent cover for noxious weeds within this Segment of the project study area is approximately 50 percent when compared to the overall coverage of other species comprising the herbaceous groundcover. This percent cover estimate is higher than that of Segment 1 due to more limited control of noxious weeds outside of landscaped areas. The widespread presence of noxious weed species within this segment can be attributed to land development practices.

5. ENVIRONMENTAL CONSEQUENCES

Figure 4-1 illustrates the proposed alignments, lane configurations, and structures for each Segment and Option of the Bypass Alternative. For the purposes of determining the environmental consequences of the project, each Segment and Option of the Bypass Alternative includes an *impact zone*. The impact zone includes the proposed footprint area required to accommodate the proposed roadway and roadway-related facilities using ODOT or City of Medford roadway design standards, as appropriate. The impact zone includes the area of construction disturbance where it is expected that all of the travel lanes, bikelanes/bikepaths, curbs, sidewalks, landscape medians/strips, fill or cut, retaining walls, and utilities would be located. Refer to Figures 4-2a, 4-2b and 4-2c and Figures 4-3a, 4-3b and 4-3c for a visual representation of the natural resources that occur within the proposed footprint.

5.1 Direct Impacts and Construction Impacts

Direct impacts to terrestrial resources are those impacts that result from the conversion of existing habitats and the construction of permanent structures (e.g., roadway fill, bridge pier foundations). Direct impacts are those impacts that result in a permanent physical loss of a terrestrial habitat or resource.

Construction impacts are those that occur during the construction phase. Standard construction practices would be used in the Highway 62 Corridor Solutions project including the use of temporary staging areas and construction easements. Although the exact placement of these construction areas has not been established, it is expected that areas exclusively within the proposed impact zone (footprint) of the Bypass Alternative or within other already developed areas would be used. No additional area beyond the proposed footprint for the Bypass Alternative would be cleared or disturbed. Therefore, all construction impacts would be similar to direct impacts. As such, both direct and construction impacts are discussed concurrently together throughout this section.

Direct impacts and construction impacts outlined in this section assume permanent impacts within the footprint; however, it is likely that a portion of the proposed footprint of the Bypass Alternative would only be temporarily impacted during construction and later restored. It is unlikely that the potential environmental impacts discussed in this Technical Report for the various Segments and Options of the Bypass Alternative would be fully realized since the analysis of impacts assumes full build-out, meaning that all areas within the proposed rights-of-way for the Bypass Alternative would be impacted. Actual impacts would likely be less since, under most roadway design scenarios, the project footprint is usually wider than the actual right-of-way of the final developed roadway.

5.1.1 No-Build Alternative

Bald Eagle

No impacts to bald eagles and no modifications or loss of bald eagle habitat would occur as a result of selecting the No-Build Alternative. This is primarily due to the lack of bald eagle habitat within the proposed footprint. No enhancements to bald eagle habitat within the proposed footprint are expected if the No-Build Alternative is chosen.

Vernal Pool Fairy Shrimp

Selection of the No-Build Alternative would not result in the loss of existing populations of vernal pool fairy shrimp within the proposed footprint. In addition, there would be no loss or modification of vernal pool fairy shrimp habitat within the proposed footprint. However, construction of other roadway and land development projects in the Medford and White City areas would continue to remove or modify existing habitats. The loss of existing vernal pool fairy shrimp habitats would be the direct result of implementing currently planned and future land use decisions. No enhancements to vernal pool fairy shrimp habitat is expected if this alternative is chosen.

Threatened, Endangered and Candidate Plant Species

The No-Build Alternative would not result in the loss or modification of existing rare plant populations or habitat within the proposed footprint. However, construction of other roadway and land development projects in the Medford and White City areas would continue to remove or modify existing rare plant habitats. The loss of existing rare plant habitats would be the direct result of implementing currently planned and future land use decisions. No enhancements to threatened, endangered or candidate species habitat is expected if this alternative is chosen.

Vegetation Communities/Wildlife Habitat

Implementation of the No-Build Alternative would not result in the short-term loss or modification of vegetation communities or wildlife habitat within the proposed footprint. However, construction of other roadway and land development projects in the Medford and White City areas would continue to remove or modify existing vegetation communities and wildlife habitat. The loss or conversion of existing vegetation communities and wildlife habitat would be the direct result of implementing currently planned and future land use decisions. No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if this alternative is chosen.

Noxious Weed Species

Implementation of the No-Build Alternative would not change or modify existing coverage or populations of noxious weed species within the proposed footprint. However, selection of this alternative would not provide an opportunity to treat noxious weed species within the proposed footprint.

Construction of other roadway and land development projects in the Medford and White City areas would likely allow for the additional control of noxious weeds. This potential control would be the direct result of implementing currently planned and future land use decisions.

5.1.2 Bypass Alternative

The Bypass Alternative, which has been identified as the Build Alternative, has been divided into three Segments. Within each Segment, there are two design Options being proposed that were assessed as part of this analysis. The following sections present a discussion of the direct impacts on the terrestrial resources located within the proposed footprint of each Segment and Design Option for the Bypass Alternative.

5.1.2.1 Segment 1 – Interstate 5 to Commerce Drive

Option 1A: Split Diamond with Interstate 5 Connection

Bald Eagle

No impacts to bald eagles would be expected if Option 1A of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. No enhancements to bald eagle habitat within the proposed footprint are expected if Option 1A is chosen. The lack of impacts to bald eagles is similar for both Options 1A and 1B.

Vernal Pool Fairy Shrimp

Selection of Option 1A would result in direct impacts to 0.23 acre of vernal pools from direct fill and encroachment and no impacts to mound-vernal pool complex habitat. Because vernal pools will be impacted, it is assumed that vernal pool fairy shrimp would also be directly impacted. No vernal pool fairy shrimp critical habitat would be impacted by this Option. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for vernal pool fairy shrimp. These impacts are similar for both Options 1A and 1B.

Threatened, Endangered and Candidate Plant Species

Implementation of Option 1A of the Bypass Alternative would impact approximately 250 individuals of Cook's lomatium and approximately 490 individuals of large-flowered wooly meadowfoam. These plants are located within the Option 1A footprint east of the Medco Haul Road and south of Commerce Drive. A population of Southern Oregon Buttercup is located immediately adjacent to the proposed footprint and project study area east of Corona Avenue and South of Skypark Drive and would not be impacted by this Option. No enhancements to threatened, endangered or candidate species are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of plant relocation and/or vernal pool creation in the Medford and White City area, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. Potential impacts to these plant species are identical for both Options 1A and 1B.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and continued use of planned roadways within the proposed footprint. Construction of Option 1A would result in approximately 58.95 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint. Of these 58.95 acres, the developed areas community would be subjected to the greatest impact, amounting to approximately 37 acres. The majority of this vegetation community and habitat type would be lost in the area surrounding the existing Highway 62 and Interstate 5. However, it is estimated that approximately 60 to 75 percent of the "developed areas" classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value. Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Grassland areas would also be impacted to a lesser degree, amounting to approximately 14.41 acres within the proposed footprint of Option 1A. Primary wildlife species impacted would be raptor

species, coyote, red fox, and mule deer. Approximately 7.54 acres of the riparian community and habitat type would be impacted along Bear Creek. The majority of this vegetation loss would be associated with footprint clearing of the riparian areas along Bear Creek to accommodate installation of new bridge structures. No mound-vernal pool complex habitat exists within this Option.

Another direct impact associated with construction of Option 1A would be additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The larger natural communities of grasslands and riparian forests west of Bear Creek would be the most affected communities. In addition, landscaping Option 1A would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if Option 1A is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. Overall, impacts to wildlife habitat and vegetation communities are similar for Options 1A and 1B.

Noxious Weed Species

The implementation of Option 1A of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within the Option 1A footprint. Given the already extensive coverage of noxious weeds in the Option 1A, the potential for an adverse increase in the further spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of Option 1A the Bypass Alternative could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along the footprint for Option 1A. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. In general, noxious weed impacts would be similar for Options 1A and 1B.

Option 1B: Highway 62 Connection

Bald Eagle

No impacts to bald eagles would be expected if Option 1B of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. No enhancements to bald eagle habitat within the proposed footprint are expected if Option 1B is chosen. The lack of impacts to bald eagles is similar for both Options 1A and 1B.

Vernal Pool Fairy Shrimp

Selection of Option 1B would result in direct impacts to 0.22 acre of vernal pools from direct fill and encroachment and no impacts to mound-vernal pool complex habitat. Because vernal pools will be

impacted, it is assumed that vernal pool fairy shrimp would also be directly impacted. No vernal pool fairy shrimp critical habitat would be impacted by this Option. The primary mound-vernal pool complex located within Option 1A is south and west of Delta Waters Road. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for vernal pool fairy shrimp. In general, the impacts to vernal pools and vernal pool fairy shrimp are essentially the same for both Options 1A and 1B.

Threatened, Endangered and Candidate Plant Species

Construction of Option 1B would impact approximately 250 individuals of Cook's lomatium and approximately 490 individuals of large-flowered wooly meadowfoam. These plants are located within the Option 1B footprint to east of the Medco Haul Road and south of Commerce Drive. A population of Southern Oregon buttercup is located immediately adjacent to the proposed footprint east of Corona Avenue and South of Skypark Drive and would not be impacted by this Option. No enhancements to threatened, endangered or candidate species are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of plant relocation and/or vernal pool creation in the Medford and White City area, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. Impacts to these plant species are identical for both Options 1A and 1B.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and use of planned roadways within the proposed footprint. Construction of Option 1B would result in approximately 52.12 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint. This is less than the overall vegetation and wildlife habitat impacts associated with Option 1A (58.95 acres). Similar to Option 1A, the developed community would be subjected to the greatest impact under Option 1B, amounting to approximately 35.05 acres within the proposed footprint. The majority of this vegetation community and habitat type would be lost in the area surrounding the existing Highway 62. However, it is estimated that approximately 60 to 75 percent of this "developed areas" classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value. Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Grassland areas would also be impacted to a lesser degree, amounting to approximately 16.20 acres within the proposed Option 1B footprint. This is less than the 14.41 acres of grassland habitat lost associated with Option 1A. Primary wildlife species impacted would be raptor species, coyote, red fox and mule deer. The riparian community and habitat type would be affected to a lesser degree along Lone Pine Creek with an estimated 0.87 acre of impacts.

Another direct impact associated with selection of Option 1B would be the additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The large grassland community surrounding the Medco Haul Road would be the most affected community. In addition, landscaping along Option 1B would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if Option 1B is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. In general, impacts to wildlife habitat and vegetation communities are slightly lower for Option 1B than Option 1A due to a smaller overall impact area.

Noxious Weed Species

The implementation of Option 1B of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within the Option 1B footprint. Given the already extensive coverage of noxious weeds in the project footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of Option 1B could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along rights-of-way for Option 1B. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. In general, noxious weed impacts would be similar for both Options 1A and 1B.

5.1.2.2 Segment 2 – Commerce Drive to Antelope Road

Option 2A: Western Alignment

Bald Eagle

No impacts to bald eagles would be expected if Option 2A of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. In addition, no enhancements to bald eagle habitat within the proposed footprint are expected if Option 2A is chosen. The lack of impacts to bald eagles is similar for both Options 2A and 2B.

Vernal Pool Fairy Shrimp

Implementation of Option 2A Bypass Alternative would result in direct impacts to 23.75 acres of mound-vernal pool complex habitat and 0.93 acre of vernal pools. Therefore, it is assumed that vernal pool fairy shrimp would also be directly impacted. In addition, 4.79 acres of critical habitat for vernal pool fairy shrimp has been mapped by the USFWS within the project footprint for this Option. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat shown for this Option. Mapped critical habitat consists of road shoulders in this Segment of the project footprint. As such, implementation of this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. Refer to Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

The primary mound-vernal pool habitat in Option 2A is located south of East Gregory Road and west of the existing Highway 62. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City area, which would potentially provide additional habitat for vernal pool fairy shrimp. In general, direct impacts to mound-vernal pool complex habitat and vernal pools are greater for Option 2A than for Option 2B. Potential impacts to vernal pool fairy shrimp critical habitat are identical for Options 2A and 2B since the impact zone for both Options is located within the same the areas of critical habitat.

Rare Plants

The implementation of Option 2A would not result in direct impacts to know populations of rare plants. However, 5.19 acres of habitat potentially suitable for Southern Oregon buttercup would be impacted by this Option. Since this habitat was not surveyed for Southern Oregon buttercup, it is assumed that this species is present within the habitat and would be impacted by the construction of this Option. Surveys will be conducted for rare plants in previously unsurveyed areas Spring 2008.

No enhancements to threatened, endangered or candidate species are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. Overall, potential impacts to rare plant species are identical for both Options 2A and 2B.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and use of planned roadways within the proposed footprint. Construction of Option 2A would result in approximately 160.91 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint of this Option. Of these 160.91 acres, the grassland community would be subjected to the greatest impact, amounting to approximately 75.97 acres. The majority of this vegetation community and habitat type would be lost in the area west of the existing Highway 62 surrounding the Medco Haul Road. Primary wildlife species impacted would be raptor species, coyote, red fox and mule deer.

Developed areas would also be impacted to a lesser degree by Option 2A, amounting to approximately 56.71 acres of impact or disturbance. However, it is estimated that approximately 50 percent of this “developed areas” classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value. Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Construction of Option 2A would result in the loss of approximately 23.75 acres of impacts to the mound-vernal pool complex community and habitat type located south of East Gregory Road and west of the existing Highway 62. As discussed in Section 4.1.3.3, the mound-vernal pool complex community provides habitat for multiple endangered and threatened species including vernal pool fairy shrimp, Cook’s lomatium and large-flowered wooly meadowfoam.

Approximately 4.48 acres of the riparian community and habitat type would be affected by Option 2A. The riparian habitats affected are located along Upton, Swanson, Whetstone, and Jack Creeks.

Another direct impact would be additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The larger natural communities of grasslands and mound-vernal pool complexes south of Agate Road and north of Justice Drive would be the communities most affected by this Option. In addition, landscaping Option 2A would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities along the proposed footprint of Option 2A are expected if this Option is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. In general, impacts to wildlife habitat and vegetation communities are slightly lower for Option 2B than Option 2A due to a smaller overall impact area for Option 2B. In addition, the mound-vernal pool complex community and habitat type would be impacted to a greater degree with Option 2A in comparison to Option 2B.

Noxious Weeds

Implementation of Option 2A has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within this segment of the project footprint. Given the already extensive coverage of noxious weeds in the Option 2A footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of Option 2A could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along rights-of-way for Option 2A. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. Because a greater area would be disturbed for Option 2A, this Option would have greater noxious weed impacts than Option 2B.

Option 2B: Eastern Alignment

Bald Eagle

No impacts to bald eagles would be expected if Option 2B of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. In addition, no enhancements to bald eagle habitat within the proposed footprint are expected if Option 2B is chosen. The lack of impacts to bald eagles is similar for both Options 2A and 2B.

Vernal Pool Fairy Shrimp

Selection of Option 2B of Bypass Alternative would result in direct impacts to 5.60 acres of mound-vernal pool complex habitat and 0.35 acre of vernal pools. Therefore it is assumed that vernal pool

fairy shrimp would also be directly impacted. In addition, 4.79 acres of critical habitat for vernal pool fairy shrimp has been mapped by the USFWS within the project footprint for this Option. The mapped critical habitat for Option 2B is identical to Option 2A. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat shown for this Option. Mapped critical habitat consists of road shoulders in this Segment of the project footprint. As such, implementation of this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. Refer to Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

The primary mound-vernal pool habitat impacted by Option 2B is located south of East Gregory Road and west of the existing Highway 62. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for vernal pool fairy shrimp. In general, impacts to mound-vernal pool habitat and vernal pools are less for Option 2B than for Option 2A. Potential impacts to vernal pool fairy shrimp critical habitat are identical for Options 2A and 2B since the impact zone for both Options is located within the same the areas of critical habitat.

Rare Plants

The implementation of Option 2B would not result in direct impacts to know populations of rare plants. However, 5.19 acres of habitat potentially suitable for Southern Oregon buttercup would be impacted by this Option. Since this habitat was not surveyed for Southern Oregon buttercup, it is assumed that this species is present within the habitat and would be impacted by the construction of this Option. Surveys will be conducted for rare plants in previously unsurveyed areas Spring 2008.

No enhancements to threatened, endangered or candidate species are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. Overall, potential impacts to rare plant species are identical for both Options 2A and 2B.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and use of planned roadways within the proposed footprint. Construction of Option 2B of the Bypass Alternative would result in approximately 145.70 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint of this Option. Similar to Option 2A, the grassland community would be subjected to the greatest impact, amounting to approximately 72 acres within the proposed footprint. The majority of the impacts to this vegetation community and habitat type would occur in the area west of the existing Highway 62 surrounding the Medco Haul Road. Primary wildlife species impacted would be raptor species, coyote, red fox and mule deer.

Of the 145.70 acres of total vegetation community disturbance, approximately 63.93 acres of impact would occur within developed areas. However, it is estimated that approximately 50 percent of this area within the “developed areas” classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value.

Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Construction of Option 2B would impact approximately 5.60 acres of the mound-vernal pool complex community and habitat type located south of East Gregory Road and west of the existing Highway 62. As discussed in Section 4.1.3.3, the mound-vernal pool complex community provides habitat for multiple endangered and threatened species including vernal pool fairy shrimp, Cook's lomatium and large-flowered wooly meadowfoam.

Approximately 4.17 of the riparian community and habitat type would be affected by Option 2A. The riparian habitats affected are located along Upton, Swanson, Whetstone, and Jack Creeks. This is a slightly lower impact to riparian communities when compared to the 4.48 acres of impacts associated with Option 2A.

Another direct impact would be additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The larger natural communities of grasslands and mound-vernal pool complexes south of Agate Road and north of Justice Drive would be the communities most affected by this Option. In addition, landscaping of Option 2B would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if Option 2B is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. . In general, impacts to wildlife habitat and vegetation communities are slightly lower for Option 2B than Option 2A due to a smaller overall impact area for Option 2B. In addition, the mound-vernal pool complex community and habitat type would be impacted to a greater degree with Option 2A in comparison to Option 2B.

Noxious Weeds

The implementation of Option 2B of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within this segment of the project footprint. Given the already extensive coverage of noxious weeds in the Option 2B project footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of the Bypass Alternative could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along rights-of-way for the Bypass Alternative. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. Because a

greater area would be disturbed for Option 2A, this Option would have greater noxious weed impacts than Option 2B.

5.1.2.3 Segment 3 – Antelope Road to Northern Terminus

Option 3A: Dutton Road A

Bald Eagle

No impacts to bald eagles would be expected if Option 3A of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. In addition, no enhancements to bald eagle habitat within the proposed footprint are expected if Option 3A is chosen. The lack of impacts to bald eagles is similar for both Options 3A and 3B.

Vernal Pool Fairy Shrimp

Implementation of Option 3A of the Bypass Alternative would result in the direct filling and encroachment of 10.80 acres of mound-vernal pool complex habitat and 0.51 acre of vernal pools. As such, it is assumed that vernal pool fairy shrimp would also be directly impacted by this Option. In addition, 7.55 acres of critical habitat for vernal pool fairy shrimp has been mapped by the USFWS within the project footprint for this Option. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat shown for this Option. Mapped critical habitat consists of disturbed areas including road shoulders, pastures, and vacant land in this Segment of the project footprint. As such, implementation of this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. Refer to Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

The majority of the mound-vernal pool habitat impacted by Option 3A is located northwest of the Veteran's Administration Domicile and east of Agate Road in the northern portion of this option. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this alternative would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for vernal pool fairy shrimp. In comparison with Option 3B, Option 3A presents a greater impact to mound-vernal pool habitat and vernal pools (10.80 acres versus 12.94 acres). In addition, impacts to vernal pool fairy shrimp critical habitat impacts are also greater for Option 3A (7.55 acres) than for Option 3B (0.34 acre).

Rare Plants

No impacts to known rare plant populations would occur if Option 3A is selected. However, 0.37 acre of habitat potentially suitable for Southern Oregon buttercup would be impacted by this Option. Since this habitat was surveyed for Southern Oregon buttercup, it is assumed that this species is present within the habitat and would be impacted by the construction of this Option. In addition, 0.30 acre of mound-vernal pool complex habitat suitable for Cook's lomatium, large-flowered wooly meadowfoam and coral-seeded allocarya was not surveyed for rare plants within this Option. As such, these species are assumed to be present in these areas and could potentially be impacted by this Option. Surveys will be conducted for rare plants in previously unsurveyed areas Spring 2008.

No enhancements to threatened, endangered or candidate species are expected if this Options chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool

creation in the Medford and White City areas, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. Impacts to rare plant species are potentially lower for Option 3A than Option 3B due to less unsurveyed habitat occurring within Option 3A.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and use of planned roadways within the proposed footprint. Construction of Option 3A of the Bypass Alternative would result in approximately 101.20 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint of this Option. Of these 101.20 acres, the grassland community would be subjected to the greatest impact amounting to approximately 49.51 acres within the proposed footprint. The majority of this vegetation community and habitat type would be lost in the northern portion of this Option in the area surrounding the existing Highway 62 and West Dutton Road. Primary wildlife species impacted would be raptor species, coyote, red fox and mule deer.

Of the 101.20 acres of total vegetation community disturbance, approximately 40.89 acres of impact would occur within developed areas. However, it is estimated that approximately 60 to 75 percent of this “developed areas” classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value. Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Approximately 10.80 acres of the mound-vernal pool complex community and habitat type would be affected northwest of the Veteran Administration Domicile. As discussed in Section 4.1.3.3, the mound-vernal pool complex community provides habitat for multiple endangered and threatened species including vernal pool fairy shrimp, Cook’s lomatium and large-flowered wooly meadowfoam. The riparian community and habitat type would not be affected within this Option.

Another direct impact would be additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The larger natural communities of grasslands and mound-vernal pool complexes west and south of the Dutton Road terminus would be the most affected communities. In addition, landscaping Option 3A would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. In general, overall impacts to developed areas, grassland, and mound-vernal pool complex vegetation communities and wildlife habitat are greater for Option 3A than for Option 3B. In addition, overall impacts to the riparian vegetation communities and wildlife habitat are less for Option 3A than for Option 3B.

Noxious Weeds

The implementation of Option 3A of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and

incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within this segment of the project footprint. Given the already extensive coverage of noxious weeds in the project footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of Option 3A of the Bypass Alternative could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along rights-of-way for Option 3A. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. Because a larger area would be disturbed for Option 3A, this Option would have greater noxious weed impacts than Option 3B.

Option 3B: Dutton Road B

Bald Eagle

No impacts to bald eagles would be expected if Option 3B of the Bypass Alternative were chosen. The absence of impacts is largely due to the lack of bald eagle habitat within the proposed footprint of the Option. In addition, no enhancements to bald eagle habitat within the proposed footprint are expected if Option 3B is chosen. The lack of impacts to bald eagles is similar for both Options 3A and 3B.

Vernal Pool Fairy Shrimp

Implementation of Option 3B of the Bypass Alternative would result in the direct filling and encroachment of 12.94 acres of mound-vernal pool complex habitat and 1.52 acres of vernal pools. In comparison to Option 3A, Option 3B presents a greater impact to mound-vernal pool complex habitat and vernal pools. In addition, 0.34 acre of critical habitat for vernal pool fairy shrimp has been mapped by the USFWS within the project footprint for this Option. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat shown for this Option. Mapped critical habitat consists of disturbed areas including road shoulders, pastures, and vacant land in this Segment of the project footprint. As such, implementation of this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. Refer to Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

The majority of the mound-vernal pool habitat within Option 3B is located northwest of the Veteran's Administration Domicile and east of Agate Road. In addition, a large complex is located west of the West Dutton Road terminus. No enhancements to vernal pool fairy shrimp within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for vernal pool fairy shrimp. As previously stated, potential impacts to mound-vernal pool habitat and vernal pools are greater for Option 3B than for Option 3A. However, potential impacts to vernal pool fairy shrimp critical habitat are less for Option 3B than for Option 3A.

Rare Plants

Implementation of Option 3B would not result in impacts to known rare plant populations. However, 33.21 acre of habitat potentially suitable for Southern Oregon buttercup was not surveyed for rare plants within this Option. Since this habitat was surveyed for Southern Oregon buttercup, it is assumed that this species is present within the habitat and would be impacted by the construction of this Option. In addition, 9.85 acres of mound-vernal pool complex habitat suitable for Cook's lomatium, large-flowered wooly meadowfoam and coral-seeded allocarya was not surveyed for rare plants within this Option. As such, these species are assumed to be present in these areas. Surveys will be conducted for rare plants in previously unsurveyed areas Spring 2008.

No enhancements to threatened, endangered or candidate species are expected if this Option is chosen. However, selection of this Option would require conservation mitigation in the form of vernal pool creation in the Medford and White City areas, which would potentially provide additional habitat for several threatened, endangered and candidate plant species. In general, potential impacts to rare plant species are potentially greater for Option 3B than Option 3A due to a greater amount of unsurveyed habitat occurring within this Option.

Vegetation Communities/Wildlife Habitat

Direct and construction impacts to vegetation communities, and similarly to wildlife habitat, would be those associated with clearing, grading, construction, and use of planned roadways within the proposed footprint. Construction of Option 3B of the Bypass Alternative would result in approximately 85.90 acres of vegetation and wildlife habitat being lost or disturbed within the proposed footprint of this Option. Of these 85.90 acres, the grassland community would be subjected to the greatest impact amounting to approximately 36.58 acres within the proposed footprint. The majority of this vegetation community and habitat type would be lost in the northern portion of this Option in the area surrounding the existing Highway 62 and West Dutton Road. Primary wildlife species impacted would be raptor species, coyote, red fox and mule deer.

Of the 85.90 acres of total vegetation community disturbance, approximately 35.86 acres of impact would occur within developed areas. However, it is estimated that approximately 50 percent of this "developed areas" classification consists of impervious surfaces (roads, parking lots, driveways, sidewalks, roofs, etc.), with no vegetation present and essentially no ecological value. Primary wildlife species affected by impacts would be raccoons, opossums, mice, and several songbird species.

Approximately 12.94 acres of the mound-vernal pool complex community and habitat type would be affected northwest of the Veteran Administration Domicile. As discussed in Section 4.1.3.3, the mound-vernal pool complex community provides habitat for multiple endangered and threatened species including vernal pool fairy shrimp, Cook's lomatium and large-flowered wooly meadowfoam. Option 3B would impact approximately 0.52 acre of the riparian community and habitat type surrounding the unnamed tributary.

Another direct impact would be additional fragmentation and subdivision of existing natural vegetation communities and wildlife habitat. The larger natural communities of grasslands and mound-vernal pool complexes west and south of the Dutton Road terminus would be the most affected communities. In addition, landscaping Option 3B would result in the introduction of new plantings of trees, shrubs or herbaceous groundcover within the unpaved portions of the footprint. This would effectively convert the completed roadway corridor to a developed urban area land type.

No enhancements to wildlife habitat or vegetation communities within the proposed footprint are expected if this Option is chosen. However, selection of this Option would require conservation mitigation and permanent conservation easements in the Medford and White City areas, which would potentially provide improved wildlife habitat and vegetation community restoration. In general, overall impacts to developed areas, grassland, mound-vernal pool complex and riparian vegetation communities and wildlife habitat are greater for Option 3A than for Option 3B. In addition, overall impacts to the riparian vegetation communities and wildlife habitat are less for Option 3A than for Option 3B.

Noxious Weeds

The implementation of Option 3B of the Bypass Alternative has the potential to further the spread of noxious weeds. Clearing and grading activities can spread invasive seed sources within the soil and incoming construction equipment could carry new invasive seed sources from other locations. Bare soil areas in newly graded areas (where seed sources exist) can facilitate the establishment of new populations of noxious weeds. Presently, noxious weeds are prevalent within all vegetation communities within this segment of the project footprint. Given the already extensive coverage of noxious weeds in the project footprint, the potential for increasing the spread and coverage of noxious weeds is expected to be minimal.

Given the pervasiveness of noxious weeds, construction of Option 3B of the Bypass Alternative could be viewed as an enhancement since such activities would provide an opportunity for control. Initial ground clearing and soil disturbance would result in localized removal of existing noxious weeds along rights-of-way for Option 3B. In addition, landscaping and restoration activities would also provide an opportunity to introduce new plantings of native species and to conduct an aggressive campaign for the removal and control of existing noxious weeds. Mitigation activities for the project also provide opportunities to control and limit the spread of noxious weeds. Because a larger area would be disturbed for Option 3A, this Option would have greater noxious weed impacts than Option 3B.

Table 5-1 Direct Impacts to Terrestrial Natural Resources within the Bypass Alternative Options, Highway 62 Corridor Solutions Project

Terrestrial Resource	Segment 1 – Interstate 5 to Commerce Drive		Segment 2 – Commerce Drive to Antelope Road		Segment 3 – Antelope Road to Northern Terminus	
	Option 1A: Split Diamond with Interstate 5 Connection	Option 1B: Highway 62 Connection	Option 2A: Western Alignment	Option 2B: Eastern Alignment	Option 3A: Dutton Road	Option 3B: Dutton Road B
Vernal Pools	0.23acre	0.22 acre	0.93 acre	0.35 acre	0.51 acre	1.52 acres
Vernal Pool Fairy Shrimp Critical Habitat	0 acre	0 acre	0 acre ¹	0 acre ¹	0 acre ¹	0 acre ¹
Developed Area Community/Habitat	37.00 acres	35.05 acres	56.71 acres	63.93 acres	40.89 acres	35.86 acres
Grassland Community/Habitat	14.41 acres	16.20 acres	75.97 acres	72.00 acres	49.51 acres	36.58 acres
Mound-Vernal Pool Complex Community/Habitat	0 acre	0 acre	23.75 acres	5.60 acres	10.80 acres	12.94 acres
Riparian Community/Habitat	7.54 acres	0.87 acre	4.48 acres	4.17 acres	0 acre	0.52 acre
Total Vegetation Community/Wildlife Habitat	58.95 acres	52.12 acres	160.91 acres	145.70 acres	101.20 acres	187.10 acres
Large-flowered wooly meadowfoam	Approximately 490 individuals	Approximately 490 individuals	0	0	0	0
Cook's lomatium	Approximately 250 individuals	Approximately 250 individuals	0	0	0	0
Potential large-flowered wooly meadowfoam, Cook's lomatium, and coral-seeded allocarya habitat not surveyed	0 acre	0 acre	0 acre	0 acre	0.30 acre	9.85 acres
Potential Southern Oregon buttercup habitat not surveyed	0 acre	0 acre	5.19 acres	5.19 acres	0.37 acre	33.21 acres

Source: *Mason, Bruce & Girard, 2007*

¹Vernal pool fairy shrimp critical habitat has been mapped within the project footprint for this Option by the USFWS. However, field investigations have revealed that no vernal pools are located within the mapped critical habitat that is traversed by the project footprint for this Option. Therefore, this Option would not result in impacts to critical habitat for vernal pool fairy shrimp. See Section 4.2.1.2 for additional information regarding critical habitat mapped within the project footprint.

5.2 Indirect Impacts and Cumulative Impacts

The implementation of the Bypass Alternative would improve local traffic patterns and stimulate future development of available parcels. The future pace of commercial, industrial and residential development in the project study area may increase and may result in future losses to terrestrial resources within undeveloped parcels in the North Medford and White City areas. However, any future development projects in these communities would be proposed independent of the proposed Bypass Alternative. As such, these independent developments would be subject to individual regulatory agency review, permitting and mitigation requirements.

As repeatedly stated within this Technical Report, existing habitats within the project study area for terrestrial species are already severely degraded. The overall condition of habitats reflects the intense land use practices of the past and the increasing development pressures of the present. Projects that are a part of any surge of private development that could follow this and other proposed ODOT transportation network improvement projects within the Medford and White City areas may increase potential losses of terrestrial resources. Given the current regulatory environment, future development in critical habitat for vernal pool fairy shrimp and other listed or sensitive species would likely be restricted and tightly controlled. Habitat mitigation or restoration requirements would play a major role in future land development activities. The anticipated mitigation requirements for future projects would reduce future impacts. Therefore, the long-term indirect and cumulative impacts of this project are primarily related to direct impacts to existing terrestrial habitats and the continued degradation of such habitats. Indirect impacts and cumulative impacts outlined for biological resources within each Segment and Option of the Bypass Alternative are identical for purposes of this Technical Report and are therefore discussed together in this section.

5.2.1 No-Build Alternative

Selection of the No-Build Alternative would result in no indirect or cumulative changes or modifications to the terrestrial biological resources within the project study area specifically designated for the Highway 62 Corridor Solutions Project. However, future construction of other roadway and land development projects in the Medford and White City areas would continue to allow for increased development in the area, which may lead to continued vegetation community and wildlife habitat loss, additional removal or alteration of mound-vernal pool complexes, impacts to rare plants and spread of noxious weed species. The loss or modification of existing terrestrial resources would be the direct result of implementing currently planned and future land use decisions. In addition, no enhancements to existing terrestrial resources or habitats are expected if the No Build Alternative is chosen.

5.2.2 Bypass Alternative

Bald Eagle

Due to the current regulatory environment which restricts and tightly controls losses in riparian corridors where bald eagles are most likely present, minimal indirect habitat loss is expected from future growth and development.

Vernal Pool Fairy Shrimp

Selection of the Bypass Alternative would result in indirect impacts to vernal pools as a result of altering or disrupting the hydrological regime that supports vernal pools. Therefore it is assumed that

vernal pool fairy shrimp would also be indirectly impacted (Refer to the Environmental Wetland Terrestrial Report for additional details on the project's potential for altering vernal pool hydrology). In addition, implementation of the Bypass Alternative would improve local traffic patterns and may increase the pace of future commercial, industrial and residential development in the study area. Additional development may result in future losses to vernal pools in the project area.

Threatened, Endangered and Candidate Plant Species

Individuals of Cook's lomatium and large-flowered wooly meadowfoam would be indirectly impacted through the altered hydrology of the vernal pools which provide habitat for these species. In addition, implementation of the Bypass Alternative would improve local traffic patterns and may increase the pace of future commercial, industrial and residential development in the study area. Additional development may result in future losses to vernal pools, which provide habitat for these species, in the project area.

Vegetation Communities/Wildlife Habitat

Implementation of the Bypass Alternative would improve local traffic patterns and likely increase the pace of future commercial, industrial and residential development in the project study area. Additional development would result in future losses to vegetation and wildlife habitat communities in the project area. The greatest losses may occur in several of the large vacant lots that can accommodate future development. Other development projects in the project study area could increase pressure on remaining and riparian and mound-vernal pool complex areas.

Given the current regulatory environment, future development in the riparian and mound-vernal pool complex vegetation communities and sensitive wildlife habitats would likely be restricted and tightly controlled. Therefore, future losses to these vegetation communities and wildlife habitats are likely to be minimal. Mitigation for lost riparian and mound-vernal pool complex vegetation communities would be a major requirement for future development, which may serve to reduce future impacts.

Noxious Weeds

Selection of the Bypass Alternative would likely increase future development in the project study area. New future development would likely remove additional populations of noxious weeds in the project study area if properly planned and executed. In addition to removing noxious weeds, native species intermixed with the noxious weeds may also be lost due to future development. Spreading noxious weed seed or plant parts offsite or to new areas within the proposed footprint on vehicle carriages, tire treads, or on clothing is also possible.

6. POTENTIAL MITIGATION MEASURES

Potential mitigation measures for each biological resource described in this Technical Report are presented in the following sections. All of the listed mitigation measures are common to each Segment and Option of the Bypass Alternative and would be employed regardless of the Option selected. Since the No-Build Alternative would not result in impacts to biological resources, no mitigation measures are described or warranted.

6.1 Direct Impacts and Construction Impacts

6.1.1 Vernal Pool Fairy Shrimp

The optimal mitigation measure for direct impacts to vernal pool fairy shrimp is avoidance of vernal pools and critical habitat wherever possible. During the project design phase, project engineers and planners would make every attempt to minimize and avoid impacts to vernal pools to the maximum extent practicable. In areas where impacts are unavoidable, other much less desirable mitigation measures would have to be implemented. Several possible mitigation measures are outlined below. These measures are common to all Options of the Bypass Alternative.

- Secure the necessary Corps and DSL permits to allow the necessary permanent filling and temporary disturbance of vernal pools. Work with the agencies to develop adequate vernal pool protection and mitigation measures.
- Establish new habitat and restore existing habitat in areas that would not be developed or disturbed. Prohibit off-road driving and implement an aggressive integrated pest management program for noxious weeds control.
- Remove the top six inches of topsoil where fairy shrimp eggs may exist from vernal pool basins that could be directly impacted. Replace this topsoil (spread to original thickness) in other existing and undisturbed habitat.
- Relative to impacts to vernal pools, design and implement compensatory mitigation plan for vernal pools within ODOT's mitigation bank in White City. Obtain approval from Corps and DSL regarding the conditions of approval for using the mitigation bank.
- Clearly identify all vernal pools in the field prior to construction. Establish exclusion zones around vernal pools to be preserved to restrict equipment encroachment during construction.
- Prohibit the discharge of pollutants of any kind (petroleum products, fresh concrete, silt, sandblasting material, welding slag, etc.) into wetlands and mound-vernal pool complexes. Prohibit the disposal of construction debris or rubble from the demolition of existing structures within any vernal pools.
- Time construction within and adjacent to vernal pools during the dry season of the year from July to November (dormant period for vernal pool fairy shrimp).

Implementation of the above mitigation measures could lessen the project's overall impacts on vernal pool fairy shrimp populations within the proposed footprint. Although the selection of the

Bypass Alternative and associated Options could result in permanent losses to vernal pool fairy shrimp habitat, the above mitigation activities could compensate for a portion of the overall losses.

6.1.2 Threatened, Endangered and Candidate Plants

The optimal mitigation measure for direct impacts to endangered plants through habitat disturbance is avoidance of rare plant populations and suitable habitat wherever possible. In areas where impacts are unavoidable, other mitigation measures would have to be implemented. Several possible mitigation options are outlined below.

- Establish Special Management Areas (SMAs) within the new right-of-way to protect listed plant populations following construction.
- Coordinate with the TNC to transplant any plants that could be directly or indirectly impacted (CPC 2007).
- During initial clearing and grubbing activities, remove topsoil (seedbank) from the impacted area and stockpile for restoration purposes. Replace this topsoil (spread to original thickness) in the same location or in other suitable habitat after construction.
- To the extent practicable, retain the undisturbed portion of the Cook's lomatium population just south of Commerce Drive to preserve the genetic variability of this southern-most population.
- Move or establish mitigation areas for Cook's lomatium and large-flowered woolly meadowfoam in areas of Agate-Winlo Complex soil complex.
- Propagate seeds or cuttings for planting in areas of temporary impacts to help maintain current population levels.
- Establish exclusion zones around rare plant populations and suitable habitat to be preserved to restrict equipment encroachment during construction.
- Transplant impacted plant populations during their dormant periods (August-December).
- Create new habitat and/or restore existing habitat in areas that would not be developed or disturbed.
- Incorporate long-term research and monitoring that addresses questions presented in the Recovery Outline for *Lomatium cookii* (Cook's Lomatium) and *Limnanthes floccosa* ssp. *grandiflora* (Large-flowered Woolly Meadowfoam) (ODFW 2003).

Implementation of the above mitigation measures could minimize the project's overall impacts on rare plant populations within the proposed footprint. Although the selection of the Bypass Alternative could result in permanent losses to rare plants, the above mitigation activities could compensate for a portion of the overall losses.

6.1.3 Vegetation Communities

Mitigation measures designed to minimize impacts to vegetation communities are generally associated with Best Management Practices (BMPs) for construction, landscaping and restoration. These BMPs would generally follow the practices and contract specification outlined in Sections 00280 (Erosion and Sediment Control), 00290 (Environmental Protection), 00320 (Clearing and Grubbing), and 01040 (Planting) of ODOT's *Standard Specifications for Highway Construction* (ODOT 2006). These sections address regulatory compliance; erosion and sediment control; vegetation protection; as well as site restoration and planting materials.

The following measures are common to all Options of the Bypass Alternative:

- Implement project standards that incorporate avoidance and minimization practices to the greatest extent possible. Consider the use of retaining walls to minimize filling disturbances to riparian and aquatic areas. Restrict clearing and grading to the proposed alignment of the selected Options of the Bypass Alternative.
- Locate equipment staging areas and construction material stockpiles in existing developed areas away from vegetation communities. Staging in previously cleared and disturbed areas would minimize additional clearing, grubbing, and related disturbance impacts to vegetation communities. Clearly identify equipment staging areas in the field prior to construction.
- Limit operation of construction equipment to designated rights-of-way. Clearly mark limits of clearing with project limiting fencing. Limit equipment operations in riparian and aquatic communities. Follow ODFW “in-water” work timelines.
- Use BMPs during construction for soil erosion and sediment control. Install sediment fencing and haybale filters along limits of disturbance. Provide temporary weed-free seed and mulch to all rough graded areas. Limit sediment to areas of construction. Maintain all soil erosion and sediment control measures until construction is complete.
- During initial grading operations, strip and stockpile topsoil for landscaping and other mitigation projects. As appropriate, salvage and replant native tree and shrub plant material along the project alignment. Store all stockpiled material away from mound-vernal pool complexes, riparian and aquatic communities.
- Improve degraded vegetation communities along the project alignment by removing noxious weeds and introducing new plantings of native species. Remove trash and debris as needed.
- Upon completion of final grading, landscape project alignment with native species at densities and with species diversity matching existing vegetation communities. Obtain all new plant material from local growers that provide plant material with similar tolerances for cold and heat. Provide permanent vegetative cover to all unpaved areas of the project alignment.
- Monitor all new mitigation and landscaped areas until fully established. Provide irrigation as required to landscaped areas to ensure survival of new plantings. Establish minimum survival rate for all new plant materials.

Implementation of the above mitigation measures could minimize the project's overall impacts on vegetation communities within the proposed footprint. Although the selection of the Bypass Alternative could result in permanent losses to vegetation, new landscaping and restoration activities could compensate for a portion of the overall losses. As previously described, existing vegetative communities within the proposed footprint have been heavily impacted by past land use practices resulting in degraded communities with little native species diversity. The introduction of native plantings in new landscaping for the project provides an opportunity to increase native species diversity and restore degraded vegetative communities to limited areas of the proposed footprint.

6.1.4 Wildlife Resources/Wildlife Habitat

Mitigation measures for wildlife resources and wildlife habitat include avoidance, minimization and restoration of habitat. Many of the measures presented in Section 6.1.3 are applicable to wildlife. The following measures are common to all Options of the Bypass Alternative:

- Locate equipment staging areas and construction material stockpiles away from active wildlife nesting sites. Clearly identify sensitive wildlife areas in the field prior to construction.
- Limit operation of construction equipment to designated rights-of-way. Clearly mark limits of clearing with project limiting fencing.
- Replace lost wildlife habitat along shoulders and roadway embankments by landscaping with native species. Match species diversity and density of new plantings with existing native habitats along roadway alignment.
- Add wildlife crossing signs (elk, deer) to appropriate areas along completed alignment.
- Improve degraded wildlife habitat along the project alignment with new plantings of native species. Introduce native shrub and tree species that provide cover and food sources for wildlife during landscaping. Design landscaping to avoid aviation/wildlife conflicts and communicate openly with the Medford International Airport regarding landscape plans.
- Monitor all new mitigation and landscaped areas until fully established. Establish minimum survival rate for all new plant materials. Monitor wildlife habitat improvement sites for effectiveness.
- On newly-established embankments and roadsides, minimize mowing and vegetation maintenance activities to minimum extent needed for motorist safety. Encourage natural succession and diversity of habitat in unmaintained areas.
- Install snags and perches in wetland and riparian areas to attract perching birds and raptors.

Employing the above-listed mitigation measures for wildlife habitat could only serve to reduce the overall impacts to wildlife. Permanent losses to wildlife habitat in several vegetation communities are expected with the selection of the Bypass Alternative. These losses could be minor since the vegetative communities that would be impacted have been degraded by past land use practices and offer only marginal fragmented habitats for many wildlife species. Furthermore, some limited improvements to wildlife habitat are expected through identified mitigation activities.

6.1.5 Noxious Weed Species

Mitigation measures designed to eradicate existing invasive species populations or control their spread to non-infested areas within or adjacent to the proposed footprint would be employed during project construction and operation. The proposed measures are common to all Options of the Bypass Alternative and include the following:

- Identify and map ODA listed 'A' and 'B' listed weeds within the proposed footprint. Develop a strategy to remove, control and prevent the spread of noxious weeds prior to the start of construction activities.
- Require inspection and cleaning of construction equipment prior to entry into construction sites. Weed seed can easily become trapped in the tread of tires or within the crevices of heavy machinery, and spread across the entire proposed footprint during the construction phase of the project.
- Specify the use of mulches, topsoil and seed mixes that are free of noxious weeds. Controlling noxious weeds in this manner could reduce the cost of monitoring and future eradication efforts.
- Ensure the use of environmentally beneficial landscaping practices. These include the use of only regionally native plants for landscaping; minimizing adverse affects to natural habitat during construction; preventing pollution by reducing fertilizer and pesticide use; and implementing water efficient practices such as mulching, and selecting and locating plants in a manner that conserves water and controls soil erosion.
- Deploy integrated pest management strategies should noxious weeds begin to spread. Integrated strategies offer the best results and could include biological, manual and chemical controls specific to the invasive target species.
- Monitor the finished Bypass Alternative alignment to ensure that noxious weeds do not regain their foothold in the area. The monitoring period should be long enough to ensure establishment of all new mitigation and landscape areas. Set appropriate thresholds for invasive cover along with an adaptive management plan, to ensure that appropriate actions are taken to ensure success.

Relative to noxious weeds, control and localized eradication should be the project goal. The implementation of the above-listed mitigation measures could result in partial control of noxious weeds, which could be considered a positive affect for the project.

6.2 Indirect and Cumulative Impacts

The following mitigation measures could be incorporated into the project design in order to minimize and avoid indirect and cumulative impacts to mound-vernal pool complexes and the sensitive species which inhabit them:

- Maintain local surface hydrology drainage patterns to the extent practical. Avoid concentrated discharges or disruptions of surface and subsurface hydrology that could disrupt existing hydrologic balance of remaining vernal pools, riparian areas and wetlands.

- Work with Corps and DSL to maintain and improve vernal pool resources within ODOT's White City mitigation bank as a mitigation resource for future ODOT road improvement projects within the project area.

7. REFERENCES

- Anthony, R.G. and F.B. Isaacs. 1981. *Characteristics of bald eagle nests in Oregon*. Unpublished report. Oregon State University, Corvallis, Oregon
- Bass, Ronald E., and Albert I. Herson. 1993. *Mastering NEPA: A Step-by-Step Approach*; Solano Press Books; Point Arena, CA.
- Campos, T. 1998. Conservation Information Assistant, Oregon Natural Heritage Program. Data system search for rare, threatened and endangered species in the Highway 62 analysis area, November 10, 1998.
- Center for Plant Conservation (CPC). 2007. CPC National Plant Collection Profile, Cook's Lomatium.
http://www.centerforplantconservation.org/ASP/CPC_ViewProfile.asp?CPCNum=7022. Accessed March 21, 2007.
- Chambers, Kenton. 1999. Personal Communication. Meeting with Dr. Kenton Chambers, OSUH and Peter Ryan, MB&G regarding identification of coral-seeded allocarya. June 22, 1999.
- City of Medford. 1987. Comprehensive Plan – Environmental Element, revised January 15, 1987. Medford, OR. 116 pp.
- City of Medford, 2000. Riparian Corridor Ordinance.
<http://www.ci.medford.or.us/files/riparian%20corridor%20ord.pdf>. Accessed April 23, 2007.
- Code of Federal Regulations. 50 C.F.R. § 17.9720 (October 1, 2005).
- Csuti, B., A.J. Kimerling, T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, M.M.P. Huso. 1997. *Atlas of Oregon Wildlife: distribution, habitat, and natural history*. 492 pp. Oregon State University Press, Corvallis, OR.
- Federal Register. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Withdrawal of Proposal to Give Endangered Status; Final Rule and Proposed Rule. 50 FR 23156 (September 19, 1994).
- Federal Register. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and the Vernal Pool Tadpole Shrimp; and Threatened Status for the Vernal Pool Fairy Shrimp. 59 FR 48136. (September 19, 1994).
- Federal Register. Invasive Species, Executive Order. 64 FR 6183 (February 12, 1999)
- Federal Register. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for the Plants *Lomatium cookii* (Cook's lomatium) and *Limnanthes floccosa* ssp. *grandiflora* (Large- Flowered Woolly Meadowfoam) in Oregon, Proposed Rule. 65 FR 30941-30952 (May 15, 2000).

- Federal Register. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon. 68 FR 46684 (August 6, 2003).
- Friedman, Sam. April 17, 2007. Personal communication with K. Currens, biologist MB&G regarding rare plant status and mitigation measures. Botanist, USFWS.
- Garrett, M., R.G. Anthony, J.W. Watson and K. McGarigal. 1988. Ecology of bald eagles on the lower Columbia River. Oregon Cooperative Wildlife Research Unit for the U.S. Army
- Grubb, T.G. and R.M. King. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. *Journal of Wildlife Management*, 55(3):500-511.
- Issacs, F.B., R.G. Anthony and R.J. Anderson. 1983. Distribution and productivity of nesting bald eagles in Oregon, 1978-1982. *Murrelet* 64:33-38.
- Isaacs, F.B., and R.G. Anthony. 2006. Database of bald eagle nest locations and history of use in Oregon and the Washington portion of the Columbia River Recovery Zone, 1971 through 2006. Oregon Cooperative Wildlife Research Unit, Oregon State University, Corvallis, Oregon.
- JRH Engineering, Inc. Traffic Data Analysis for Highway 62 Project. Unpublished Data. Provided to URS Corporation in Portland, Oregon.
- Jackson County Geographic Information System (GIS) Website. <http://www.co.jackson.or.us>. Accessed website on multiple occasions in 2007.
- Johnson, D.R. 1992. Soil Survey of Jackson County Area, Oregon. USDA SCS in Cooperation with the Oregon Agricultural Experiment Station.
- Knight, R.L. 1984. Response of wintering bald eagles to boating activity. *Journal of Wildlife Management* 48:999-1004.
- Marshall, D.B. 1992. Sensitive Vertebrates of Oregon. Oregon Department of Fish and Wildlife, Portland, OR.
- MB&G (Mason, Bruce & Girard, Inc.). 2000. Threatened and Endangered Species Technical Report 2. Oregon Department of Transportation, Highway 62 Corridor Solutions Project.
- MB&G. 2004. Biology: Terrestrial Baseline Existing Conditions Memorandum. Oregon Department of Transportation, Highway 62 Corridor Solutions Project. August 13, 2004.
- MB&G. 2007. Impact data calculations from Geographic Information System (GIS) analysis of wetland, aquatic and terrestrial resource mapping.
- May Consulting. 1999. Analysis of soil samples for the presence of federally listed large branchiopods. Unpublished Report, Walnut Grove, CA. 6 pp.
- Meinke, R. J. 1982. Threatened and Endangered Vascular Plants of Oregon: An Illustrated Guide. U.S. Fish and Wildlife Service. Portland, Oregon. 343 pp. + appendices.

- Oregon Department of Agriculture. 2007. Weedmapper.org. <http://www.weedmapper.org/facts.html>. Accessed April 12, 2007.
- Oregon Department of Environmental Quality. (ODEQ). 2006. ODEQ's 2004/2006 303(d) list of water quality limited waterbodies and Oregon's criteria used for listing waterbodies. URL: <http://www.deq.state.or.us/wq/assessment/rpt0406/search.asp#db>. (April 24, 2007).
- Oregon Department of Fish and Wildlife (ODFW). 2003. Recovery Outline for *Lomatium cookii* (Cook's Lomatium) and *Limnanthes floccosa* ssp. *grandiflora* (Large-flowered Woolly Meadowfoam). <http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/CooksLomatiumRecoveryOutlineforwebposting.pdf>. Accessed March 21, 2007.
- Oregon Department of Fish and Wildlife Service. 2007. Personal Communication. Phone call with S. Niemala of ODFWS and K. Currens of MB&G regarding the presence of federally threatened and endangered species. May 4, 2007.
- Oregon Department of Transportation (ODOT). 2002. Standard Specifications for Highway Construction. Oregon Department of Transportation, Salem, Oregon.
- Oregon Department of Transportation (ODOT). 2006. Supplemental Standard Specifications for Highway Construction. Oregon Department of Transportation, Salem, Oregon.
- Oregon Natural Heritage Program (ONHP). 2001. Rare, threatened, and endangered plants and animals of Oregon. Oregon Natural Heritage Program, Portland, OR. 94 pp.
- Oregon Natural Heritage Program (ONHP). 2003. Oregon Natural Heritage Plan. Department of State Lands, Salem, OR. 167 pp.
- Oregon Natural Heritage Program (ONHP). 2004. Personal Communication. Letter from C. Alton of ONHP to J. Lloyd of Mason, Bruce & Girard, Inc. regarding results of ONHP database search. August 11, 2004.
- Oregon Natural Heritage Program (ONHP). 2007. Personal Communication. Letter from C. Alton of ONHP to K. Currens of Mason, Bruce & Girard, Inc. regarding results of ONHP database search. April 23, 2007.
- Rogue Valley Metropolitan Planning Organization (RVMPO). 2005. 2030 Regional Transportation Plan, Rogue Valley, Oregon. Adopted 2005.
- Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. *Journal of Wildlife Management* 42:506-513.
- Stalmaster, M.V. 1980. Management strategies for wintering bald eagles in the Pacific Northwest. Pages 46-47 in Knight, R.L. et al. editors. *Proceedings of the Washington Bald Eagle Symposium*. June 14-15, 1989. Seattle, Washington.
- Stalmaster, M.V. 1987. *The bald eagle*. Universe Books, New York, NY.

- Steenhof, K. 1978. Management of wintering bald eagles. Eastern Energy and Land Use Team, USFWS, Office of Biology Service.
- Sullivan, Molly. 1999. Personal communication. Meeting with Ms. Sullivan, The Nature Conservancy and Peter Ryan, MB&G regarding identification of Cook's lomatium and Southern Oregon buttercup. March 23, 1999.
- Swenson, J.E., K.L. Alt and R.L. Eng. 1986. Ecology of bald eagles in the greater Yellowstone ecosystem. Wildlife Monographs No. 95.
- USFS (U.S. Forest Service). 1977. Bald eagle habitat management guidelines. USFS, Pacific Southwest Region, Guidelines, San Francisco, California
- USFWS (U.S. Fish and Wildlife Service). 1986. Recovery plan for the Pacific bald eagle. U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS. 1996. Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods. United States Department of the Interior. Fish and Wildlife Service. April 19, 1996. 11 pp.
- USFWS. 1999. Personal Communication. Letter from A. Hernandez of USFWS to G. Apke of ODOT regarding the presence of federally threatened and endangered species.
- USFWS. 2000. Critical Habitat, What is it? http://library.fws.gov/Pubs9/critical_habitat00.pdf. Accessed April 23, 2007.
- USFWS. 2003. Final Critical Habitat for 15 Vernal Pool Species, GIS mapping metadata. URL: <http://gis.ca.gov/catalog/showSourceXML.epl?id=31223;style=2> (February 6, 2008).
- USFWS. 2007. Personal Communication. Email from K. Maurice of USFWS to K. Currens of MB&G regarding the occurrence of federally threatened and endangered species within Jackson County.
- U.S. Geological Survey (USGS). 1983a. Eagle Point, Oregon. 7.5 minute quadrangle, 1:24000
- U.S. Geological Survey (USGS). 1983b. Medford East, Oregon. 7.5 minute quadrangle, 1:24000
- U.S. Geological Survey (USGS). 1983c. Medford West, Oregon. 7.5 minute quadrangle, 1:24000.
- Watson, J.W., M.G. Garrett and R.G. Anthony. 1991. Foraging ecology of bald eagles in the Columbia River Estuary. *Journal of Wildlife Management*. 55:492-499.
- Watson, James. 2002. Comparative Home Ranges and Food Habits of Bald Eagles Nesting in Four Aquatic Habitats in Western Washington. *Northwestern Naturalist*: Vol. 83, No. 3, pp. 101–108.
- Western Regional Climate Center (WRCC). 1998. Medford WSO AP, Oregon (355429) –Period of Record Monthly Climate Summary. World wide web document: <http://www.wrcc.dri.edu/cgi-bin/cliRECTM.pl?ormedf>. Western Regional Climate Center at Desert Research Institute.

Williamson, R.J., Fogg, E.F., Rains, M.C., and Harter, T.H. 2005. Hydrology of Vernal Pools at Three Sites, Southern Sacramento Valley. Final Technical Report. Department of Land, Air and Water Resources, Hydrologic Sciences Graduate Group, UC Davis.