Chapter 4

Supplemental Environmental Analysis

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Supplemental Environmental Analysis

4.0 Introduction

This chapter provides updated information on the affected environment, environmental consequences, and mitigation measures associated with the resource topics discussed in Chapters 3 and 4 of the June 2000 Final EIS. Each section in this chapter includes a summary of the approach and methodology used to examine the need for and, if necessary, obtain updated and supplemental information. Each section also includes a discussion of the environmental consequences associated with the proposed build alternatives and the No-Build Alternative, as well as an assessment of a future no-build scenario. This chapter only presents supplemental and updated information based on changes that have occurred since publication of the Final EIS. Information presented in the Final EIS that did not change has not been reproduced in this document.

The following provides a brief discussion of the study area and the project alternatives evaluated in this chapter.

4.0.1 Study Area

The study area is located in the Great Salt Lake Valley region of Utah. The two dominant geologic formations of this area are the northern Wasatch Range and Great Salt Lake. The limited land resources between these two formations support developed suburban cities, highways and arterial streets, railroad tracks, major utility corridors, industrial and commercial development, refineries, mining operations, agricultural, and recreation opportunities.

More specifically, and as described in the Final EIS, the study area for the proposed action is located in Salt Lake and Davis Counties, and includes portions of Salt Lake City, North Salt Lake, Woods Cross, West Bountiful, Centerville, Farmington, and Kaysville (Figure 4.0-1). In general, the study area is bounded on the east by I-15 and the Denver & Rio Grande (D&RG) and Union Pacific Railroad (UPRR) tracks, and on the west by Great Salt Lake and the associated wetland complexes. The northern limit of the study area lies just north of the I-15/US-89 interchange in Kaysville, and the southern limit extends just beyond I-80. However, to facilitate complete evaluation of environmental impacts, the study area boundary for the following resource areas was modified. Specific modifications to the study area boundary are described in the *Affected Environment* subsection for each resource area.

- Section 4.1, *Land Use*.
- Section 4.3, *Social*.

- Section 4.5, *Economics*.
- Section 4.8, *Air Quality*.
- Section 4.9, *Noise*.
- Section 4.12, *Wetlands*.
- Section 4.13, *Wildlife*.
- Section 4.16, *Historic and Archaeological Resources*.
- Section 4.18, *Visual Resources*.
- Section 4.19, *Energy*.
- Section 4.21, *Cumulative Impacts*.

It should be noted that the southern limit of the study area extended to I-80 in the Final EIS to allow for evaluation of project alternatives in and around the Salt Lake City International Airport.[1] Although none of the project components associated with the alternatives evaluated in the Supplemental EIS extend south of I-215, the southern boundary of the study area remains at I-80 to facilitate comparison with the data presented in the Final EIS (see Chapter 1, *Purpose of and Need for Action*).

4.0.2 Great Salt Lake Ecosystem

The proposed action generally borders the southeast shore of Great Salt Lake. Technically, the Great Salt Lake Ecosystem (GSLE) encompasses the full drainage basin of Great Salt Lake, including the ancient lakebed and drainages of Lake Bonneville and the complete watersheds of the Bear, Ogden/Weber, and Jordan Rivers. However, for this Supplemental EIS, the geographic extent of the GSLE is defined as Great Salt Lake and the wetlands/wildlife habitats surrounding its shoreline.

As described in the Final EIS, the GSLE provides important habitat for a variety of birds, reptiles, amphibians, and mammals, some of which are rare and have small geographical distributions. The wetlands of Great Salt Lake account for 75 percent of all wetlands in Utah, and the shores of Great Salt Lake are internationally important because they are a link in the Pacific Flyway for migratory waterfowl, and a link of the Western Hemisphere Shorebird Reserve Network. Between 2 million and 5 million birds use the lake yearly, including a wintering bald eagle population of approximately 500 birds. Great Salt Lake also provides extensive recreational opportunities in the area, including waterfowl hunting, bird-watching, and boating opportunities.

Great Salt Lake is also one of the four largest terminal saline lakes in the world and supports an economically viable brine shrimp industry. Salinity is decreasing in the southern half of the lake, adjacent to the proposed location of Legacy Parkway, and increasing in the northern half. Development

[1] In August 2004, the Utah Transportation Commission (UTC) confirmed that the decision disclosed in the Final EIS to eliminate from consideration a highway west of the Salt Lake City International Airport, designed to connect the proposed Legacy Parkway to 5600 West (now Mountain View Corridor), was still valid (Abeggien pers. comm.). In addition, it should be noted that the WFRC long-range plan does not include a highway west of the Salt Lake City International Airport.

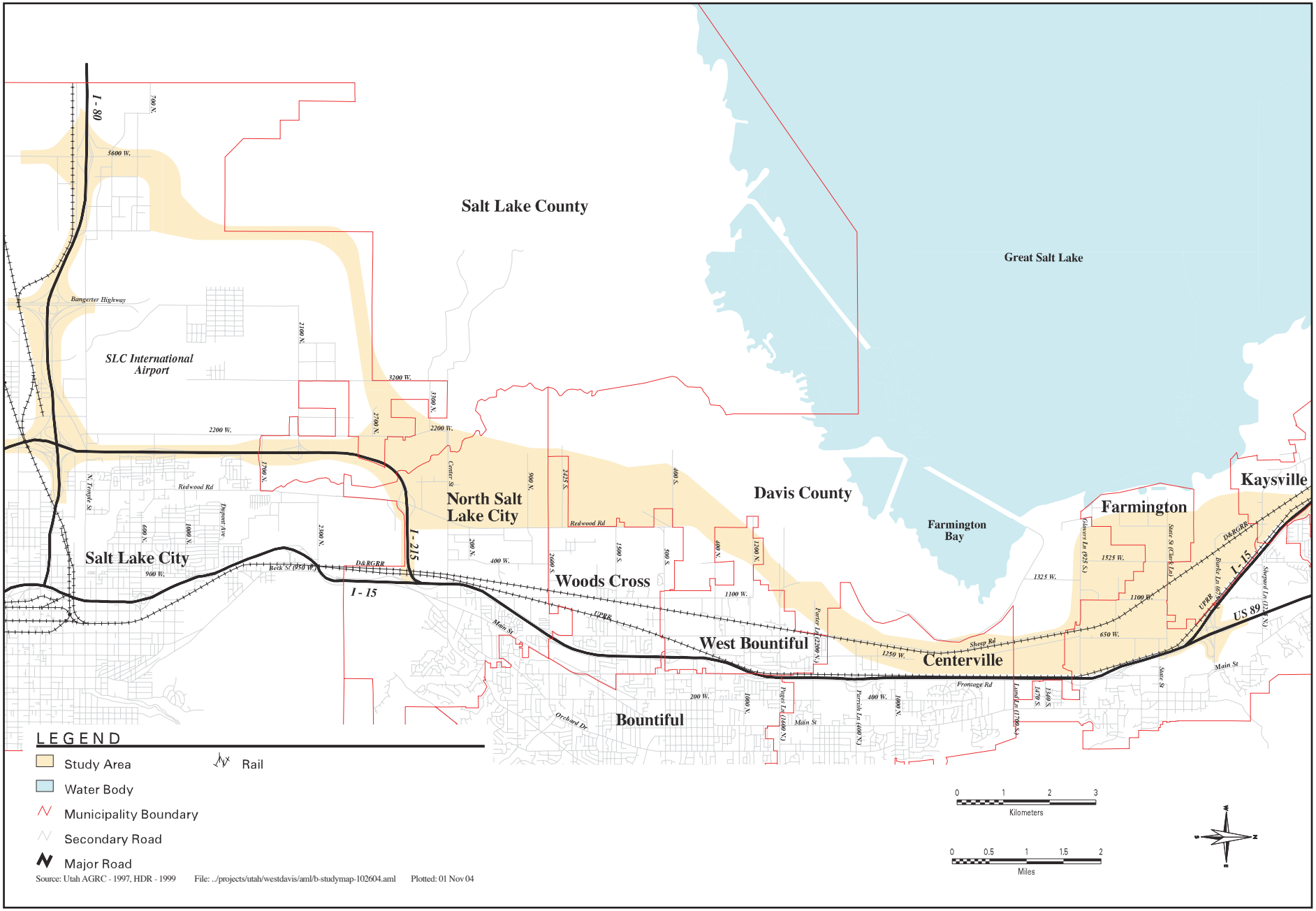

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Figure 4.0-1
Legacy Parkway Study Area

encroaching towards the lake has also played a role in diminishing and stressing the function and hydrology of the ecosystem surrounding the lake.

4.0.3 Alternatives Evaluated

As described in Chapter 3, *Alternatives*, the Supplemental EIS presents detailed impacts of the following six alternatives.

- **No-Build Alternative**. NEPA requires evaluation of a no-build alternative to illustrate what would happen if a proposed action were not taken. For this Supplemental EIS, the federal lead agencies have determined to present information in two ways for the No-Build assessment.

  - Existing conditions.

    Under existing conditions, the No-Build Alternative consists of transportation improvements detailed in the *Wasatch Front Urban Area Long Range Transportation Plan Update, 2004–2030* (long range plan) (Wasatch Front Regional Council 2003a), but does not include the Legacy Parkway project, the Legacy North project, or I-15 reconstruction (i.e., full widening of I-15 to 10 lanes). The following long range plan components are included in the existing conditions No-Build Alternative: commuter rail, widening Redwood Road from two to five lanes from south of I-215 to 500 South, enhanced bus service, and various local road improvements. This alternative is different from the No-Build Alternative evaluated in the Final EIS in that the WFRC long range plan has since been updated to include commuter rail and other capacity-enhancing projects.

  - Future conditions.

    The future conditions No-Build Alternative is presented to illustrate the development that would likely occur if Legacy Parkway were not constructed, as well as the roadway and infrastructure improvements accounted for under the existing conditions No-Build Alternative. The land use aspect of the future condition is based on discussions with land use planners from cities and counties within the study area. Impacts associated with the future conditions No-Build Alternative are described qualitatively in this chapter because the nature and timing of these improvements are not known at this time.

    The future conditions No-Build Alternative was not noted as a separate discussion in the Final EIS; instead, it was combined with discussion of the existing conditions No-Build Alternative under the No-Build Alternative discussion. The future conditions No-Build Alternative has been separated out in this Supplemental EIS to better distinguish between project-related impacts and impacts associated with future actions that are independent of the proposed action, but that are likely to occur.

- **(Modified) Alternative A**. (Modified) Alternative A, hereafter referred to as Alternative A, follows the same alignment described for Alternative A in the Final EIS (Figure 3-2). However, the right-of-way width evaluated in the Supplemental EIS has been reduced from 100 m (328 ft) to 95 m (312 ft), and potential footprint modifications would further reduce impacts within the right-of-way. Additional minor modifications have been made to the Alternative A alignment since preparation of the Draft Supplemental EIS. The impact information presented in this Final Supplemental EIS has been updated to reflect those modifications.

Following are the design refinements that have been made to Alternative A since publication of the Draft Supplemental EIS, as described in Section 3.4.2, *Modified Build Alternatives A, B, C, and D/E*, of the Final Supplemental EIS.

- The right-of-way at 500 South was changed for Alternative A to match Alternative E because more advanced design supported a determination of the actual area needed.

- The right-of-way of Alternative A was changed to match Alternative E from Parrish Lane to the I-15/US-89/Legacy Parkway interchange in Farmington. This altered the Alternative A right-of-way slightly to incorporate the redesign of Parrish Lane. This includes crossing Parrish Lane over the mainline at that interchange and crossing 1250 West over the mainline as an overpass.

- **(Modified) Alternative B**. (Modified) Alternative B, hereafter referred to as Alternative B, follows the same alignment described for Alternative B in the Final EIS (Figure 3-2) and is evaluated at the narrower 95-m (312-ft) right-of-way width, and potential footprint modifications would further reduce impacts within the right-of-way.

- **(Modified) Alternative C**. (Modified) Alternative C, hereafter referred to as Alternative C, follows the same alignment described for Alternative C in the Final EIS (Figure 3-2) and is evaluated at the narrower 95-m (312-ft) right-of-way width, and potential footprint modifications would further reduce impacts within the right-of-way.

- **Alternative D (Final EIS Preferred Alternative)**. Alternative D, which was the Final EIS Preferred Alternative, follows the alignment described for the Preferred Alternative in the Final EIS (Figure 3-2) and is evaluated at the 100 m (328-ft) right-of-way, the original right-of-way width evaluated in the Final EIS. Although it has been dropped from further consideration, analysis of this alternative is presented in this chapter for some resource topics to illustrate changes in impacts between the Final EIS and the Supplemental EIS. It has been included in this chapter for comparative purposes only.

- **Alternative E**. Alternative E follows the same alignment as Alternative D (Figure 3-2), but is evaluated at the narrower 95-m (312-ft) right-of-way width, and potential footprint modifications would further reduce impacts within the right-of-way. Additional minor modifications have been made to the Alternative E alignment since preparation of the Draft Supplemental EIS. The impact information presented in this Final Supplemental EIS has been updated to reflect those modifications.

  Following are the design refinements that have been made to Alternative E since publication of the Draft Supplemental EIS, as described in Section 3.4.2, *Modified Build Alternatives A, B, C, and D/E*, of the Final Supplemental EIS.

  - The right-of-way of Alternative E was modified slightly in the area of Parrish Lane and 1250 West to accommodate the new design for these local roads.

  - The right-of-way for Alternative E was changed at the I-15/US-89/Legacy Parkway interchange slightly to match the Alternative A right-of-way.

Section 4.1
Land Use

This section discusses land use in the study area. It provides an update on current land use in the study area, as well as information on local land use plans that have been updated since publication of the Final EIS. Supplemental information on regional land use planning studies is also provided. The environmental consequences associated with both the No-Build and build alternatives have been updated to reflect changes in current land use and local land use plans.

4.1.1 Approach and Methodology

4.1.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with land use in the study area, Sections 3.1 and 4.1 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The southern, western, and eastern boundaries of the study area for this section are described in Section 4.0.1, *Study Area*. However, to evaluate potential growth impacts beyond the North Corridor, the northern boundary of the study area for this section was extended to southern Weber County, up to and including the City of Ogden.[1]

The following documents, many of which were referenced in the Final EIS, were reviewed for this analysis.

- *Salt Lake City Downtown Plan* (Salt Lake City 1995).
- *Salt Lake City Transportation Master Plan* (Salt Lake City 1996).
- *Salt Lake City Transportation Action Plan Update* (Salt Lake City 2000).
- *Salt Lake City Visionary Gateway Plan* (Salt Lake City 1994a).
- *Gateway Specific Plan, Draft* (Salt Lake City 1998a).
- *Gateway Development Master Plan* (Salt Lake City 1998b).

[1] The study area boundary for the Land Use section was extended to the north to evaluate potential growth impacts in southern Weber County and the City of Ogden. Much of the land use south of the study area is currently developed or is planned for development, and it was therefore concluded that areas south of the study area would experience full build-out, with or without construction of the proposed action. As a result, this section does not evaluate growth impacts south of the study area.

- *Beck Street Gateway Vision Plan* (Salt Lake City 1994b).
- *Northwest Jordan River/Airport Master Plan* (Salt Lake City 1992).
- North Salt Lake Land Use Development and Management Act (City of North Salt Lake 2001).
- *Woods Cross City General Plan* (Woods Cross City 2003).
- *West Bountiful City Master Plan, 1990–2010* (City of West Bountiful 1992).
- *City of West Bountiful General Plan, Draft Transportation Element* (City of West Bountiful 1997a).
- *Planning District #6 Plan* (City of West Bountiful 1997b).
- *General Plan for Centerville City, Utah* (Centerville City 1996).
- *Comprehensive General Plan, Farmington, Utah* (Farmington City 1993).
- *Farmington City Master Transportation Plan* (Farmington City 1998).
- *Envision Utah Quality Growth Strategy and Technical Review* (Envision Utah 2000).
- *Davis County Shorelands Comprehensive Land Use Plan* (Davis County Council of Governments 2001).
- *Inter-Regional Corridor Alternatives Analysis* (Carter Burgess 2002).

A series of meetings was held with representatives from each of the jurisdictions in the study area—North Salt Lake City, Woods Cross, West Bountiful, Centerville, Farmington, and Davis County—to discuss topics pertaining to the Supplemental EIS, including current land use, updates to local plans that had occurred since publication of the Final EIS, and potential use of the lands associated with the proposed action and Legacy Nature Preserve if the proposed action is not constructed. The meetings were held in July and September 2003. Table 4.1-1 provides information on the dates and attendees of these meetings. Minutes from these meetings were reviewed for this analysis (HDR Engineering 2003, 2004c).

As described in Chapter 2 (Section 2.3, *Integration of Legacy Parkway with Mass Transit*), a planning meeting with Community Planning and Information Committee (CPIC) representatives was also held to identify land use changes that would represent the highest level of transit-oriented land use that the local jurisdictions, community members, property owners, and future real estate market could support. The intent of the planning session was to gather information on aggressive, but achievable, transit-supportive land use changes that could be used for the analysis.

4.1.1.2 Changes since Draft Supplemental EIS

Changes have been made to the land use section since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- UDOT held additional meetings with city and county planning staff in October, November, and December 2004 to discuss topics pertaining to the Supplemental EIS, including current land use, updates to local plans, and potential use of land associated with the proposed action and the Legacy

Nature Preserve if the proposed action is not constructed. The meeting dates and attendees are shown in Table 4.1-1.

- Five new residential subdivisions have been platted since publication of the Draft Supplemental EIS. The impacts discussion has been modified to discuss how each of these subdivisions would be affected by the proposed build alternatives.
- Information for several subdivisions that were included in the Draft Supplemental EIS has been updated (e.g., the number of units in the subdivision and subdivision features).
- A discussion of the potential land use effects associated with the Utah Transit Authority's Weber County to Salt Lake City Commuter Rail Project, which is a component of the shared solution, has been added.
- Table 4.1-3 has been modified to include population, household, and employment totals. In addition, the percentage rounding was adjusted.

Table 4.1-1 Public and Agency Coordination Meetings

Jurisdiction	Meeting Dates	Attendees
West Bountiful	July 10, 2003	Wendell Wild, City Manager, City of West Bountiful
		Bill Flanders, Engineer & Supervisor, City of West Bountiful
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering
		Bryan Adams, UDOT
	September 16, 2003	Bill Flanders, Engineer & Supervisor, City of West Bountiful
		Mike Connors, HDR Engineering
		Terry Warner, HDR Engineering
	October 25, 2004	Wendell Wild, City Manager, City of West Bountiful
		Bill Flanders, Engineer & Supervisor, City of West Bountiful
		Dick Gorton, HDR Engineering
		Jeff Scarborough, Land Architects
	November 23, 2004	Bill Flanders, Engineer & Supervisor, City of West Bountiful
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 3, 2004	Bill Flanders, Engineer & Supervisor, City of West Bountiful
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
Farmington	July 8, 2003	David Peterson, City Planner, Farmington City
		Max Forbush, City Manager, Farmington City
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering

Jurisdiction	Meeting Dates	Attendees
	September 16, 2003	David Peterson, City Planner, Farmington City
		Bethany Shingleton, HDR Engineering
		Mike Connors, HDR Engineering
	October 25, 2004	David Peterson, City Planner, Farmington City
		Dick Gorton, HDR Engineering
		Jeff Scarborough, Land Architects
	November 24, 2004	David Peterson, City Planner, Farmington City
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 3, 2004	David Peterson, City Planner, Farmington City
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
Centerville	July 8, 2003	Randy Randall, Director of Public Works, Centerville City
		Fred Campbell, Engineer, Centerville City
		Aric Jensen, Community Development Director, Centerville City
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering
	September 15, 2003	Aric Jensen, Community Development Director, Centerville City
		Fred Campbell, Engineer, Centerville City
		Bethany Shingleton, HDR Engineering
		Mike Connors, HDR Engineering
	October 25, 2004	Cory Snyder, Community Development Director, Centerville City
		Fred Campbell, Engineer, Centerville City
		Dick Gorton, HDR Engineering
		Jeff Scarborough, Land Architects
	November 23, 2004	Cory Snyder, Community Development Director, Centerville City
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
Woods Cross	July 10, 2003	Gary Uresk, City Administrator, Woods Cross City
		Tim Stephens, Community Development Director, Woods Cross City
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering
		Bryan Adams, UDOT
	September 15, 2003	Gary Uresk, City Administrator, Woods Cross City
		Bethany Shingleton, HDR Engineering

Jurisdiction	Meeting Dates	Attendees
		Mike Connors, HDR Engineering
	October 26,2004	Gary Uresk, City Administrator, Woods Cross City
		Wilf Sommerkorn, Director of Economic Development, Davis County
		Dick Gorton, HDR Engineering
		Jeff Scarborough, Land Architects
	November 23, 2004	Tim Stephens, Community Development Director, City of Woods Cross
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 3, 2004	Tim Stephens, Community Development Director, City of Woods Cross
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 8, 2004	Scott Anderson, Public Works Director, City of Woods Cross
		Lee Commack, JUB Engineering
		Greg Kloberdanz, Land Architects
Davis County	July 11, 2003	Barry Burton, Assistant Director, Community & Economic Development, Davis County
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering
	September 16, 2003	Barry Burton, Assistant Director, Community & Economic Development, Davis County
		Terry Warner, HDR Engineering
		Mike Connors, HDR Engineering
	November 24, 2004	Barry Burton, Assistant Director, Community & Economic Development, Davis County
		Paul Allred, Planner, Davis County
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 3, 2004	Barry Burton, Assistant Director, Community & Economic Development, Davis County
		Paul Allred, Planner, Davis County
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 7, 2004	Barry Burton, Assistant Director, Community & Economic Development, Davis County
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects

Jurisdiction	Meeting Dates	Attendees
North Salt Lake	July 15, 2003	Mayor Kay Briggs, City of North Salt Lake
		Rod Wood, Public Works Director, City of North Salt Lake
		Paul Otteson, City Engineer, City of North Salt Lake
		Collin Wood, City Engineer, City of North Salt Lake
		Bethany Shingleton, HDR Engineering
		Terry Warner, HDR Engineering
	September 15, 2003	Paul Otteson, City Engineer, City of North Salt Lake
		Rod Wood, Public Works Director, City of North Salt Lake
		Bethany Shingleton, HDR Engineering
		Mike Connors, HDR Engineering
	October 26, 2004	Rod Wood, Public Works Director, City of North Salt Lake
		Paul Otteson, City Engineer, City of North Salt Lake
		Dick Gorton, HDR Engineering
		Jeff Scarborough, Land Architects
	November 22, 2004	Paul Otteson, City Engineer, City of North Salt Lake
		Greg Kloberdanz, Land Architects
		Jeff Scarborough, Land Architects
	December 3, 2004	Paul Otteson, City Engineer, City of North Salt Lake
		Rod Wood, Public Works Director, City of North Salt Lake
		Jeff Scarborough, Land Architects
		Greg Kloberdanz, Land Architects
	December 8, 2004	Paul Otteson, City Engineer, City of North Salt Lake
		Greg Kloberdanz, Land Architects

4.1.2 Affected Environment

4.1.2.1 Current Land Use and Development Trends in the Study Area

This section describes land use changes that have occurred since publication of the Final EIS, including development and changes in planned land use that have occurred since 1999. As illustrated in Figure 4.1-1, which updates Figure 3-1 in the Final EIS, much of the study area is now either planned for development or is already developed. Section 4.1 of the Final EIS stated that up to 283 ha (700 ac) of low-intensity land uses (i.e., agricultural, grazing, idle) were being converted to urban uses each year in Davis County; planned development in the study area has occurred as disclosed in the Final EIS. The WFRC population growth projections for 2020 have been revised slightly downward (from 1,941,000 to 1,918,000) since publication of the Final EIS; however, according to Davis County planners, the development trends disclosed in the Final EIS are still accurate, with approximately 243 ha (600 ac) per

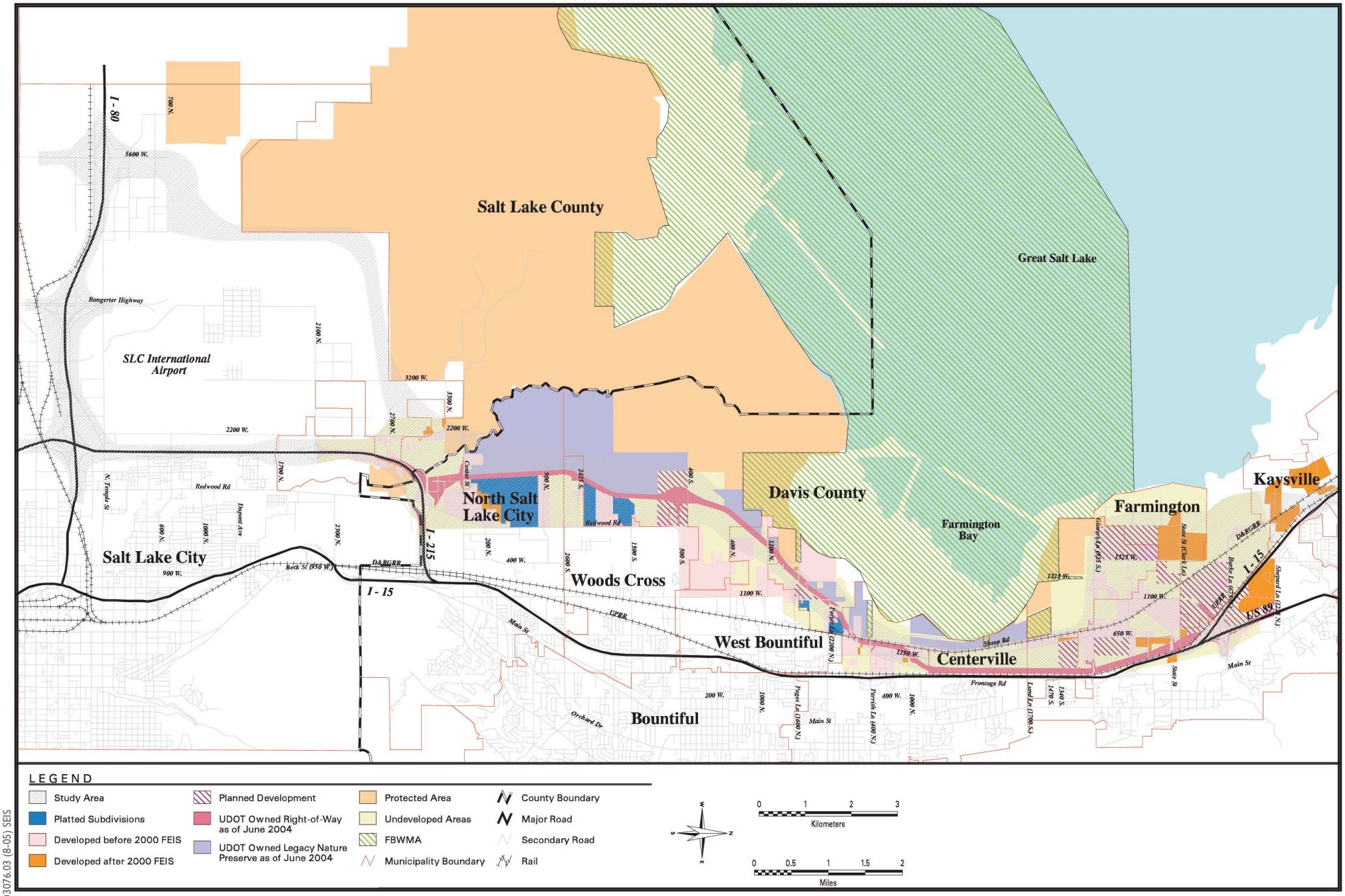

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Figure 4.1-1
Existing, Planned, and Platted Development in the Study Area

year being converted to residential development and 40 ha (100 ac) per year being converted to non-residential development (Sommerkorn pers. comm.[a]).

Table 4.1-2 illustrates that the number of construction permits for new residential units issued per year in Davis County increased overall between 1998 and 2002, despite slight decreases in 1999 and 2000. This increase indicates that projected development in the study area has continued to occur since publication of the Final EIS. These economic indicators further illustrate that, although the WFRC population projections for 2020 have been revised downward slightly, the pace of growth in Davis County has kept up with the rate anticipated in the Final EIS.

Table 4.1-2 Economic Indicators for Davis County, 1998–2002

Construction Permits Authorized	1998	1999	2000	2001	2002
New Dwelling Units (number)	2,363	2,294	1,832	2,571	2,564
Value of Total Construction (thousands of dollars)*	375,022	341,336	321,401	390,724	430,955

Notes:

* Represents value of new residential and non-residential construction.

Sources: University of Utah, Bureau of Economic and Business Research, 2004.

Notable development in the study area since publication of the Final EIS is described below. There has been no change in development or planned land use since publication of the Final EIS for the portions of Salt Lake County, Salt Lake City, Davis County (unincorporated), and Centerville located in the study area. Development in these jurisdictions has proceeded as anticipated in the Final EIS.

North Salt Lake

In North Salt Lake, a new housing development, the Foxboro development, is currently being built west of Redwood Road between Center Street and 900 North. This 110-ha (272-ac) mixed-use development, which was platted in 2003, includes homes, parks, commercial zoning along Redwood Road, a planned elementary school, and a church. A total of 1,250 residential units are planned, including about 240 low- to moderate-income housing units and 12 Department of Housing and Urban Development- (HUD-) supported transitional housing units.

Woods Cross

Woods Cross is also experiencing considerable residential growth in the western part of their jurisdiction. According to Woods Cross planners, many of the currently vacant and undeveloped parcels west of Redwood Road (Figure 4.1-1) will likely be rezoned for residential, recreation, and commercial land uses (HDR Engineering 2003). Two new planned unit developments are also being constructed in Woods Cross. Valentine Estates, located at 2100 S. Redwood Road just east of the Alternative E right-of-way, will include 93 single-family homes and 182 multifamily units. Mountain View Estates, located at 1500 S. Redwood Road just east of the Alternative E right-of-way, will include approximately 175 single-family homes.

West Bountiful

Construction has begun on three new developments in West Bountiful since publication of the draft Supplemental EIS. Birnam Woods, located near 2200 North and 800 West, will include 110 single-family

homes in a residential subdivision. Olsen Farms is located near 1600 North, 1000 West and includes plans for 11 single-family homes. Miller Meadows, located north of Glovers Lane near 650 West and 700 South in Farmington, includes plans for 107 single-family homes.

Farmington

Farmington Ranches, a planned unit development located west of the Davis County Fairgrounds at 1525 W. Clark Lane in Farmington, includes 540 planned single-family homes on large lots, a new elementary school, and a proposed church. In addition, rural residential and single-family residential growth is continuing south of Farmington Ranches, south of Shepard Lane, and north of Glovers Lane (HDR Engineering 2003).

4.1.2.2 Local Land Use Plans

There have been no changes or updates to the following land use plans since publication of the Final EIS.

- *Salt Lake City Downtown Plan* (Salt Lake City 1995).
- *Salt Lake City Transportation Master Plan* (Salt Lake City 1996).
- *Salt Lake City Visionary Gateway Plan* (Salt Lake City 1994a).
- *Gateway Specific Plan, Draft* (Salt Lake City 1998a).
- *Gateway Development Master Plan* (Salt Lake City 1998b).
- *Beck Street Gateway Vision Plan* (Salt Lake City 1994b).
- *Northwest Jordan River/Airport Master Plan* (Salt Lake City 1992).
- *General Plan for Centerville City* (Centerville City 1996).
- *West Bountiful City Master Plan 1990–2010* (City of West Bountiful 1992).
- *West Bountiful City General Plan, Draft Transportation Element* (City of West Bountiful 1997a).
- *West Bountiful City Planning District No. 6 Plan* (City of West Bountiful 1997b).
- *Comprehensive General Plan, Farmington, Utah* (Farmington City 1993).
- *Farmington City Master Transportation Plan* (Farmington City 1998).

There have been some new plans and updates to certain other plans since publication of the Final EIS, as described below.

Transportation Advisory Board Salt Lake City Transportation Action Plan Update

The *Transportation Advisory Board Salt Lake City Transportation Action Plan* (transportation action plan) (Salt Lake City 2000) is designed to appropriately direct Salt Lake City's transportation future. It is

based on the guiding principles and direction statements adopted in the 1996 *Salt Lake City Transportation Master Plan*. The transportation action plan was prepared to report on the progress of the master plan. The transportation action plan specifically states the following regional planning guidelines.

- Salt Lake City will actively participate in the WFRC Inter-regional Corridor Alternatives Analysis.
- Salt Lake City will work with other local jurisdictions and WFRC on regional efforts to include bicycle trails in land use plans.
- Salt Lake City will participate in Envision Utah regional land use planning studies.
- Salt Lake City will work with UDOT to resolve transportation issues.
- Salt Lake City's Transportation Division will work with regional transportation agencies to explore and develop regional rail service.

North Salt Lake Land Use Development and Management Act

The North Salt Lake Land Use Development and Management Act outlines zoning regulations for various land use designations in North Salt Lake (City of North Salt Lake 2001). These zoned boundaries will be determined by general development plans adopted by the City of North Salt Lake at a later time.

Woods Cross City General Plan

The *Woods Cross City General Plan* offers specific recommendations for land use and transportation improvements in Woods Cross and discusses Legacy Parkway, as summarized below (Woods Cross City 2003).

- The construction of Legacy Parkway or an equivalent highway would help to decrease traffic volumes on I-15 and lessen the spillover impact in Woods Cross.
- Woods Cross City has proposed to work with the City of West Bountiful to jointly plan and develop the 500 South/Legacy Parkway interchange area. As disclosed in the Final EIS, this is one of the areas in which land uses are anticipated to change in response to the project. The plan proposes to create a mixed-use development zone on land adjacent to the proposed Alternative E alignment at the 500 South interchange in which residential, commercial, recreational, entertainment, office, and transit-oriented development uses are supported. However, the city is proposing this development zone more in response to the transit element of the Shared Solution, which also includes I-15 widening and commuter rail development, than in response to the Legacy Parkway project itself. This development zone would be close to a proposed transit station and would likely be developed regardless of whether Legacy Parkway is constructed.
- Several residential developments along the Legacy Parkway corridor are planned, including Mountain View Estates and Valentine Estates. As described above in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, these two developments would abut the Alternative E alignment between 500 South and 2600 North. No interchange for Legacy Parkway is planned in this area.
- A 91-m (300-ft) minimum open buffer is planned on the east side of the Alternative E alignment. According to the city, this buffer zone is intended to moderate the direct impact of the highway on the

natural surroundings to the west and to act as a buffer between the proposed highway and residential and commercial development between the highway and Redwood Road (Woods Cross City 2003). The buffer, which would be located between approximately 1900 South and 500 South, and between 500 South and the city's northern border, is proposed in addition to the buffer area included as a component of the proposed Legacy Parkway build alternatives (see Chapter 3, *Alternatives*).

In addition, the City of Woods Cross is working with UTA to develop a commuter rail station at 800 West and 500 South in Woods Cross. UTA has not acquired any land for this station to date.

4.1.2.3 Regional Land Use Planning Studies

Envision Utah Quality Growth Strategy and Technical Review

Envision Utah is a partnership between public and private entities that was formed in 1997 to study and address the effects of long-term growth in the Greater Wasatch Front area.[2] It is sponsored by the Coalition for Utah's Future and includes representatives from state and local governments, business leaders, developers, conservationists, landowners, academicians, church groups, and independent citizens. Its goal is to create a publicly supported growth strategy that will preserve Utah's high quality of life, natural environment, and economic vitality (Envision Utah 1999).

Through the involvement of the public, local and state elected officials, businesses, civic organizations, religious communities, and other stakeholders, Envision Utah has gathered information about what Greater Wasatch Area residents value and how they think growth should be accommodated. Envision Utah has also sponsored the *Envision Utah Quality Growth Strategy and Technical Review* (January 2000). Based on this information, Envision Utah has identified the following six primary goals that need to be addressed in the Greater Wasatch Area if these communities are to protect the environment and maintain their economic vitality.

1. Enhance air quality.
2. Increase mobility and transportation choices.
3. Preserve critical lands, including agricultural, sensitive, and strategic open lands and address the interaction between these lands and developed areas.
4. Conserve and maintain the availability of water resources.
5. Provide housing opportunities for a range of family and income types.
6. Maximize efficiency in public and infrastructure investments to promote the other goals.

The following transportation goals are associated with the second primary goal (Increase mobility and transportation choices).

- Advocate an increase in the capacity of east-west transportation links, recognizing that some communities may have a greater need for additional north-south arterial capacity. Improve traffic

[2] The Greater Wasatch Front area, as defined by Envision Utah, extends from Brigham City on the north to Nephi on the south.

flow and provide better access. Work with UDOT and local governments to identify the corridors of greatest need.

- Promote the building of a region-wide transit system to make transit more convenient and reliable. Work with UTA, UDOT, railroad companies, and local governments to find ways to identify and purchase right-of-way in the near term for future transit.
- Foster transit-oriented development.
- Foster and promote walkable community development where feasible.
- Promote the creation of a network of bikeways and trails, especially commuter trails linking daytime destinations.
- Encourage the addition of carpool lanes and promote incentives for use.
- Encourage reversible lanes where feasible to reduce peak-hour congestion and take advantage of unused road capacity.

In October 2000, Envision Utah released the *Urban Planning Tools for Quality Growth* report. Changes and updates specific to Centerville include joint funding, by Envision Utah and the Quality Growth Commission,[3] of local quality growth demonstration projects, including a proposed mixed-use development that integrates affordable housing, open space, and compact, high-density development. There has been no change to the sections with regard to Woods Cross, West Bountiful, and North Salt Lake.

In 2002, Envision Utah also released the *Wasatch Front Transit-Oriented Development Guidelines* (Envision Utah 2002), which provide a framework for understanding, designing, and implementing transit-oriented development in the greater Wasatch Front Region. These guidelines generally are designed to serve as a tool for implementing a region-wide transportation and land use opportunities strategy.

Envision Utah supports adoption of the Shared Solution, and in particular, the transit component of the Shared Solution.

Inter-Regional Corridor Alternatives Analysis

The Inter-Regional Corridor Alternatives Analysis (IRCAA) (Carter Burgess 2002) was initiated as a collaborative effort in October 1999 by four sponsor agencies: WFRC, Mountainland Association of Governments (MAG), UTA, and UDOT. The analysis was conducted to develop a comprehensive plan for the best mix of transportation solutions to meet long-term (30-year) inter-regional mobility needs.

[3] The Quality Growth Commission was established by the Utah Quality Growth Act of 1999. The commission has 13 members, each appointed by the governor and confirmed by the state senate. Membership is required to consist of two state representatives, six elected officials from local government, one representative from the construction industry, one representative from the real estate industry, two representatives from the farming community, and one at-large individual. The commission's purpose is to develop balances between quality of life and economic development with respect to growth issues.

IRCAA Study Area

The IRCAA study area covers a 120-mile corridor between the communities of Brigham City on the north and Payson on the south, encompassing most of the urbanized areas in Utah, as well as the primary commercial, business, and education institutions. The corridor is linear and relatively narrow, located between the Wasatch Range on the east and Great Salt Lake, Utah Lake, and the Qquirrh Mountains on the west. More than 50 cities and towns in the counties of Box Elder, Weber, Davis, Salt Lake, and Utah are part of the study area.

Locally Preferred Alternative

The IRCAA identified a Locally Preferred Alternative (LPA) that included commuter rail, roadway improvements (including the proposed Legacy Parkway), new interchanges, HOV lanes, and bus rapid transit as necessary transportation improvements. The IRCAA determined that commuter rail should operate between Brigham City and Payson, using either locomotive-hauled coaches or self-propelled diesel multiple units (DMU). The analysis recommended that trains operate in the UPRR corridor from Ogden to Salt Lake City, and in the D&RG corridor from Salt Lake City to Provo.

As a result of the IRCAA, UTA had acquired 282 km (175 mi) of railroad corridor between Payson and Brigham City as of 2002, as well as a rail maintenance facility adjacent to Beck Street in North Salt Lake (Utah Transit Authority 2003). These facilities will be components of the future rail system.

The Davis County Shorelands Comprehensive Land Use Plan

The *Davis County Shorelands Comprehensive Land Use Plan* is a plan for conserving and preserving the land along Great Salt Lake (Davis County Council of Governments 2001). It presents a balanced approach to managing land use while preserving Great Salt Lake Shorelands,[4] a regionally important resource. The Davis County Shorelands Steering Committee, created by the Davis County Council of Governments, implemented an inclusive and informed public input process that included input from landowners, residents, city and county officials, developers, conservationists, and other concerned citizens. The plan addressed the following local issues:

- **North Salt Lake**. The lands west of the proposed Legacy Parkway will be preserved as a Legacy Nature Preserve as part of the mitigation required to construct Legacy Parkway.

- **Woods Cross**. Although a small portion of the land at the proposed Legacy Parkway/500 South interchange will be developable, the land west of the highway corridor will not be developed. Duck clubs currently use most of this land; due to the sensitivity of the land, this is unlikely to change.

- **West Bountiful**. There will be no development west of the Alternative E alignment with the exception of an access road to a treatment plant and the Bountiful City Landfill.

- **Centerville**. Centerville City plans a future development between the Alternative E alignment and the Denver & Rio Grande rail corridor to the west. Wetland mitigation will likely be necessary in this area due to the nature of the site. Centerville's Master Plan explains that the southern part of the site will be mitigation land for developing the northernmost part of the site.

[4] The Davis County Shorelands Plan considers shorelands those lands located west of the proposed Legacy Parkway corridor (Davis County 2001).

- **Farmington**. Because a lot of land is available for development near the Federal Emergency Management Agency (FEMA) Flood Line, Farmington City has approved a new conservation plan that will preserve open space and farmland.

Although the Davis County Shorelands Plan was finalized after publication of the Final EIS, the concepts presented in the plan were generally captured in the Final EIS. Specifically, during development of the Final EIS, local jurisdictions in the study area stated that Legacy Parkway would represent a western boundary for future growth, primarily due to the lack of available access on the western side of the proposed highway. See Section 4.1.1 of the Final EIS for a more detailed explanation of this discussion.

Utah Transit Authority Weber County to Salt Lake City Commuter Rail Project

As described in Chapter 1, *Purpose of and Need for Action*, one component of the Shared Solution is commuter rail, the northern portion of which will run between Weber County and Salt Lake City. The corridor for this portion of the proposed commuter rail line will extend 71 km (44 mi) within the existing UPRR corridor in Salt Lake, Davis, and Weber Counties, and will include nine commuter rail stations (Federal Transit Administration and Utah Transit Authority 2005). As disclosed in the final EIS for the commuter rail project, the construction of the rail segment between Salt Lake City and Weber County will be consistent with local plans and policies, support transit-supportive land use development policies, and result in higher development densities and direct pedestrian access around the commuter rail line. The proposed commuter rail line will also result in the conversion of current land uses to transportation use in and around proposed stations (Federal Transit Administration and Utah Transit Authority 2005).

4.1.3 Environmental Consequences and Mitigation Measures

4.1.3.1 Impacts on Cities and Counties

No-Build Alternative

Following is a discussion of the No-Build Alternative, both under existing conditions (2004) and future conditions (2020). Under both of these scenarios, land use development in the study area would continue as described in Section 4.1.2.2, *Local Land Use Plans*. However, several of the local land use plans that incorporate the Alternative E alignment would have to be changed if one of the build alternatives is not selected, as described in Section 4.1.3.2, *Consistency with Plans and Policies.*

Existing Conditions and Future Conditions (2020)

As described in the Final EIS and verified by local planners during preparation of the Draft Supplemental EIS, land uses would continue to change from a rural character (a combination of farmland, open space, industrial, commercial, low-density residential, and wetlands) to more of an urbanized, developed land use under the No-Build Alternative. Since neither the proposed Legacy Parkway nor the I-15 improvements would be constructed, local jurisdictions would be required to resolve growth and traffic problems, through individual or collective actions, over the course of the next 15 years.

Based on the number of Davis County building permits issued since 1999, approximately 280 ha (700 ac) of undeveloped land, much of which is farmland, are being developed per year in Davis County (Sommerkorn pers. comm.[b]) (see Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, and Table 4.1-2). This planned development will likely continue. In addition, wetlands that

would otherwise be preserved in the Legacy Nature Preserve would be available for permitted development.

For the City of North Salt Lake, current land use and zoning will continue in the study area under the No-Build Alternative. Community planners believe that, without Legacy Parkway, it would take longer for two undeveloped parcels of land in North Salt Lake to develop, although both would likely be developed by 2020 (Wood pers. comm.[a]). The first parcel of land (18 ha [45 ac]) is located northwest of I-215 and Redwood Road and south of Center Street. The second parcel of land (about 8 ha [20 ac]) is located directly south of I-215 and west of Redwood Road. Both of these properties are currently zoned as commercial land use and would remain as such under the No-Build Alternative.

Growth in Woods Cross under the No-Build Alternative would continue according to current trends. According to community planners, Legacy Parkway would provide a boundary for the city's westward development (HDR Engineering 2003). If Legacy Parkway is not built, the city will need to reexamine the western edge of the city and determine where the western city boundary should be located (Woods Cross City 2003). The city planners believe that without the proposed highway, development will continue to the west, and that if Legacy Parkway is not built, the *Woods Cross City General Plan* will need to be updated to address this growth issue.

Based on meetings with City of West Bountiful land use planners, under the No-Build Alternative, development of residential lots of between 0.4 ha (1 ac) and 2 ha (5 ac) would continue as planned north of 500 South (HDR Engineering 2003).

In Centerville, the current land use in the study area is zoned as business park. If Legacy Parkway is not built, the land will remain under the same zoning designation. Similarly for Farmington, land uses will be the same with or without Legacy Parkway. However, improvements to Park (formerly Burke) Lane to provide access to western portions of the city would have occurred, even if plans for the proposed highway had not been put forward.

Build Alternatives

As describe above, local community planners and city administrators in Davis County continue to state that, in general, current development patterns would not substantially change if Legacy Parkway is built, but several local changes could occur. Types of land use near the two interchanges may change from residential to commercial, and the overall pace of development in the corridor might slightly accelerate as a result of constructing any proposed Legacy Parkway build alternative (HDR Engineering 2003). However, the rate of growth to the west, as indicated in several of the revised land use plans of these communities, and the types of development that would occur around the Legacy Parkway interchanges, would not likely be different from what would occur without the proposed highway. Since publication of the Final EIS, several of the cities in the study area have made changes to land use zoning and plans in anticipation of the eventual construction of Legacy Parkway and the Legacy Nature Preserve. Specific changes made by each city are discussed in the following paragraphs.

Overall, the right-of-way width of Legacy Parkway identified in the Final EIS has changed from 100 m (328 ft) to 95 m (312 ft) due to design changes that decreased the width of the center median of the roadway (see Chapter 3, *Alternatives*). As a result, 2.4 m (8 ft) on either side of the roadway may become available for other uses, depending on specific circumstances. It is doubtful, however, that the addition of a 2.4-m (8-ft) parcel of land would result in significant changes to the possible land uses of property adjoining Legacy Parkway.

North Salt Lake

Since publication of the Final EIS, the City of North Salt Lake has made several changes in its land use designations west of Redwood Road between Center Street and 2600 South. Previously, the city's general land use plan identified land use west of Redwood Road as manufacturing-distribution. Since then, the city has stated that it will revise its general plan to rezone approximately 312 ha (772 ac)[5] west of the Alternative E alignment as natural open space, if the proposed action is implemented (Wood pers. comm.[b]). This area has already been purchased by UDOT as part of the proposed Legacy Nature Preserve, and would be rezoned to be consistent with the purpose of the preserve.

In the area east of the Alternative E alignment and west of Redwood Road, between Center Street and 2600 South, the City of North Salt Lake rezoned 231 ha (570 ac) of manufacturing-distribution to commercial/general (Wood pers. comm.[b]). Private developers approached the city in late 2001 to rezone 110 ha (272 ac) of the 231 ha (570 ac)[6] to residential and commercial, 97 ha (240 ac) to residential, and 12.9 ha (32 ac) to commercial (Wood pers. comm.[b]). This land is being used to construct the Foxboro residential development, which is described above in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*. The Foxboro development includes provisions for connecting recreational facilities in the development to the Legacy Parkway Trail associated with the build alternatives (see Section 4.7, *Pedestrian and Bicyclist Considerations*). Of note, under Alternative A, 53 of the platted lots[7] associated with the Foxboro Development would be displaced, and 36 of the platted lots in the Foxboro Development would be displaced under Alternative B. The Foxboro Development would not be affected by Alternative C or E.

In addition to the above land use changes, two existing undeveloped parcels of land in North Salt Lake, an 18.2-ha [45-ac] parcel located northwest of I-215 and Redwood Road, south of Center Street, and an 8.1-ha (20-ac) parcel located directly south of I-215, west of Redwood Road, would likely develop more rapidly with exposure and visibility from the proposed Legacy Parkway build alternatives (Wood pers. comm.[b]). North Salt Lake has refocused its land use management within this area of the community because of the proposed Legacy Parkway (Wood pers. comm.[b]).

The City of North Salt Lake reiterated that Legacy Parkway would act as a natural barrier, preventing development west and protecting the city from urban growth (Wood pers. comm.[b]). The city prefers that areas west of the proposed Legacy Parkway, which have flat terrain subject to drainage concerns, a lack of infrastructure, and sensitive environmental conditions, continue to be a part of the Legacy Nature Preserve (Wood pers. comm.[b]).

Woods Cross

The 1990 version of the *Woods Cross City General Plan*, which was completed before Legacy Parkway was proposed, designated approximately 752.7 ha (1,860 ac) of land west of Redwood Road (1800 West) as high-density industrial and commercial use (Stephens pers. comm.). In 2003, the *Woods Cross City General Plan* was updated to reflect changes in land use designations that would result from implementation of the proposed Legacy Parkway. The city, planning that Legacy Parkway—specifically the Alternative E alignment—would be built, rezoned the undeveloped land west of Redwood Road for a combination of commercial, residential, and open-space uses (Stephens pers. comm.). The following represent some of the notable land use designation changes:

[5] HDR Engineering, Inc. used GIS and 2003 aerial photography to determine approximate acres in area described by Rod Wood, North Salt Lake.
[6] Acres provided by Rod Wood, North Salt Lake.
[7] A *platted lot* is an individual lot within a subdivided parcel legally dedicated for development.

- 52.6 ha (130 ac) of land on the eastern edge of the Alternative E alignment adjacent to 500 South are planned for high-density urban commercial use.

- 62.7 ha (155 ac) of land on the west side of the Alternative E alignment, near 500 South, are now zoned for commercial and office use. This area is referred to as the Land's End Neighborhood.

- 77.3 ha (191 ac) of land are planned for parks and recreation, including a 9.44-m (300-ft) open-space buffer zone on the east side of the Alternative E alignment (Woods Cross City 2003). As described above, the buffer zone was planned by the city to moderate the direct impact of the proposed highway on the natural surroundings to the west and on the residential and commercial development between the proposed highway and Redwood Road. This buffer is in addition to the buffer proposed as a component of the build alternatives.

- 60.7 ha (150 ac) of land are designated for construction of Mountain View Estates and Valentine Estates, which are envisioned as planned-unit developments. Both developments are located between 500 South and 2600 South and would abut the Alternative E alignment. None of the build alternatives would affect any of the platted lots associated with these developments.

- 43.3 ha (107 ac) of land located east of the Alternative E alignment, along 2600 South, are zoned for future business park development.

Woods Cross City will continue to restrict development in the areas west of the proposed highway because of sensitive environmental conditions. The updated *Woods Cross City General Plan* also reflects connections between the proposed Legacy Parkway Trail and the trail system in the city (see Section 4.9, *Pedestrian and Bicyclist Considerations*) (Woods Cross City 2003).

West Bountiful

Before Legacy Parkway was proposed, the *West Bountiful General Plan* included residential lots of between 0.4 ha (1 ac) and 2 ha (5 ac) north of 500 South. After Legacy Parkway was proposed, the city reduced the size of the planned lots to between 0.2 ha (0.5 ac) and 0.4 ha (1 ac), and the city has subsequently indicated that the reduced residential lot size would be maintained even if Legacy Parkway is not constructed (Scarborough pers. comm.). This land use change is in response to the potential for transit-oriented development afforded by the North Corridor roadway projects, including the proposed Legacy Parkway, and the mixture of proposed future commercial and residential land uses. The City of West Bountiful supports limiting development near the shoreline of Great Salt Lake to protect sensitive environmental conditions (HDR Engineering 2003). Community planners have stated that the proposed Legacy Parkway build alternatives would act as a barrier to this development. In addition, with West Bountiful's future bicycle and pedestrian trail system, the city proposes to purchase surplus properties east of the Alternative E alignment, develop them as small neighborhood parks, and tie them into the Legacy Parkway Trail system. Specifically, the *West Bountiful General Plan* includes connections between the proposed Legacy Parkway Trail and existing equestrian centers and the city's planned trail system (see Section 4.7, *Pedestrian and Bicyclist Considerations*) (City of West Bountiful 1997a).

As described above in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, construction has begun on two new residential subdivisions in West Bountiful—Birnam Woods and Olsen Farms—since publication of the draft Supplemental EIS. Under Alternative A, one platted lot in Olsen Farms and 13 platted lots in Birnam Woods would be displaced. None of the other build alternatives would affect any of the platted lots associated with these developments.

Centerville

Centerville City's master plan continues to project the development of all land north of the current Centerville Business Park to Lund Lane; this area encompasses about 125.4 ha (310 ac)[8] of land zoned as high-density industrial (Jensen pers. comm.). Under Alternatives A and E, all of this undeveloped land would be directly affected; 26.3 ha (65 ac) of the 125.4 ha (310 ac) would be used for right-of-way and the remaining 99.1 ha (245 ac) would be isolated from the rest of the city (Jensen pers. comm.).

According to community planners, the city anticipates continuing its business park development northwest to the old D&RG railroad alignment (Jensen pers. comm.). However, in December 2003, because of the proposed Legacy Parkway, the city rezoned this area from high-density industrial to medium-density industrial (Jensen pers. comm.). This rezoning affects the types of development that would occur in this area if Legacy Parkway were built.

Alternatives B and C would be located farther west. This eventuality would provide more land for the city to pursue future industrial development and continue current business park development (Jensen pers. comm.).

Centerville City's *Trail Master Plan*, which is part of the city's general plan (Centerville City 1996), reflects the proposed Legacy Parkway Trail as part of the city's trail system (see Section 4.7, *Pedestrian and Bicyclist Considerations*).

Farmington

In Farmington, Alternatives A, C, and E parallel the I-15 alignment and terminate at the I-15/US-89 interchange. The area surrounding Park (formerly Burke) Lane is zoned for mixed-use development. The city believes that the proposed Legacy Parkway build alternatives would cause this area to develop more quickly than it would without the proposed highway (HDR Engineering 2003).

Because the amount of right-of-way needed for Alternative B is greater than that needed for the other build alternatives, Alternative B would have a greater impact on existing land uses in Farmington. Currently, Alternative B would affect the newly opened Farmington Eagle Bay Elementary School in Farmington Ranches, described in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, above.

The *Farmington Master Trails Map* (Farmington City 2003) reflects the proposed location of the Legacy Parkway Trail (see Section 4.7, *Pedestrian and Bicyclist Considerations*).

Platted lots associated with Farmington Ranches and Miller Meadows (see Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*) would not be affected under any of the build alternatives.

4.1.3.2 Consistency with Plans and Policies

No-Build Alternatives

Existing Conditions (2004) and Future Conditions (2020)

Since publication of the 2000 Final EIS, there has been no change to this section.

[8] HDR Engineering, Inc. used GIS and 2003 aerial photography to determine approximate acres in area described by Aric Jensen, City of Centerville.

Build Alternatives

Construction of any proposed build alternative would include an interchange at 500 South. The *Woods Cross City General Plan* proposes to create a mixed-use development zone adjacent to the Legacy Parkway/500 South interchange in which residential, commercial, recreational, entertainment, office, and other transit-oriented development uses will be supported. Therefore, Legacy Parkway and the other components of the North Corridor Shared Solution (I-15 improvements and commuter rail) are consistent with the city's updated general plan.

All proposed build alternatives would be consistent with *Davis County Shorelands Comprehensive Land Use Master Plan* because the Legacy Nature Preserve associated with each alternative would ensure that a large part of the area designated by the county for protection would be acquired as a preserve, thus removing the threat of future development in those sensitive habitat areas.

Development that occurs in the study area under the proposed build alternatives would be consistent with local land use plans governing future growth, including the following plans.

- *General Plan, City of North Salt Lake.*
- *Woods Cross City General Plan*.
- *West Bountiful City Master Plan.*
- *General Plan for Centerville City*.
- *Comprehensive General Plan, Farmington, Utah.*

4.1.3.3 Indirect Growth Impacts within and beyond the North Corridor

The following potential indirect effects of the proposed Legacy Parkway related to population growth and land development were disclosed in the Final EIS.

- Changes in land use around the proposed interchanges.
- Acceleration of planned residential development in the corridor.
- Shifts in the location of development from west of the proposed Legacy Parkway alignment to other portions of the region, most of it likely occurring in the study area, and with more lands designated for open space and habitat preservation on the west side of the highway.

The issue of induced growth resulting from the proposed action in the south Weber County/Ogden area is of interest as both a regional land use and a regional economic issue.[9] Planning officials in the study area interviewed after publication of the Final EIS stated that the proposed action, when combined with other North Corridor improvements (i.e., other components of the Shared Solution), could *accelerate* the pace

[9] As stated in Footnote 1, under Section 4.1.1, *Approach and Methodology*, growth impacts south of the study area (e.g., in Salt Lake County) were not evaluated because much of the land use south of the study area is currently developed, or planned for development. As a result, it was concluded that areas south of the study area would experience full build-out, with or without construction of the proposed action.

of planned growth in the study area (HDR Engineering 2003). Although it appears that the proposed action would not substantially affect the land use plans of the Davis County jurisdictions (see Section 4.1.3.1 above), the impacts on unincorporated Weber County and the City of Ogden are more difficult to quantify. To evaluate these potential impacts, the project team examined whether the Legacy Parkway build alternatives and the cumulative impacts of the North Corridor transportation improvements would accelerate growth to a northern boundary that included southern Weber County, up to and including Ogden. The WFRC travel demand model, (version 3.2), which was used to project operating conditions in 2020 under the No-Build Alternative (see Chapter 3, *Alternatives*), indicates that these improvements would increase traffic on I-15 in southern Weber County, near Ogden. However, travel demand models provide little insight regarding induced growth in land use, specifically residential land use in the areas between Salt Lake City and Ogden, making it difficult to determine if these increased volumes would be attributable to induced growth in the corridor, or would simply reflect the different transportation choices available to motorists. Modeling for land use (e.g., using the UrbanSim model) is still under consideration and evaluation by WFRC, and was consequently not available for use for this Supplemental EIS.

A recent study entitled *Highways and Sprawl in North Carolina* (Hartgen 2003) concluded that although development often follows major road investment, major road investment follows growth with equal frequency. The study concluded that many factors outside of highways and roads can affect growth, including the region's economic health, prior growth and available land, site suitability, zoning, sewer and water provisions, other utilities, income, tax rates, crime, schools, housing policies, and race and other demographics.

Although it is possible that increases in highway capacity (and corresponding reductions in travel time) between Salt Lake City and the Farmington area could spur additional residential development in Ogden or other parts of Weber County beyond what will occur without the project, it is unlikely. There is still a significant distance to travel between Farmington and south Weber County or Ogden. As discussed in Section 4.1.4 of the Final EIS, families choose where to live based on a range of economic, demographic, and aesthetic factors. The proposed Legacy Parkway would not likely change any of these factors families use to choose where to live. Discussions with planners from Weber County (Gentry pers. comm.) and Ogden (Montgomery pers. comm.) confirm this fact. The addition of commuter rail to the area, however, could result in higher development densities and direct pedestrian access in and around the commuter rail line and associated stations (Federal Transit Administration and Utah Transit Authority 2005).

Under the proposed build alternatives, approximately 324 ha (800 ac) of developable land in North Salt Lake, Centerville, Farmington, Woods Cross, Bountiful, and West Bountiful would be set aside within the Legacy Parkway right-of-way and the proposed Legacy Nature Preserve. Planners from the cities with jurisdiction over this land have stated that, under the No-Build Alternative, this land would be available for development and would be developed in a manner similar to adjacent areas and/or consistent with current zoning designations (HDR Engineering 2004a, 2004b, 2005a).

These planners also stated that if none of the proposed build alternatives is implemented, development of those 324 ha (800 ac) will increase rather than dilute the total development levels in their communities. Because the official 2020 regional economic projections do not include the additional 324 ha (800 ac) of development, developing an additional 324 ha (800 ac) in the North Corridor would likely displace development that would otherwise occur elsewhere in the region. The following sections discuss the transportation impacts of relocating up to 324 ha (800 ac) of 2020 growth from the Legacy Parkway right-of-way and preserve to north Davis and Weber Counties, Ogden, and other parts of the region. See Appendix B (Section B5.1) for further discussion of possible land use shifts under the No-Build Alternative.

Weber County

According to conversations with Weber County community planners (Gentry pers. comm.), growth and land use patterns in the unincorporated areas of Weber County would not change substantially with the proposed Legacy Parkway build alternatives. As indicated by Jim Gentry of the Weber County Planning Commission (Gentry pers. comm.):

> There seems to be very little area that has not been filled in between Salt Lake and Weber Counties. Over the last several years, the development of housing north of Salt Lake City has not been because of urban growth; instead the growth appears to be more a result of expansion of communities and jobs in the Weber County area. With Great Salt Lake on the west and the Wasatch Range on the east, urban growth in Ogden will continue to expand northward as the population grows, regardless of whether or not any of the North Corridor projects are completed.

Weber County planners believe that the population along the Wasatch Front will migrate towards Weber County as building sites to the east and south become scarcer and as housing costs in Salt Lake City rise, regardless of whether the proposed action is built. As noted by Jim Gentry, development in the county will be somewhat limited until wastewater and other infrastructure improvements in unincorporated Weber County are further developed (Gentry pers. comm.). As described above, addition of commuter rail could result in shifts in development densities around the commuter rail line and associated stations (Federal Transit Administration and Utah Transit Authority 2005).

Table 4.1-3 below, which updates, in part, Table 3-3 in the Final EIS, illustrates that the population, number of households, and employment in Weber County are projected to increase at an annual rate of 2.0 percent, 2.2 percent, and 2.4 percent, respectively, through 2020. This outcome represents an increase over similar projections in the Final EIS, which projected an annual growth rate of 2.0 percent for all of these measurements (Wasatch Front Regional Council 1997). It should be noted that these projections do not necessarily take into consideration transportation improvements in the north corridor (e.g., Legacy Parkway) but are, instead, based on current growth trends.

Table 4.1-3 Projected Annual Increases in Population, Households, and Employment in Salt Lake, Davis, and Weber Counties, 2002 to 2020

	Population			Households			Employment		
	2002	2020	% Annual Increase	2002	2020	% Annual Increase	2002	2020	% Annual Increase
Salt Lake County	923,900	1,283,784	1.84	306,767	458,900	2.26	521,930	733,665	1.91
Davis County	250,000	347,412	1.84	75,923	119,094	2.53	89,427	124,346	1.85
Weber County	199,825	286,919	2.03	67,032	99,700	2.23	84,100	128,904	2.40
Total	1,373,725	1,918,115	1.87	449,722	677,694	2.30	695,457	986,915	1.96

Source: Wasatch Front Regional Council 2003b.

Ogden

Between 1990 and 2000, Weber County's population grew at a rate of nearly 2.2 percent per year, with Ogden comprising the majority of this growth (U.S. Census Bureau 1990, 2000). The city is currently dealing with a variety of growth concerns, including the possibility that "big box" retailers will establish outlets outside its boundaries and pull businesses away from downtown Ogden. Ogden is considered a regional commerce center with little room left for in-fill. WFRC population estimates project Ogden to grow at a rate of 1.1 percent per year between 2003 and 2020, a decrease over historical growth caused by the lack of area available for expansion within the city limits (Wasatch Front Regional Council 2003b).

Residential growth is already occurring in the western parts of Weber County due to local social and economic factors, irrespective of growth pressures from Davis and Salt Lake Counties. The proposed Legacy Parkway (and its contribution to the Shared Solution) could increase the desirability of the Ogden area and southern Weber County to families or individuals working in Davis County and Salt Lake City, although this is unlikely (Gentry pers. comm.; Montgomery pers. comm.). In fact, Ogden is expected to grow to full build-out, with or without implementation of the proposed Legacy Parkway.

Section 4.2
Farmland

This section discusses farmland in the study area. It provides an update on prime, unique, state-important, and locally important farmland, and discusses newly designated Agricultural Protection Areas. This section also updates the environmental consequences of the proposed build alternatives on farmland. The discussion of environmental consequences takes into consideration development since publication of the June 2000 Final EIS, unrelated development in the study area, revisions in the policy on designating special farmland within municipal boundaries, and the reduction in the right-of-way width associated with all proposed build alternatives.[1]

4.2.1 Approach and Methodology

4.2.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with farmland in the study area, Sections 3.2 and 4.2 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for farmland is described in Section 4.0.1, *Study Area*, of this document.

Updated information on the types of crops and irrigation systems associated with all farmland in the study area was obtained from a map titled *Water-Related Land Use Data Inventory*, from the Utah Department of Natural Resources (UDNR), Division of Water Resources (UDNR) (Utah Department of Natural Resources, Division of Water Resources 2003). Erin Bell of the Natural Resources Conservation Service (NRCS) was contacted in October 2003 for updated information on prime and unique farmland and farmland of state and local importance in the study area. Susan Yoshinaga of the Salt Lake County Assessor's Office and Barry Burton of Davis County were also contacted regarding potential Agricultural Protection Areas in the study area. The data provided by these sources were also verified during review of recent (2003) orthophotographs and limited field surveys.

Farmland impacts were reassessed based on the updated data to determine whether the narrower right-of-way (i.e., 95 m [312 ft] versus 100 m [328 ft]) proposed for all build alternatives (see Chapter 3, *Alternatives*, of this document) would change the acreage or type of farmland impacts disclosed in the Final EIS.

[1] Section 4.13, *Wildlife*, describes impacts on several different wildlife habitat types, including pasture habitat and cropland habitat. Those wildlife habitat types are different from the farmland described in this section in that they are defined differently and described according to a larger wildlife study area. As a result, impacts on pasture and cropland identified in Section 4.13 are different from the farmland impacts disclosed in this section.

4.2.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of impacts on farmlands since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. Where applicable, impact information presented in this section has been updated to reflect those modifications. See Sections 4.2.3.1, *All Farmland (Cropland)*, and 4.2.3.2, *Prime Farmland.*

- Some of the impact assessments were found to be incorrect. These incorrect calculations have been revised. Section 4.2.3.1, *All Farmland (Cropland)*, and Table 4.2-3 include revised calculations for Alternatives B, C, and D.

4.2.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to farmland. The Final EIS described production of irrigated crops in the study area, including alfalfa, corn, and pasture, as well as prime, unique, state-important, and locally important (i.e., farms under the "Century Farm and Ranch" program) farmland. This section provides an update on the area of land currently associated with these farmland categories in the study area, as well as information on Agricultural Protection Areas.

4.2.2.1 Current Agricultural Production

Information on farmland in the Final EIS was obtained from the 1988 version of the UDNR Division of Water Resources map titled *Water-Related Land Use Data Inventory*. Because this version of the map was over 10 years old when the Final EIS was published, other sources were also used in the Final EIS for information on farmland in the study area, including data from field reconnaissance, tax assessor parcel information, and project orthophotographs. Based on these sources, crops in the Final EIS were divided into three categories of irrigated crops: alfalfa, corn, and pasture. The Final EIS did not provide information on non-irrigated croplands.

The 2003 UDNR Division of Water Resources map, which was used to assess agricultural production in the study area for the Supplemental EIS, includes six categories of irrigated crop types—alfalfa, grain, corn, vegetables, grass hay, and pasture-irrigated—and three categories of non-irrigated crop types—pasture-non-irrigated, pasture-sub-irrigated, and farmsteads.

Table 4.2-1 and Figure 4.2-1 present updated information on both irrigated and non-irrigated cropland in the study area.

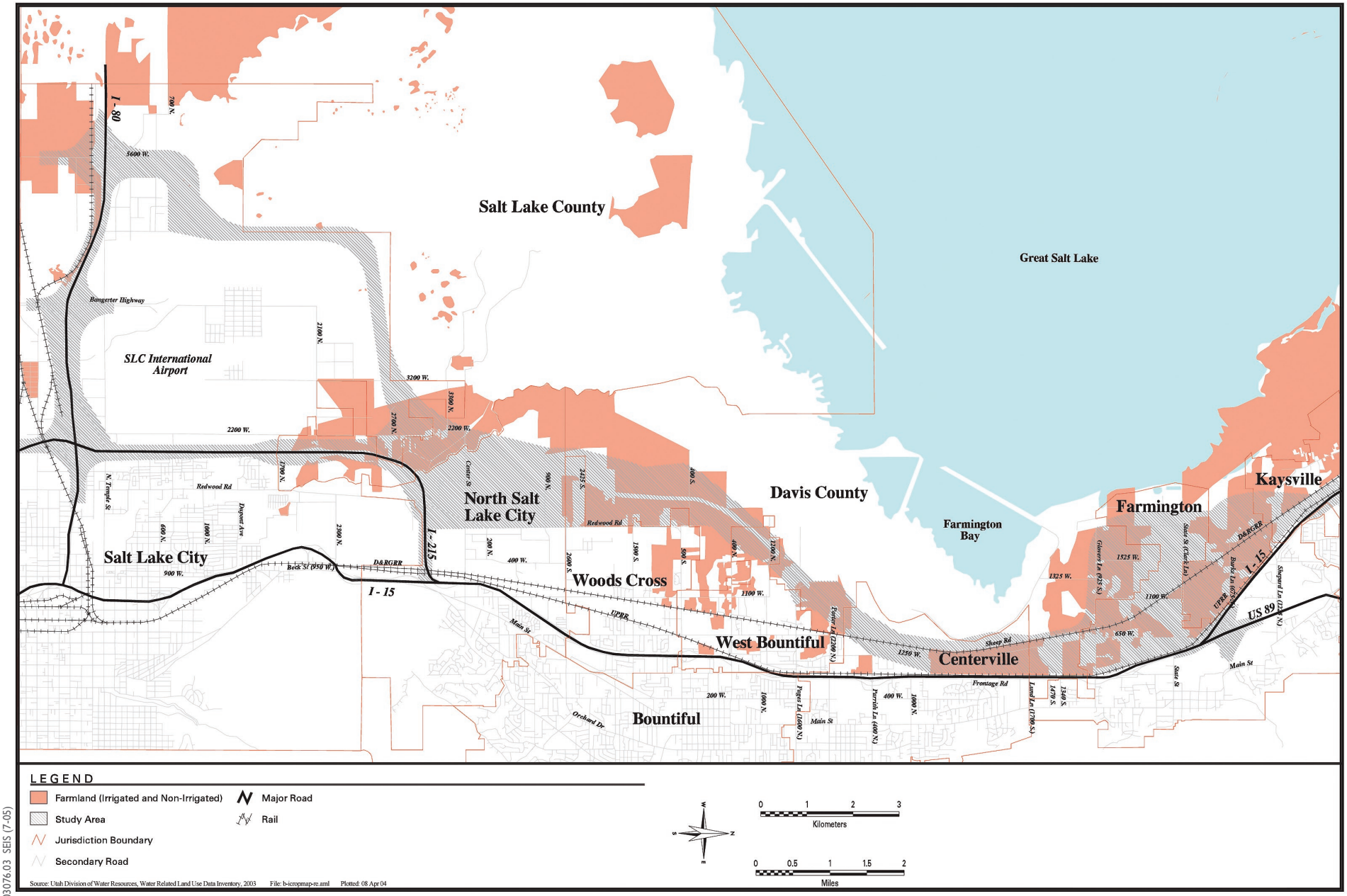

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Figure 4.2-1
Farmland in the Study Area

Table 4.2-1 Area of Irrigated and Non-irrigated Cropland in Study Area

	Hectares (Acres)[1]	
Crop Type	Final EIS	Supplemental EIS
Irrigated Crops[2]		
Alfalfa	301 (743)	204 (504)
Grain	NA	71 (175)
Corn	194 (479)	32 (78)
Vegetables	NA	1 (2)
Grass hay	NA	92 (228)
Pasture, irrigated	1,091 (2,695)	673 (1,665)
Total	1,586 (3,917)	1,073 (2,652)
Non-Irrigated Crops[3]		
Pasture, non-irrigated	NA	296 (733)
Pasture, sub-irrigated	NA	224 (554)
Farmsteads	NA	21 (51)
Total	NA	541 (1,338)

Notes:

[1] Conversions are from acres to hectares. Conversions have been rounded.

[2] Cropland in the Final EIS was divided into three crop types (alfalfa, grain, and corn). The additional crop types presented in this table are based on UDNR's Division of Water Resources 2003 map, *Water-Related Land Use Data Inventory*, which further subdivides croplands in the study area.

[3] The total area of non-irrigated cropland was not disclosed in the Final EIS.

Source: UDNR Division of Water Resources 2003.

4.2.2.2 Prime Farmland

As described in the Final EIS, NRCS classifies certain farmland as prime farmland based on specific physical criteria (e.g., water availability, soil temperature, pH); however, since publication of the Final EIS, NRCS has adopted a new policy that does not allow for designation of prime, unique, or state-important farmland within the boundaries of a municipality (Bell pers. comm., Weber pers. comm.). An updated NRCS CPA 106 form, Farmland Conversion Impact Rating for Corridor Type Projects, is included in Appendix A. As a result of this policy change, some of the farmland identified in the Final EIS as prime and state-important farmland is not included as prime and state-important farmland in this section of the Supplemental EIS.

The acreage of prime farmland outside municipal boundaries was updated through field reconnaissance and consultation with NRCS.

No additional farmland has been designated as prime farmland since publication of the Final EIS. Table 4.2-2 presents updated information on prime farmland in the study area, and Figure 4.2-2 provides location information.

Table 4.2-2 Area of Prime and State-Important Farmland

Farmland Designation	Hectares (Acres)*	
	Final EIS	Supplemental EIS
Prime	359 (888)	166 (409)
State-Important	25 (62)	7 (17)

Note:
* Conversions are from acres to hectares. Conversions have been rounded.
Sources: Bell pers. comm., Federal Highway Administration et al. 2000.

4.2.2.3 Unique Farmland

As described in the Final EIS, no unique farmland is located in the study area (Bell pers. comm.).

4.2.2.4 Farmland of State Importance

As stated in the Final EIS, farmland of state importance is classified by NRCS based on certain physical criteria similar to those required for designating prime farmland. The acreage of farmland of state importance in the study area has decreased since publication of the Final EIS because of development and the new NRCS policy described above. Table 4.2-2 above presents updated information on farmland of state importance in the study area, and Figure 4.2-2 provides location information.

4.2.2.5 Farmland of Local Importance

As described in the Final EIS, Utah initiated a “Century Farm and Ranch” program in 1996 that allowed for recognition of farms that have been operated continuously by the same family for at least 100 years. One farm in the study area has Century Farm status, and several other farms represent multigenerational farming operations (see Section 3.2.5 of the Final EIS). The status of these properties has not changed since publication of the Final EIS. Figure 4.2-2 illustrates the location of these properties in the study area.

4.2.2.6 Agricultural Protection Areas

Since publication of the Final EIS, the Utah Legislature has enacted a new law—Utah Code Title 17 (Counties), Chapter 41 (Agricultural Protection Area)—to better protect certain agricultural areas. The law requires each county in Utah to create an Agriculture Protection Area Advisory Board to evaluate proposals for Agriculture Protection Areas. Owners of land in agricultural production (crops or livestock) can petition their local municipality for an Agriculture Protection Area designation. Agriculture Protection Areas are protected from state and local laws that restrict farm practices unless the regulations are required for public safety or are required by federal law. Agriculture Protection Areas also cannot be condemned for highway purposes unless there is no reasonable and prudent alternative for the project.

Based on consultation with representatives from Davis and Salt Lake Counties, there are no designated Agricultural Protection Areas in the study area (Burton pers. comm. [a], Yoshinaga pers. comm.).

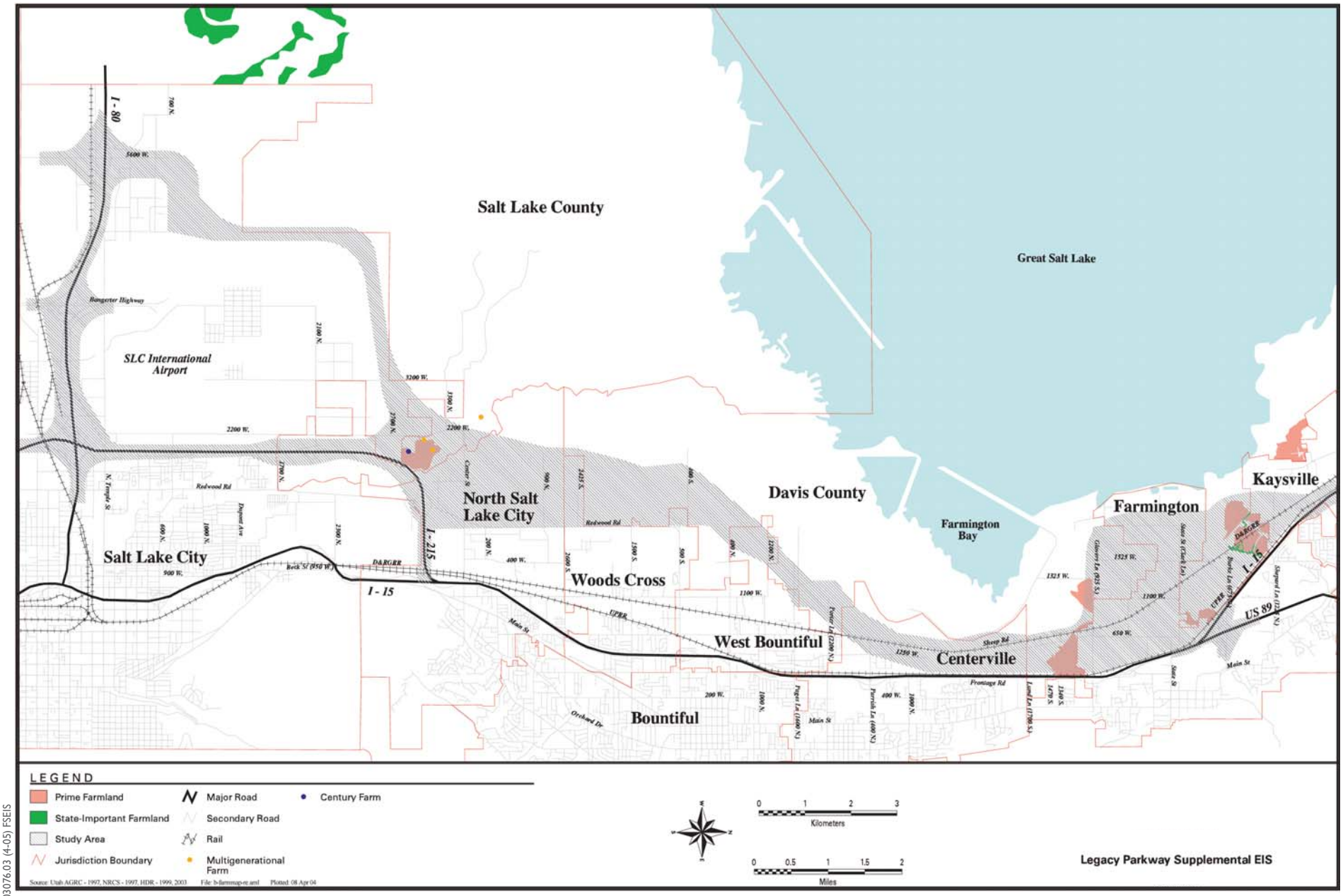

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Figure 4.2-2
Prime and State/Local-Important Farmland

4.2.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, all proposed build alternatives would have an impact on farmland in the study area. Since publication of the Final EIS, development unrelated to the proposed action has affected farmland in the study area. In addition, because of a new NRCS policy, farmland within municipal boundaries is no longer designated as prime, unique, or state-important farmland (see Section 4.2.2.2 above). As a result, the acreage of farmland in the study area has decreased.

The updated environmental consequences and mitigation measures associated with farmland are summarized below.

4.2.3.1 All Farmland (Cropland)

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions (2004) No-Build Alternative, no farmland would be affected by the proposed action.

Future Conditions (2020)

If none of the build alternatives is implemented, development in the study area will likely continue at its current rate. Based on the number of building permits issued in Davis County since 1999, between approximately 240 ha (600 ac) and 320 ha (800 ac) of land are being developed per year in Davis County (Sommerkorn pers. comm.[a]). Because a large portion of the undeveloped land in the study area is farmland, it is likely that farmland will be converted at a similar rate in the future. The exact nature and timing of the future conversion of farmland are not known at this time.

Build Alternatives

As described in the Final EIS, all the proposed build alternatives would directly and indirectly affect farmland in the study area. Direct impacts would occur on farmland in the right-of-way of a build alternative; indirect impacts would occur if the right-of-way created farmland parcels smaller than 2 ha (5 ac) and not contiguous with other farmland, or if the right-of-way resulted in farmland that is no longer accessible.

Table 4.2-3 and Figure 4.2-3 provide updated information relative to impacts of the proposed build alternatives on farmland. Farmland impacts associated with all the proposed build alternatives, except Alternative A, have decreased from those presented in the Final EIS because of unrelated development activities in the study area and the proposed narrower right-of-way associated with the build alternatives. The increase in farmland impacts under Alternative A relative to the Final EIS is attributable to the revised methodology used for the Supplemental EIS to determine the acreage of farmland in the study area (see Section 4.2.2.1, *Current Agricultural Production*). Specifically, the 2003 UDNR Division of Water Resources map, which was used to calculate the farmland in the study area for the Supplemental EIS, shows an area of farmland near 400 South west of Redwood Road that was not shown as farmland in the Final EIS. Alternative A would affect some of the farmland in that area.

Mitigation Measures

As described in the Final EIS, owners of farmland within the proposed right-of-way of a build alternative (i.e., farmland subject to direct impacts) would be compensated according to the requirements of Uniform Relocation Assistance and Real Property Acquisition Policies Act (URAA), as amended, and other state and federal guidelines. For indirect impacts, UDOT would determine, based on cost comparison, whether to restore access to the parcel or purchase the remainder of the farmland.

Table 4.2-3 Impacts on Farmland

	Hectares (Acres) Affected by Alternative[1]					
Crop	No-Build Alternative	Alternative A[2]	Alternative B	Alternative C	Alternative D	Alternative E
Direct Impacts						
Irrigated Crops						
Alfalfa	0 (0)	2 (4)	27 (66)	3 (7)	3 (7)	3 (7)
Grain	0 (0)	0 (0)	17 (43)	0 (0)	0 (0)	0 (0)
Corn	0 (0)	0 (0)	5 (12)	0 (0)	0 (0)	0 (0)
Vegetables	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Grass Hay	0 (0)	4 (9)	6 (14)	3 (8)	3 (8)	4 (9)
Pasture, irrigated	0 (0)	80 (197)	81 (201)	58 (143)	57 (140)	57 (140)
Non-Irrigated Crops						
Pasture, non-irrigated	0 (0)	4 (10)	14 (34)	7 (18)	8 (21)	8 (20)
Pasture, sub-irrigated	0 (0)	36 (897)	51 (127)	24 (60)	43 (105)	44 109)
Farmsteads	0 (0)	1 (3)	4 (90)	2 (4)	3 (7)	3 (7)
Total Direct Impacts	0 (0)	127(312)	205(506)	97 (240)	117 (288)	119 (292)
Indirect Impacts[3]						
Total Indirect Impacts	0 (0)	17 (43)	3 (7)	4 (10)	7 (17)	6 (16)
TOTAL IMPACTS (Direct & Indirect)	0 (0)	144 (355)	208 (513)	101 (250)	124 (305)	125 (308)
TOTAL IMPACTS FROM FINAL EIS (Direct & Indirect)[4]	0 (0)	133 (328)	286 (706)	146 (362)	136 (337)	NA

Notes:

1 Conversions are from acres to hectares. Conversions may vary because of rounding.

2 The increase in farmland impacts under Alternative A, relative to the Final EIS, is attributable to the revised methodology used for the Supplemental EIS to determine the acreage of farmland in the study area.

3 Indirect impacts would occur if the right-of-way created farmland parcels smaller than 2 ha (5 ac) and not contiguous with other farmland, or if the right-of-way resulted in farmland that is no longer accessible.

4 Impact measurements taken from Table 4-2 in the Final EIS. Impacts representative of direct and indirect impacts within the 100-m (328-ft) right-of-way.

Source: UDNR Division of Water Resources 2003.

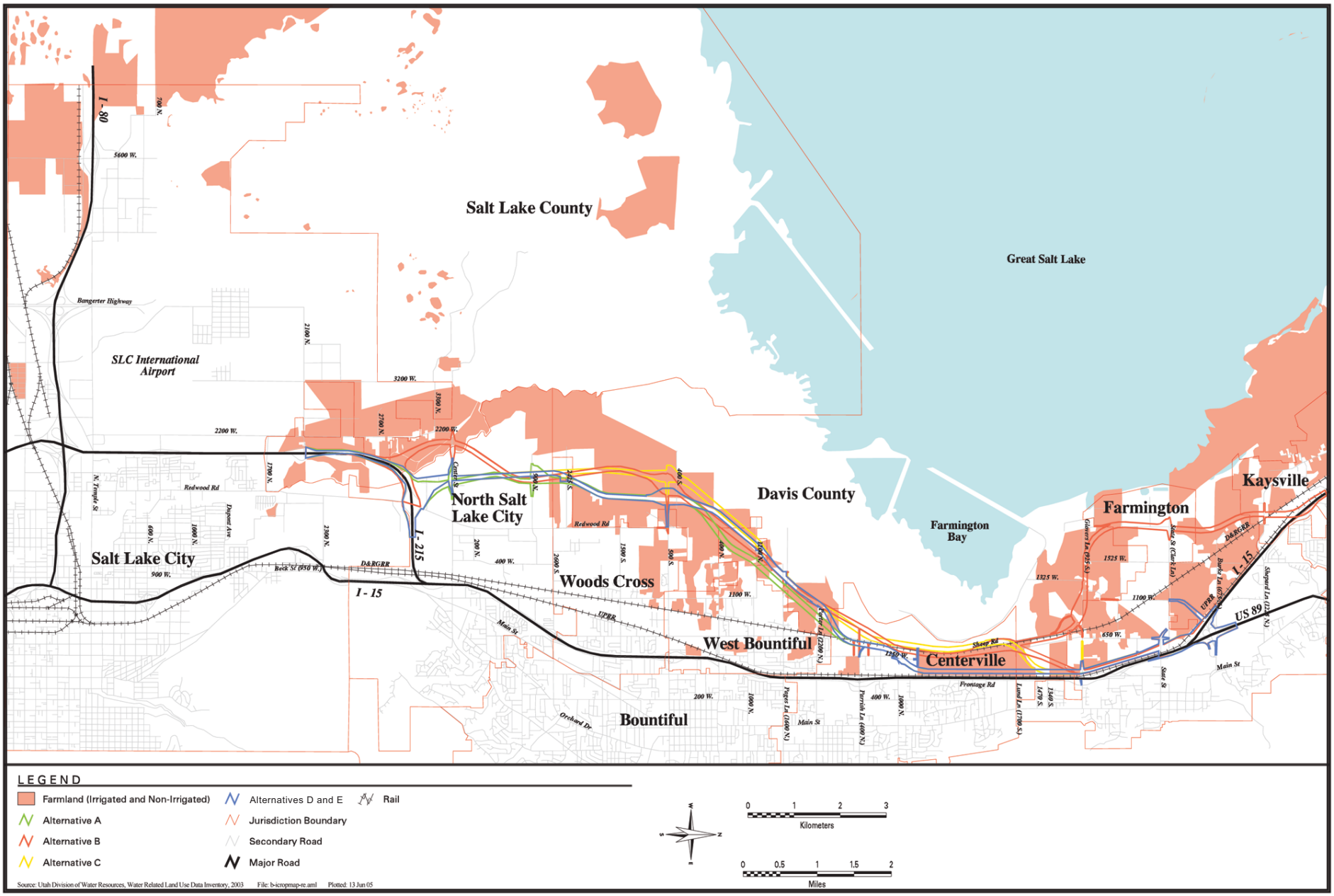

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Figure 4.2-3
Farmland Impacts

4.2.3.2 Prime Farmland

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related impacts on prime farmland.

Future Conditions (2020)

If none of the build alternatives is implemented, development in the study area will likely continue at its current rate. It is possible that these future projects would encroach on prime farmland in the study area, although the nature and timing of these projects are not known at this time.

Build Alternatives

As described in the Final EIS, all the proposed build alternatives would have direct impacts on prime farmland in the study area. Farmland impacts associated with all proposed build alternatives have decreased from those presented in the Final EIS as a result of unrelated development activities; the new NRCS policy of not designating prime, unique, and state-important farmland within municipal boundaries; and the proposed narrower right-of-way associated with the build alternatives. Table 4.2-4 and Figure 4.2-4 provide updated impact information relative to prime farmland in the study area.

Table 4.2-4 Impacts on Prime and State-Important Farmland

	Hectares (Acres) Affected by Alternative*					
Designation	No-Build Alternative	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Prime Farmland						
Final EIS	0 (0)	34 (84)	72 (178)	36 (90)	26 (64)	NA
Supplemental EIS	0 (0)	9 (23)	36 (88)	11 (28)	13 (31)	11 (27)
Farmland of State Importance						
Final EIS	0 (0)	3 (7)	2 (5)	3 (7)	0(0)	NA
Supplemental EIS	0 (0)	0 (0)	1 (2)	0 (0)	0(0)	0 (0)

Note:
* Conversions are from acres to hectares. Conversions have been rounded.
Source: Bell pers. comm.

Mitigation Measures

The mitigation measures for prime farmland are the same as those described above in Section 4.2.3.1 for all farmland.

4.2.3.3 Unique Farmland

There is no unique farmland located in the study area. Therefore, unique farmland would not be affected by the No-Build Alternative (existing or future conditions) or the proposed build alternatives.

4.2.3.4 Farmland of State Importance

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related impacts on farmland of state importance.

Future Conditions (2020)

If none of the build alternatives is implemented, development in the study area will likely continue at its current rate. It is possible that these future projects would encroach on farmland of state importance in the study area, although the nature and timing of these projects are not known at this time.

Build Alternatives

The Final EIS stated that all the proposed build alternatives would have direct impacts on farmland of state importance. However, impacts on farmland would decrease from those shown in the Final EIS such that only Alternative B would impact farmland of state importance. This decrease is due to unrelated development activities in the study area; the new NRCS policy of not designating prime, unique, and statewide important farmland within municipal boundaries; and the proposed narrower right-of-way associated with the build alternatives. Table 4.2-4 and Figure 4.2-4 above provide updated impact information relative to farmland of state importance in the study area.

Mitigation Measures

Only Alternative B would impact state-important farmland. If Alternative B were chosen as the proposed build alternative, the mitigation measures identified in Section 4.2.3.1 for all farmland would be adopted to mitigate adverse impacts on farmland of state importance.

4.2.3.5 Farmland of Local Importance

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related impacts on other farmland of local importance.

Future Conditions (2020)

If none of the build alternatives is implemented, development in the study area will likely continue at its current rate. It is possible that these future projects would encroach on designated Century Farm or multigenerational farms in the study area, although the nature and timing of these projects are not known at this time.

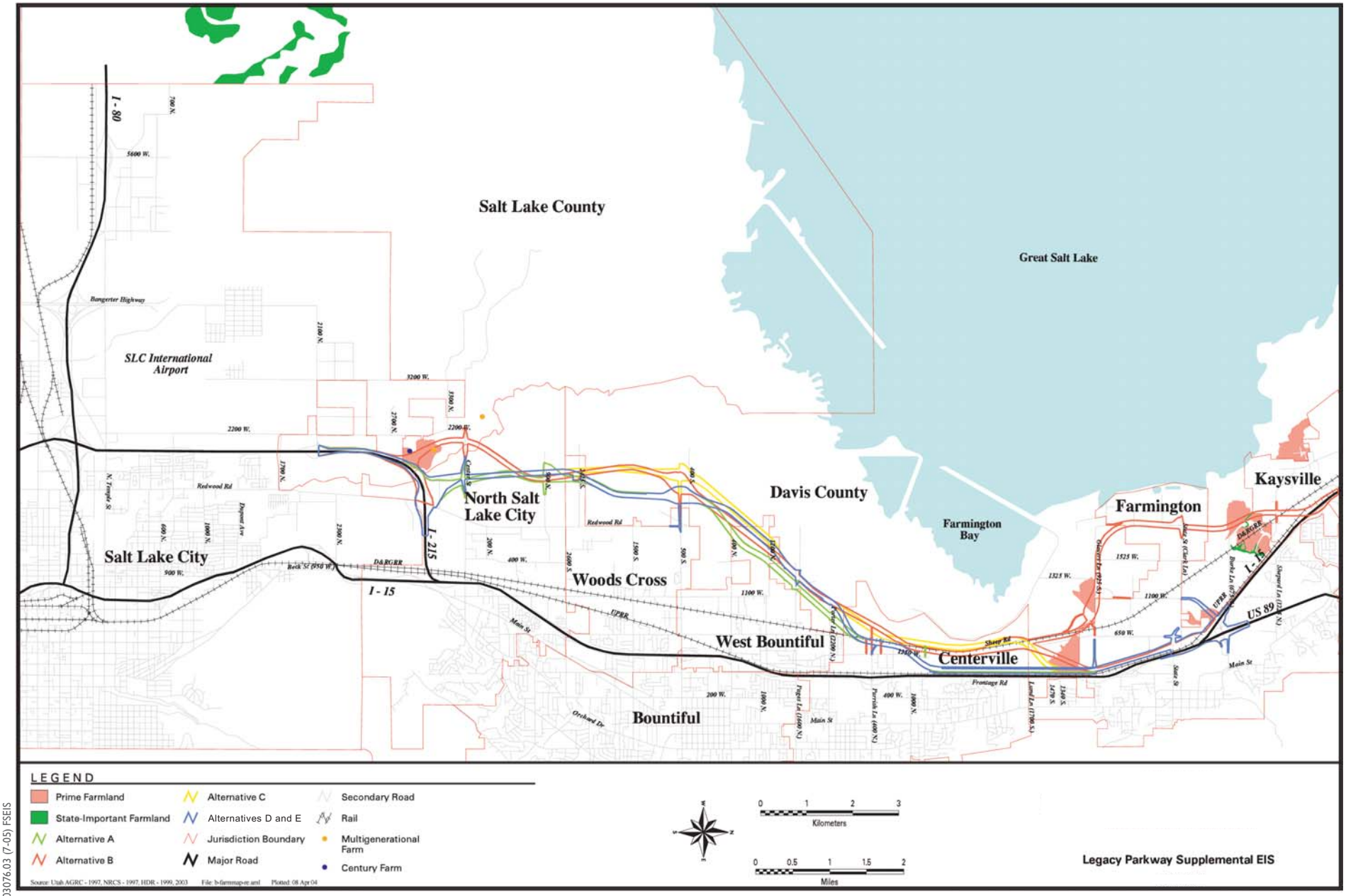

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Figure 4.2-4
Prime and State/Local-Important Farmland Impacts

Build Alternatives

As stated in the Final EIS, all the proposed alternatives would affect the designated Century Farm in the study area, although none would alter the farm's operation or its Century Farm designation. Alternative B would also affect the two multigenerational farms in the study area. These impacts have not changed since publication of the Final EIS (see Section 4.2.5 of the Final EIS). Impacts associated with Alternative E would be identical to those disclosed for Alternative D in the Final EIS.

Mitigation Measures

The mitigation measures for locally important farmland would be the same as those described above for all farmland.

4.2.3.6 Agricultural Protection Areas

There are no Agricultural Protection Areas in the study area. Therefore, none would be affected by the No-Build Alternative or the proposed build alternatives.

Section 4.3
Social

This section discusses the social environment in the study area. The section includes updated population information based on the 2000 Census. In addition, as described in the June 2000 Final EIS, the discussion of the social environment includes a discussion of the social composition, community cohesion, travel patterns and accessibility, public facilities, public services and utilities, recreation resources, public health and safety, and the overall quality of life in the study area.

Information on community structures and resources (i.e., schools, recreational resources) that have been constructed in the study area since publication of the Final EIS are also presented, as is updated information on travel patterns and accessibility in the study area, based on the 2004 WFRC travel demand model (version 3.2). This section also includes an updated assessment of potential impacts on minority and low-income populations.

4.3.1 Approach and Methodology

4.3.1.1 Changes since June 2000 Final EIS

This section presents information specific to the Wasatch Front region (i.e., Salt Lake, Davis, Weber, Tooele, and Morgan Counties), as well as pertinent to the State of Utah, to assess the social environment in the study area relative to the larger region and state. To update the affected environment and environmental consequences information associated with the social environment in the study area, Sections 3.3 and 4.3 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for evaluating the social environment is described in Section 4.0.1, *Study Area*, of this document. However, because much of the analysis in this section is based in large part on the 2000 Census tract and block groups boundaries, the study area represented in this section is actually larger in some discussions than that defined in Section 4.0.1.

The population data presented in the Final EIS was based, in part, on the 1990 Census. In 2000, the U.S. Census Bureau collected updated census data (U.S. Census Bureau 2000). The 2000 Census data were reviewed at the state, county, and city levels to complete an updated demographic analysis for this Supplemental EIS. This demographic analysis included use of a geographic information systems (GIS) overlay to identify minority and low-income populations at the census tract and block group levels within the study area.[1]

[1] Year 2000 Census data for census tracts, block groups, and blocks, were assembled in a GIS framework using an overlay technique that allowed project impacts on areas of high concentrations of minority and/or low-income populations to be assessed. The census tract and census block group boundaries changed between the 1990 and 2000 censuses. As a result, population and social trends based on census tracts and/or block group boundaries could not be determined.

The *Wasatch Front Region Small Area Socioeconomic Projections: 2002–2030* technical report (Wasatch Front Regional Council 2003b) and the *Demographic and Economic Analysis 2003 Economic Report to the Governor* (Utah Governor's Office of Planning and Budget 2003) were also reviewed to determine population demographics and trends in the study area. The Salt Lake County Board of Realtors and the Salt Lake and Davis County Assessor's offices were contacted to obtain information on housing costs and indigent households in the study area.

4.3.1.2 Changes since Draft Supplemental EIS

Changes have been made to some calculations in this social section since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- The acquisition status of properties within the Alternative D/E right-of-way has been updated to reflect new acquisitions made since the Draft Supplemental EIS. See Section 4.3.3.3, *Neighborhood and Community Cohesion.*

- The traffic volume numbers have been updated because the traffic model was re-run using updated land use assumptions that included consistent allocation of transit-supportive land use for year 2020 scenarios. The traffic model was re-run for all scenarios and alternatives to ensure a single, consistent, complete application of WFRC travel model version 3.2 for all scenarios reported in this Supplemental EIS. See Section 4.3.3.3, *Neighborhood and Community Cohesion*, Tables 4.3-6 and 4.3-7, and Section 4.3.3.4, *Travel Patterns and Accessibility*, Tables 4.3-9 and 4.3-10. Also, Table 4.3-7 was revised based on changes in the approach to rounding of data reported for this Final Supplemental EIS.

4.3.2 Affected Environment

The following subsections provide a summary of information relative to the social environment that has been updated since publication of the Final EIS. Since publication of the Final EIS, the 2000 Census was updated with new statistics on population growth, social composition, and environmental justice populations. Boundaries of the census tracts used in the 1990 and 2000 Census are not identical.

In addition, the 2004 WFRC travel demand model (version 3.2) was used to reevaluate travel patterns and accessibility in the study area. This model has been re-run; see above. Updated information on public facilities and utilities, recreation resources, and public health and safety is also presented below.

4.3.2.1 Population Growth

Between 1990 and 2000, the population of Utah grew by 29.6 percent. State growth projections estimate a 2.1 percent rate of annual population growth between 2000 and 2020 (Utah Governor's Office of Planning and Budget 2003). Table 4.3-1, which updates Table 3-3 in the Final EIS, summarizes population statistics for Utah, counties in the Wasatch Front region, and census tracts in the study area, to show how expected population growth in the study area compares to population growth in the Wasatch Front region and in the state. Figure 4.3-1 shows the boundaries of the census tracts referenced in Table 4.3-1.

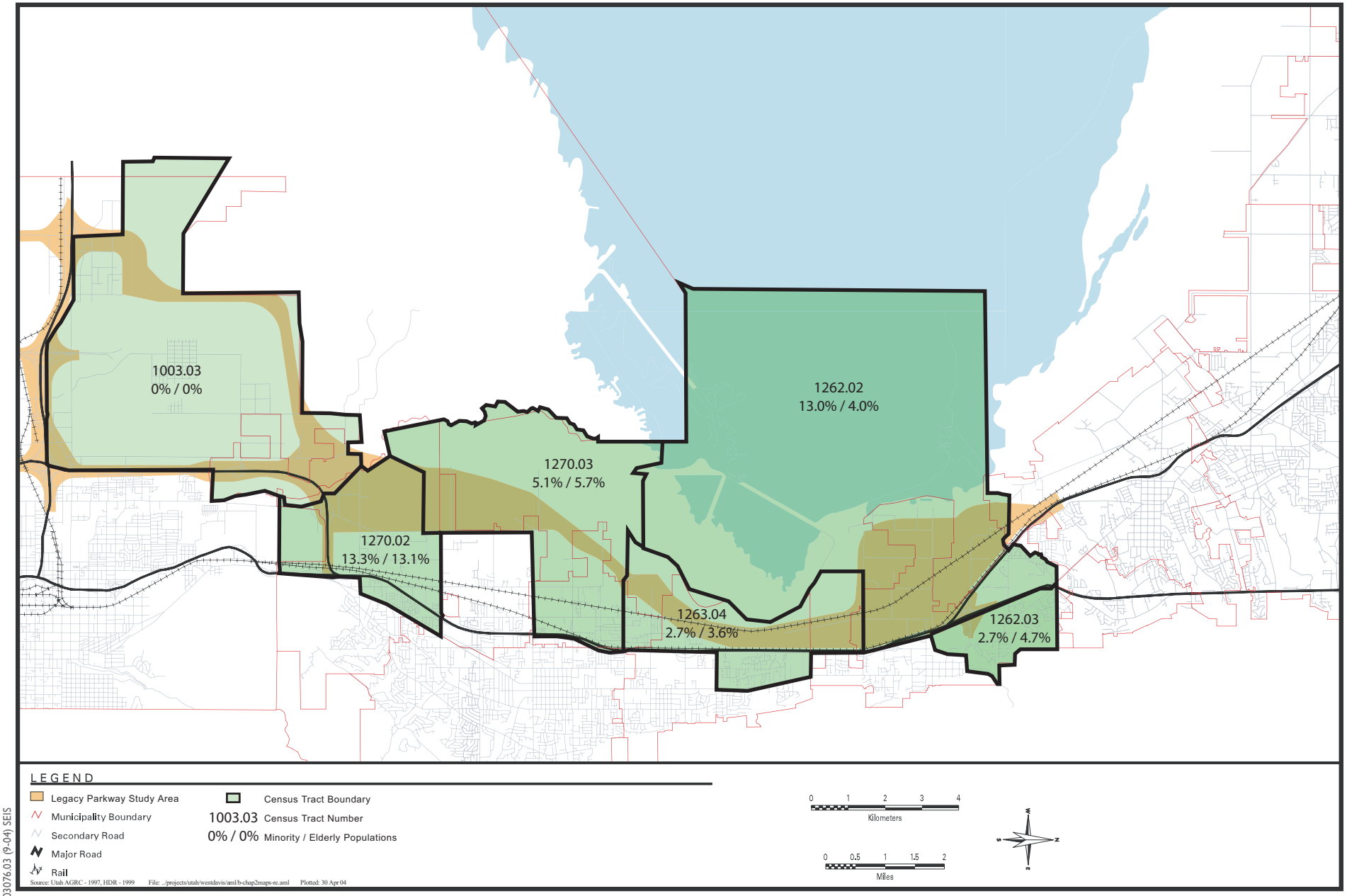

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Figure 4.3-1
Census Tract Boundaries

Table 4.3-1 Population Statistics for State of Utah, Wasatch Front Region, and Study Area

	Year							Projected Annual Growth Rate
Area	1980	1990	2000	2005	2010	2015	2020	2000 to 2020
Utah	1,461,037	1,722,850	2,233,169	2,464,633	2,787,670	3,126,736	3,371,071	2.08%
Wasatch Front								
Davis County	147,509	190,709	238,994	262,241	292,201	323,992	347,412	1.89%
Morgan County	4,917	5,528	7,129	7,506	8,329	9,250	9,981	1.70%
Salt Lake County	637,091	733,906	898,387	967,390	1,077,556	1,195,554	1,283,784	1.80%
Tooele County	26,033	26,601	40,735	50,119	59,780	70,338	79,539	3.40%
Weber County	139,890	160,388	196,533	211,207	237,877	265,905	286,919	1.91%
Wasatch Front Total	955,440	1,117,132	1,381,778	1,498,463	1,675,743	1,865,039	2,097,635	1.89%
Cache County	57,176	70,183	91,391	101,811	115,697	130,246	137,966	2.08%
Box Elder County	33,222	36,485	42,745	46,928	53,224	59,433	63,391	1.99%
Study Area by Traffic Analysis Zone and Census Tract Boundaries*								
1003.03	NA	NA	563	678	1,020	1,676	2,018	6.59%
1262.02	NA	NA	1,847	2,088	2,727	3,499	4,644	4.72%
1262.03	NA	NA	1,054	1,119	1,329	1,552	1,805	2.73%
1263.04	NA	NA	6,163	6,298	6,451	6,778	7,190	0.77%
1270.02	NA	NA	2,229	2,567	4,414	5,369	5,380	4.50%
1270.03	NA	NA	4,269	4,325	4,464	4,909	5,467	1.24%

Note:

* These census tracts encompass a larger area than the study area. Year 2000 Census tract populations are reflected as 2002 population taken from the WFRC Technical Report No. 42 (Wasatch Front Regional Council 2003b) and present a more detailed picture of population in these areas than data from the 2000 Census.

Sources: Utah Governor's Office of Planning and Budget 2003, Wasatch Front Regional Council 2003b, U.S. Census Bureau 2000.

Compared to the previous population estimates and projections presented in the Final EIS, the year 2000 population was higher than anticipated in most areas; however, the estimated rates of growth between 2000 and 2020 are somewhat lower. For Salt Lake, Davis, and Morgan Counties, the estimated 2020 populations are slightly lower than that shown in the Final EIS, but the estimated 2020 populations for Tooele and Weber Counties are slightly higher.

Tables 4.3-2a and 4.3-2b summarize respectively the population density statistics for Utah, Davis, and Salt Lake Counties and the census tracts in the study area. These tables update Table 3-4 in the Final EIS. Between the 1990 and 2000 Censuses, the average population density of the two-county area (Davis and Salt Lake Counties) increased from 800 to 1,104 people per square mile. The average population density of the census tracts in the study area also increased (i.e., from 15 to 226 people per square mile). Trend determinations based on Census tracts are not possible, however, because the boundaries of the 2000 Census tracts were different than those for the 1990 Census tracts. The population density increases were particularly notable in the Centerville and Farmington areas, which correspond to census tracts 1262.02 and 1263.01 in the 1990 Census and tracts 1262.03 and 1263.04 in the 2000 Census.

Table 4.3-2a Population Densities for State of Utah and Davis and Salt Lake Counties

	Persons Per Square Mile	
Area	1990	2000
State of Utah	21	27
Davis County	617	785
Salt Lake County	985	1,218

Source: U.S. Census Bureau 2000.

Table 4.3-2b Population Densities for Census Tracts in or Adjacent to Study Area

Census Tracts	Cities Located Adjacent to the Tract	Persons per Square Mile
1990 Census Tracts		
1262.01	Farmington	4
1262.02	Kaysville, Farmington	10
1263.01	Centerville	2
1270.01	Woods Cross, West Bountiful	2
1270.02	North Salt Lake	2
1003.03	Salt Lake City	<1
1003.04	Salt Lake City	86
2000 Census Tracts*		
1262.02	Kaysville, Farmington	101
1262.03	Kaysville, Farmington	1,658
1263.04	Centerville	1,029
1270.02	North Salt Lake	546
1270.03	Woods Cross, West Bountiful	294
1003.03	Salt Lake City	7

Note:
* Census tracts were redistricted in 2000.
Source: U.S. Census Bureau 2000

4.3.2.2 Social Composition

Information from the 2000 Census and the Utah Governor's Office of Planning and Budget was used to update information presented in the Final EIS on blind, ethnic, minority, and elderly populations in the study area, average household incomes and housing values, indigent households, and transportation issues.

Population Characteristics

The study area is sparsely populated, containing less than 2 percent of the total combined populations of Salt Lake and Davis Counties. Table 4.3-3, which is a partial update of Table 3-8 in the Final EIS, presents census information on minority and low-income populations in the study area. It should be noted that minority populations can be classified by either race or ethnicity, or both (U.S. Census Bureau 2000). The estimates provided in Table 4.3-3 have been evaluated to ensure that individuals listed under both minority categories are not counted twice.

Approximately 6.4 percent of the population in the study area is considered minority, and 2.2 percent is considered low-income. In the total two-county area, 17.2 percent of the population is considered minority, and 7.2 percent is considered low-income. Figure 4.3-2, which updates Figure 3-10 in the Final EIS, illustrates the ethnic and racial composition of the study area.

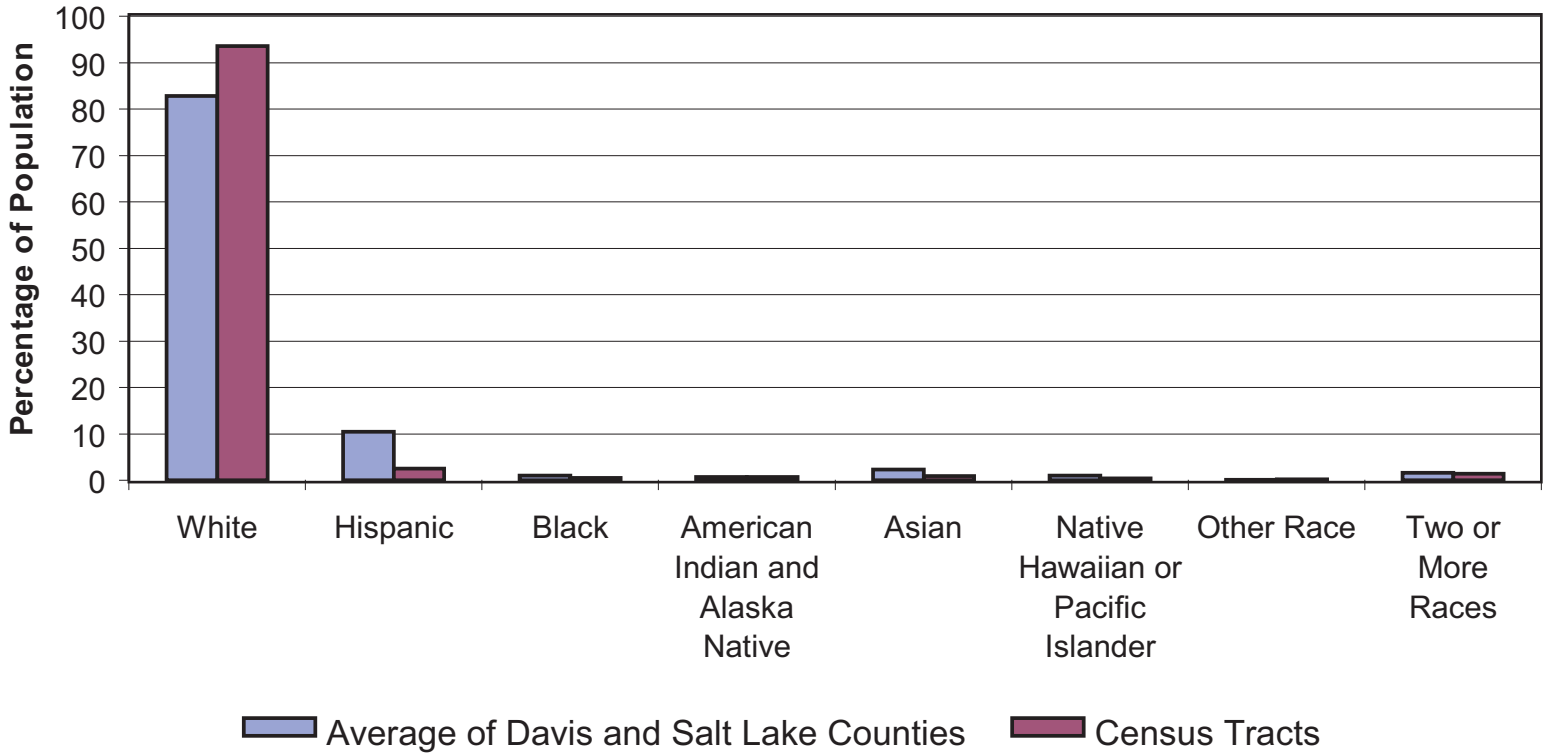
Census tract 1003.04 from the 1990 Census contained a relatively high number of minorities (see Table 3-8 in the Final EIS). Census tract boundaries were redistricted for the 2000 Census, splitting tract 1003.04 into two tracts, 1003.5 and 1003.6. Both of these tracts now lie entirely south and east of I-215, outside the study area. Because the Supplemental EIS bases its study on the 2000 Census, these populations are no longer considered in this document.

The Final EIS also presented information on elderly populations. Table 4.3-4, which partially updates Table 3-8 in the Final EIS, presents updated information on elderly populations in the study area based on the 2000 Census.

Finally, as described in Section 4.3.6 of the Final EIS, there are two households with blind residents in the study area in Davis County.

Table 4.3-3 Minority and Low Income Populations

	Minority (Racial & Ethnic)		Low-Income Households	
Area	Number	Percentage of Total Population	Number	Percentage of Total Households
Utah	328,904	14.7%	62,280	8.9%
Salt Lake County	171,190	19.1%	22,754	7.7%
Davis County	24,358	10.2%	3,597	5.1%
Census Tract*				
1003.03	0	0.0%	0	0.0%
1262.02	397	13.0%	14	2.1%
1262.03	96	2.7%	0	0.0%
1263.04	151	2.7%	33	2.3%
1270.02	360	13.3%	37	3.6%
1270.03	153	5.1%	28	5.7%
Total	1157	6.4%	112	2.2%
Block Groups				
Block Group 3, Census Tract 1003.03	0	0.0%	0	0.0%
Block Group 1, Census Tract 1262.02	397	13.0%	14	2.1%
Block Group 1, Census Tract 1262.03	57	3.7%	0	0.0%
Block Group 2, Census Tract 1262.03	39	2.0%	0	0.0%
Block Group 1, Census Tract 1263.04	58	3.8%	19	4.2%
Block Group 2, Census Tract 1263.04	93	2.3%	14	1.5%
Block Group 1, Census Tract 1270.02	151	10.3%	22	3.4%
Block Group 2, Census Tract 1270.02	209	16.8%	15	3.9%
Block Group 1, Census Tract 1270.03	109	7.7%	18	4.6%
Block Group 2, Census Tract 1270.03	21	2.4%	10	3.9%



Source: U.S. Census Bureau 2000 Census Count

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Figure 4.3-2
Ethnic Composition in the Study Area

Area	Minority (Racial & Ethnic) Number	Minority (Racial & Ethnic) Percentage of Total Population	Low-Income Households Number	Low-Income Households Percentage of Total Households
Block Group 3, Census Tract 1270.03	23	6.9%	0	0.0%
Block Group 4, Census Tract 1270.03	0	0.0%	0	0.0%
Total	1157	6.4%	112	2.2%

Note:
* These census tracts encompass a larger area than the study area.
Source: U.S. Census Bureau 2000, Summary File 3.

Table 4.3-4 Elderly Populations

Census Tract*	Elderly (65 years and over) Number	Elderly (65 years and over) Percentage of Total Population
1003.03	0	0.0%
1262.02	123	4.0%
1262.03	165	4.7%
1263.04	203	3.6%
1270.02	354	13.1%
1270.03	174	5.7%

Note:
* These census tracts encompass a larger area than the study area.
Source: U.S. Census Bureau 2000.

Household Income and Housing Values

Household income in the study area continues to be slightly higher than either that of Salt Lake and Davis Counties (Utah Governor's Office of Planning and Budget 2003). Figure 4.3-3, which updates Figure 3-10 in the Final EIS, presents information on the income characteristics of the study area.

According to the Salt Lake County Board of Realtors, the 2003 average market value of a single-family house was $182,521 in Salt Lake County and $167,726 in Davis County (Salt Lake County Board of Realtors 2003). In comparison, the 2003 average market value of a single-family house was $116,884 in Salt Lake City. These figures represent an increase in the housing values from those presented in the Final EIS.

Indigent Households

Salt Lake and Davis Counties and the State of Utah classify people as indigent when they are disabled or 65 or over and have an annual household income of less than $24,245, an increase over the $19,950 threshold used in the Final EIS (Utah State Tax Commission 2004). Twenty-two households in Salt Lake and Davis Counties between North Salt Lake and Kaysville receive indigent tax abatements, only two of which are located in the study area (Law pers. comm.). This represents a decrease from the Final EIS,

which cited seven indigent households in the study area. All the indigent households in the study area also receive tax relief from the state under the tax category of "circuit breaker," as described in the Final EIS.

Transportation and Low-Income and Elderly Populations

As described in the Final EIS, a survey conducted by the Justice Economic Dignity and Independence (JEDI) for Women group identified two main issues associated with transportation in the Wasatch Front region that primarily affect low-income and elderly populations: the expense of owning and maintaining a vehicle and the lack of convenience and scheduling of transit. These variables are still considered barriers to self-sufficiency for these populations. Aside from the advancement of commuter rail, which would facilitate relatively inexpensive travel within the study area, there has been no other major change to this section since publication of the Final EIS.

4.3.2.3 Environmental Justice Populations

As described in the Final EIS, Title VI of the Civil Rights Act and Executive Order 12898 (regarding environmental justice populations) requires federal agencies to identify minority and low-income populations in areas where the effects of a proposed federal action on human health and the environment would be disproportionately high or adverse. Information from the 2000 Census and the Utah Governor's Office of Planning and Budget was used to update information presented in the Final EIS on environmental justice populations.

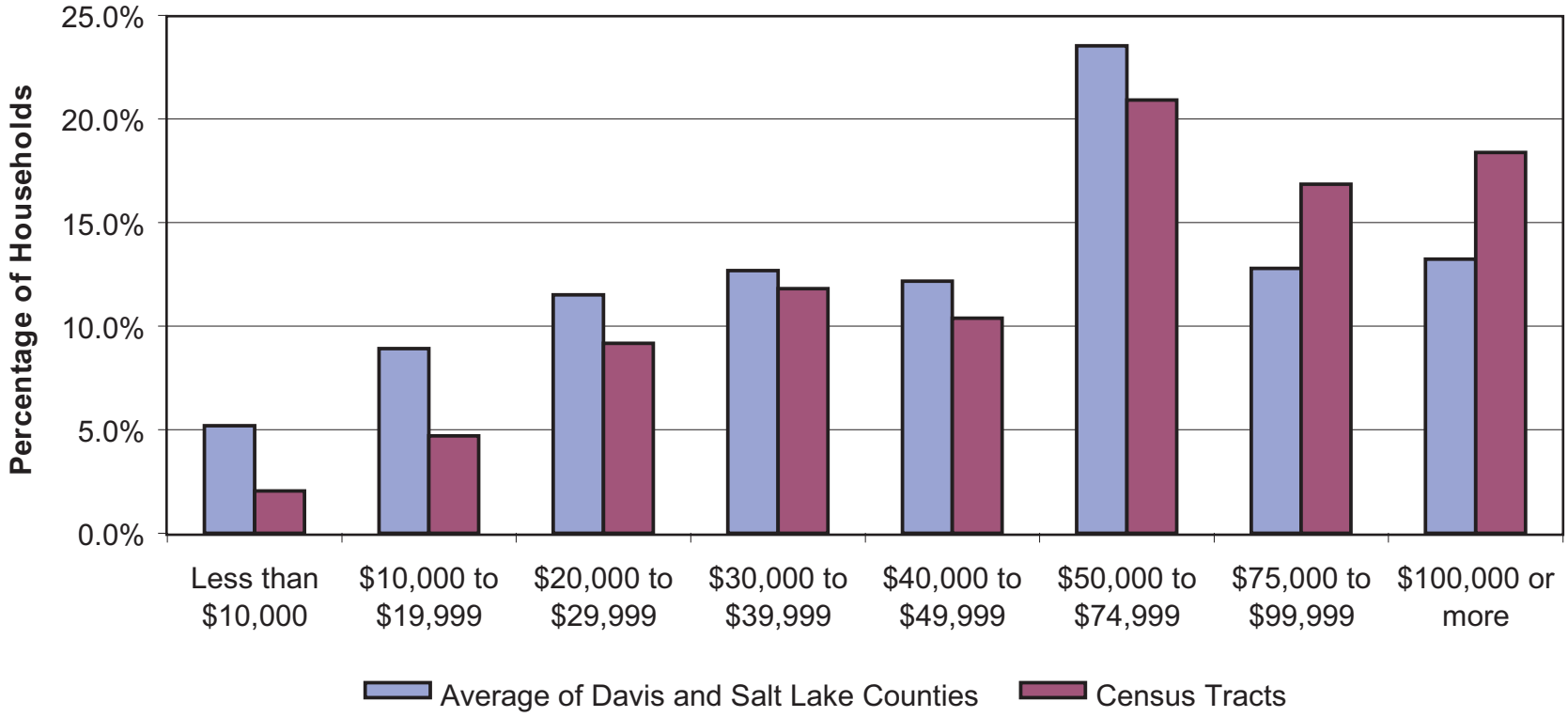
Table 4.3-3 and Figures 4.3-2 and 4.3-3 disclose the percentages of minority and low-income populations in the study area, as well as those in Salt Lake County, Davis County, and the State of Utah. In the study area, approximately 6.4 percent of the population is minority, and 2.2 percent is low income (Table 4.3-3). Comparatively, in Salt Lake and Davis Counties and the state, 19.1 percent, 10.2 percent, and 14.7 percent of the populations are minority, and 7.7 percent, 5.1 percent, and 8.9 percent are low income, respectively. These numbers illustrate that the study area as a whole has a lower proportion of minority and low-income populations than Salt Lake County, Davis County, and the state. This trend is reflected in all the census tracts in the study area except two: census tract 1262.02, block group 1 and census tract 1270.2, block group 2.

Census tract 1262.02, block group 1 has a minority population of 13.0 percent (which is higher than the Davis County average of 10.2 percent), indicating that there is a higher potential for impacts on environmental justice populations in this block group. All development in this block group occurs north of the I-15/US-89 divergence, except for a small residential development of high-end custom homes off Shepard Lane west of the D&RG railroad tracks. It is highly likely that any low-income populations in this census tract are concentrated in the developed areas north of the I-15/US-89 divergence rather than in the custom-home development off Shepard Lane. Minority populations could live in either the area north of the I-15/US-89 divergence, or in the custom-home development off Shepard Lane.

Census tract 1270.2, block group 2 contains a minority population of 16.8 percent, which is higher then the Davis County average (10.2 percent) and the state average (14.7 percent). This indicates that an environmental justice population may also exist in this area. Residential development in this block group occurs east of Redwood Road.

4.3.2.4 Neighborhood and Community Cohesion

The Final EIS defined *community cohesion* as the attribute of a geographic area where its segmentation or division would reduce its desirability to current and future residents. Six communities are located in the



Source: U.S. Census Bureau 2000 Census Count

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Figure 4.3-3
Household Income in the Study Area

study area: North Salt Lake, Woods Cross, West Bountiful, Centerville, Farmington, and Kaysville. Each seeks to develop and maintain its community in a cohesive fashion. Achievement of this goal is currently limited by I-15, existing power line corridors, gas lines, and railroad rights-of-way.

Since publication of the Final EIS, construction has begun on the Foxboro residential development, which is located near the southern terminus of the proposed Legacy Parkway, adjacent to Redwood Road in North Salt Lake. The City of North Salt Lake has annexed the area surrounding this development, and the development has subsequently become a cohesive member of North Salt Lake. Since publication of the Draft Supplemental EIS, construction has also begun on several other residential housing developments, all of which are located east of the Alternative E alignment (See Figure 4.1-1).

The federal lead agencies hosted a series of Community Planning Information Committee (CPIC) meetings focused specifically on the technical analyses summarized in Chapter 2, *Tenth Circuit Court Ruling Analysis*. The first CPIC meeting, held in July 2003, focused specifically on discussing the potential Legacy Parkway alignment options within the D&RG regional corridor (see Chapter 3, *Alternatives*), which were developed as a result of public comments during project scoping. The majority of the local jurisdictions in the study area expressed concerns that a major new road facility in the D&RG corridor would create a physical and social barrier in the area that would sever neighborhoods and communities and affect community cohesion. These concerns were reiterated during individual interviews also held in 2003 and 2004 with each of the local jurisdictions in the study area. In general, the majority of the communities in the study area felt that a highway alignment in the Great Salt Lake Corridor, and in particular Alternative E, would be less disruptive to their communities than a highway alignment in the D&RG corridor. Section 4.3.3.3, *Neighborhood and Community Cohesion,* provides an assessment of how the proposed build alternatives would affect neighborhood and community cohesion in the study area.

4.3.2.5 Travel Patterns and Accessibility

Section 3.3.2 of the Final EIS described the study area as primarily undeveloped, with limited existing travel patterns. It was noted that access to the study area was limited from the east by the existing interchanges and overpasses crossing I-15. Although access to the study area remains limited, development occurring in and around the southern termini (e.g., Foxboro development) and northern termini (e.g., residential development and school near the intersection of Clark Lane and 1525 West), as well as development north and south of the corridor, is causing traffic volumes and travel patterns to increase in the study area.

The Final EIS also described 15 major east-west and north-south routes in the study area that could be affected by the proposed Legacy Parkway. To reevaluate the substantive travel patterns and accessibility effects that would be associated with the proposed action, the 2004 WFRC travel demand model (version 3.2) was used to evaluate three interstates/major state highways (I-15, US-89, and I-215) and two local roadways that would provide direct connections to the proposed Legacy Parkway (Parrish Lane in Centerville and 500 South/Redwood Road in Woods Cross). The location of these roadway facilities in the study area is shown in Figure 4.3-4. The following provides a description of the existing configurations of these facilities and their current and future levels of service.

Since publication of the Draft Supplemental EIS, and as noted in Section 4.3.1.2, *Changes since Draft Supplemental EIS*, the traffic model was re-run using updated land use assumptions that included consistent allocation of transit-supportive land use for year 2020 scenarios. The traffic model was re-run for all scenarios and alternatives to ensure a single, consistent, complete application of WFRC travel model version 3.2 for all scenarios reported in this Supplemental EIS.

Interstates/Major State Highways

I-15

I-15 is an essential element of the local, regional, and national transportation system. As part of the national interstate system, it provides a north-south link between southern California and the Canadian border. I-15 provides the only continuous major north-south roadway for travel within Utah and is the only major highway that directly links Utah's three largest urban areas of Provo, Salt Lake City, and Ogden.

In Weber County (north of Ogden), I-15 transitions from four to six lanes, then continues south as a six-lane facility to the proposed I-15/US-89/Legacy Parkway interchange in Farmington. I-15 becomes an eight-lane facility through Farmington to the I-15/I-215/US-89 interchange in North Salt Lake. South of this interchange, I-15 is a six-lane facility to 600 North in Salt Lake City. South of 600 North, I-15 becomes an eight-lane facility with two high-occupancy vehicle (HOV) lanes.

US-89

US-89 is a north-south major arterial that is not continuous through the North Corridor; some segments of US-89 are separate roadways, and other segments follow I-15 and local roadways. US-89 is a separate roadway from Harrison Boulevard in South Ogden south to the I-15/US-89/Legacy Parkway interchange in Farmington, a distance of 20 km (12.5 mi). This segment of US-89, which connects I-15 and I-84, is planned to be upgraded to a six-lane, controlled-access expressway. FHWA issued a Record of Decision (ROD) for this improvement in 1996, and the upgrade is being constructed as funding becomes available; it is anticipated that improvements to US-89 will be completed between 2020 and 2030. In addition, the segment of US-89 between Park (formerly Burke) Lane and Cherry Hills was recently reconstructed; the improvements were completed in September 2004.

South of the proposed I-15/US-89/Legacy Parkway interchange, there is no separate US-89 facility. The I-15 facility carries both the I-15 and US-89 route designations through Farmington and Centerville. From the I-15/500 West interchange, US-89 follows 500 West southward into Bountiful. From the 500 West/Main Street intersection in Bountiful, US-89 follows Main Street south through Bountiful and North Salt Lake. At the I-15/I-215/US-89 interchange in North Salt Lake, US-89 becomes a separate roadway again and runs parallel to I-15 south into downtown Salt Lake City.

I-215

I-215 is a limited-access interstate highway that functions as a beltway around three-quarters of Salt Lake City. North of the airport, I-215 is on an east-west alignment and connects with I-15 immediately south of Center Street in North Salt Lake. In addition to providing an alternate high-speed travel route to I-15, I-215 north of I-80 links the airport to the northern Salt Lake City metropolitan area and Davis and Weber Counties. I-215 is a four-lane facility between the I-15/I-215/US-89 interchange and 2100 North in Salt Lake City and transitions to a six-lane facility south of 2100 North.

Local Roadways

Parrish Lane

Parrish Lane is an east-west collector street in Centerville and has an existing interchange with I-15. It is a four-lane road east of I-15 and a two-lane road west of I-15. The area east of I-15 at Parrish Lane is more developed than the area west of I-15, although the area to the west is planned for further development. In addition, arterial roads on the east side of I-15 connect Centerville to Bountiful, West Bountiful, and

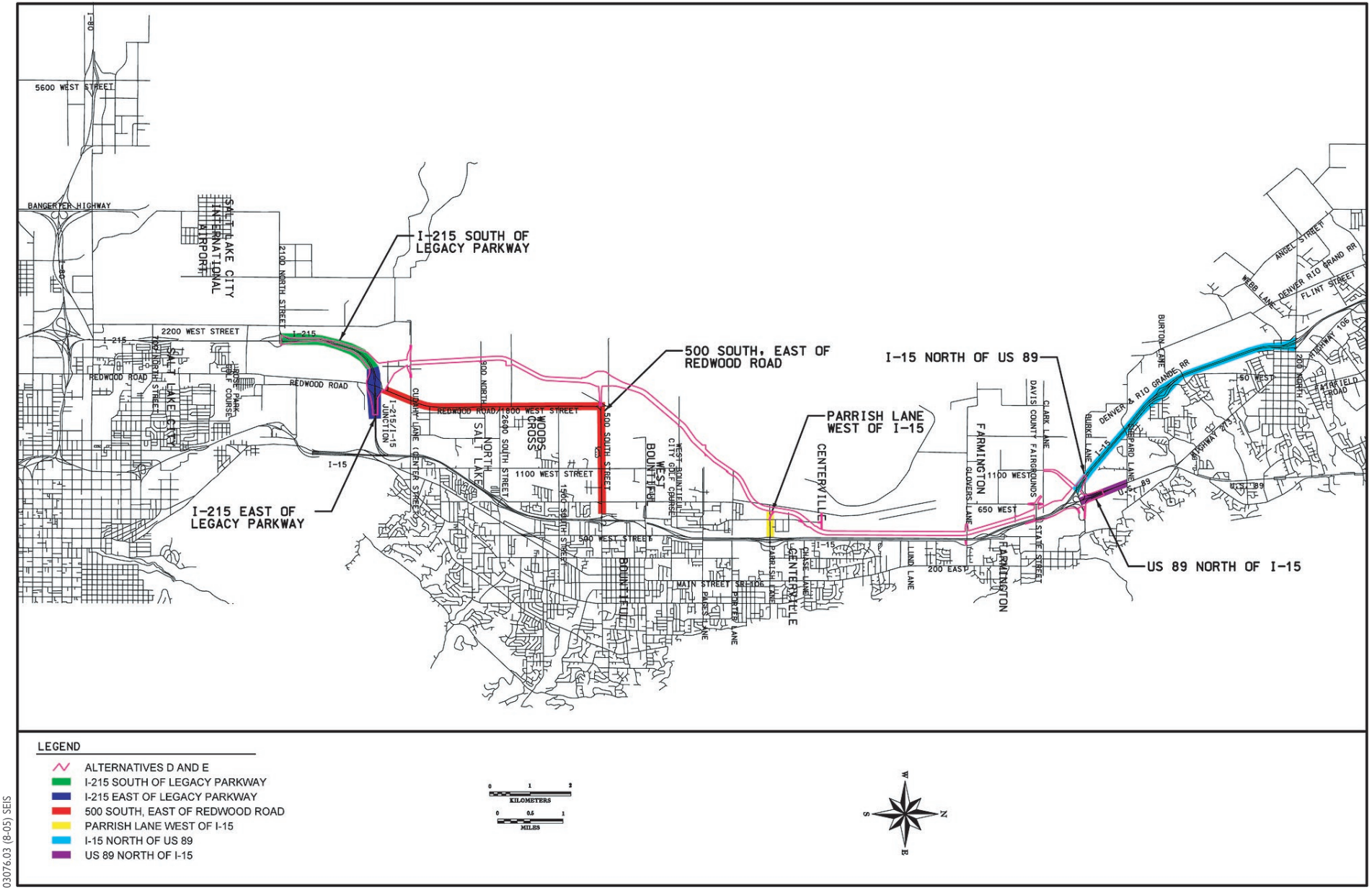

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Figure 4.3-4
Major Arterials and Local Roadways

Farmington. The interchange on- and off-ramps for northbound traffic are on the east side of I-15, and the on- and off- ramps for southbound traffic are on the west side of I-15.

500 South and Redwood Road

The 500 South/Redwood Road intersection connects these two roadways so that they function as a continuous arterial. Redwood Road is a north-south arterial that extends through the southern portion of the North Corridor, from an interchange and crossing of I-215 at the south end of the corridor to a northern terminus at 500 South. Traffic on Redwood Road continues on 500 South, an east-west arterial. Redwood Road serves western North Salt Lake and Woods Cross, an area with existing commercial and industrial development and additional planned future development, including major residential development.

500 South has an existing interchange with I-15. West of the interchange, 500 South is essentially the boundary between Woods Cross and West Bountiful. East of the interchange, 500 South is part of the Bountiful street system. 500 South is a four-lane road east of I-15 and a two-lane road west of I-15. Future capacity improvements planned for 500 South include converting it to a tree-lined parkway with four through lanes, wide sidewalks, wide park strips, bicycle lanes, street furnishings, and pedestrian-scale lighting. (Woods Cross City 2003.)

Existing Traffic Operating Conditions

As defined in Chapters 1 and 3 of this document, level of service is represented in a letter grading system that describes different levels of traffic congestion, ranging from level of service (LOS) A for excellent conditions (free-flowing traffic) to LOS F for failure conditions (extremely congested stop-and-go traffic). LOS B through LOS E describe progressively worse traffic conditions. The following analysis describes conditions for both the 3-hour p.m. peak period and, within that period, the single highest traffic hour of the day: the p.m. peak hour. The *peak period* consists of the single p.m. peak hour and the peak shoulder hours, which are the hour immediately before and the hour immediately after the peak hour. The peak period LOS is the average condition during the full 3-hour period.

Table 4.3-5 shows the maximum vehicle capacity per lane during the peak period with respect to the following three roadway classifications.

- **Arterials**. An arterial is a signalized street that primarily serves through-traffic and that secondarily provides access to abutting properties. For the purposes of this analysis, Parrish Lane, 500 South, and Redwood Road are considered arterials.

- **Expressways**. An expressway is an arterial highway with limited access control. Expressways can carry less traffic at any given level of service than freeways. For the purposes of this analysis, the segment of US-89 evaluated in this section is considered an expressway.

- **Freeways**. A freeway is an arterial highway with full access control. Freeways are intended to provide high levels of safety and efficiency in the movement of large volumes of traffic at high speeds. For the purposes of this analysis, the segments of I-15 and I-215 evaluated in this section are considered freeways.

Typically, in urban areas, UDOT strives to maintain LOS D or better operating conditions on interstate freeways.

Table 4.3-5 Level of Service Criteria

	Maximum Capacity (vehicles per lane per peak period)		
Level of Service	Arterial[1]	Expressway[2]	Freeway[3]
A	540	1,335	2,130
B	1,110	2,310	3,510
C	1,650	3,345	5,040
D	1,920	4,095	6,270
E	2,190	4,620	7,050

Notes:

[1] Arterial capacities estimated based on WFRC travel demand model and engineering judgment. Regional model uses LOS E capacity during the peak hour.

[2] Expressway capacity estimated midway between freeway and arterial.

[3] Freeway capacity estimated based on *Highway Capacity Manual* 2000 for 65-mph freeway.

The following analysis describes levels of service for the primary streets and highways identified above for the 3-hour p.m. peak period. Table 4.3-6 shows existing (2001) levels of service based on peak-period capacities for the interstates and major state highways that would be affected by the proposed action. Table 4.3-7 shows existing (2001) levels of service based on peak-period capacities for the local roadways that would be affected by the proposed action.

Table 4.3-6 Existing Levels of Service on Interstates and Major State Highways in Study Area

	Existing Conditions (2001)				
Segment	Lanes per Direction	Total Daily Traffic	Peak-Hour, Peak-Direction Volume	Peak-Period, Peak-Direction Volume	Peak-Period Level of Service
US-89 North of I-15 Interchange in Farmington	2	52,440	2,780	7,710	C
I-15 North of US-89 Interchange in Farmington	3	86,250	5,790	16,070	D
I-215 East of Legacy Parkway	2	59,280	3,720	10,320	D
I-215 South of Legacy Parkway	2	59,280	3,720	10,320	D

Notes:

Total daily traffic values (two-directional) were derived from the UDOT 2005b *Traffic on Utah Highways*.

Peak-period, peak-direction volumes taken from the WFRC travel demand model (version 3.2). Peak-hour, peak-direction values computed as a factor (36 percent) of peak-period volumes, based on approximate peak flows.

Level of service for the peak period is estimated based on the average hourly vehicles per lane per hour during the 3-hour peak period. Level of service represents conditions in the peak direction (p.m. northbound).

Source: Fehr & Peers 2005.

Table 4.3-7 Existing Levels of Service on Local Roadways in Study Area

	Existing Conditions (2001)				
Roadway	Lanes per Direction	Total Daily Traffic	Peak-Hour, Peak-Direction Volume	Peak-Period, Peak-Direction Volume	Peak-Period Level of Service
Parrish Lane (west of I-15)	1	7,860	360	1,100	B
500 South (east of Redwood Road)	1	10,545	320	880	B
Redwood Road (500 South to 1500 South)	1	10,545	300	830	B
Redwood Road (1500 South to 2600 South)	1	8,290	330	910	B
Redwood Road (2600 South to Center Street)	1	9,139	370	1,040	B
Redwood Road (Center Street to I-215)	1	9,139	620	1,710	D

Notes:

Total daily traffic values (two-directional) were derived from the UDOT 2005b *Traffic on Utah Highways*.

Peak-period, peak-direction volumes taken from the WFRC travel demand model (version 3.2). Peak-hour, peak-direction values computed as a factor (36%) of peak-period volumes, based on approximate peak flows.

Level of service for the peak period is estimated based on the average hourly vehicles per lane per hour during the 3-hour peak period. Level of service represents conditions in the peak direction (p.m. northbound).

Source: Fehr & Peers 2005.

4.3.2.6 Public Facilities

As described in the Final EIS, all the cities in the study area fall within either the Davis or Salt Lake City School Districts. At the time the Final EIS was published, the only school in the study area was Meadowlark Elementary School, part of the Salt Lake City School District. In 2003, after publication of the Final EIS, construction on the Eagle Bay Elementary School, located at 1933 West Clark Lane in the Farmington Ranch subdivision in the Davis School District, was completed. The Davis School District is planning to build the additional schools in the study area, both of which are depicted in Figure 4.3-5 and listed below.

- A high school near the intersection of Glovers Lane and 650 West (Clark Lane), slightly west of the Alternatives D and E, next to Glovers Lane Park.

- An elementary school in North Salt Lake, west of Redwood Road, between Center Street and 900 North. Slated to be completed in 2007, this school will accommodate new development in the Foxboro and North Salt Lake areas.

The other existing public facilities described in the Final EIS include four churches (two in Salt Lake City, one each in Farmington and Kaysville) and their facilities, the Farmington Public Works facility, the Centerville Public Works facility, a UDOT maintenance facility, and the Bountiful Sanitary Landfill (Bay Area Refuse Disposal [BARD]). These facilities are also shown in Figure 4.3-5. Since publication of the

Final EIS, the Farmington Public Works facility has been relocated to 720 West, 100 North to accommodate construction at the northern terminus of Alternative D (Final EIS Preferred Alternative) (Figure 4.3-5). No other public works facilities have been constructed in the study area and no other new facilities have been planned in the study area since publication of the Final EIS.

4.3.2.7 Public Services and Utilities

The Final EIS described four primary types of public services that are provided in the study area: fire protection and ambulance service, response to hazardous materials incidents, police protection and highway patrol, and water and sanitation services. Utilities in the study area include electrical, water, natural gas, petroleum, telecommunications, sewer, and storm drainage.

Public Services

Fire Protection and Ambulance Service

As described in the Final EIS, fire protection and paramedic and ambulance service in the study area are typically provided by combined jurisdictions (see Table 3-5 in the Final EIS). Local fire chiefs consider current access to I-15 from fire stations to be adequate. However, local officials also indicate that emergency response times will likely increase if additional access is not provided in the future. There have been no changes to this section since publication of the Final EIS.

Response to Hazardous Materials Incidents

As described in the Final EIS, the presence of I-15, railroad corridors, and refineries in the study area allows for the possibility for hazardous material incidents to occur. Such incidents could result in the closure of I-15, depending on the location and severity of the incident. The responsible party, with oversight from the Utah Department of Environmental Quality (UDEQ), would be responsible for immediate action after an incident. There have been no changes to this section since publication of the Final EIS.

Police Protection and Highway Patrol

As described in the Final EIS, each city in the study area maintains its own police department. Additional police assistance can be obtained from the sheriff's offices of Davis and Salt Lake Counties, as well as the state highway patrol. There have been no changes to this section since publication of the Final EIS.

Water and Sanitation Services

As described in the Final EIS, each municipality in the study area provides its own water and sewer (see Table 3-7 in the Final EIS). Residents and commercial interests outside each jurisdiction use domestic wells to supply their own water. Irrigation water is supplied by the Weber Basin Water Conservancy District. There have been no changes to this section since publication of the Final EIS.

Utilities

Figures 3-8a through 3-8e in the Final EIS illustrate the location of the major utilities in the study area. Major utilities described in the Final EIS include electrical utilities, water utilities, natural gas utilities, petroleum utilities, telecommunications utilities, sewer utilities, and storm drainage utilities. There have been three minor changes to the description of utilities in the study area since publication of the Final EIS. These three changes are described below.

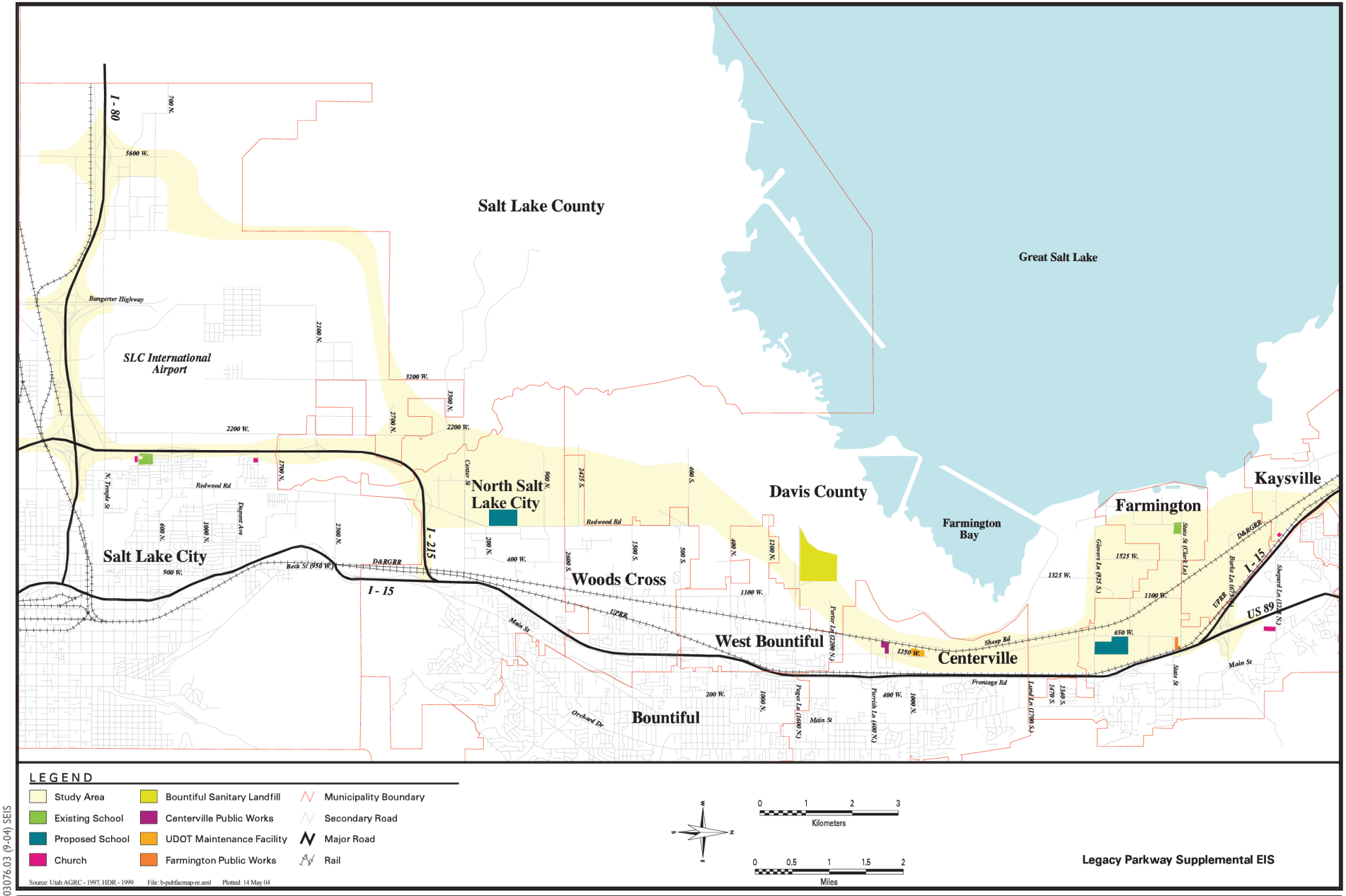

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Figure 4.3-5
Public Facility Locations

- **Electrical Utilities**. The existing transmission corridors in the study area are depicted in Figure 3-8a in the Final EIS. UDOT has arranged with PacifiCorp (doing business as Utah Power) to increase the existing transmission corridor easement by 75 feet on the west side of Alternative E to accommodate one additional transmission line. Currently, there are five transmission lines in the corridor and the expanded easement would accommodate six. The alignment of the existing transmission corridor would not change.

  Access to the Utah Power facility located within the proposed Legacy Nature Preserve would require approval by the Corps. It is anticipated that access will be provided at limited, specified locations to minimize potential impacts on sensitive resources within the preserve. In accordance with the terms of a utility asset maintenance and operations plan (AMOP), Utah Power has agreed to conduct its regular inspection and maintenance activities of this facility outside of established nesting periods for sensitive wildlife species, except that Utah Power would be able to conduct repairs on its facility irrespective of such nesting periods in the event of an emergency outage.

- **Water and Wastewater Utilities**. A trunk line and minor lateral owned by the South Davis County Sewer Improvement District were relocated from the proposed Legacy Nature Preserve to the east side of Alternative E alignment.

- **Natural Gas Lines**. Two Questar natural gas lines have been relocated from the proposed Legacy Nature Preserve to the east side of the Alternative E alignment. It should be noted that Figure 3-8c in the Final EIS depicted one of these lines as a Kern River pipeline; however, when UDOT negotiated to relocate this line, it was owned by Questar.

All other information presented in the Final EIS relative to utilities has not changed.

4.3.2.8 Recreation Resources

Three different types of recreation resources in the study area were described in the Final EIS: wildlife recreation areas (i.e., the Farmington Bay Waterfowl Management Area [FBWMA]), public recreation facilities, and private recreation facilities. The following provides updated information on these resources.

Wildlife Recreation Areas

As described in the Final EIS, the FBWMA is the only wildlife recreation area in the study area. It is managed by the UDNR Division of Wildlife Resources and comprises 4,856 ha (12,000 ac). The main entrance is from Glovers Lane in the north, and the recreation area is open year round. Access can also be obtained from 1250 West and Pages Lane at certain times of the year. The Final EIS estimated annual visits to the FBWMA to be approximately 50,000. In 2003, visits had increased to 72,000 annually.

Since publication of the Final EIS and the Draft Supplemental EIS, an additional parcel of land has been added to the FBWMA. This 8.4-ha (20.7-ac) parcel is located immediately west of Sheep Road off the end of Parrish Lane in Centerville and is managed for wildlife and waterfowl. It was private mitigation for a development in the Centerville area prior to being turned over to FBWMA. This parcel has been added to the appropriate figures in the Final Supplemental EIS, and the evaluation for FBWMA has been updated to include this parcel.

The Final EIS stated that, under all the proposed build alternatives, an overpass would be constructed at Pages Lane to provide pedestrian, equestrian, and bicycle access to the FBWMA. Since publication of the Final EIS, the City of West Bountiful has decided not to construct this access due to feasibility and cost

concerns (HDR Engineering 2003). This will move the access to both FBWMA and Bountiful City Pond from Pages Lane to 500 South via a new frontage road under all the proposed build alternatives (see *Public Recreation Facilities*, below). As a result, motorized vehicles would have access to the FBWMA by taking the 500 South exit off Legacy Parkway and the corresponding frontage road. Non-motorized access would also be provided by the frontage roads that run along the west side of the proposed alignments. Access to the frontage roads would be provided at 500 South.

There have been no other changes to this section since publication of the Final EIS.

Public Recreation Facilities

As described in the Final EIS, many different public recreation facilities are located in the study area, including several golf courses, bike paths, trails, and parks, as well as Bountiful City Pond, the Davis County Fairgrounds, and the Jordan River Off-Highway Vehicle Center (Jordan River OHV Center).[2] Lagoon Drive, which provides access to Lagoon Park, a large amusement park located east of I-15 in Farmington, is also located in the study area. Since publication of the Final EIS, one additional park, which would be located adjacent to the Davis County Fairgrounds south of the Davis County Justice Complex, has been planned in the study area.

As described above, the non-motorized overpass that would provide access to Bountiful City Pond is no longer being considered. Motorized vehicles would access Bountiful City Pond by taking the 500 South exit and the frontage road along the west side of the proposed Legacy Parkway. Non-motorized access would be provided by the frontage roads that run along the west side of the proposed alignments. Access to the frontage roads would be provided at 500 South and the State Street pedestrian overpass.

There have been no other changes to this section since publication of the Final EIS.

Private Recreation Facilities

The Final EIS described several private recreation facilities in the study area, including equestrian centers in West Bountiful, three private duck hunting clubs, a private gun club at 200 South on the west side of Redwood Road, facilities for private bicycle touring (see Section 4.7, *Pedestrians and Bicycles*, of this document), and a planned golf course near Woods Cross. There has been no change in the status of these facilities since publication of the Final EIS.

4.3.2.9 Public Health and Safety

As described in the Final EIS, air quality, fog, lake-effect snow, and congestion-related aggression are public health and safety considerations in the study area. In particular, Salt Lake and Davis Counties are maintenance areas for ozone, and Salt Lake County is a moderate non-attainment area for particulate matter (PM10) (see Section 4.8, *Air Quality*), which is a public health concern. Great Salt Lake can cause localized fog and lake-affect snow that can create adverse travel conditions and a reduced level of safety to the traveling public. Given the proximity of the build alternatives to Great Salt Lake, and the fact that the proposed action is a highway, these factors are relevant to the discussion of public health and safety in the study area. Finally, increased congestion on roadways can lead to congestion-related aggression (e.g., road-rage). The continued increase in traffic volume in the study area could lead to aggressive driving incidents.

[2] Since publication of the Final EIS, the name of the area has changed from the Jordan River Raceway to the Jordan River Off-Highway Vehicle (OHV) Center.

There has been no change to any of these discussions since publication of the Final EIS.

4.3.2.10 Quality of Life

The Final EIS stated that residents throughout the region consider their quality of life fairly high because of the nearby location of the Great Salt Lake ecosystem and the Wasatch Mountains. The quality of life, however, has been changing as growth and development in the valley increases. This growth and development threatens many of the area characteristics that residents enjoy.

To address growth issues that extend beyond individual local jurisdictions, efforts have been made since publication of the Final EIS to deal with growth-related transportation issues at a regional level. Envision Utah, a partnership between public and private entities aimed at addressing the effects of long-term growth in the greater Wasatch Front Area, has sponsored several regional studies that, among other things, address transportation and land use at a regional level. These studies, which include the *Envision Utah Quality Growth Strategy and Technical Review* (Envision Utah 2000) and the *Envision Utah Transit-Oriented Development Guidelines* (Envision Utah 2002) endorse integration of land use and transportation through transit and transit-oriented land uses, improving the "walkability of communities," reducing traffic congestions, and otherwise promoting regional transportation options that maximize quality of life.

Similarly, the *Inter-Regional Corridor Alternatives Analysis* (IRCAA) (Wasatch Front Regional Council et al. 2002) was initiated as a collaborative effort in October 1999 by WFRC, the Mountainland Association of Governments (MAG), UTA and UDOT to address inter-regional mobility (e.g., mobility within the Wasatch Front region). As summarized in Section 4.1, *Land Use*, this study attempted to determine a desirable mix of transportation modes and transit-oriented land uses that would reduce traffic congestion and promote quality of life. This study recommended integration of a strong transit and commuter/passenger rail component into future transportation infrastructure improvements.

4.3.3 Environmental Consequences and Mitigation Measures

The following subsections provide a summary of the environmental consequences and mitigation measures for social effects in the study area. As described in the Final EIS, the proposed build alternatives would affect, to differing degrees, social composition, community cohesion, public facilities, services and utilities, recreation resources, public health and safety, and quality of life in the study area. Although the proposed build alternatives would impact minority and low-income populations, these impacts would not be disproportionately high or adverse compared to the same impacts on the population as a whole.

4.3.3.1 Socially Disadvantaged Groups

As described in the Final EIS, socially disadvantaged groups include blind, low-income, minority, and elderly persons. As described in Section 4.3.2.2 above, the number of indigent households in the study area has decreased from seven to two since publication of the Final EIS; both indigent households are located in Davis County. Figure 4.3-6, which updates Figure 4-6 of the Final EIS, illustrates the location of affected socially disadvantaged groups in the study area.

Section 4.3.3.2 below provides a discussion of environmental justice, which is related to this discussion of socially disadvantaged groups.

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on socially disadvantaged groups would occur under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would impact socially disadvantaged groups, although the nature and timing of these projects are not known at this time.

Build Alternatives

There have been no changes to the impact discussion in the Final EIS relative to socially disadvantaged groups. As described in the Final EIS, all the build alternatives would indirectly affect the two households with blind residents in Davis County. After publication of the Final EIS, Commercial Coatings, a company employing 75 percent minority persons, was relocated to a new facility within 2 miles of the previous facility. The new facility is more accessible for employees and there are no adverse impacts associated with this relocation.

All the proposed build alternatives would facilitate movement and transportation of persons in all social groups, including socially disadvantaged groups. However, funding for North Corridor projects would come in part from gas taxes, which could disproportionately affect low-income populations.

Mitigation Measures

As described in the Final EIS, business displacement assistance would be provided to Commercial Coatings pursuant to the eligibility and other requirements of the Uniform Relocation Assistance and Real Property Acquisition Act (see Section 4.4, *Relocations.*)

4.3.3.2 Environmental Justice Population

As described in 4.3.2.2 above, information from the 2000 Census and the Utah Governor's Office of Planning and Budget was used to identify environmental justice populations (i.e., minority and low-income populations) in the study area. Project impacts, including relocations, noise, and construction-related impacts, were then examined in relation to these populations to determine whether the environmental, social, or economic effects associated with the proposed build alternatives would be disproportionately high or adverse on these populations. The impact conclusions presented in the Final EIS have not changed. The following supplemental information is presented to support the analysis disclosed in Section 4.3.7 of the Final EIS, and to present an updated analysis based on information collected from the 2000 Census.

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on environmental justice populations would occur under the existing conditions (2004) No-Build Alternative.

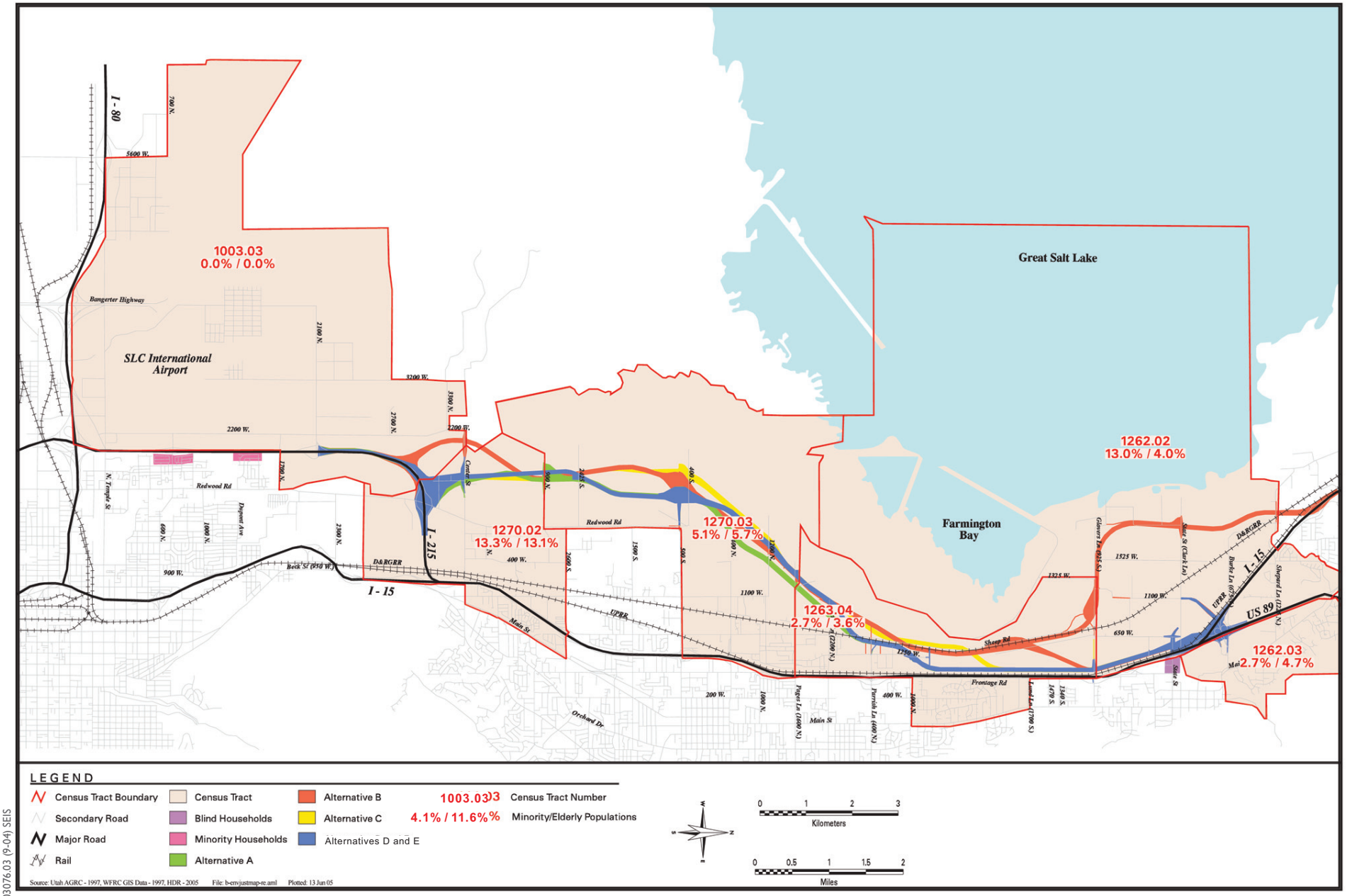

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Figure 4.3-6
Minority, Elderly, and Blind Populations

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would impact environmental justice populations, although the nature and timing of these projects are not known at this time.

Build Alternatives

Potential impacts on minority and low-income households resulting from implementation of the build alternatives were evaluated using two steps. The first step used census tract, block group, and block data to determine where concentrations of minority or low-income populations were located in the study area. The second step examined whether minority or low-income populations would be disproportionately affected by the environmental, social, or economic impacts of the proposed build alternatives. Impacts considered included relocations, noise, and construction-related impacts.

As mentioned above in Section 4.3.2.3, census tract 1262.02, block group 1 has a higher proportion of minorities than the Davis County average (13.0 percent versus 10.2 percent), which indicates the possible existence of an environmental justice population in this area. Alternatives A, C, D, and E stop at the proposed northern terminus, which is south and well east of the I-15/US-89 divergence, where the majority of the development in this census tract is located. Although Alternative B would extend north and east of the I-15/US-89 divergence, the alignment would not affect any development in that area.

In addition, Alternative B is the only build alternative that would likely affect the high-end residential development near Shepard Lane. However, given the type of development near Shepard Lane, it is unlikely that Alternative B would have a disproportionate adverse effect on low-income populations. It is not known whether there are minority populations living in the development near Shepard Lane.

As described in Section 4.3.2.3 above, census tract 1270.2, block group 2 contains a minority population of 16.8 percent, which is higher then the Davis County average (10.2 percent) and the state average (14.7 percent). This indicates that an environmental justice population may also exist in this area. However, because all the proposed build alternative alignments are located west of Redwood Road in primarily undeveloped areas, it is unlikely that the environmental justice populations in this block group would be affected by the build alternatives.

As of September 2003, UDOT has acquired four residential properties, all of which are necessary for construction of all the build alternatives (see Subsection 4.4.3.1, *Residential Properties*). Of these four properties, one is considered an environmental justice household due to a combination of low-income and elderly residents. Although this household would be affected, this impact is not considered disproportionate to impacts on other residential populations.

In summary, taking into consideration the 2000 Census data and residential relocations to date, it does not appear that any proposed build alternative would have a disproportionate adverse impact on minority or low-income populations.

4.3.3.3 Neighborhood and Community Cohesion

Community Concerns

The Final EIS provides an in-depth discussion of local community concerns and preferences relative to construction of the proposed Legacy Parkway (see Section 4.52 of the Final EIS). These concerns and

preferences have not changed since publication of the Final EIS. Issues identified by community leaders as important in their respective jurisdictions include relocations, visual impacts, noise impacts, air quality impacts, public safety, and community cohesion. Communities in the study area favor constructing a roadway as far west as reasonably possible to maximize the contiguous area available for development and to minimize community division. At the same time, the communities want to prevent growth in environmentally sensitive and difficult-to-serve areas west of the proposed corridor.

The following sections provide more specific discussion of community concerns relative to the No-Build and build alternatives. These concerns were reiterated during the public scoping period for the Supplemental EIS, as well as during CPIC meetings, which were held during the summer and fall of 2003 to solicit input from local jurisdictions and interested parties on, among other things, potential community impacts that could result from implementation of the proposed build alternatives (see *Foreword/Introduction*). In addition to the concerns listed below, communities have expressed concern over the economic costs associated with further delays in construction of the proposed action.

Community Concerns about No-Build Alternative

As described in the Final EIS, local jurisdictions and the public are primarily concerned about traffic congestion, safety, and emergency service delays under the No-Build Alternative. These impacts are discussed in detail in this section, as well as in Section 4.5.2 of the Final EIS.

Community Concerns about Build Alternatives

Local jurisdictions and the public continue to have a number of general concerns regarding the proposed build alternatives, as described below. Concerns specific to each local jurisdiction have not changed since publication of the Final EIS, and are presented in Section 4.5.2 of the Final EIS. All the local jurisdictions have stated that they would prefer that Legacy Parkway be located along the western edge of their developable lands to minimize the concerns described below.

- **Displacement and Relocation of Current Businesses and Residents**. Section 4.4, *Relocations*, of this document provides details on the number and location of potential residential, business, and farmsteads that would be displaced under each of the build alternatives. Minimizing the number of relocations remains a concern of the local communities.

- **Loss of Developable Upland**. Section 4.5.2 and Tables 4-10a through 4-10f in the Final EIS quantify the acreage of developable upland that would be lost with implementation of any proposed build alternative. Since publication of the Final EIS, the proposed right-of-way width for the build alternatives has been narrowed from 100 m (328-ft) to 95 m (312-ft) (see Chapter 3, *Alternatives*). This 5-m (16-ft) reduction in the right-of-way could decrease the acreage of developable upland lost under the proposed build alternatives; however, because this reduction is minimal and it may not be possible for UDOT to sell back this limited area to affected property owners, it is assumed for the purposes of the Supplemental EIS that the impacts on developable land are the same as those presented in the Final EIS. Minimizing the amount of developable upland affected by the highway remains a concern of the local communities.

  Table 4.3-8, which summarizes information presented in Table 4-10a of the Final EIS, illustrates the total developable uplands in the study area, the total developable uplands that would be lost due to project impacts, and location of those developable uplands relative to each project alignment (i.e., the acreage that would be located to the west of the alignment and, therefore, segmented from the associated community). Although this information has not been updated to reflect the narrower right-of-way associated with Alternatives A, B, C, and E, or the extent of the Legacy Nature Preserve

described in the Supplemental EIS, it provides *relative* information on how each build alternative would affect developable lands in the study area, and which of the alternatives would result in more segmentation of local communities.

Table 4.3-8 Approximate Amount of Developable Upland in the Study Area

	Hectares (Acres)				
	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Total Developable Uplands in Communities[1]	2,200 (5,436)	2,200 (5,436)	2,200 (5,436)	2,200 (5,436)	2,200 (5,436)
Total Developable Uplands Lost to Project[2]	363 (897)	523 (1,292)	403 (996)	415 (1,026)	415 (1,026)
Total Remaining Developable Uplands After Project	1,837 (4,539)	1,677 (4,144)	1,797 (4,440)	1,785 (4,410)	1,785 (4,410)
Remaining Developable Uplands West of Alignment	1,264 (3,123)	844 (2,086)	944 (2,332)	1,125 (2,779)	1,125 (2,779)

Notes:

[1] *Communities* include the Cities of North Salt Lake, West Bountiful, Woods Cross, Centerville, and Farmington, as well as nearby unincorporated areas likely to be annexed. Total developable uplands in communities excludes developed areas, wetlands, and uplands that are difficult to access.

[2] Total developable uplands lost to project are attributed to developable uplands in the proposed right-of-way and land in the Legacy Nature Preserve. These acreages are based on the right-of-way width considered in the Final EIS (i.e., 328-feet) and have not been adjusted to reflect the narrowed (i.e., 312-ft) right-of-way width associated with Alternatives A, B, C, and E. They are provided to present *relative* impacts only.

Source: Federal Highway Administration et. al. 2000.

- **Loss of Tax Base**. The loss of tax base is defined in the Final EIS as the loss of current tax revenues from the undeveloped lands purchased for the proposed build alternative plus the foregone tax revenues that might be realized if that land were developed under the No-Build Alternative. The loss of tax base under the build alternatives remains a concern for communities in the study area.

- **Fragmentation of Remaining Developable Land**. As described in the Final EIS, local communities are concerned that the proposed build alternatives would affect additional developable lands in the study area by either dividing them (i.e., leaving lands on both sides of the proposed highway) or by acquiring a portion of a given parcel (i.e., reducing the parcel size). Table 4.3-8 provides relative information on the amount of developable uplands that would remain on the west side of each build alternative alignment, providing a quantitative measure of how communities would be fragmented as a result of the proposed action.

- **Emergency Services**. As described in the Final EIS, local communities are also concerned that the proposed highway would adversely affect emergency service access to the west side of the proposed highway. See Section 4.3.3.6 for a discussion of impacts associated with emergency services.

- **Neighborhood and Community Cohesion**. Local communities are also concerned that the proposed build alternatives would physically divide their communities, affecting future neighborhood and community cohesion. These concerns are exacerbated by current highway (I-15) and railroad (UPRR and D&RG) infrastructure in their communities. As mentioned above, Table 4.3-8 provides relative information on the amount of developable uplands that would remain on the west side of the

alternative alignments, illustrating how community cohesion could be affected by the proposed action.

Property Purchased by UDOT

Section 4.5.2 in the Final EIS and Figure 4.1-1 list and graphically depict the location of parcels in the study area that had been acquired by UDOT to facilitate construction of Alternative D (Final EIS Preferred Alternative). Since publication of the Final EIS, UDOT has continued to acquire land in the proposed Alternative D right-of-way and the Legacy Nature Preserve. Section 4.4, *Relocations*, lists additional properties that have been acquired since publication of the Final EIS. In total, as of August 2005, UDOT has completed the purchase of 204 (307 ha [758 ac]) of the 228 (357 ha [881 acres]) property parcels that lay in the proposed Alternative D right-of-way (West pers. comm.[e]). The preceding total acreage is in addition to the 849 ha (2,098 ac) in the Legacy Nature Preserve, of which only 67.6 ha (167 ac) (in 5 parcels) remain to be purchased (West pers comm. [e]).

4.3.3.4 Travel Patterns and Accessibility

As described in Section 4.3.2 of the Final EIS, both the No-Build Alternative and build alternatives would result in impacts on the travel patterns and accessibility of arterials and local roadways in the study area. The Final EIS evaluated more generically traffic flow and post construction access issues for a wide range of arterials and local roadways in and around the study area. This section updates and provides a more detailed analysis of impacts on four locations on major corridor highways (I-15, US-89, and I-215) and 12 locations on three local roadways (Parrish Lane, 500 South, Redwood Road), as described above in Section 4.3.2.5, above. This section also addresses the projected post construction level of service in 2020 under the No-Build Alternative and build alternatives. Construction-related access issues are described in Section 4.20, *Construction Impacts*.

Of note, the following impact analysis differentiates between the build alternatives and No-Build Alternative (future conditions). As described in Section 4.0.3, *Alternatives Evaluated*, the future conditions (2020) No-Build Alternative represents the WFRC long range plan in the year 2020, without Legacy Parkway and without improvement of I-15 improvements to 10 lanes. In 2020, the long range plan includes commuter rail, expanding Redwood Road from two to four lanes (from south of I-215 to 500 South), and no expansion of I-15.

No Build Alternative

Existing Conditions

As presented in section 4.3.2.5, level of service is represented in a letter grading system used to describe different levels of traffic congestion, ranging from LOS A for excellent conditions (free-flowing traffic) to LOS F for failure conditions (extremely congested stop-and-go traffic). In urban areas, UDOT strives to maintain LOS D or better operating conditions on interstate freeways. Existing p.m. peak-period level of service for the primary facilities in the corridor are described above in Tables 4.3-6 and 4.3-7. All the listed freeways, expressways, and arterials operate at acceptable peak-period ratings of LOS D or better under existing conditions.

Future Conditions (2020)

As shown in Tables 4.3-9 and 4.3-10 (below), under the future conditions (2020) No-Build Alternative, levels of service would deteriorate to LOS E or worse at many locations, including those listed below.

- US-89 north of I-15 interchange in Farmington (LOS F).
- I-15 north of US-89 interchange in Farmington (LOS E).
- I-215 east of Legacy Parkway (LOS F).
- I-215 south of Legacy Parkway (LOS F).
- Parrish Lane from I-15 to 400 West (LOS F).
- Redwood Road from 500 South to 1500 South (LOS E).
- Redwood Road from 1500 South to 2600 South (LOS E).
- Redwood Road from 2600 South to Center Street (LOS F).
- Redwood Road from Center Street to I-215 (LOS F).

Table 4.3-9 Projected 2020 Levels of Service on Interstate and Major State Highway Segments in Study Area

	No-Build Alternative					Shared Solution				
Roadway Segment	Lanes per Direction	Total Daily Traffic	Peak-Hour Peak-Direction (Northbound) Volume	Peak-Period Peak-Direction (Northbound) Volume	Peak-Period LOS	Lanes per Direction	Total Daily Traffic	Peak-Hour Peak-Direction (Northbound) Volume	Peak-Period Peak-Direction (Northbound) Volume	Peak-Period LOS
US-89 north of I-15 interchange in Farmington	2	97,810	5,550	15,420	F	2	96,620	5,270	14,630	F
I-15 north of US-89 interchange in Farmington	3	124,550	7,520	20,880	E	5	129,410	8,250	22,920	C
I-215 east of Legacy Parkway	2	104,370	5,430	15,100	F	2	39,870	2,110	5,850	B
I-215 south of Legacy Parkway	2	104,370	5,430	15,100	F	3	110,150	6,000	16,670	D
Legacy Parkway south of 500 South						2	70,300	3,900	10,800	D

Notes:

The No-Build Alternative represents WFRC long range plan in the year 2020, without Legacy Parkway or I-15 improvements to ten lanes. The build alternatives represent complete Shared Solution, including I-15 improvements, Legacy Parkway, and maximum future transit.

Values represent direct model values using the 2004 WFRC travel demand model (version 3.2). Total daily traffic volumes are two-directional daily volumes.

Level of service provided based on planning-level volume-to-capacity comparisons in the p.m. peak-period direction.

Source: Fehr & Peers 2005.

The level of service under the No-Build Alternative on I-15, I-215, and local arterials would be worse on most segments than under the proposed build alternatives. Tables 4.3-9 and 4.3-10 provide a complete comparison of future (2020) conditions under the No-Build and build alternatives.

Traffic projections for the 2020 conditions listed above and for the comparison of No-Build and build alternatives in Tables 4.3-9 and 4.3-10 are based on the same WFRC 2020 land use projections used in the current long range plan. While these projections represent the officially adopted land use plans and provide a consistent basis for comparing the future No-Build and build alternatives, it is also possible that some land use shifts could occur under the No-Build Alternative, although any such shifts would be minor in the corridor-wide and regional context. As discussed in Section 4.1.3.3, approximately 324 ha (800 ac) of developable land would become available for development in North Salt Lake, Centerville, Farmington, Woods Cross, Bountiful, and West Bountiful if the proposed Legacy Parkway were not built. The land is located in the Legacy Parkway right-of-way and proposed Legacy Nature Preserve, generally west of existing and developing areas. Under the future conditions No Build Alternative, UDOT would be legally obligated to relinquish the property.[3]

Given this potential variation in land availability, the level of service projections for the 2020 No-Build Alternative presented above and in Tables 4.3-9 and 4.3-10 represent the low end of the range of potential 2020 traffic levels on I-15 and provide a potentially favorable assessment of the potential traffic conditions on surface streets in western areas of North Corridor communities. The land use shifts resulting from the additional 324 ha (800 ac) of developable land in the corridor would range between the following conditions on I-15 at the Woods Cross screenline.

- An increase of 1,100 p.m. peak-period, peak-direction passenger-car equivalents (or 4 percent) above the traffic projection for the official WFRC land use projection. This would occur if the 324 ha (800 ac) of new land use were drawn from development potential further north, in North Davis and Weber Counties.

- An increase of 1,500 p.m. peak-period, peak-direction passenger-car equivalents (or 5 percent) above traffic projections for the WFRC land use projection, if the new North Corridor land use were drawn from other parts of the region.

In both cases, the land use shift would worsen the 2020 level of service on I-15 at the Woods Cross screenline to a worse LOS F than reported in Table 4.3-9 and Chapters 1 and 3 for future No Build conditions. Also, in both cases, relinquishment of the land within the Legacy Parkway right-of-way and Legacy Nature Preserve would increase traffic generation and local street construction in the western portions of North Salt Lake, Woods Cross, Centerville, Bountiful, West Bountiful and Farmington.

Build Alternatives

Impacts on Interstates/Major Arterials

Table 4.3-9 shows the total daily traffic projections, the peak-hour and peak-period volumes, and the level of service on interstate and major state highway segments in the study area. As shown in Table 4.3-9, the build alternatives would result in improved traffic operating conditions for all the interstate and major highway segments analyzed, as well as reduced traffic volumes on all the analyzed interstate and major

[3] The Corps could require UDOT to maintain some of the mitigation land in the Legacy Nature Preserve because of the impacts on wetlands that have already occurred. However, most of the mitigation land and all the right-of-way land would be excessed according to Utah law.

highway segments except two (I-15 north of US-89 interchange in Farmington and I-215 south of Legacy Parkway). Although the volume of traffic would increase along these two segments, roadway improvements that would be implemented as part of the build alternatives would result in an improved level of service over the No-Build Alternative. In 2020, the level of service of the I-15 north of US-89 interchange segment would be at LOS E under the No-Build Alternative but would improve to LOS C under the build alternatives. The I-215 south of Legacy Parkway segment would be at LOS F under the No-Build Alternative but would improve to LOS D under the build alternatives.

I-15

About 65 percent of the existing and future traffic on I-15 in the North Corridor is estimated to be through-corridor traffic (Wasatch Front Regional Council 2003a). As I-15 becomes more congested, drivers will begin to divert to alternative routes, including local streets, or forego peak-period travel, if they have the option. Comparison of the build alternatives and the No-Build Alternative in Table 4.3-9 indicates that drivers are likely to choose both options under the No-Build Alternative. North of the corridor, travel on I-15 and US-89 combined will be about 2 percent lower on a daily basis under the No-Build Alternative. During peak periods, travel will be about 3 percent lower under the No-Build Alternative, reflecting higher influence of congestion during the traffic peaks than on average throughout the day. Under the No-Build Alternative, traffic on I-15 will be about 4 percent lower, reflecting a combination of trips foregone and trips diverted to US-89 and local routes. During the peak periods, this trip suppression and diversion would be more pronounced, with I-15 carrying 9 to 10 percent less traffic than under the build alternatives. These percentages decreased slightly from those reported in the Draft Supplemental EIS because the traffic volume numbers have been updated based on the re-run the traffic model. The build alternatives would reduce trip suppression and diversion while providing improved traffic levels of service. The I-15 improvements that would be implemented as part of the Shared Solution would allow the build alternatives to operate at better levels of service than the No-Build Alternative on I-15 and slightly better operating conditions within the same LOS range on US-89.

Table 4.3-10 Projected 2020 Levels of Service on Local Roadways with Peak-Period Volumes

				2020 – No-Build Alternative				2020 – Shared Solution			
Roadway	Lanes per Direction	From	To	Total Daily Traffic	Peak Period EB	Peak Period WB	LOS	Total Daily Traffic	Peak Period EB	Peak Period WB	LOS
Parrish Lane	2	Legacy	1250 West	NA	NA	NA	NA	8,440	1,220	1,810	B
	2	1250 West	I-15	11,560	2,450	1,150	C	11,600	1,840	1,880	B
	2	I-15	400 West	27,010	2,410	4,430	F	27,750	3,750	3,570	D
500 South	2	Legacy	Redwood Rd.	NA	NA	NA	NA	11,000	1,280	1,960	B
	2	Redwood Rd.	1100 West	14,350	3,770	1,380	D	5,790	980	740	A
	2	1100 West	800 West	13,030	2,860	1,170	C	5,840	870	590	A
	2	800 West	I-15	20,740	3,500	2,510	D	21,470	2,770	2,140	C
	2	I-15	200 West	16,530	2,020	1,820	B	24,010	2,720	2,400	C
				Total Daily Traffic	Peak Period SB	Peak Period NB	LOS	Total Daily Traffic	Peak Period SB	Peak Period NB	LOS
Redwood Road	2	500 South	1500 South	15,250	1,550	3,860	E	10,560	1,070	1,980	B
	2	1500 South	2600 South	16,990	1,890	4,040	E	12,060	1,450	2,000	B
	2	2600 South	Center St.	21,640	2,580	4,740	F	16,260	2,100	2,380	C
	2	Center St.	I-215	25,040	3,480	5,610	F	19,450	2,440	2,900	C

Notes:

The build alternatives represent the complete Shared Solution, including I-15 improvements to ten lanes, Legacy Parkway, and maximum future transit. The No-Build Alternative represents WFRC long range plan in the year 2020, without Legacy Parkway improvements and I-15 ten lane improvements.

Values represent direct model values using the 2004 WFRC travel demand model (version 3.2). Total daily traffic volumes are two-directional daily volumes.

Level of service provided based on planning-level volume-to-capacity comparisons in the p.m. peak period, peak direction.

Source: Fehr & Peers 2005.

US-89

The volume of traffic on US-89 north of the I-15 interchange in Farmington (northbound) would be similar under both the build alternatives and the No-Build Alternative, and the level of service in 2020 would be LOS F under both scenarios.

Because of improvements on I-15 that are part of the Shared Solution, US-89 is projected to experience a slight decrease in traffic volume under the build alternatives.

I-215

The amount of traffic on I-215 south of Legacy Parkway would be greater under any build alternative than under the No-Build Alternative. An additional travel lane is proposed as part of the build alternatives in the short section of I-15 between Legacy Parkway and 2200 North. Consequently, this segment would operate at LOS D under the build alternatives, which would be an improvement over the anticipated LOS F under the No-Build Alternative.

The section of I-215 east of Legacy Parkway would operate at LOS B and would carry substantially less traffic under the build alternatives. Legacy Parkway would improve the operation on this segment of I-215 relative to the No-Build Alternative, which would result in LOS F conditions.

Interstates/Major Arterials Outside Study Area

Additional increases in traffic volume of up to 4 percent can be expected on certain facilities both north and south of the Legacy Parkway termini as a result of the Shared Solution.[4] Highway segments north of the North Corridor are expected to experience demand in excess of capacity in 2020, according to WFRC regional transportation plans. Traffic volumes on I-15 north of both US-89 and 200 North are projected to increase regardless of whether the proposed action is implemented. If highway improvements north of the proposed action are not constructed and no improvements are made to I-15 north of 200 North, I-15 north of the North Corridor is projected to reach LOS F by 2020 under both the No Build and build alternatives. UDOT and WFRC are currently conducting a study to identify potential solutions to this problem, but improvements are not currently included in the WFRC long range plan.

US-89 north of the I-15 interchange is also projected to fail by 2020, with capacity improvements planned between 2020 and 2030. The proposed action, as part of the Shared Solution, would reduce traffic volume on US-89 but not enough to allow US-89 to operate better than LOS F.

I-215 south of the Legacy Parkway interchange is also projected to experience increased traffic volumes due to the Shared Solution improvements in the North Corridor. Conditions on I-215 northeast of the Legacy interchange would improve with implementation of the Shared Solution, and the segment immediately southwest of the Legacy/I-215 would operate at LOS D. However, the volume increase further south on I-215, between 2100 North and I-80, may reach LOS E. The segment of I-215 between I-80 and I-15 has been identified as a “problem” in the WFRC long range plan; as such, an “Illustrative Project” to solve the problem has been identified in the long range plan, in the event that funding increases above the projected (financially constrained) amount. Detailed design analysis of the Legacy Parkway terminus interchanges would also address any operational traffic issues at connections to and from I-215 at the southern end of the corridor and to and from I-15 at the northern end.

[4] The issue of induced demand is discussed further in Section B3.4.4 in Appendix B.

Impacts on Local Roadways

Table 4.3-10 above shows the level of service on local roadways proposed to have interchanges with Legacy Parkway in the study area. The level-of-service determinations are based on peak-period volumes. On average, the level of service based on the 3-hour peak-period volumes would be expected to be one half to one full grade better than the peak-hour level of service.

As shown in Table 4.3-10, all of the build alternatives would result in improved traffic operating conditions on analyzed local roadway segments. The build alternatives would result in reduced peak-period, peak-direction traffic volumes on all the local segments except two (Parrish Lane between 1250 West and I-15, and 500 South between I-15 and 200 West). Although the volume of traffic would increase along Parrish Lane, future planned roadway improvements would result in an improved level of service over the No-Build Alternative. The segment of 500 South that is east of I-15 would experience a change in level of service from LOS B to LOS C under the build alternatives.

Parrish Lane

Under the build alternatives, the volume of traffic would be slightly higher than under the No-Build Alternative. Traffic volumes on Parrish Lane immediately west of I-15 are projected to increase with or without implementation of the proposed action. Parrish Lane is included in the WFRC long range plan to be widened to four lanes from I-15 to the proposed Parrish Lane/Legacy Parkway interchange. Under the build alternatives, additional improvements to Parrish Lane associated with the interchange improvements would add additional capacity. With the planned improvements, even segments of Parrish Lane that are predicted to carry more traffic under the build alternatives would operate at equal or better level of service than under No-Build conditions because the volume of traffic flowing east and west would be balanced (i.e., reduced west-bound congestion).

500 South and Redwood Road

Under the No-Build Alternative, the 500 South/Redwood Road roadway serves as a “relief valve” for congestion on I-15. Due to traffic diversion as well as development activity in the area, traffic levels under the No-Build Alternative are projected to increase, and the level of service would reach LOS E or F on the southern segments of Redwood Road. Redwood Road would not meet UDOT’s policy for acceptable level of service.

Under the build alternatives, a substantial amount of this traffic would move to the more efficient Legacy Parkway, and the level of service would improve to LOS C or higher.

4.3.3.5 Public Facilities

As described in Section 4.3.2 of the Final EIS and Section 4.3.2.6 above, four churches, two existing schools, two planned schools, the Centerville Public Works facility, a UDOT maintenance facility, and the Bountiful Sanitary Landfill are located in the study area. As a result of construction activities associated with Alternative D (Final EIS Preferred Alternative), the Farmington Public Works facility was relocated to 720 West 100 North in Farmington. The following provides a summary of potential impacts on these resources.

No-Build Alternative

Existing Conditions (2004)

As stated in the Final EIS, there would be no project-related impacts on public facilities in the study area under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would impact public facilities, although the nature and timing of these projects are not known at this time.

Build Alternatives

Table 4.3-11, which is based on Table 4-5 in the Final EIS, summarizes the public facilities that would be affected under each build alternative. Impacts on existing facilities have not changed, and a more detailed description of these potential impacts is presented in Section 4.3 of the Final EIS. For the new and planned schools described above in 4.3.2.6, impacts are as follows.

- Construction of Alternative B would physically displace the new Farmington Bay Elementary School in the Farmington Ranch subdivision.
- Alternatives A, C, D, and E would be adjacent to the proposed new high school at Glovers Lane. Given the proximity of the proposed high school to I-15 and these proposed alignments, it is possible that noise levels at the high school could exceed FHWA noise thresholds if any of these alignments were constructed. Alternative B would be west of the proposed high school and would not affect it.
- The proposed elementary school in North Salt Lake would be located considerably east of the build alternatives and would not be affected.

Mitigation Measures

As described in the Final EIS, impacts on public facilities would be mitigated by providing compensation for real property taken or damaged, or by functionally replacing the publicly owned real property with another facility that would provide an equivalent use to that lost.

Table 4.3-11 Impacts on Public Facilities

	Build Alternative[1]				
Facility	A	B	C	D	E
Bountiful City Landfill (BARD)		X	X	X	X
Centerville Public Works (at 1250 West Street)	X			X	X
Farmington Public Works (at 50 North 650 West)[2]	X	X	X	X	X
UDOT Maintenance (at 1100 North and 1250 West, Centerville)	X	X		X	X
Church and associated Athletic Field (near 350 West and Shepard Lane, Kaysville)		X			
Farmington Bay Elementary School (at 1933 W. Clark Lane)		X			
Proposed High School (near Glovers Lane and 650 West)	X		X	X	X
Proposed Elementary School (west of Redwood Road, North Salt Lake)					

Notes:

Shaded areas represent new public facilities in the study area identified since publication of the Final EIS.

[1] An "X" in the table indicates that there would be an impact on the facility. See Section 4.3 of the Final EIS for details on the nature of the impacts.

[2] The Farmington Public Works facility was relocated from 50 North 650 West to 720 West 100 North in Farmington as a result of construction activities associated with Alternative D (Final EIS Preferred Alternative). This facility would have required relocation under all the proposed build alternatives, as indicated above. None of the build alternatives would affect the current location of 720 West 100 North.

4.3.3.6 Public Services and Utilities

As described in Section 4.3.4 of the Final EIS, the two primary public services that could be affected by the proposed build alternatives are emergency services (i.e., fire protection, paramedic services, and law enforcement) and hazardous material incident response. Implementation of any proposed build alternative could also affect utility lines in the study area. The environmental consequences and mitigation measures associated with public services and utilities are summarized below.

Fire Protection and Ambulance Service

No-Build Alternative

Existing Conditions (2004)

As described in the Final EIS, traffic congestion on I-15 will continue to increase under the existing conditions (2004) No-Build Alternative. This congestion would make it more difficult for emergency response vehicles to respond to emergencies on and around I-15.

Future Conditions (2020)

If none of the build alternatives is implemented, I-15 congestion will continue as described under the existing conditions (2004) No-Build Alternative. Future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action, although the nature and timing of these projects are not known at this time. Under the future conditions No-Build Alternative, it is likely that response times for fire protection and ambulance services would be similar to, if not slightly greater than, those described for the existing conditions No-Build Alternative.

Build Alternatives

As described in the Final EIS, local emergency response officials indicate that construction of any proposed build alternative would improve emergency response times by relieving I-15-related traffic. In most cases, Alternative A would result in the most substantial improvements to response times; however in certain areas to the west of the proposed build alternatives, response time under Alternative A could increase because of limited crossings over the proposed highway. Alternative B would exacerbate response times in Farmington because the volunteer emergency response team would have to cover greater distances.

Response to Hazardous Material Incidents

No-Build Alternative

Existing Conditions (2004)

As described in the Final EIS, under the existing conditions (2004) No-Build Alternative, accidents involving hazardous materials could occur on the existing roadways in the study area. Such incidents could result in the closure of I-15, the only north-south route in the study area.

Future Conditions (2020)

If none of the build alternatives is implemented, the potential for hazardous materials incidents will continue as described under the existing conditions (2004) No-Build Alternative. Future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action, although the nature and timing of such projects are not known at this time. Under the future conditions No-Build Alternative, it is likely that response times to hazardous materials incidents would be similar to, if not slightly greater than, those described for the existing conditions No-Build Alternative.

Build Alternatives

As with the No-Build Alternative, accidents involving hazardous material could occur on any roadway in the study area, including the proposed Legacy Parkway. However, it is unlikely that there would be an accident so severe that it would close both I-15 and the proposed highway. As stated in the Final EIS, construction of any proposed build alternative would ensure that at least one north-south route remains accessible during a potential spill.

Police Protection and Highway Patrol

The environmental consequences associated with the No-Build and build alternatives on police protection and highway patrol have not changed since publication of the Final EIS, and are similar to those described above under *Fire Protection and Ambulance Services*.

Water and Sanitation Service

Water and sanitation services located east of the proposed build alternative alignments would not be adversely affected by the build alternatives because existing water mains and sewer interceptors could be easily relocated to accommodate future growth or construction of the proposed highway. Providing water and sanitation services west of the proposed alignments would be more difficult because of the additional cost and logistics associated with crossing the new highway.

Mitigation Measures

No mitigation measures are proposed for impacts on public services.

Utilities

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on utility infrastructure or service would occur under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would impact utility service and infrastructure, although the nature and timing of these projects are not known at this time.

Build Alternatives

As described in the Final EIS, local utility service could temporarily be lost during relocation of utility lines in the rights-of-way of the build alternatives. Any disruption would be minimal, however, and comparable to that associated with maintenance during normal operating periods.

Several major utility lines in the study area would have to be relocated, and several have been relocated since publication of the Final EIS, including the two water and wastewater utility lines and two natural gas lines that were relocated to the east side of the Alternative E alignment (see Section 4.3.2.7 above). All relocated lines would be located in a transmission corridor easement. Of note, providing utilities to the west of any of the proposed alternative alignments would be difficult and possibly cost prohibitive.

Existing telecommunication fiber-optic lines in the rights-of-way of the proposed build alternatives (which were summarized on Page 3-23 in the Final EIS) would be protected in place rather than relocated. This would minimize telecommunication service interruptions resulting from construction of the proposed action.

Mitigation Measures

No mitigation measures are proposed for impacts on utilities.

4.3.3.7 Recreation Resources

No-Build Alternative

Existing Conditions (2004)

There would be no project-related impacts on recreation resources under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

Recreation facilities in the study area are expected to experience increased use as the population and recreation demands in the study area expand. Recreation opportunities, however, are likely to decrease as development takes up more of the area’s open space.

Build Alternatives

Table 4.3-12 summarizes the impacts on recreation resources in the study area that are described in detail in Section 4.3.5 of the Final EIS. It should be noted that Table 4.3-12 only lists the recreation resources that would be affected by the build alternatives; all other resources listed in Section 4.3.2.8 above, including the two newly identified planned parks, would not be affected by the build alternatives and are not listed in Table 4.3-12.

Table 4.3-12 Impacts on Recreation Resources in Study Area

	Alternatives[2]					
Recreation Resource[1]	No-Build (Existing Conditions 2004)	A	B	C	D	E
Wildlife Recreation Areas						
Farmington Bay Waterfowl Management Area			X	X		
Public Recreation Facilities						
Jordan River OHV Center		X	X	X	X	X
Access to Lagoon Park at Lagoon Drive		X	X	X	X	X
Bountiful City Pond			X	X	X	X
Private Recreation Facilities						
Planned Golf Course (2200 South, Woods Cross)		X	X	X	X	X
Equestrian Center (1450 West, 400 North, West Bountiful)		X				
Gun Club (200 South, Redwood Road)		X			X	X

Notes:

1 Recreation resources in the table only reflect those that would be affected by one of the proposed build alternatives. A complete description of the type and extent of these impacts is provided in Section 4.3.5 of the Final EIS.

2 An "X" in the table indicates that there would be an impact on the resources. See Section 4.3.5 of the Final EIS for details on the nature of the impacts.

Impacts on recreation resources have not changed since publication of the Final EIS, with three exceptions: the elimination of a proposed access location to the FBWMA and Bountiful City Pond; updated noise analyses for evaluation of impacts at the FBWMA and Bountiful City Pond; and a change in the amount of land that would be acquired at Bountiful City Pond, Jordan River OHV Center, and FBWMA. The following text summarizes these updates. Section 4.3.5 of the Final EIS should be consulted for a complete description of impacts on recreation resources. Refer to Section 4.7, *Pedestrians and Bicycle Considerations*, for a discussion of the potential recreational opportunities from the proposed trail associated with the build alternatives.

Access to Farmington Bay Waterfowl Management Area and Bountiful City Pond

As described in Section 4.3.2.8, the non-motorized vehicle overpass at Pages Lane is no longer proposed. As a result, motorized vehicles would access the FBWMA by taking the 500 South exit off Legacy

Parkway and the corresponding frontage road. Similarly, motorized vehicles would access Bountiful City Pond by taking the 500 South exit and the frontage road along the west side of the proposed Legacy Parkway. Non-motorized access would be provided to both FBWMA and Bountiful City Pond by the frontage roads that run along the west side of the proposed alignments. Access to the frontage roads would be provided at 500 South. As stated in the Final EIS, travel time would slightly increase for motorists visiting these areas.

Noise at Farmington Bay Waterfowl Management Area and Bountiful City Pond

Noise levels at the FBWMA and Bountiful City Pond would increase as a result of the proposed action. However, relatively noisy activities are associated with both Bountiful City Pond and the FBWMA (e.g., boating, hunting), and increased noise levels resulting from the proposed action would not substantially affect recreational activities.

Encroachment on Farmington Bay Waterfowl Management Area, Bountiful City Pond, and Jordan River OHV Center

Table 4.3-13 illustrates the amount of land in the FBWMA, Bountiful City Pond, and Jordan River OHV Center that would need to be acquired to construct the build alternatives. This information has been updated since publication of the Final EIS due to slight changes in the alignments and right-of-way widths of Alternatives A, B, C, and E. As such, the information disclosed in the Final EIS is presented for comparative purposes.

Table 4.3-13 Land Acquisitions Required in Recreation Areas in the Study Area (hectares [acres])

	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
Recreation Area	Final EIS	SEIS	Final EIS	SEIS	Final EIS	SEIS	Final EIS	SEIS	Final EIS	SEIS
Bountiful City Pond	0 (0)	0 (0)	1.6 (4)	1.7 (4.2)	2.4 (6)	2.4 (5.9)	2.4 (6)	2.4 (6)	N/A	2.1 (5.2)
FBWMA	0 (0)	0 (0)	0.2 (0.5)	1.6 (4.0)	1.2 (3.0)	2.7 (6.5)	0 (0)	0 (0)	N/A	0 (0)
Jordan River OHV Center	1.9 (4.8)	1.0 (2.5)	3.8 (9.5)	3.2 (7.8)	1.9) (4.8)	1.0 (2.5)	1.9 (4.8)	1.9 (4.8)	N/A	1.0 (2.5)

SEIS = Supplemental EIS

The City of Bountiful stated in a September 23, 2004, letter to UDOT that the proposed Legacy Parkway project and the resulting improved access are beneficial for the recreation facilities located on the Bountiful City Pond property. The city also clarified that the southeastern corner of the Bountiful City Pond property, which would be affected by Alternatives B, C and E, is not used for recreational activities.

Mitigation Measures

As described in the Final EIS, providing a frontage road along the western side of Legacy Parkway from Sheep Road to the eastern entrance of the FBWMA would mitigate the impact under Alternatives B and C on FBWMA's eastern entrance and parking lot. The parking lot and other land would be replaced with land of at least equal value and usefulness.

4.3.3.8 Public Health and Safety

As described in 4.3.2.9, air quality, fog, lake-effect snow, and congestion-related aggression are public health and safety considerations in the study area. The impacts on public health and safety have not changed since publication of the Final EIS. Air quality impacts are discussed in Section 4. 8, *Air Quality*, of the Supplemental EIS; other public health and safety impacts are summarized below.

Ice, Fog, and Lake-Effect Snow

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions (2004) No-Build Alternative, the public would continue to be subject to safety concerns associated with ice, fog, and lake-effect snow on existing roadways.

Future Conditions (2020)

Under the future conditions No-Build Alternative, traffic volumes on I-15 and side streets would likely increase, thereby increasing the time travelers are threatened by the effects of ice, fog, and lake effect snow. Exacerbated traffic congestion during periods of ice, fog, and lake-effect snow would also make it difficult for emergency vehicles to operate efficiently in the area.

Build Alternatives

As described in the Final EIS, the effects of ice, fog, and lake-effect snow would be essentially the same under all the proposed build alternatives as under the No-Build Alternative, except that the proposed Legacy Parkway would provide an alternate route that would reduce congestion and minimize time spent on roadways. This could decrease the time the public is subjected to these hazards; however, increased travel speeds could increase the potential severity of accidents.

Congestion-Related Aggression

No-Build Alternative

Existing Conditions (2004)

As described in the Final EIS, increased traffic congestion on I-15 will result in traffic delays and increased potential for aggressive driving (i.e., road rage) incidents.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. However, until such projects are implemented, the increased potential for aggressive driving incidents would be similar to that described under the existing conditions No-Build Alternative.

Build Alternatives

As described in the Final EIS, construction of any proposed build alternative would provide an alternate north-south route in the study area. This would reduce traffic congestion and the likelihood of aggressive driving incidents.

4.3.3.9 Quality of Life

As described in the Final EIS, individuals in the study area have different opinions about how both the No-Build and build alternatives would affect the quality of life in the study area. Factors that affect this qualitative assessment include the rate and scope of development in the region and how that development affects open space, wetlands and wildlife habitats, agricultural land, and recreation opportunities, as well as accessibility, traffic congestion, and the local tax base. Other variables considered may include changes in noise levels, air quality, and utilization of the public transportation system.

The Final EIS discusses how the above factors could be viewed under both the No-Build Alternative and build alternatives; it does not determine which factors are preferable or provide a higher quality of life. There have been no changes to this section since publication of the Final EIS.

Finally, as described in Section 4.3.2.10, *Quality of Life*, Envision Utah and the IRCAA study emphasize developing multi-faceted solutions to traffic congestion problems caused by growth. These solutions, intended to maintain a high quality of life in the region, include the increased use of transit and promotion of transit-oriented development; expansion of existing roadways; and construction of new roadways. This philosophy is also part of the Shared Solution for the North Corridor, which includes a strong transit component, reconstruction of I-15, and construction of the proposed Legacy Highway (see Chapter 3, *Alternatives*). As a result, the proposed action, as part of the Shared Solution, is consistent with the regional transportation strategies described above.

These studies, which include the *Envision Utah Quality Growth Strategy and Technical Review* (Envision Utah 2000) and the *Envision Utah Transit Oriented Development Guidelines* (Envision Utah 2002) endorse integration of land use and transportation through transit and transit-oriented land uses, improving the “walkability of communities,” reducing traffic congestions, and otherwise promoting regional transportation options that maximize quality of life.

Section 4.4
Relocations

This section discusses the potential for the proposed action to result in relocations of residences, business, farmsteads and horse paddocks. This section provides information on the affected environment related to relocations, including one new business structure that has been constructed in the proposed right-of-way of Alternative B since publication of the June 2000 Final EIS. This section also provides updated information on relocation impacts, including properties that have been acquired to date and platted residential subdivisions.

4.4.1 Approach and Methodology

4.4.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with potential relocations in the study area, Sections 3.4 and 4.4 of the Final EIS were reviewed to determine the changes that had taken place since publication of the Final EIS. The study area for relocations is described in Section 4.0.1, *Study Area*, of this document.

Meetings were held with the appropriate city and county planning staff to discuss local land use changes in the study area and to determine whether those changes would affect relocation impacts disclosed in the Final EIS. Minutes of the meetings (HDR Engineering 2003) were reviewed in the preparation of this section. Table 4.1-1 in Section 4.1, *Land Use*, of this Supplemental EIS provides a summary of the dates and attendees at those meetings. In addition, Dave West, the UDOT Right-of-Way Manager for the Legacy Parkway project, was contacted to determine which properties within the Alternative D (Final EIS Preferred Alternative) right-of-way had been acquired since publication of the Final EIS (West pers. comm.[a]).[1] Displacements were reassessed to determine whether the narrower typical cross section (i.e., 95 m [312 ft] versus 100 m [328 ft]) proposed for each of the build alternatives (see Chapter 3, *Alternatives*) would change the number or type of relocation impacts disclosed in the Final EIS (West pers. comm.[b]).

4.4.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of relocations impacts since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

[1] All land acquisitions described in this section are fee-simple title transfers in which UDOT owns the land under clear title. It should be noted, however, that there are other properties within the right-of-way of the build alternatives for which UDOT has a right or access, or is at an interim stage of the condemnation process. These additional properties are not described herein.

- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. Where applicable, impact information presented in this Final Supplemental EIS has been updated to reflect those modifications.

- The acquisition status of business properties within the Alternative D/E right-of-way has been updated to reflect new acquisitions. See Section 4.4.3.2, *Businesses*, and Tables 4.4-4 and 4.4-7.

- Out-of-date information has been updated based on recent input since publication of the Draft Supplemental EIS, and the impact assessment revised as appropriate.

  - Construction has occurred in new housing developments; residential property displacements have been revised accordingly. See Section 4.4.3.1, *Residential Properties*, and Table 4.4-1.

  - Several new residential subdivisions have been platted. Revisions have been made in tables throughout this section to reflect the number of these platted lots that would be displaced under each proposed build alternative.

- Some of the impact assessments were found to be based on incorrect calculations. Such incorrect calculations have been revised. See Section 4.4.3.3, *Farmsteads and Horse Paddocks*, and Tables 4.4-5 and 4.4-7.

- UDOT held additional meetings with planning staff from local jurisdictions in October, November, and December 2004, to discuss topics pertaining to the Supplemental EIS, including current land use, updates to local plans, and potential use of the land associated with the proposed action and the Legacy Nature Preserve if the proposed action is not constructed. Although some of these meetings took place prior to December 2004, this information was inadvertently left out of the Draft Supplemental EIS.

4.4.2 Affected Environment

4.4.2.1 Existing Conditions

Several residential, business, farmstead, and horse paddock properties are located in the study area. As noted in the Final EIS, single-family housing is the predominant type of residence in the study area and the only type of residential property that could be affected by any proposed build alternative. Some land in the study area is zoned light industrial and currently supports businesses associated with auto repair, storage, and other nonretail enterprises. As described in Section 4,2, *Farmlands*, there are over 1,614 ha (3,990 ac) of irrigated and non-irrigated cropland in the study area. In addition, there are numerous horse paddocks and corral facilities in the study area, most of which are located on small parcels of between 1 ha and 3 ha (2 ac and 8 ac).

Although the types of residences, businesses, and farmsteads in the study area have not changed since publication of the Final EIS, one existing business in the study area, Pack Storage Units, has constructed an additional storage facility since publication of the Final EIS. Pack Storage Units was identified in the Final EIS as a business that would be displaced if Alternative B were implemented.

4.4.2.2 Uniform Relocation Assistance and Real Property Acquisition Act of 1970

The Uniform Relocation Assistance and Real Property Acquisition Act (URAA), as amended (42 USC 4601 et seq., as amended, 1989), requires that project applicants provide equitable and uniform treatment of all persons displaced from their homes, businesses, and farmsteads, without discrimination on any basis. The act requires that financial and technical relocation assistance be provided to residents displaced, and that business and farmstead properties be purchased at fair market value. A more complete description of the requirement of the URAA is provided in Section 4.4 of the June 2000 Final EIS.

The relocation provisions of the URAA do not apply to platted lots where structures would not be displaced by project construction.

4.4.3 Environmental Consequences and Mitigation Measures

The following subsections provide an update of the environmental consequences and mitigation measures associated with relocation impacts.

4.4.3.1 Residential Properties

As described in the Final EIS, all the residential properties that would be affected by the proposed build alternatives are occupied, single-family structures. There have been no changes to the number, type, or location of residential properties identified for displacement in the Final EIS. However, all four of the residential structures that fall within the Alternative D/ E alignment have been acquired by UDOT since publication of the Final EIS (West pers. comm.[a]). Table 4.4-1 below lists the residential displacements that would occur under each of the alternatives as well as the number of platted lots that would be affected by the proposed build alternatives.

Since publication of the Draft Supplemental EIS, the number of residential properties displaced by Alternative A has been updated because construction has occurred in new housing developments, as described in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*. Alternative A would displace an additional 10 residential properties not indicated in the Draft Supplemental EIS, which leads to a total of 17 residential displacements under Alternative A. Of these additional residential properties, three are in the Foxboro development in North Salt Lake and seven are in the Birnam Woods development in West Bountiful.

The following provides a summary of the impacts on residential properties that would result from the No-Build Alternative and the build alternatives.

No-Build Alternative

Existing Conditions (2004)

No residential properties would be displaced under the existing conditions No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. These future projects could possibly displace residential properties, although the nature and timing of these projects are not known at this time.

Build Alternatives

As mentioned above, there have been no changes in the number, type, or location of residential properties that would be displaced by the proposed build alternatives since publication of the Final EIS, except for Alternative A. Table 4.4-1 summarizes the number of residences and platted lots that would be displaced by each build alternative. (The addresses of these residential properties are provided in Section 4.4.1 of the Final EIS.) The proposed narrower typical cross section would not affect the number of residential properties that would be displaced by the build alternatives because no additional residential properties would be included or excluded by this right-of-way width change (West pers. comm.[b]).

Table 4.4-1 Number of Residential and Platted Lot Displacements Associated with Build Alternatives

Alternative	Number of Residential Displacements[1]	Number of Platted Lot Displacements[2]
No-Build Alternative	0	0
Alternative A	17	67
Alternative B	14	36
Alternative C	5	0
Alternative D	4	0
Alternative E	4	0

Notes:

[1] Represents number of single-family residences that would be displaced in the proposed 95-m (312-ft) right-of-way. See Section 4.4.1 of the Final EIS for location information for residential structures.

[2] Represents the number of platted lots that would bisected by a proposed build alternative and, therefore, not available for construction of residential homes. Under Alternative A, 53 platted lots would be displaced from the Foxboro Development, 13 from Birnam Woods, and one from Olsen Farms. All platted lots displaced under Alternative B would be in the Foxboro Development. See Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, for a description of each of these platted developments.

Table 4.4-2 lists the residential properties that have been acquired by UDOT since publication of the Final EIS (West pers. comm.[a]). Acquisition of these four properties would be necessary for construction of any proposed build alternative.

Table 4.4-2 Residential Property Acquired since Publication of Final EIS*

Residential Property Address	Associated Road Segment Triggering Acquisition
1395 W. Parrish Lane, Centerville	500 South Interchange (Woods Cross) to Parrish Lane (Centerville)
250 W. 1050 South, Farmington	Parrish Lane (Centerville) to Glovers Lane (Farmington)
562 West 100 North, Farmington	Glovers Lane (Farmington) to I-15/US-89 interchange (Farmington)
602 W. State Street, Farmington	

Note:

* Represents property acquired as of September 2003. Acquisition necessary for construction of any build alternative.

4.4.3.2 Businesses

As described in the Final EIS, several businesses in the study area would be displaced by the construction of the build alternatives. The number, type, location, and number of employees associated with business displacements is the same as presented in the Final EIS, except that Alternative B would displace one additional structure that was constructed since publication of the Final EIS. The new structure is associated with an existing business that the Final EIS indicated would be displaced. As of August 2005, 13 of the 14 business properties required for constructing Alternative D/E have been purchased by UDOT (West pers. comm.[e]).

The following provides a summary of the impacts on businesses that would result from the No-Build Alternative and the build alternatives.

No-Build Alternative

Existing Conditions (2004)

No businesses would be displaced under the existing conditions No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would displace businesses in the study area, although the nature and timing of these projects are not known at this time.

Build Alternatives

Table 4.4-3 provides a summary of the number of businesses and employees that would be displaced by each build alternative. (The addresses of these businesses are provided in Section 4.4.2 of the Final EIS.) Although the number of businesses and employees displaced by the build alternatives would be the same as the number presented in the Final EIS, a new storage facility (owned by Pack Storage Units) constructed since publication of the Final EIS would also be displaced. This additional impact would not result in another business displacement because Pack Storage Units was already considered displaced in the Final EIS. However, if Alternative B were implemented, additional compensation to Pack Storage Units would be required for the new structure. The proposed narrower typical cross section would not

affect the number of businesses that would need to be acquired for construction of any proposed build alternative (West pers. comm.[b]).

Table 4.4-3 Number of Business Displacements Associated with Build Alternatives*

Alternative	Number of Business Displacements	Approximate Number of Employees Displaced
No-Build	0	NA
Alternative A	16	124
Alternative B	10	57
Alternative C	9	57
Alternative D	14	109
Alternative E	14	109

Note:

* Represents number of businesses that would be displaced within the proposed 95-m (312-foot) right-of-way. See Section 4.4.2 of the Final EIS for location information.

Thirteen of the 14 business properties required have been acquired (Table 4.4-4) (West pers. comm.[e]). These properties were originally acquired to facilitate construction of Alternative D (Final EIS Preferred Alternative), but several of the properties would also be required for construction of the other build alternatives, as indicated in Table 4.4-4.

Table 4.4-4 Business Properties Acquired[1]

Identity and Address	Road Segment Triggering Acquisition	Build Alternatives Requiring Acquisition of Property[2]				
		Alt A	Alt B	Alt C	Alt D	Alt E
B&M Concrete 1710 West 900 North North Salt Lake	I-215/2100 North interchange (North Salt Lake) to 500 South interchange (Woods Cross)		X	X	X	X
Salley Wheelwright Trucking 2198 West 2425 South Woods Cross	I-215/2100 North interchange (North Salt Lake) to 500 South interchange (Woods Cross)	X			X	X
Commercial Coatings 55 South 1500 West Centerville	500 South interchange (Woods Cross) to Parrish Lane (Centerville)	X			X	X
Phil's Automotive 1411 Parrish Lane Centerville	500 South interchange (Woods Cross) to Parrish Lane (Centerville)	X			X	X
Hogan and Associates 1398 Parrish Lane Centerville	Parrish Lane (Centerville) to Glovers Lane (Farmington)	X			X	X
LMCC 919 North 1250 West Centerville	Parrish Lane (Centerville) to Glovers Lane (Farmington)	X			X	X

Identity and Address	Road Segment Triggering Acquisition	Build Alternatives Requiring Acquisition of Property[2]				
		Alt A	Alt B	Alt C	Alt D	Alt E
Nielson Storage 400 West 250 South Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
John Stathis 650 West State Street Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
Cams 650 West 100 North Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
Oakridge Storage 530 West 100 North Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
Daniels Design 530 West 100 North Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
Peterson Storage 562 West 100 North Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X
Beck Paving 136 North 600 West Farmington	Glovers Lane (Farmington) to US-89 interchange (Farmington)	X	X	X	X	X

Notes:

[1] Information representative of property acquired as of August 2005.

[2] An “X” in a column indicates that the acquisition of this property is necessary for construction of that alternative.

4.4.3.3 Farmsteads and Horse Paddocks

As described in the Final EIS, several farmsteads and horse paddocks would be affected by the build alternatives. As indicated in the Final EIS, acquisition of farmland for highway construction is not considered a farm displacement unless the amount of farmland acquired is large enough to render the remainder of the farm nonviable. In most cases, UDOT would acquire land but leave the farmstead (farm structures and improvements) intact. Other farmland impacts, such as land acquisitions, lost crop production, and split parcels, are discussed in Section 4.2, *Farmlands*, of this document. The number and location of farmsteads and horse paddocks that would be displaced as a result of the build alternatives has not changed since publication of the Final EIS. However, the number of horse paddocks displaced by Alternative A has changed since publication of the Draft Supplemental EIS, from 15 to 16 horse paddocks. The following provides a summary of the impacts on farmsteads and horse paddocks that would result from the No-Build Alternative and the build alternatives.

No-Build Alternative

Existing Conditions (2004)

No farmsteads or horse paddocks would be displaced under the existing conditions No-Build Alternative.

Future Conditions (2020)

Farmland in the study area is rapidly being sold for commercial and residential development (see Section 4.2, *Farmland*, of this document). Existing farmsteads and horse paddocks could be displaced as development of the area continues. The impacts of this development would be similar to those that would occur under the build alternatives. In addition, farmsteads and paddocks could be displaced if future projects are undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. The location and timing of these displacements are not known at this time, but since the study area is likely to be built out within the study period, it is likely that many of these farmsteads and horse paddocks will be displaced in the next 15 years.

Build Alternatives

Table 4.4-5 provides a summary of the number of farmsteads and horse paddocks that would be displaced by each build alternative. (The location of these resources is provided in Section 4.4.3 of the Final EIS.) Alternative A would displace one additional horse paddock that was not included in the Draft Supplemental EIS, for a total of 16. The proposed narrower typical cross section would not affect the number of horse paddocks or farmsteads that would need to be acquired for construction of any proposed build alternative (West pers. comm.[b]).

Table 4.4-5 Number of Farmstead and Horse Paddock Displacements[1]

Alternative	Type of Property[2]	Number of Displacements
No-Build	NA	0
Alternative A	F	0
	H	16
Alternative B	F	2
	H	16
Alternative C	F	0
	H	8
Alternative D	F	0
	H	10
Alternative E	F	0
	H	10

Notes:

1 Represents number of farmsteads and horse paddocks that would be displaced within the proposed 95-m (312-ft) right-of-way. See Section 4.4.3 of the Final EIS for location information.

2 F = farmstead; H = horse paddock and/or corral

Ten horse paddock facilities have been acquired since publication of the Final EIS (Table 4.4-6) (West pers. comm.[a]). These properties were originally acquired to facilitate construction of Alternative D (Final EIS Preferred Alternative), but several of the properties would also be required for construction of the other build alternatives, as indicated in Table 4.4-6.

Table 4.4-6 Horse Paddocks Acquired by Location since Publication of Final EIS[1]

Location	Number of Horse Paddocks Acquired at Location	Build Alternatives Requiring Acquisition of Property [2]				
		Alt A	Alt B	Alt C	Alt D	Alt E
Between 1200 North and Pages Lane (West Bountiful), near 1400 North	2	X	X	X	X	X
East of Bountiful Sanitary Landfill along 1100 West (West Bountiful)	2	X	X	X	X	X
At intersection of 1100 West and Porter Lane, on the north side of Porter Lane	1		X	X	X	X
On Sheep Road (1500 West, Centerville) between Commercial Coatings and Utah Power substation	1	X			X	X
On west side 1250 West (Centerville), south of Parrish Lane, between Phil's Automotive and Aspen Springs Storage	1	X			X	X
On east side of 1250 West (Centerville), north of Parrish Lane	1	X			X	X
On relocated portion of Burke (Park) Lane (Farmington)	2	X	X	X	X	X

Notes:

[1] Information representative of property acquired as of August 2005.

[2] An "X" in a column indicates that the acquisition of this property is necessary for construction of that alternative.

4.4.3.4 Summary of Displacements

Table 4.4-7 summarizes the displacement information presented above for residences, businesses, and farmsteads and horse paddocks, and updates the information presented in Table 4-8e in the Final EIS. Table 4.4-7 also provides information on the number of parcels that have been acquired to date and how those acquisitions would support construction of each of the proposed build alternatives.

Table 4.4-7 Summary of Displacements*

Type of Displacement	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Residential	17 (4)	14 (4)	5 (4)	4 (4)	4 (4)
Platted Lots	67 (0)	36 (0)	0 (0)	0 (0)	0 (0)
Business	16 (12)	10 (8)	9 (8)	14 (13)	14 (13)
Farmstead	0 (0)	2 (0)	0 (0)	0 (0)	0 (0)
Horse Paddock	16 (9)	16 (7)	8 (7)	10 (10)	10 (10)

Note:

* The number of properties acquired that would facilitate construction of the indicated build alternative is represented in parenthesis next to the number of displacements. Information representative of property acquired by UDOT as of August 2005.

4.4.3.5 Mitigation Measures

As stated in the Final EIS, assistance and re-establishment expenses would be provided to displaced property owners and lessees pursuant to eligibility and other requirements of the URAA.

Section 4.5
Economics

This section discusses economics in the study area, which is defined below. The current economic climate and temporary and permanent economic impacts that could occur in the study area as a result of implementation of any proposed build alternative are discussed herein. Four regional economic variables—employment, motorists' time savings, resource-based industries (the brine shrimp industry and federal mineral reservation income), and recreation—were assessed in the Final EIS. To update the impacts on employment that were presented in the Final EIS, revised employment estimates for Davis and Salt Lake Counties are presented below. The methodology used to estimate the value of motorists' time has been updated and applied to reassess the value of time savings under the build alternatives.

4.5.1 Approach and Methodology

4.5.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with economics in the study area, Sections 3.5 and 4.5 of the Final EIS were reviewed to determine the changes that had taken place since publication of the Final EIS. The study area for assessing regional economic impacts in this section is the Wasatch Front, which includes all of Salt Lake, Davis, Weber, and Tooele Counties, and a portion of Morgan County. However, for the individual economic topics discussed in this section (i.e., employment, commerce, and tax base), zones of interest, referred to herein as "topical zones," were identified as appropriate in the study area. These zones are described below.

- The topical zone for analyzing local employment is based on county boundaries and the census tracts that overlay the right-of-way of the proposed build alternatives. Updated employment projections for census tracts in the Wasatch Front region (e.g., Davis, Morgan, Salt Lake, Tooele, and Weber Counties) were obtained from a technical report prepared by WFRC (Wasatch Front Regional Council 2003b).

- The topical zone for analyzing commerce comprises Salt Lake and Davis Counties. Updated information on economic growth in the study area was obtained from Utah's Office of Planning and Budget (Utah Governor's Office of Planning and Budget 2002).

- The topical zone for estimating the property tax revenues includes most of the parcels located in the study area. A copy of the *Utah Property Tax 2002 Annual Statistical Report* was obtained from the Utah State Tax Commission to determine whether the tax base had changed since publication of the Final EIS (Utah State Tax Commission 2003).

- The topical zone for estimating the city tax revenues includes the Cities of North Salt Lake, Woods Cross, West Bountiful, Centerville, and Farmington. City finance directors from West Bountiful (Hall pers. comm.), Centerville (Lutz pers. comm.), Woods Cross (Uresk pers. comm.[a]), and Farmington (Johnson pers. comm.) were contacted to obtain current city operating budgets (fiscal year 2002, except fiscal year 1999 for Centerville). The current operating budget for the City of North Salt Lake was obtained from the city's web site (City of North Salt Lake 2002).

Information collected from these sources was used to update the impact conclusions presented in the Final EIS specific to regional and local economics, including how the proposed build alternatives would affect employment in the study area, resource-based industries in the study area, revenue generated from recreation opportunities in the study area, and time savings realized by motorists using the proposed build alternatives (e.g., the value of motorists time savings).

4.5.1.2 Changes since Draft Supplemental EIS

For various reasons—including minor alignment modifications, updates of information, and corrections of inadvertent miscalculations—changes have been made to the calculations of impacts for some resources since the Draft Supplemental EIS was published in December 2004. For this economics section, however, no changes have occurred since the publication of the Draft Supplemental EIS that required changing the calculation of impacts related to economics.

4.5.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to economics and individual economic topics, such as employment, commerce, and tax base. These topics are discussed to provide a foundation for assessing the economic impacts that Legacy Parkway could have in the study area, in particular the value of the travel time savings that could be realized by individuals using the proposed build alternatives.

4.5.2.1 Employment

The topical zone for analyzing local employment is based on county boundaries and the census tracts that overlay the right-of-way of the proposed build alternatives. Tables 4.5-1 and 4.5-2 update Tables 3-10a and 3-10b in the Final EIS and provide updated employment estimates for Davis and Salt Lake Counties, respectively. Table 4.5-3 updates Table 3-11 in the Final EIS and provides updated employment projections according to the census tracts that cover the rights-of-way of the proposed build alternative alignments. These estimates are based on 2002 baseline projections generated by the Utah Department of Work Force (Utah Governor's Office of Planning and Budget 2002) and the *Wasatch Front Region Small Area Socioeconomic Projections: 2002–2030*, which was prepared by WFRC in 2003 (Wasatch Front Regional Council 2003b).

Compared to the employment statistics presented in the Final EIS (Tables 3-10a and 3-10b), the updated 2020 projections for employment in Davis County show increases in the services, government, and non-farm proprietor economic sectors, and decreases in the construction, manufacturing, and trade economic sectors (Table 4.5-1). Similarly, when compared to the statistics presented in the Final EIS, the updated 2020 projections for employment in Salt Lake County show increases in the construction and services sectors, and decreases in the manufacturing, TCPU (i.e., transportation, communications, and public

utilities), and trade economic sectors (Table 4.5-2). Overall, estimates of the rate of job growth for the various employment sectors have been slightly reduced since the Final EIS was published.

Notably, employment in Weber County is projected to increase at a rate of 2.4 percent per year between the years 2002 and 2020 (Wasatch Front Regional Council 2003). This is an increase over the 2 percent annual increase projected by the WFRC for Weber County in 1997 (Wasatch Front Regional Council 1997).

Table 4.5-1 Employment in Davis County (1980–2020)[1]

	Year				
Economic Sector	1980	1990	2000	2010	2020
Agriculture	2%	1%	1%	1%	1%
Mining	<1%	<1%	<1%	<1%	<1%
Construction	4%	3%	6%	4%	4%
Manufacturing	10%	10%	9%	8%	8%
TCPU[2]	3%	3%	3%	3%	3%
Trade	17%	18%	20%	19%	19%
FIRE[3]	2%	2%	3%	3%	3%
Services[4]	10%	14%	17%	20%	21%
Government	37%	28%	20%	19%	18%
Non-farm Proprietors	15%	21%	22%	22%	22%

Notes:

1 Percentages shown for each sector represent percentage of total employment in the county. For each year identified in the table, employment percentages for most economic sectors vary from the percentages presented in Table 3-10a of the Final EIS.

2 TCPU = Transportation, communications, and public utilities.

3 FIRE = Finance, insurance, and real estate.

4 Includes private households and agricultural services employment.

Source: Utah Department of Work Force, Utah Governor's Office of Planning and Budget 2002.

Table 4.5-2 Employment in Salt Lake County (1980–2020)[1]

	Year				
Economic Sector	1980	1990	2000	2010	2020
Agriculture	<1%	<1%	<1%	<1%	<1%
Mining	2%	1%	<1%	<1%	<1%
Construction	5%	3%	5%	5%	5%
Manufacturing	14%	11%	9%	8%	7%
TCPU[2]	7%	6%	7%	6%	6%
Trade	22%	21%	20%	18%	18%
FIRE[3]	5%	6%	6%	6%	6%
Services[4]	17%	22%	25%	30%	31%

	Year				
Economic Sector	1980	1990	2000	2010	2020
Government	15%	13%	12%	12%	12%
Nonfarm Proprietors	13%	16%	15%	14%	14%

Notes:

[1] Percentages shown for each sector represent percentage of total employment in the county. For each year identified in the table, employment percentages for most economic sectors vary from the those presented in Table 3-10b of the Final EIS.

[2] TCPU = Transportation, communications, and public utilities.

[3] FIRE = Finance, insurance, and real estate.

[4] Includes private households and agricultural services employment.

Source: Utah Department of Work Force, Utah Governor's Office of Planning and Budget 2002.

4.5.2.2 Commerce

The topical zone for analyzing commerce comprises Salt Lake and Davis Counties. State of Utah gross annual retail sales have grown from $25.8 billion in 1996 (see Section 3.5.2 of the Final EIS) to $30 billion in 2000, which represents an approximate annual growth rate of 3.8 percent (Utah Governor's Office of Planning and Budget 2002). Salt Lake County accounted for 50 percent of the $30 billion dollar retail sales figure for 2000, which is a decrease from the county's 57.8 percent share in 1996 (Utah Governor's Office of Planning and Budget 2002). Davis County accounted for approximately 8.3 percent of the growth in the state in 2000, a slight increase from the 8.1 percent growth in 1996 that was presented in the Final EIS.

As stated in the Final EIS, the topical zone for commerce contributes approximately $3.2 billion to the state economy. The economic contribution of the commerce topical zone has not substantially increased since publication of the Final EIS (Utah Governor's Office of Planning and Budget 2002). In addition, although UDOT has acquired some of the businesses in the footprint of Alternative D (Final EIS Preferred Alternative), residential and commercial development has continued in areas near the proposed build alternatives, as described in Section 4.1, *Land Use*.

As described in the Final EIS, two resource-based industries (i.e., the brine shrimp industry and the mining industry associated with federal mineral reservation lands) that contribute to the regional and local economy in the commerce topical zone could be affected by implementation of the proposed build alternatives. In addition, the recreation industry, which supports recreation resources could be affected by implementation of the proposed build alternatives. The contributions of these industries to the economy in the commerce topical zone have not changed since publication of the Final EIS.

Table 4.5-3 Employment Projections (2002–2020) by Census Tracts

	Number of Jobs								Annual Growth 2002–2020			
	2002				2020							
Census Tracts*	Government	Industrial	Retail	Service & Wholesale	Government	Industrial	Retail	Service & Wholesale	Government	Industrial	Retail	Service & Wholesale
1003.03	3,820	15,228	168	7,820	4,718	18,414	255	8,908	1.18%	1.06%	2.35%	0.73%
1262.02	3,318	3	25	62	4,156	51	117	240	1.26%	17.05%	8.95%	3.59%
1262.03	13	1	19	1,181	20	2	45	1,906	2.42%	3.93%	4.91%	2.69%
1263.04	641	373	706	1,470	916	574	1,095	2,365	2.00%	2.42%	2.47%	2.68%
1270.02	1	4,134	430	1,413	51	8,076	672	2,870	24.41%	3.79%	2.51%	4.02%
1270.03	98	382	912	1,015	301	1,601	1,262	1,868	6.43%	8.29%	1.82%	3.45%
Totals	7,891	20,121	2,260	12,961	10,162	28,718	3,446	18,157	1.42%	2.00%	2.37%	1.89%

Notes:

* These census tracts encompass an area greater than the topical zone for employment. The 2000 census tract employment projections are reflected as 2002 employment projections taken from the WRFC technical report *Wasatch Front Region Small Area Socioeconomics: 2002–2030*, and present more information regarding employment in these areas than the 2000 census.

Source: Wasatch Front Regional Council 2003b.

4.5.2.3 Tax Base

Property Tax Revenues

The topical zone for estimating the property tax revenues includes most of the parcels located in the study area. Table 4.5-4 updates Table 3-16a in the Final EIS and presents updated information on property taxes collected in the tax base topical zone, as well as Davis County, Salt Lake County, and the state.

Table 4.5-4 Revenues—Property Taxes (2002)

Area	Property Tax Revenues (approximate)	Proportion of State's Property Taxes
Topical Zone*	$2.75 million	0.3%
Davis County	$101.3 million	10.6%
Salt Lake County	$577.1 million	51%
State of Utah	$1.178 billion	–

Note:

* 2000 property tax data for parcels within the study area, except for the area north of Shepard Lane.

Source: Federal Highway Administration et al. 2000, Utah Property Tax Annual Statistical Report (Utah State Tax Commission 2003).

Approximately 51 percent of the state's total assessed property value is in Salt Lake County, while less than 11 percent is in Davis County. Both of these figures represent 3 percent increases from what was presented in the Final EIS. This 3 percent increase is attributable to both an increase in development in the tax base (i.e., new types of property being valued and taxed) and an increase in assessed property values (i.e., attributable to market forces) within the counties.

The tax base topical zone produces less than 1 percent of Utah's property tax revenues, which is comparable to what was presented in the Final EIS (Utah State Tax Commission 2003).

City Tax Revenues

The topical zone for estimating the city tax revenues includes the Cities of North Salt Lake, Woods Cross, West Bountiful, Centerville, and Farmington. Table 4.5-5 updates Table 3-16b in the Final EIS and presents updated information on the amount and source of general fund monies in these cities. These estimates are based on the current and most recent operating budgets for each of the listed jurisdictions, which are fiscal year 2002 except for Centerville, which is fiscal year 1999.[1] As described in the Final EIS, property tax revenue is the second largest single source of revenue, behind sales tax, for most of these cities. Overall, municipal tax revenues have substantially increased since publication of the Final EIS.

4.5.2.4 Value of Motorists Travel Time

Since publication of the Final EIS, there have been considerable advances in the theory and practice of estimating the value of motorists' travel time. As a result, a revised estimate of the average value of

[1] An operating budget later than fiscal year 1999 could not be obtained from the City of Centerville.

motorists' time was developed for the Supplemental EIS analysis. The revised estimate presented in this document accounts for the different values associated with personal, business, and truck travel. The revised average for these values is $18.65 per hour, a $9.15 increase over the value presented in the Final EIS.

Table 4.5-5 City Revenue Projections[1]

Source	North Salt Lake	Woods Cross	West Bountiful	Centerville	Farmington
Total Sales Tax	$1,655,600	$1,772,765	$735,300	$2,054,207	$1,179,770
Total Property Tax	$1,061,230	$328,961	$309,262	$844,479	$912,067
Other Major Sources[2]	$2,156,100	$840,644	$677,271	$1,568,850	$2,050,733
All Other Sources	$454,355	$165,829	$318,197	$551,634	$267,453
Total Revenue (2002)	$5,327,285	$3,108,199	$2,040,035	NA	$4,410,023
Total Revenue (1999) (Final EIS)	$3,861,375	$2,195,960	$1,598,000	$5,019,170	$3,311,705
Change, 1999–2002	36%	40%	25%	NA	33%

Notes:

1 Reported revenues are for fiscal years ending June 30, 2002. City of Centerville reported revenues are for fiscal year ending June 30, 1999.

2 Revenue from other major sources includes such items as fines, forfeitures, building permits, sale of fixed assets, franchise taxes, licenses and permits.

Sources: Operating budgets for fiscal year 2002 for North Salt Lake, Woods Cross, West Bountiful, and Farmington; operating budget for fiscal year 1999 for Centerville.

4.5.3 Environmental Consequences and Mitigation Measures

This section describes regional and local economic impacts that could occur from implementation of Legacy Parkway. In addition, this section describes how induced growth north of the study area could affect regional economics.[2] A summary of local community concerns and preferences relative to economics and the No-Build (existing and future conditions) and build alternatives is presented in this section, although the general substance of input received from local communities in the study area regarding economics has not changed since publication of the Final EIS.

4.5.3.1 Regional Economic Impacts

As stated above, the study area for the regional economic impact analysis is the Wasatch Front, which includes all of Salt Lake, Davis, Weber, and Tooele Counties, and a portion of Morgan County. Both temporary and permanent regional economic impacts were considered. Temporary (short-term) impacts are those associated with construction expenditures, including increases in travel time associated with construction, and the indirect economic impacts (i.e., impacts on resource-based industries) they generate.

[2] Growth impacts south of the study area (e.g., in Davis County) were not evaluated in this section because much of the land use south of the study area is currently developed or planned for development. As a result, it was assumed that areas south of the study area would experience full build-out, with or without construction of the proposed action. See Section 4.1, *Land Use*, for a complete discussion of impacts within and beyond the North Corridor.

Permanent regional impacts are long-term and are associated with continued operation and maintenance activities and shortened travel times.

Temporary and permanent impacts were evaluated in the Final EIS according to four regional economic variables: employment, regional commerce, tax base, and value of motorists' time savings. Impacts on resource-based industries (e.g., the brine shrimp and mining industries) and on the recreation industry were also considered. As summarized in Table 4-9 in the Final EIS, which is not reproduced herein because there has been no change in the data, impacts on employment, commerce, and tax base would be the same as those described in the Final EIS. The results from the Final EIS are summarized below.

- Estimates of employment impacts due to construction and displacements have not changed since the Final EIS. The estimated number of affected construction jobs and jobs in supporting industries remains the same. The Final EIS estimated that relatively few jobs would be affected by displacements, and of those business displacements, nearly all could be successfully relocated in the region. Since publication of the Final EIS, most of the proposed right-of-way has been purchased by UDOT, and no new enterprises have located here.

- Similar to the employment impacts, the estimates of impact on regional commerce have not changed from the Final EIS. Reduced traffic congestion and improved highway access would facilitate regional commerce. Impacts on commerce resulting from business displacement were estimated to be minimal because the corridor was sparsely developed and contained few businesses requiring displacement when the Final EIS was developed. Since then, UDOT has purchased much of the affected property, and no new businesses have located along the proposed rights-of-way of the build alternatives. In addition, there were adequate opportunities for the displaced businesses to relocate in the region.

- Estimates for impacts on tax base have also not changed since the Final EIS. Most of the right-of-way has already been purchased by UDOT and removed from the tax base. As a result, the impacts on the tax base have already been realized.

- Similarly, as disclosed in the Final EIS, there would be no impacts on either the brine shrimp industry or the recreation resource industry under any proposed build alternative. Impacts on federal mineral reservations would also be the same as those listed in Table 4-9 in the Final EIS, except that Alternative E would preclude royalties on about 32 ha (80 ac) of federal mineral reservation lands, which is 1 ha (3 ac) less than the impact associated with Alternative D.

Since all of the above impacts are similar to those estimated in the Final EIS, the regional economic impact discussion presented in this section focuses on updated information relative to the value of motorists' time.

Value of Motorists' Time Savings

No-Build Alternative

Existing Conditions (2004)

As described in the Final EIS, motorists would continue to experience increased levels of congestion and time delays on existing roadways in the study area under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. The costs associated with motorists' travel time would increase under future conditions because continued development in and adjacent to the North Corridor would result in increased congestion on the roadway system. Construction of future transportation improvements by local governments would help this situation but could not eliminate it.

Build Alternatives

All the proposed build alternatives would result in a net decrease in traffic congestion in the study area. The value of this benefit was estimated in the Final EIS to be $28.7 million, based on post-construction traffic conditions and an average value of motorists' time estimated to be $9.50 per hour. (See Section 4.5.1 and Table 4-9 in the Final EIS.) Based on the revised estimate of the value of motorists' time, $18.65 per hour, the annual value of time savings associated with the proposed build alternatives would range from $56.4 million to $60.4 million, an increase of between $27.7 million and $31.7 million over the savings figures presented in the Final EIS (i.e., $28.7 million). The $56.4 million estimate only accounts for the increased dollar per hour estimate, while the $60.4 million estimate also takes into account recent traffic modeling estimates using the revised WFRC travel demand model (version 3.2).

In response to the appellate court remand, the federal lead agencies evaluated four different sequencing scenarios that incorporated the three major components of the Shared Solution: mass transit, I-15 improvements, and Legacy Parkway. This analysis is documented in the sequencing technical memorandum (HDR Engineering 2004b) and the administrative record and is summarized in Section 2.4, *Sequencing*, of this document. The sequencing analyses assess these four scenarios according to a number of variables, one of which is cost to the traveling public. A complete discussion of the value of motorists' time savings with respect to the different sequencing scenarios can be found in either the technical memorandum or Section 2.4 of this document.

4.5.3.2 Local Economic and Community Impacts

As described in the Final EIS, construction of any proposed build alternative could affect the economic base of communities in the study area. Such impacts would be associated with displacement of homes, farms, and businesses; changes in vehicular access; severance of land parcels; and division of communities, which the communities view as a permanent impact. Because all these factors contribute to the social make up of the communities in the study area, they are collectively discussed in Section 4.3.3.3, *Neighborhood and Community Cohesion*, of this document.

Impacts on developable lands in the individual communities along the corridor is an issue that was given considerable attention in the Final EIS and remains important in this Supplemental EIS. In conjunction with the proposed Legacy Nature Preserve, the build alternatives would serve as barriers for any development west of the Legacy Parkway. The Final EIS estimates the area of uplands precluded from future development and discusses the revenue losses the communities would experience as a result of this land being removed from the tax base. Despite the potential for losing developable land and associated tax revenues, the communities have consistently supported the Legacy Parkway project. For economic reasons, however, they have shown a strong preference for build alternatives aligned as far west as possible.

Section 4.6

Joint Development

This section discusses proposed recreation and public works projects that may be developed jointly with the proposed action but by other project proponents. *Joint development* is a term used by FHWA, which, in this context, encompasses opportunities and potential impacts that are also addressed elsewhere in this Supplemental EIS (i.e., pedestrian and bicycle opportunities). The following joint development opportunities are considered in the Final EIS and in this section.

- Joint use of the right-of-way for the proposed action, including future pipelines or other public works infrastructure.
- Public and private education centers and rest areas in the study area.
- Trail systems.

This section provides an update on land associated with joint development opportunities that has been acquired to date; an update on the status of the wetlands ecosystem education plan published by the UDNR Division of Wildlife Resources and the Utah Reclamation Mitigation Conservation Commission (URMCC); and a summary of UDOT's *Statewide Pedestrian and Bicycle Plan*, which was released in 2001 (Utah Department of Transportation 2001b). Various local jurisdictions have provided input since publication of the Final EIS on how a regional recreation and transportation corridor could or should be developed in conjunction with the proposed Legacy Parkway project. That input is summarized below in Section 4.6.3, *Environmental Consequences and Mitigation Measures*.

4.6.1 Approach and Methodology

4.6.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with joint development opportunities in the study area, Sections 3.6 and 4.6 of the Final EIS were reviewed to determine whether any changes had taken place since publication of the Final EIS. The study area for joint development opportunities is described in Section 4.0.1, *Study Area*, of this document.

Documents reviewed for this analysis included the *Kaysville City General Plan, as Amended* (City of Kaysville 2002), the *Woods Cross City General Plan* (Woods Cross City 2003), the *Davis County Shorelands Comprehensive Land Use Master Plan* (Davis County Council of Governments 2001), and the *Envision Utah Quality Growth Strategy and Technical Review* (Envision Utah 2000).

A series of meetings was held with representatives from each of the jurisdictions in the study area—North Salt Lake, Woods Cross, West Bountiful, Centerville, Farmington, and Davis County—to discuss topics pertaining to the Supplemental EIS, including joint development opportunities, and to review trail master plans that have been updated or revised since the Final EIS was published. These meetings were held in July and September 2003 and October, November, and December 2004. Table 4.1-1 in Section 4.1, *Land Use*, provides information on the dates and attendees of these meetings. Minutes from these meetings were reviewed for this analysis (HDR Engineering 2003, 2004c).

4.6.1.2 Changes since Draft Supplemental EIS

For various reasons—including minor alignment modifications, updates of information, and corrections of inadvertent miscalculations—changes have been made to the calculations of impacts for some resources since the Draft Supplemental EIS was published in December 2004. For this joint development section, out-of-date information was updated based on recent input since publication of the Draft Supplemental EIS, and the opportunities for joint development revised as appropriate.

4.6.2 Affected Environment

The following provides a summary of information on the affected environment that has been updated since publication of the Final EIS.

4.6.2.1 Jordan Valley Water Conservancy District

As indicated in the Final EIS, the Jordan Valley Water Conservancy District (JVWCD) and the Weber Basin Water Conservancy District (WBWCD) are pursuing the development of a water treatment plant in Weber County, Utah. The proposed water treatment plant would include a 64-km (40-mi) treated-water pipeline that would extend parallel to and west of I-15 from the plant in West Haven through Clinton, Layton, Centerville, and Woods Cross, to about 3800 West 2100 South in Salt Lake City, where it would connect to the Jordan Aqueduct Reach. The water treatment plant and treated-water pipeline are sometimes called the “Bear River Pipeline” because of their association with the Bear River. Since publication of the Final EIS, property has been purchased for a water tank in West Haven, and approximately half of the property needed for the pipeline right-of-way in Salt Lake, Davis, and Weber Counties has been acquired (Hess pers. comm.).

The Bear River Pipeline project traverses the study area. Both water conservancy districts have expressed interest in possibly using the same right-of-way as Legacy Parkway, but no formal application has been submitted to UDOT to date (Hogg pers. comm.). The project is scheduled to be completed in 15 to 20 years.

Both the proposed water treatment plant and treated-water pipeline were included in the Bear River Development Act, which was passed in 1991 to direct the development of the Bear River and its tributaries. The scope of the act also covers proposals for building dams and expanding reservoirs in and along the Bear River and its tributaries. Any proposals under the Bear River Development Act, including construction and operation of the water treatment plant and/or treated-water pipeline, would be subject to appropriate environmental review.

4.6.2.2 Trail System Development

As in the Final EIS, joint development opportunities relating to pedestrian/bicycle trail systems in the study area are covered in Section 4.7, *Pedestrian and Bicyclist Considerations.*

4.6.2.3 Environmental Interpretation

The wetland ecosystem education plan developed by the Utah State University Wetlands Education Team, *Beyond Kids and Signs: A Comprehensive Wetlands Education Master Plan for the Greater Great Salt Lake Ecosystem,* was published by the UDNR Division of Wildlife Resources and URMCC in April 2000 (UDNR Division of Wildlife Resources and Utah Reclamation Mitigation Conservation Commission 2000). This plan was in development when the Final EIS was being written and was described as a draft document therein. The plan could provide opportunities for incorporating wetland ecosystem interpretation facilities, such as information and educational signs, along the proposed Legacy Parkway Trail under all the proposed build alternatives. The proposed Legacy Parkway Trail neither passes through nor abuts the Legacy Nature Preserve. No environmental interpretation facilities that encourage extended human use would be constructed in the Legacy Nature Preserve within 1.6 km (1 mi) of bald eagle nest and roost sites in the study area (see Section 4.15, *Threatened and Endangered Species*), in accordance with the CWA Section 404 permit and consistent with the biological opinion issued for Alternative D (Final EIS Preferred Alternative).

4.6.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, the construction of public works infrastructure in the project right-of-way, the development of trail systems in conjunction with the proposed Legacy Parkway Trail, and the construction of various education and recreation centers along the trail alignment are the only joint development opportunities available in the study area at this time. The environmental consequences and mitigation measures associated with these joint development opportunities are the same as those presented in the Final EIS. However, supplemental information was received from several local communities in June 2003 on how trail, education, and/or recreation facilities could be incorporated into the proposed trail alignment in their communities. The following provides a summary of the input received from each local jurisdiction since publication of the Final EIS relative to the No-Build Alternative and the build alternatives.

4.6.3.1 No-Build Alternative

Existing Conditions (2004)

As stated in the Final EIS, there would be no opportunity for joint development opportunities under the existing conditions (2004) No-Build Alternative because there would not be a project in place to facilitate the organized development of facilities such as pedestrian, equestrian, and/or bicycle trails.

Future Conditions (2020)

Similarly, under the future conditions (2020) No-Build Alternative, none of the build alternatives would be implemented, so there would be no joint development opportunities available to pursue.

4.6.3.2 Build Alternatives

Jordan Valley Water Conservancy District

As described in Section 4.6.2.1, the Bear River Pipeline project traverses the study area, and both the JVWCD and WBWCD have expressed interest in possibly using the proposed Legacy Parkway right-of-way for the pipeline. However, because there has been no application or request made to UDOT on behalf of the water conservancy districts to use any part of the proposed Legacy Parkway right-of-way for this project, and because this pipeline is not part of the purpose and need for the Legacy Parkway project, the Bear River Pipeline project is not discussed further in this Supplemental EIS.

Trail System Development

As described in the Final EIS, the multi-use Legacy Parkway Trail is proposed in conjunction with all the build alternatives. The trail, as shown in Figure 4.6-1, connects to the Jordan River Parkway Trail in the south and consists of a 2.4-m (8-ft) paved portion for pedestrians and bicycles and a 1.8-m (6-ft) unpaved portion for equestrians. The Legacy Parkway Trail would connect with the Farmington Creek Trail, and would allow connection with other pedestrian and bicycle facilities that may be developed in the future.[1] Construction of the trail would be consistent with UDOT's *Long Range Transportation Plan* (Utah Department of Transportation 2003b), as well as UDOT's *Statewide Pedestrian and Bicycle Plan* (Utah Department of Transportation 2001b).

West Bountiful

The Final EIS described potential trail access to the Farmington Bay Waterfowl Management Area via a nonmotorized overpass at Pages Lane in West Bountiful. This nonmotorized access has since been reviewed by the city and was removed from the design plans because of feasibility and cost concerns (HDR Engineering 2003). West Bountiful is proposing to construct seven access points to integrate the city's existing trail system with the proposed Legacy Parkway Trail (Flanders pers. comm). The Legacy Parkway Trail would be the backbone of the trail system and would represent approximately 30 percent of the trail system's surface area (Flanders pers. comm.). Figure 4.6-1 has been updated since publication of the Draft Supplemental EIS to include information on existing and proposed trails in West Bountiful.

Farmington

As mentioned above, the proposed Legacy Parkway Trail would tie into the Farmington trail system through the Farmington Creek Trail. Representatives from the City of Farmington have stated that the location of the Legacy Parkway Trail under any proposed build alternative would serve the following areas and facilities (HDR Engineering 2003; Petersen pers. comm.).

- A new high school that will be located just north of Glovers Lane and directly west of the Legacy Parkway Alternative E alignment and I-15.
- Developing residential areas north of Glovers Lane between 650 West and the Legacy Parkway Alternative E alignment.

[1] The locations of the trails in Figure 4.6-1 are based on input received from community planners and derived from local land use plans. Many of these plans were completed prior to the purchase of lands associated with the proposed Legacy Nature Preserve. If constructed, trails within the Legacy Nature Preserve would likely have to be relocated to meet the conditions of the Clean Water Act Section 404 permit.

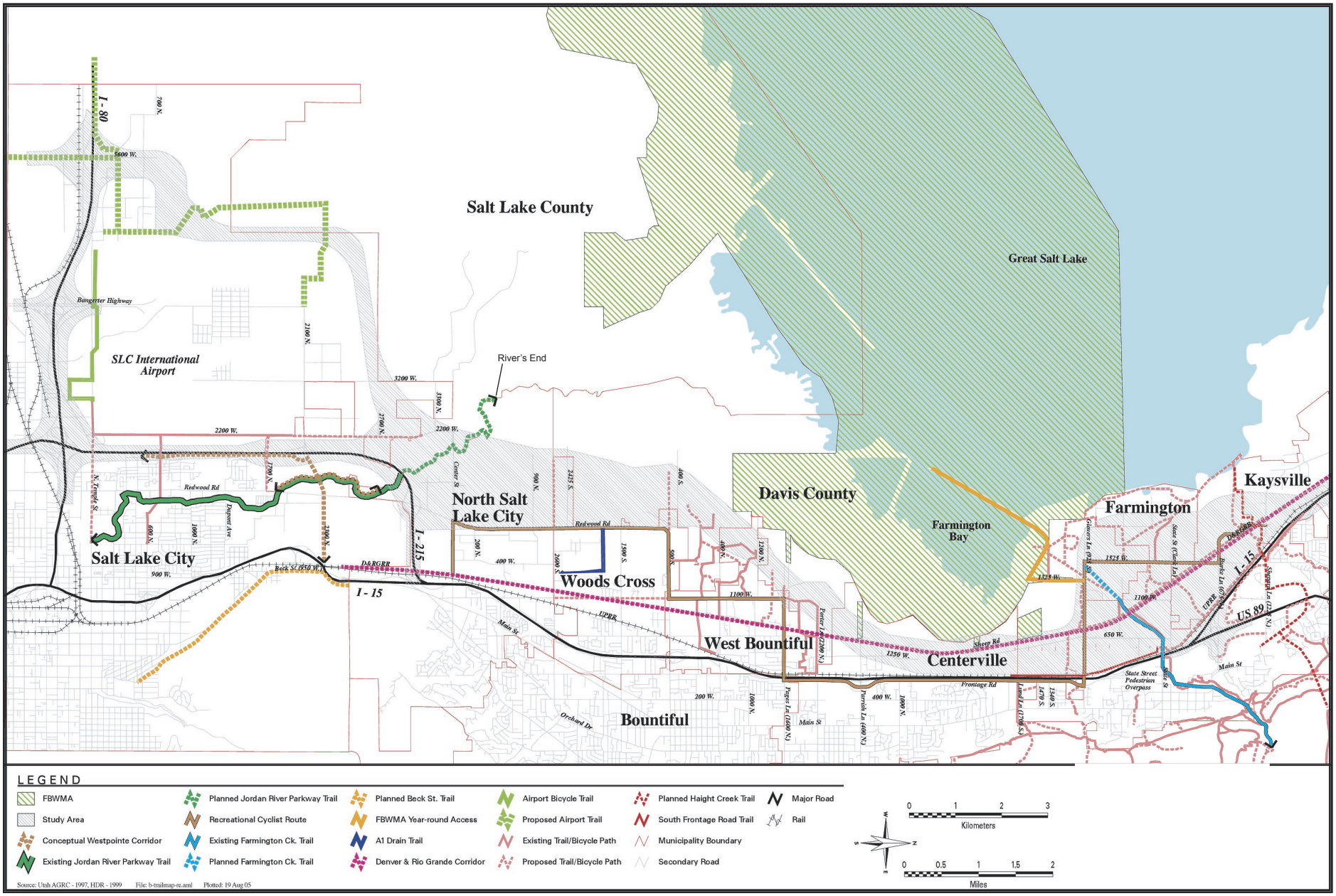

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Figure 4.6-1
Joint Development Opportunities
with Proposed Legacy Parkway Trails and Other Trails

- The Davis County Fairgrounds.
- A new park located east of the fairgrounds and south of State Street.
- Public works building.
- Commuter rail station.
- State Street in the vicinity of the pedestrian bridge over I-15.
- 250 South Street at the eastern end.
- Glovers Lane in the vicinity of the overpass.

In addition, the Legacy Parkway Trail would provide Farmington maintenance crews access to sewer manholes that parallel the trail, and could provide access to portions of the D&RG railroad tracks in Farmington that are informally used for recreation (see Section 4.7, *Pedestrian & Bicyclist Considerations*). Figure 4.6-1 has been updated since publication of the Draft Supplemental EIS to include information on existing and proposed trails in Farmington.

Centerville

The City of Centerville's general plan (Centerville City 1996) includes a trails master plan, which includes a connection to the Legacy Parkway trail. No other formal plans have been made at this time (Snyder pers. comm.).

North Salt Lake

The Foxboro development is currently being constructed in North Salt Lake west of Redwood Road between Center Street and 900 North. The development was platted in 2003. It will be a mixed-use development with homes, parks, a planned elementary school, a church, and commercial zoning along Redwood Road. About 240 low- to moderate-income housing units are planned, including 12 Housing and Urban Development- (HUD-) supported transitional housing units. The development also includes trails that would tie into the proposed Legacy Parkway Trail (HDR Engineering 2003). Since publication of the Draft Supplemental EIS, construction on the Foxboro Trail has begun; the trail will be approximately 1.6 k (1 m) in length.

Davis County

UTA has submitted a proposal for construction of a recreational trail along the D&RG rail line in Davis County. UTA has applied to WFRC for funds (Congestion Mitigation/Air Quality) to convert the railway grade to a pedestrian/bicycle trail from West Bountiful to the Roy area in Weber County. The trail would be a joint development project with UTA, UDOT, and local jurisdictions and would connect with the proposed Legacy Parkway Trail under all build alternatives. As of August 2005, WFRC has not received any CMAQ funds; this has therefore not yet been funded through CMAQ.

Environmental Interpretation

In accordance with the wetland ecosystem education plan published by UDNR and URMCC, the proposed Legacy Parkway Trail would provide opportunities to incorporate wetland ecosystem interpretation facilities along the trail under all the proposed build alternatives.

Section 4.7

Pedestrian and Bicyclist Considerations

This section presents an update on the existing and proposed pedestrian and bicyclist facilities in the study area and the use and accessibility of several trail systems and bicycle paths in the study area. The section also presents an update on the impacts the alternatives would have on pedestrian and bicyclist facilities.

4.7.1 Approach and Methodology

4.7.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with pedestrian and bicyclist considerations in the study area, Sections 3.7 and 4.7 of the Final EIS were reviewed to determine the changes that had taken place since publication of the Final EIS. The study area for pedestrian and bicyclist considerations is described in Section 4.0.1, *Study Area*, of this document.

A series of meetings was held with representatives from each of the jurisdictions in the study area—North Salt Lake, Woods Cross, West Bountiful, Centerville, Farmington, and Davis County—to discuss topics pertaining to the Supplemental EIS, including pedestrian and bicyclist considerations, and to review trail master plans that have been updated or revised since the Final EIS was published. These meetings were held in July and September 2003. Table 4.1-1 in Section 4.1, *Land Use*, provides information on the dates and attendees of these meetings. Minutes from these meetings were reviewed to identify potential impacts on pedestrian and bicyclist resources for this Supplemental EIS (HDR Engineering 2003). In addition, meetings with the cities and Davis County were held October 25 and 26, 2004, to specifically discuss the Legacy Parkway Trail (HDR Engineering 2004c).

4.7.1.2 Changes since Draft Supplemental EIS

For various reasons—including minor alignment modifications, updates of information, and corrections of inadvertent miscalculations—changes have been made to the calculations of impacts for some resources since the Draft Supplemental EIS was published in December 2004. For this section on pedestrian and bicyclist considerations, out-of-date information was updated and revised as appropriate, based on recent input since publication of the Draft Supplemental EIS.

4.7.2 Affected Environment

Below is a summary of information on the affected environment related to pedestrian and bicyclist considerations that has been updated since publication of the Final EIS.

4.7.2.1 Existing Facilities

As disclosed in the Final EIS, several pedestrian and bicycle trails are currently located in or pass through the study area. Others were being constructed in or through the study area at the time of publication of the Final EIS. Since publication of the Final EIS, one of these trails has been closed because of security issues, and several others are still under construction. The following subsections summarize the current status of these facilities in the study area. Figure 4.6-1 in Section 4.6, *Joint Development*, of this document illustrates the current trail locations and has been updated since publication of the Draft Supplemental EIS.

Airport Bicycle Path

As described in the Final EIS, the Airport Bicycle Path begins west of I-215 and continues west for 5.1 km (3.2 mi) to the International Center west of the airport. During summer 2001, the Salt Lake City Airport Authority closed to public access portions of 4000 West and 4200 West within the boundaries of Salt Lake City International Airport because of security concerns. This closure eliminated a large portion of this popular path, leaving only the portion west of I-215 open to the public (Boes pers. comm.).

Jordan River Parkway

As described in the Final EIS, the Jordan River Parkway Trail is a paved, multi-use pathway intended for walkers, joggers, bicyclists, and inline skaters. It is currently developed through Salt Lake City and County to just south of the Davis County line. When completed, the trail will extend northwest along the Jordan River to a location called “Rivers End” (Figure 4.6-1), which is located at the confluence of the Jordan River and a drainage canal, along the western boundary of North Salt Lake (Burton pers. comm. [b]).

Portions of the trail have already been built (i.e., paved), and Salt Lake City has been active in planning the design and construction phases for the unfinished sections. As identified in the 2004 Salt Lake City *Bicycle and Pedestrian Master Plan* (Salt Lake City Transportation Division 2004), the following sections of the trail have yet to be completed.

- Pierpont Avenue to 200 South.
- 200 South to North Temple.
- Northern segment (1000 North to northern city limits).

South Frontage Road Trail

The South Frontage Road Trail is a popular jogging and walking path along the frontage road east of I-15 between Lund Lane in Centerville to the south and Clark Lane in Farmington to the north. The lagoon portion of the Farmington Creek Trail is accessible from the northern terminus of this 3.7-km (2.3-mi) trail via a sidewalk that runs on the east side of the frontage road to Clark Lane (Main Street).

Bicycle Touring

As described in the Final EIS, many rural roads in western Davis County are used by bicyclists, including cyclists participating in the weekly recreational rides hosted by the Bonneville Bike Touring Club. The

American Investment Bank Century Ride still uses several sections of Davis County Roads in Farmington.

Farmington Trails

Figure 4.6-1 has been updated since publication of the Draft Supplemental EIS to include information on existing and proposed trails in Farmington.

Farmington Creek Trail

As described in the Final EIS, the major current pedestrian and bicycle facility in the study area is the Farmington Creek Trail. The trail runs from the eastern bench of the Wasatch Front through Farmington to the intersection of 1525 West and Glovers Lane (Farmington). The southern extension of the Farmington Creek Trail provides direct access to the FBWMA near 1325 West in Farmington, which in turn provides a network of dirt roads and dikes that serves as trails for birders, pedestrians, and bicyclists.

The Farmington Creek Trail is the major east-west trail in the area, providing pedestrian and bicyclist access over I-15 and the UPRR via the State Street Pedestrian overpass. The developed portion of the trail currently ends at 1100 West. The Final EIS stated that the trail was expected to be completed by 2001; however, according to a the Farmington Area Master Trails map dated March 2005, portions of the trail in the Farmington Canyon area and in the southwest section of the Farmington near Glovers Lane are not yet complete. There is no estimated date for completion.

Spring Creek Trail

The Spring Creek Trail runs parallel to Ranch Road in western Farmington. This segment of the trail has been completed, and there are two branches off this segment proposed to connect to other future trails in the area.

Davis Creek Trail

Two short segments of the Davis Creek Trail have been completed and run parallel to 925 South and 1050 South. The segment along 925 South connects to the South Frontage Road Trail. Proposed segments of this trail once completed will connect to the existing Davis Creek Trail in Davis Canyon, a U.S. Forest Service trail.

West Bountiful Trail System

Figure 4.6-1 has been updated to include information received since publication of the Draft Supplemental EIS on existing and proposed trails in West Bountiful. The names used in this supplemental evaluation refer to the physical features adjacent to the trails. The West Bountiful Trail System consists of three main trails: the A1 Canal Trail, the Pages Lane Trail, and the DSB Canal/Porter Lane Trail. All three trails run parallel to the existing canal route or streets. The City of West Bountiful has proposed building connections to the Legacy Parkway Trail from each trail.

The City of West Bountiful has also identified future trails that have been reviewed by the City Council and Planning Commission but that have not been formally adopted as part of the West Bountiful Master Plan (Flanders pers. comm.).

A-1 Drain Trail

Since publication of the Final EIS, the City of Woods Cross has completed the A-1 Drain Trail, which was described in Section 4.7.2 of the Final EIS. The A-1 Drain Trail provides pedestrian and bicycle access from neighboring subdivisions in Woods Cross to Woods Cross Community Park (Uresk pers. comm.[b]).

4.7.2.2 Proposed Facilities

Several pedestrian and bicycle trails are also proposed to be located in part or in full in the study area. The following subsections provide an update on the status of proposed facilities discussed in the Final EIS, as well as a description of new facilities that have been proposed since publication of the Final EIS. Figure 4.6-1 in Section 4.6, *Joint Development*, illustrates the proposed trail locations.

Airport Trail

The Salt Lake City Airport Authority, with support from the Salt Lake Planning Commission and City Council, has agreed to allow the city to construct a shared-use trail around the west side of the airport to mitigate the loss of the bicycle path within the airport boundaries (see *Airport Bicycle Path* above). The new route would be a 3-m (10-ft) wide shared-use path that would connect 2200 North with the existing shared-use bicycle path on the south end of the airport. It is expected that this new route will be popular with bicyclists and hikers because it will pass through large wetlands near or in proximity to the shores of Great Salt Lake (Boes pers. comm.). The estimated date of completion of the airport trail has not been determined.

Salt Lake City Open Space Plan

As described in the Final EIS, Salt Lake City has developed an open space plan with a policy to “connect the neighborhoods…by developing a pedestrian/bicycle urban trail system which transcends these barriers.” Two trail systems, one in Westpointe and another along Beck Street, are proposed in the open space plan. The description of these proposed trail systems has not changed since publication of the Final EIS (Wheelwright pers. comm.).

D&RG Recreational Trail

In early 2003, UTA applied to WFRC for $500,000.00 in Congestion Mitigation/Air Quality (CMAQ) funds to assist in converting the D&RG railroad corridor into a pedestrian/bicycle corridor from West Bountiful to the Roy area, Davis to Weber Counties. The trail would be a joint development project with UTA, UDOT, interest groups, and the communities, and would be constructed to tie into the proposed Legacy Parkway Trail under all the build alternatives. As of August 2005, WFRC has not received any CMAQ funds; this UTA proposal has therefore not yet been funded through CMAQ.

North Salt Lake

The Foxboro residential development located west of Redwood Road between Center and 900 North in North Salt Lake would include a trail system that would tie into the proposed Legacy Parkway Trail (HDR Engineering 2003; Wood pers. comm [c].). The Foxboro Trail is currently under construction and will be approximately 1.6 k (1 m) in length.

Woods Cross

The *Woods Cross City General Plan* discusses the proposed Legacy Parkway Trail and provides access to it at approximately 2425 South (HDR Engineering 2003; Woods Cross City 2003). The general plan also calls for a proposed residential development along the western edge of the city, with the Alternative E alignment acting as the western boundary. This development would include trails and open space connected to the proposed action trail system. The city also plans to connect the A-1 Drain Trail with the Legacy Parkway Trail (Uresk pers. comm.[b]).

West Bountiful

West Bountiful has identified seven future access points where connections with the Legacy Parkway Trail could occur: the A1 Canal near 400 South, the Equestrian Park Trail near 400 North, the 1200 North Nature Park and trailhead, the 1450 North access trail, the Pages Lane trailhead, the DSB Canal/Porter Lane trailhead, and the Birnam Woods/D&RG trailhead near 2350 North. The Legacy Parkway Trail would be the backbone of these access trails and would represent approximately 30 percent of the trail system's surface area (Flanders pers. comm.). Other future trails have been identified and reviewed by the City Council and Planning Commission but have not been formally adopted as part of the West Bountiful Master Plan (Flanders pers. comm.).

Centerville

The proposed Legacy Parkway Trail is part of Centerville's trails master plan (Snyder pers. comm.), part of the city's general plan (Centerville City 1996).

Farmington

The City of Farmington's *Farmington Master Trails Map* (Farmington City 2003) reflects the proposed Legacy Parkway Trail (HDR Engineering 2003). Within the Farmington City limits, this trail alignment would run alongside the UPRR to the Shepard Lane overpass, where it would connect to the Haight Creek Trail, another proposed trail. The proposed Legacy Parkway Trail would also give students at a proposed high school at 925 S. Glovers Lane access to other trails in Farmington (Toronto pers. comm.). Farmington City also has plans in place to provide connections between the Legacy Parkway Trail at the commuter rail station, the public works building, State Street near the overpass, the eastern end of 250 South Street, and Glovers Lane near the overpass. (Petersen pers. comm.). Figure 4.6-1 has been updated to include information received since publication of the Draft Supplemental EIS on existing and proposed trails in Farmington.

4.7.3 Environmental Consequences and Mitigation Measures

Both the No-Build Alternative, under existing (2004) and future (2020) conditions, and the build alternatives could affect existing and proposed pedestrian and bicyclist facilities in the study area. The environmental consequences and mitigation measures associated with these alternatives are described below and summarized in Table 4.7-1.

4.7.3.1 Existing Facilities

No-Build Alternative

Existing (2004)

As described in the Final EIS, under the No-Build Alternative, all the existing pedestrian and bicycle facilities in the study area would receive increased use as the population grows. Currently, pedestrians and bicyclists regularly use two arterial streets in the study area, 1100 West and 800 West in the communities of West Bountiful and Woods Cross, despite heavy car and truck traffic during rush hour. An increase in pedestrian and bicycle use under the No-Build Alternative, combined with a likely increase in car and truck traffic in these areas under the No-Build Alternative, would make these routes less desirable for walking and bicycling.

In addition, connectivity benefits between existing pedestrian and bicycle facilities in the study area that would be offered by the proposed Legacy Parkway Trail would not be realized under the No-Build Alternative because the trail would not be constructed. For example, the Foxboro Trail would be a stand-alone 1.6-k (1-m) trail that would have no connection to other proposed trails.

Future (2020) Conditions

If none of the build alternatives is implemented, future projects may be undertaken to improve access to lands in the study area, although the nature and timing of such projects are not known at this time. These projects could result in impacts on existing pedestrian and bicycle facilities.

Build Alternatives

All the proposed build alternatives would affect both the State Street pedestrian overpass and the Farmington Creek Trail at the State Street pedestrian overpass. The State Street pedestrian overpass would be demolished and replaced with a single, combined vehicle/pedestrian overpass designed to be long enough to span the I-15, UPRR, commuter rail, and proposed action alignments.

The Final EIS stated that, under all the build alternatives, an overpass would be constructed at Pages Lane to provide pedestrian, equestrian, and bicycle access to the FBWMA. Since publication of the Final EIS, the City of West Bountiful has decided not to construct this access because of feasibility and cost concerns (HDR Engineering 2003). This changes the access from Pages Lane to 500 South via a new frontage road connecting to both the FBWMA and Bountiful City Pond. Motorized vehicles would access the FBWMA by taking the 500 South exit off Legacy Parkway and the corresponding frontage road. Similarly, motorized vehicles would access Bountiful City Pond by taking the 500 South exit and the frontage road along the west side of the proposed Legacy Parkway. Non-motorized access would be provided to both FBWMA and Bountiful City Pond by the frontage roads that run along the west side of the proposed alignments. Access to the frontage roads would be provided at 500 South. The build alternatives would have no impact on the Airport Bicycle Path, the Airport Trail, South Frontage Road Trail, the Jordan River Parkway Trail, the Spring Creek Trail, the Davis Creek Trail, the West Bountiful Trail System, or any other trails in Davis County.

Table 4.7-1 Impacts on Existing and Proposed Pedestrian and Bicyclist Facilities

Affected Facility	No-Build Alternative (Existing Conditions 2004)	Alternative A	Alternative B	Alternative C	Alternative D (Final EIS Preferred Alternative)	Alternative E
1100 West and 800 West Streets	Traffic conflicts with pedestrians and bicycles would increase.	Traffic conflicts with pedestrians and bicycles would decrease	Traffic conflicts with pedestrians and bicycles would decrease	Traffic conflicts with pedestrians and bicycles would decrease	Traffic conflicts with pedestrians and bicycles would decrease	Traffic conflicts with pedestrians and bicycles would decrease
State Street Pedestrian Overpass	No impact	New vehicle/ pedestrian overpass would be constructed	New vehicle/ pedestrian overpass would be constructed	New vehicle/ pedestrian overpass would be constructed	New vehicle/ pedestrian overpass would be constructed	New vehicle/ pedestrian overpass would be constructed
Farmington Area Trails	No impact	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase
Pages Lane	Change to access	Access would be provided to FBWMA & Bountiful City Pond via 500 South and frontage road	Access would be provided to FBWMA & Bountiful City Pond via 500 South and frontage road	Access would be provided to FBWMA & Bountiful City Pond via 500 South and frontage road	Access would be provided to FBWMA & Bountiful City Pond via 500 South and frontage road	Access would be provided to FBWMA & Bountiful City Pond via 500 South and frontage road
Proposed trail system in Foxboro development	No impact	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase
Proposed residential trail system in Woods Cross	No impact	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase
Proposed trail system in West Bountiful Trail System	30% of planned trail system would be eliminated	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase
Proposed trail systems in Farmington	No impact	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase	Connectivity would increase

4.7.3.2 Proposed Facilities

No-Build Alternative

Existing Conditions (2004)

As described in the Final EIS, many future land use plans for local jurisdictions in the study area were formulated based on the assumption that the proposed Legacy Parkway Trail would be implemented. Under the existing conditions (2004) No-Build Alternative, the following pedestrian/bicycle facilities would not be completed as planned.

- The Foxboro trail system in North Salt Lake would not have connectivity to other trails (Wood pers. comm.[c]).
- Trail access and general accessibility for the proposed residential development along the western edge of the City of Woods Cross would be eliminated.
- Approximately 30 percent of the planned trail system in the City of West Bountiful would not be constructed (i.e., 30 percent of the trail system in the city is associated with the proposed trail alignment of the build alternatives) (Flanders pers. comm.), including the seven access points designed to connect with the proposed Legacy Parkway Trail system.
- The connectivity of trails in the City of Farmington would be reduced because the Legacy Parkway Trail would not connect to the Shepard Lane overpass and the proposed Haight Creek Trail. In addition, the existing South Frontage Road Trail, rather than the proposed Legacy Parkway Trail, would provide trail access to students at the proposed high school on Glovers Lane (Toronto pers. comm.).

In general, the No-Build Alternative would be inconsistent with existing land use and circulation plans and would require revision of general and comprehensive land use and circulation plans for many of the local jurisdictions in the study area. As discussed in Section 4.1.3.3, *Impacts on Growth within and Beyond the North Corridor*, approximately 324 ha (800 ac) of developable land in the Legacy Parkway right-of-way and proposed Legacy Nature Preserve would become available for development under the No-Build Alternative. Local jurisdictions would need to update their official planning policies and plans for the area, including master plans for vehicular circulation, pedestrians, and bicycles.

Future Conditions (2020)

If none of the build alternatives is implemented, future projects could be undertaken to improve access to lands in the study area. New traffic circulation projects could result in impacts on proposed pedestrian and bicycle facilities, if the planned trails are implemented, although the nature and timing of such projects are not known at this time.

Build Alternatives

Given the information in the current land use plans, all the proposed facilities described in Section 4.7.2.2 of this document would be constructed if any proposed build alternative is implemented. However, the specific location of these facilities would likely have to be adjusted to accommodate the different trail configurations of the build alternatives. In addition, under all the proposed build alternatives, the proposed Legacy Parkway Trail would be developed jointly to tie into the proposed D&RG Recreational Trail.

4.7.3.3 Mitigation Measures

Impacts on existing and proposed pedestrian and bicyclist facilities in the study area are considered beneficial because the Legacy Parkway Trail would provide increased access and connectivity to pedestrian and bicyclist facilities throughout the study area. The existing State Street pedestrian overpass in Farmington would be replaced with one combined vehicle-pedestrian overpass spanning I-15, the UPRR, commuter rail, and Legacy Parkway. Therefore, additional mitigation measures are not proposed.

Section 4.8
Air Quality

This section discusses air quality in the study area. Specifically, it includes the following air quality data and information and analyses that have been updated since publication of the June 2000 Final EIS.

- Updated information on pollutants of concern specific to transportation-related projects.
- Supplemental information on urban air toxics, which were not discussed in the Final EIS.
- Supplemental information on particulate matter with a diameter of 2.5 microns or less (PM2.5).
- Updated mesoscale air quality modeling and analyses, based on an updated conformity analysis completed by the WFRC.
- Microscale analyses of the proposed Legacy Parkway/500 South interchange, including measurements of carbon monoxide concentrations at sensitive receptors on Legacy Parkway mainline,[1] and adjacent Legacy Parkway Trail, for carbon monoxide and particulate matter.

4.8.1 Approach and Methodology

4.8.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with air quality in the study area, Sections 3.8 and 4.8 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. Because of the regional nature of air quality, the study area for this section includes all of Salt Lake and Davis Counties and relevant portions of Weber County.

The FHWA publication *Guidance for Preparing and Processing Environmental and 4(f) Documents* (Federal Highway Administration 1987) identifies the requirements for evaluating potential air quality impacts associated with transportation projects and provides guidance on completing mesoscale and microscale air quality evaluations. As described in the Final EIS, mesoscale evaluations are related to regional air quality impacts and are typically conducted by the local metropolitan planning organization (MPO). For the proposed Legacy Parkway, the MPO responsible for completing the mesoscale evaluation is WFRC. WFRC recently completed a mesoscale evaluation and addressed regional air quality issues in the *Conformity Analysis for the Updated 2030 Long-Range Plan for the Wasatch Front Region* (Wasatch Front Regional Council 2003c). The proposed Legacy Parkway is included in this most recent mesoscale

[1] The Legacy Parkway *mainline* refers to the four travel lanes associated with the proposed highway, excluding the on- and off-ramps.

evaluation. The 2003 conformity analysis was therefore reviewed to update the mesoscale evaluation presented in the Final EIS.

Microscale evaluations are related to localized air quality impacts, primarily at the roadway or intersection level. Although not completed for the Final EIS, a microscale "hot-spot" analysis was required for the Supplemental EIS at the proposed Legacy Parkway/500 South interchange. The CAL3QHC line source dispersion model (version 2.0), which is the air quality dispersion model recommended by EPA, UDOT, and WFRC for roadway projects, was used to complete the microscale analysis. This model was used to calculate peak 1-hour carbon monoxide (CO) concentrations near the proposed Legacy Parkway/500 South interchange, the Legacy Parkway mainline, and the adjacent trail. A more detailed description of the methods and assumptions employed to complete the microscale analysis is provided in the following subsections.

Both the mesoscale and microscale air quality evaluations were used to determine whether Legacy Parkway would conform to the appropriate mobile-source pollutant budgets in approved state implementation plans, as described below in Section 4.8.3.

4.8.1.2 Changes since Draft Supplemental EIS

Since publication of the Draft Supplemental EIS, historic data has been added to Table 4.8-5 to reflect air quality data for particulate matter with a diameter of 10 microns or less (PM10) for the years 1995 to 2003. In addition, the number of PM10 exceedances disclosed in that table has been updated to reflect the fact that the Utah Department of Environmental Quality (UDEQ) bases an exceedance on the second 24-hour high, rather than the first. Additional information on air toxics has also been added to 4.8.3.2, *Mesoscale Evaluation*, pursuant to 40 CFR 1502.22(b), which requires FHWA to provide specific information on why it is unable to complete a project-specific analysis of mobile-source air toxics (MSATs).

4.8.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to air quality. The section includes discussions of pollutants of concern for transportation-related projects, the National Ambient Air Quality Standards (NAAQS), and the air quality attainment status of the study area.

4.8.2.1 Pollutants of Concern

The Final EIS described five major air pollutants of concern that have the potential to cause health problems and that are typically associated with transportation-related projects: carbon monoxide (CO), particulate matter (PM), ozone (O_3), nitrogen oxides (NO_x), and volatile organic compounds (VOC). The Supplemental EIS also considers lead (Pb) as a potential air pollutant of concern because of its potential to be released from the soil during construction activities. The specific concerns associated with these pollutants and their typical sources of emission are described below. The only change in this information since publication of the Final EIS is that lead has been included in the evaluation.

- CO is emitted by combustion processes such as vehicle engines. In high concentrations, CO can reduce the amount of oxygen in the bloodstream.

- PM is regulated under one of two categories: PM with a diameter of 10 microns or less (PM10) and PM with a diameter of 2.5 microns or less (PM2.5). There are two categories of particulate emissions from mobile sources: primary and secondary.
  - Primary particulate emissions are those emitted from vehicle tailpipes, brake wear, decomposition of rubber tires, and road dust stirred up by moving vehicles. Depending on the condition of the roadway, re-suspended dust emissions are usually a greater source of particulates than tire and brake wear emissions.
  - Secondary particulate emissions result from chemical reactions in the atmosphere and include oxides of sulfur (SO_x) and NO_x that are emitted from vehicle tailpipes as gaseous pollutants.
  - PM has been linked to a number of health problems, including aggravated asthma, chronic bronchitis, and decreased lung function.
- O_3 is a secondary pollutant formed when precursor emissions of NO_x and VOCs react in the presence of sunlight. O_3 is a major component of photochemical smog. O_3 pollution is a regional problem during warm, sunny summer months. The photochemical reactions take several hours to complete, so that the highest O_3 concentrations typically occur far downwind of the original emission sources.
- NO_x is composed mainly of nitric oxide (NO) and nitrogen dioxide (NO_2). NO is formed in high-temperature combustion processes such as internal combustion engines. When NO reaches the atmosphere, most of it oxidizes and produces NO_2, the brownish component of photochemical smog.
- VOCs, the reactive component of hydrocarbon emissions, are compounds of carbon and hydrogen that react chemically in the atmosphere to produce NO_2 and O_3. Principal sources of VOCs are vehicle exhaust emissions and the evaporation of gasoline from fuel tanks and carburetors.
- Pb-containing dust can be released during construction from soils that contain exceptionally high concentrations of historic lead deposits (i.e., from before lead was phased out of gasoline). Pb can cause a range of health effects, including behavioral problems and/or learning disabilities. Children 6 years old and under are at particular risk from lead exposure because their bodies are growing quickly (U.S. Environmental Protection Agency 2003a).

4.8.2.2 Climate

The climatic conditions of the study area have not changed since publication of the Final EIS .

4.8.2.3 National Ambient Air Quality Standards

As described in the Final EIS, NAAQS are set by the U.S. Environmental Protection Agency (EPA) and are the standards that have been established as the official ambient air quality standards for Utah. They include both primary standards to protect public health and secondary standards to protect public welfare (such as protecting property and vegetation from the effects of air pollution). Table 4.8-1, which updates Table 3-18 in the Final EIS, shows the NAAQS for the pollutants of primary concern in the study area (see Section 4.8.2.1). For these pollutants, the primary and secondary standards set by EPA are the same, with the exception of CO for which no secondary standard has been identified.

Table 4.8-1 National Ambient Air Quality Standards

Pollutant	National (EPA) Standard	
	Primary	Secondary
Lead (Pb)		
Quarterly average	1.5 μg/m^3	1.5 μg/m^3
Particulate Matter (PM10)		
Annual arithmetic mean[1]	50 μg/m^3	50 μg/m^3
24-hour average	150 μg/m^3	150 μg/m^3
Particulate Matter (PM2.5)		
Annual arithmetic mean[2]	15 μg/m^3	15 μg/m^3
24-hour average[3]	65 μg/m^3	65 μg/m^3
Carbon Monoxide (CO)		
8-hour average[4]	9 ppm	No standard
1-hour average[4]	35 ppm	No standard
Ozone (O_3)		
8-hour average[5]	0.08 ppm	0.08 ppm
1-hour average	0.12 ppm	0.12 ppm
Nitrogen Dioxide (NO_2)		
Annual average	0.05 ppm	0.05 ppm

Notes:

[1] To attain this standard, the 3-year average of the weighted annual mean PM10 concentration at each monitor within an area must not exceed 50 ug/m3.

[2] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 ug/m3.

[3] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 ug/m3.

[4] Not to be exceeded more than once per year.

[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

Primary standards are set to protect public health; secondary standards are based on other factors (e.g., protecting crops and materials, avoiding nuisance conditions).

ppm = parts per million; μg/m^3 = micrograms per cubic meter

Source: U.S. Environmental Protection Agency 2003b.

Several recent epidemiological studies have suggested that there may be health effects associated with air pollutants at concentrations lower than the current NAAQS (e.g., Samet et al. 2000, Green et al. 2002, Schwartz 1999). However, the NAAQS have not been revised to reflect this research and remain, as promulgated, the controlling standards against which transportation-related air quality impacts are assessed.

4.8.2.4 Air Quality Attainment Status in the Study Area

As described in the Final EIS, the Clean Air Act requires that all areas with recorded violations of the NAAQS be designated nonattainment areas (i.e., out of compliance with established air quality

standards). In nonattainment areas, a state implementation plan must be developed and approved by EPA that identifies control strategies for bringing the region back into compliance with the NAAQS for that pollutant.

Nonattainment areas are further categorized as marginal, moderate, serious, severe, or extreme, depending on the severity of the recorded violations. According to the Clean Air Act, an area classified as marginal will be permitted less time to reach attainment than an area classified as extreme. Maintenance areas are areas that have been in violation of the NAAQS but have not had a recorded violation in several years and are in the process of being redesignated as attainment areas.

Table 4.8-2 shows the air quality attainment status for Salt Lake City, Ogden, and Salt Lake and Davis Counties. These designations have not changed since publication of the Final EIS.

Table 4.8-2 Nonattainment Designations for Jurisdictions in or adjacent to Study Area

Areas	Status	Pollutants
Salt Lake City	Maintenance area	Carbon Monoxide (CO)
Ogden	Maintenance area	Carbon Monoxide (CO)
	Moderate nonattainment area	Particulate Matter (PM10)
Salt Lake County	Moderate nonattainment area	Particulate Matter (PM10)
	Maintenance area	Ozone (O_3) – 1-hour average
Davis County	Maintenance area	Ozone (O_3) – 1-hour average

Source: Wasatch Front Regional Council 2003c.

As shown above in Table 4.8-2, Salt Lake City and Ogden are maintenance areas for CO, and Ogden is a nonattainment area for PM10. Salt Lake and Davis Counties are maintenance areas for O_3 (1-hour average), and Salt Lake County is a nonattainment area for PM10.[2]

4.8.2.5 Air Toxics

In addition to the NAAQS, EPA has also established a list of air toxics (64 FR 38706). Air toxics are pollutants that may cause cancer or other serious health effects or adverse environmental effects. The primary sources of air toxics are industrial activities and motor vehicle emissions. Most air toxics originate from human-made sources, including road mobile sources, non-road mobile sources (e.g., airplanes), and stationary sources (e.g., factories or refineries).

Mobile-source air toxics (MSATs) are a subset of the 188 air toxics identified by EPA and include compounds emitted from highway vehicles and non-road equipment. MSATs are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. They are also emitted from the incomplete combustion of fuels as secondary combustion products. Metal air toxics result from engine wear or from impurities in oil or gasoline (Environmental Protection Agency 2000a).

[2] Recent ambient PM10 data suggests that Salt Lake County is meeting NAAQS. PM10 monitoring data indicate that the PM10 standard has not been exceeded since 1994 (Bird pers. comm.).

Six of the 21 MSATs have been identified by EPA as priority MSATs: acetaldehyde, benzene, formaldehyde, diesel exhaust, acrolein, and 1, 3 butadiene (66 FR 17230). EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The following toxicity information for the six prioritized MSATs was taken from EPA's Integrated Risk Information System (IRIS) database, *Weight of Evidence Characterization* summaries, and represents EPA's most current evaluation of the potential hazards and toxicology of these chemicals or mixtures.

- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Benzene** is characterized as a known human carcinogen under the proposed revised *Carcinogen Risk Assessment Guidelines***.**
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans and sufficient evidence in animals.
- **Diesel exhaust,** which represents the combination of diesel particulate matter and diesel exhaust organic gases, is likely to be carcinogenic to humans by inhalation from environmental exposures.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure**.**
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.

To date, neither NAAQS for MSATs nor national project-level guidelines or guidance to study MSATs under various climatic and geographic situations have been developed. Such limitations make the study of MSAT concentrations, exposures, and health impacts difficult and uncertain.

In July 1999, EPA published a strategy to reduce air toxics; in March 2001, EPA issued regulations for automobile and truck manufacturers to decrease the amounts of these pollutants by target dates in 2007 and 2020. Under the March 2001 regulation, between 1990 and 2020, highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde will be reduced by 67 percent to 76 percent, and on-highway diesel particulate matter emissions will be reduced by 90 percent. These reductions will be realized through implementation of mobile-source control programs, including the reformulated gasoline program, a new cap on toxics content of gasoline, the national low-emission vehicle standards, the Tier 2 motor vehicle emission standards and gasoline sulfur control requirements, and the heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements (U.S. Environmental Protection Agency 2000b).

The reductions described above are net emission reductions; that is, the reductions will occur even after growth in vehicle-miles traveled (VMT) is taken into account.

4.8.2.6 Other Pollutants

Historically, climate change has occurred naturally. However, human activities, including industrialization, population growth, fossil fuel burning, and deforestation, are changing the atmospheric concentrations and distributions of gases in the atmosphere, including greenhouse gases and aerosols. Motor vehicles are a large producer of greenhouse gases because the burning of petroleum fuels is a primary producer of carbon dioxide (CO_2), a greenhouse gas. Changes in the concentrations of the

greenhouse gases affect how the Earth absorbs and radiates heat, thus affecting climate change (U.S. Environmental Protection Agency 2002).

Naturally occurring greenhouse gases include water vapor, CO_2, methane (CH_4), nitrous oxide (N_2O), and O_3. Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also greenhouse gases, but for the most part, they are solely products of industrial activity (U.S. Environmental Protection Agency 2002). Carbon dioxide is the primary transportation-related greenhouse gas.

4.8.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, the impacts of highway operation on air quality would be long term and directly related to traffic volumes and average speeds. This section presents an updated mesoscale analysis of air quality impacts based on the 2003 WFRC conformity analysis for the region. In addition, this section presents CO and PM microscale analyses for the proposed Legacy Parkway/500 South interchange and an assessment of air quality impacts on the Legacy Parkway mainline and the adjacent Legacy Parkway Trail.

4.8.3.1 Conformity Requirements

The Transportation Equity Act (TEA-21) and the Clean Air Act Amendments require that all regionally significant highway and transit projects in air quality nonattainment areas come from a “conforming” transportation plan and transportation improvement program. A *conforming plan* is one that has been analyzed regionally for emissions of controlled air pollutants and is found to be within emission limits established in the State Implementation Plan. Transportation projects are said to “conform” if, both alone and in combination with other planned projects included in that transportation improvement program, the project would not result in any of the following.

- New violations of the NAAQS.
- Increases in the frequency or severity of existing violations of the NAAQS.
- Delays in attainment of the NAAQS.

For the study area, WFRC, the MPO for the region, conducts the regional conformity analyses and submits them to FHWA for a conformity determination. Both the mesoscale evaluation completed by WFRC and the microscale evaluations completed for the Supplemental EIS were used to help determine whether Legacy Parkway would be in conformance with the appropriate mobile-source pollutant budgets in approved state implementation plans.

4.8.3.2 Mesoscale Evaluation

As described above in Section 4.8.1, WFRC completed the most recent regional conformity analysis in December 2003 (Wasatch Front Regional Council 2003c). Based on the mesoscale analysis presented in that plan, WFRC concluded that the updated 2030 transportation plan, which includes Legacy Parkway, conformed to the state implementation plan for all air pollutants. A summary of the air quality conformity

conclusions derived from this analysis are presented below for the primary pollutants of concern described in Section 4.8.2.1, as well as for sulfur dioxide, MSATs, and greenhouse gases.

Although the regional conformity analysis demonstrated that future transportation emissions, including those from the Legacy Parkway project, will not cause ambient concentrations to exceed NAAQS limits, a revised mesoscale analysis was prepared for this Supplemental EIS to identify potential changes in regional emissions between the future conditions (2020) No-Build Alternative (assuming full build-out of the WFRC long range plan) and the proposed build alternatives (Wasatch Front Regional Council 2004). The analysis was completed using the most recent version of EPA's MOBILE emission factor model, MOBILE6, and regional traffic data derived from WFRC's 2004 travel demand model (version 3.2). The following section presents the results of this analysis, including emission calculations for region-wide ozone precursors (NO_x and VOCs) and CO, for the No-Build Alternative (both existing and future conditions) and the build alternatives.

No-Build Alternative

Existing Conditions

Table 4.8-3, which updates in part Table 4-12 in the Final EIS, illustrates existing CO, NO_x, and VOC emissions within Weber, Davis, and Salt Lake Counties. As described above in Section 4.8.2.4, measured air pollutants throughout the region (including the pollutants for which the region is classified as "non-attainment" or "maintenance") are currently lower than the allowable NAAQS limits. Under existing conditions, regional air quality would remain unchanged. There would be no project-related air quality impacts.

Future Conditions (2020)

As shown in Table 4.8-3, regional VMT would increase under both the 2020 No-Build Alternative and the build alternatives in 2020 compared to existing conditions because of projected regional growth. However, regional emissions for all transportation-related air pollutants are predicted to decline between 2001 and 2020 under both the No-Build Alternative and the build alternatives because of the increasing efficiency of the vehicle fleet.

Table 4.8-3 Existing (2001) and Future (2020) Regional Mesoscale Air Quality for Weber, Davis, and Salt Lake Counties

	No-Build Alternative			Percentage Change between Future No-Build Alternative (2020) and Build Alternatives
	Existing Conditions	Future Conditions (2020)	Build Alternatives (2020)	
VMT (million miles/day)	31.32	48.15	48.08	0%
VHT (hours/day)	850,763	1,391,028	1,356,434	- 2%
Average Speed (mph/kph)	36.8/59.2	34.6/55.7	35.4/57.0	2%
Summer Day Emissions (tons/day)				
CO	667.84	280.77	281.62	0%
VOC	58.97	20.40	20.27	- 1%
NOx	91.45	20.70	20.83	1 %

	No-Build Alternative			
	Existing Conditions	Future Conditions (2020)	Build Alternatives (2020)	Percentage Change between Future No-Build Alternative (2020) and Build Alternatives
Winter Day Emissions (tons/day)				
CO	994.16	587.49	588.41	0%
VOC	52.19	17.39	17.30	- 1%
NOx	98.74	22.55	22.63	0%

Source: Wasatch Front Regional Council 2004.

Build Alternatives

As shown in Table 4.8-3, implementation of the build alternatives would have a minor impact on overall regional emissions relative to the future conditions (2020) No-Build Alternative.

The following also provides a qualitative discussion of the primary pollutants of concern based primarily on the regional conformity analysis completed for the WFRC long range plan, which includes the proposed Legacy Parkway. As described in Section 4.3.3.4, *Traffic Patterns and Accessibility*, the level of service (LOS) on the major interstates, arterials, and local roadways in the study area in 2020 will either stay the same or improve under the build alternatives. Improvements to the level of service on through streets would equate to reductions in congestion and increases in traffic flow, which could translate to improvements in air quality. Taking into consideration expected increases in VMT and resulting energy consumption (see Section 4.19.3, *Energy*), at a minimum, air quality conditions in 2020 in the study area would likely be comparable to existing conditions if the build alternatives were constructed. This assumption is supported by the build alternatives' conformance with the WFRC regional conformity analysis.

Carbon Monoxide (CO)

The proposed action is located in an attainment area for CO (outside of Salt Lake City and the City of Ogden). While the majority of regional CO emissions can be attributed to motor vehicles, industrial and natural processes such as metals processing, wood stoves, and forest fires are additional sources of CO emissions. Substantial changes in other emission sources combined with changes in travel patterns and transportation networks might affect CO emissions at a regional level, but the effects of any individual project are likely to be small (Utah Department of Transportation 2003c).

Particulate Matter (PM10 and PM2.5)

Regional characteristics play an important role in PM10 levels in Utah. Utah's climate and geography contribute to regional PM10 impacts when temperature inversions cause particles to become trapped in the valleys. Meteorological conditions combined with changes in the regional land use and transportation patterns might affect PM10 at a regional level, but the effects of any individual project are likely to be small and uncertain (Utah Department of Transportation 2003c).

The southern portion of the study area is located in Salt Lake County, which is a nonattainment area for PM10, as shown above in Table 4.8-2. All of the proposed build alternatives would support vehicle traffic and would, therefore, result in PM10 emissions.

As shown in Table 4.8-3, regional VMT under the 2020 No-Build Alternative and the build alternatives is expected to increase compared to existing conditions because of projected regional growth. Increased VMT would result in increased PM10 emissions, including vehicle exhaust and re-suspended dust. Table 4.8-3 shows that the build alternatives would result in slightly lower regional VMT, which would result in slightly lower PM10 emissions than the 2020 No-Build Alternative. Emissions associated with vehicle traffic include both tailpipe and non-tailpipe emissions (emissions from tire and brake wear and re-suspended dust). Depending on the condition of the roadway, re-suspended dust emissions are usually a greater source of particulates than tire and brake wear emissions. Re-suspended dust emissions can be minimized through street sweeping and other mitigation measures. Natural precipitation events and dust displaced by high-speed traffic also minimize these emissions.

EPA regulates tailpipe emissions on a national basis; these regulations require vehicle manufacturers to meet specific emission limitations. Tailpipe particulate emission limits for light-duty trucks and automobiles have decreased from 0.6 grams/mile for model years 1982 to 1986 to 0.08 grams/mile for model years 1994 to 2000, a reduction of 87 percent (U.S. Environmental Protection Agency 2000). PM10 emissions per vehicle are expected to decrease in the future as emission limitations become more stringent. EPA's approval of the state implementation plan for PM10 in December 2002[3] (Utah Department of Environmental Quality, Division of Air Quality 2002) and WFRC's determination that the 2030 long range plan and transportation improvement program conform to the state implementation plan (Wasatch Front Regional Council 2003c) suggest that it is unlikely that Legacy Parkway would increase the frequency or severity of the current exceedance of the NAAQS PM10 standard.

The new PM2.5 air quality standard has been in place as of July 18, 1997 (62 FR 138), and Salt Lake Valley has recently been declared an attainment area for PM2.5 (Bird pers. comm.). As described above, the proposed action would result in a slight decrease in regional VMT compared to the future No-Build Alternative, and therefore, a slight decrease in regional PM2.5-related emissions.

Ozone (O_3)

Legacy Parkway would be located in a maintenance area for O_3 because it is in Salt Lake and Davis Counties, both of which are maintenance areas for O_3. Since the ozone state implementation plan was approved by EPA on August 18, 1997 (Utah Department of Environmental Quality, Division of Air Quality 1997), and WFRC has determined that both the region's 2030 long range transportation plan and transportation improvement program conform to the ozone state implementation plan, it is unlikely that Legacy Parkway would cause new exceedances of the NAAQS.

Nitrogen Dioxide, Sulfur Dioxide, and Lead

There are currently no nonattainment or maintenance areas for nitrogen dioxide, sulfur dioxide, or lead in the study area. Because of their regional nature and the minimal contribution of motor vehicles as a source of these pollutants, it is unlikely that Legacy Parkway would substantially affect concentrations of these pollutants in the study area.

Section 4.17, *Hazardous Waste*, of this document provides additional information on the potential impacts associated with aerially deposited lead in the proposed right-of-way of the build alternatives.

[3] The state implementation plan for PM10 was originally approved by the EPA on July 8, 1994. The portion of the document relevant to Utah County was most recently amended in 2002. The December 2002 approval is only for the amended portions of the document.

Air Toxics

The analysis of air toxics is an emerging field, and the U.S. Department of Transportation (DOT) and EPA are currently working to develop and evaluate the technical tools necessary to perform air toxics analysis, including improvements to emissions models and air quality dispersion models. FHWA's ongoing work in air toxics includes a research program to determine and quantify the contribution of mobile sources to air toxic emissions, the establishment of policies for addressing air toxics in environmental reports, and the assessment of scientific literature on health impacts associated with motor vehicle toxic emissions. However, the science and modeling necessary to complete an assessment of project-specific MSAT impacts is currently encumbered by technical shortcomings that prevent a formal determination of MSAT impacts for this project (see *Unavailable Information for Project-Specific MSAT Impact Analysis* below).

Even though reliable quantitative methods do not exist to accurately estimate the health impacts of MSATs associated with the Legacy Parkway project, it is possible to qualitatively assess future MSAT emissions under the project alternatives. Based on this approach it is likely that the build alternatives would result in lower MSAT emissions than the future No-Build Alternative, and future emissions under both the build and no-build scenarios would be lower than present-day emissions.

For the build alternatives, the amount of MSATs emitted would be proportional to VMT, assuming that other variables such as fleet mix are the same for each alternative. Because the VMT estimated for the future No-Build Alternative is slightly higher than that estimated for the build alternatives (see Table 4.8-3), impacts on regional air quality related to MSATs are not expected to increase under any of the build alternatives. It is expected there would be no appreciable difference in overall MSAT emissions in the study area between the No-Build and build alternatives.

In addition, 2020 emissions would likely be lower than existing levels as a result of EPA's national control programs, which are expected to reduce MSAT emissions by 67 to 90 percent, per both vehicle mile and total fleet. As noted above in Section 4.8.2.5, several national regulatory programs are in place, including the Tier II light-duty vehicle emissions regulations, the 2007 heavy-duty diesel regulations, and the EPA non-road engine-control regulations. The nature of the Legacy Parkway corridor itself also limits any potential air toxics impacts. The proposed highway would be constructed through a largely undeveloped area and would include a large right-of-way buffer. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures.However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions are likely to be lower in the future as well. In addition, human exposure to mobile source emissions would be lower than for a comparable roadway constructed in a more densely developed area (see *Evaluation of MSAT Impacts* below).

Air quality impacts on wildlife resources are addressed in Subsection 4.13.3.4 of Section 4.13, *Wildlife*, of this Supplemental EIS.

Unavailable Information for Project-Specific MSAT Impact Analysis

As noted above, the science and modeling of project-specific MSAT impacts has not developed to the point where there is certainty or acceptance from the scientific community. Accordingly, information on MSAT impacts associated with the build alternatives evaluated in the Supplemental EIS is not available, and the means to obtain this information has not been fully developed. When this is the case, 40 CFR 1502.22(b) requires FHWA to provide the following information.

- A statement that such information is incomplete or unavailable.

- A statement of the relevance of the incomplete or unavailable information to evaluating reasonable foreseeable significant adverse impacts on the human environment.
- A summary of existing credible scientific evidence relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment.
- The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

The following addresses these specific provisions.

- Information is Incomplete or Unavailable

  As noted above, project-specific MSAT analysis is an emerging field for which the science has not been fully developed and in many cases is unavailable. FHWA is aware that MSAT releases to the environment may cause some level of pollution. What is not scientifically definable is an accurate level of human health or environmental impacts that would result from construction of new transportation facilities, such as the proposed action.

  Project-level MSAT risk assessment involves four major steps: emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and final determination of health impacts based on the estimated exposure. Each of these steps is currently encumbered by technical shortcomings that prevent a formal determination of the MSAT impacts of the proposed action. Specifically, the air emissions model (MOBILE6.2) is based on limited data, raising concerns over the accuracy of the final air emission rate estimates. Further, the particulate emissions rates from MOBILE6.2 are not sensitive to vehicle speed or acceleration.[4] Given these uncertainties in the emissions estimation process, subsequent calculated concentrations of air toxics would be equally uncertain.

  In addition, the available dispersion models have not been successfully validated for estimating ambient concentrations of particulate matter or reactive organic MSATs. Available exposure models are not well designed to simulate roadside environments. Similarly, the toxicity value of at least one of the priority MSATs—diesel exhaust—has not been nationally established, which would prevent the determination of health impacts of this pollutant even if the other necessary tools were available. As a result, current scientific techniques, tools, and data make it impossible to accurately estimate actual human health or environmental impacts from MSATs that would result from a transportation project.

- Relevance of Incomplete or Unavailable Information

  Without information necessary to complete project-specific MSAT analysis, it is impossible to quantitatively evaluate air toxic impacts at a project level. This unavailable or incomplete information is very relevant to understanding the "significant adverse impacts on the human environment" given that the significance of the likely MSAT levels cannot be assessed.

- Summary of Existing Credible Scientific Evidence

  Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that MSATs are statistically associated with negative health outcomes

[4] Vehicle speed is an important determinant for emission rates for diesel exhaust, but not for the remaining priority MSATs.

(frequently based on emission levels found in occupational settings and epidemiological studies), or that animals demonstrate negative health outcomes when exposed to large doses. To address some of the unresolved health issues associated with MSATs, the Health Effects Institute, a non-profit organization jointly funded by EPA and industry, has undertaken a series of studies to determine whether MSAT hot spots exist and what the health implications are if they do. The final summary of these studies is not expected to be completed for several years.

Other studies have been reported to show that close proximity to roadways is related to negative health outcomes, particularly respiratory problems, although many are not specific to MSATs (South Coast Air Quality Management District 2000). Instead, they have encompassed the full spectrum of pollutants, making it impossible to determine whether MSATs or other pollutants are responsible for the health outcomes.

There is also considerable literature on the uncertainties associated with the emissions modeling process. The most significant of these is an assessment conducted by the National Research Council of the National Academy of Sciences, entitled *Modeling Mobile-Source Emissions* (2000). This review noted numerous problems associated with then-current models, including the predecessor to the current MOBILE6.2 model. The review found that "significant resources will be needed to improve mobile source emissions modeling." The improvements cited included model evaluation and validation, and uncertainty analysis to raise confidence in the model's output. While the release of MOBILE6.2 represents an improvement over its predecessor, the MSAT emission factors have not been fully validated due to limits on dispersion modeling and monitoring data. The MOBILE6.2 model is currently being updated and its results will not be evaluated and validated for several years.

- Evaluation of MSAT Impacts

  Although there is no accepted model or accepted science for determining the impacts of project-specific MSATs, as noted above, EPA predicts that its national control programs will result in meaningful future reductions in MSAT emissions, as measured on both a per-vehicle-mile and total-fleet basis. FHWA believes that these projections are credible because the control programs are required by statute and regulation. Also, because the build alternatives would reduce VMT in the project area compared to the future No-Build Alternative, FHWA believes that MSAT emissions in 2020 would also be lower in the project area under the build alternatives. Because MSAT emissions on a per-VMT basis are expected to decline due to EPA's control program, and because each of the build alternatives would result in a nearly equal reduction in VMT relative to the future No-Build Alternative, FHWA does not believe that Legacy Parkway would result in significant adverse impacts on the human environment.

Other Pollutants

There are currently no federal laws or regulations, or EPA-established criteria or thresholds, for greenhouse gas emissions. Because the sources and effects of greenhouse gases are global in nature, attempting project-level analysis of increases or decreases of greenhouse gases, including carbon dioxide, is technically infeasible. In addition, given the high level of uncertainty inherent in such an analysis, it is likely that the results would not be informative for making project-level decisions.

4.8.3.3 Microscale "Hot Spot" Impact Analysis

A microscale impact analysis was completed for the Supplemental EIS at the Legacy Parkway/500 South interchange. This interchange was selected for detailed modeling because it would have the highest traffic

volumes of the proposed action components (compared to the Legacy Parkway mainline and the proposed interchange at Parrish Lane/Legacy Parkway) and therefore represents the worst-case scenario for evaluating potential air quality impacts. The microscale analysis for the Legacy Parkway/500 South interchange included mainline Legacy Parkway traffic volumes in the vicinity of the interchange.

Project-level microscale analyses were performed for CO and PM10. As described below, the CAL3QHC line source dispersion model (version 2.0) was used to calculate CO concentrations in the vicinity of the Legacy Parkway/500 South interchange. Because EPA has not issued modeling guidance for PM10 microscale analyses, a qualitative assessment of the local conditions for PM10 was conducted, which is the standard procedure for completing such analyses.

Carbon Monoxide – Microscale Analysis Methodology

As described above in Section 4.8.1, the CAL3QHC line source dispersion model (version 2.0) is the current air quality dispersion model recommended by EPA, UDOT, and WFRC for calculating pollutant concentrations caused by transportation sources. The model considers free-flow and idling emissions in conjunction with intersection geometry, wind direction, and other meteorological factors. This model was used to calculate peak 1-hour CO concentrations near the proposed Legacy Parkway/500 South interchange, and at sensitive receptors along the Legacy Parkway mainline and the proposed trail in the vicinity of the interchange. Eight-hour CO concentrations were estimated by applying a persistence factor of 0.7 to the 1-hour concentration, as recommended by EPA.

Consistent with recommendations provided in the UDOT *Air Quality "Hot Spot" Manual* (Utah Department of Transportation 2003c), critical assumptions and configuration parameters used in the CAL3QHC modeling included a 1,000-m (3,280-ft) mixing height, low wind speed (i.e., 1 m/sec [3.2 ft/sec]), a 1-hour background CO concentration of 8.0 ppm, an 8-hour background CO concentration of 5.0 ppm, and a 2020 horizon year. In addition, the modeling assumed a very stable (Class E) atmosphere to simulate adverse wintertime air quality conditions when CO violations are more likely to occur. The modeling evaluated 36 wind directions (in 10-degree increments) to ensure that the worst-case condition was considered for each receptor location.[5] Vehicle emission rates for 2020 were also obtained from the *Air Quality "Hot Spot" Manual.*

Sensitive Receptors

CO concentrations were estimated at locations referred to as sensitive receptors. Sensitive receptors are locations where the maximum total CO concentration is likely to occur and where the general public is likely to have continuous access and exposure to vehicle emissions. The proposed Legacy Parkway/500 South interchange would be located in a relatively undeveloped area. Most individual exposure to CO emissions would be at locations adjacent to the roadway, including the mainline and ramp intersections where people would be likely to spend more time, and along the proposed trail that would run adjacent to Legacy Parkway.

Sixty receptors were modeled around the Legacy Parkway/500 South interchange, including immediately adjacent to the on- and off-ramps; along 500 South (eastbound and westbound); and along the proposed trail adjacent to the alignment, approximately 20 to 30 m (66 to 98 ft) from the northbound on- and off-ramps. For the Legacy Parkway mainline, 30 receptors were modeled adjacent to the roadway in the vicinity of the interchange.

[5] CO concentrations at receptor locations under worst-case meteorological conditions represent the most serious CO levels that could be caused by vehicle emissions. This approach is consistent with the objective of the ambient air quality standards to prevent human exposure to unsafe levels of air pollution.

Carbon Monoxide – Microscale Analysis Air Quality Impact Criteria

Section 4.8.3.1 describes the conformity requirements for determining whether a project would violate the NAAQS on a regional scale. The microscale analysis was used to determine whether localized concentrations of emissions resulting from any proposed build alternatives would exceed either the 1-hour or 8-hour standards for CO. Potential impacts described in this section are associated with operating Legacy Parkway; construction related air-quality impacts are summarized in Section 4.20 of the Final EIS. Mitigation measures associated with these construction-related air quality impacts have been included in Section 4.20, *Construction Impacts*, of this document.

An air quality impact would occur if the microscale analysis results indicated any of the following results.

- An exceedance of the 1-hour CO standard (35 ppm) at a receptor location.
- An exceedance of the 8-hour CO standard (9 ppm) at the highest modeled receptor. Under this criterion, the 8-hour CO concentration could increase under the build alternatives, provided the 8-hour standard of 9 ppm was not exceeded.
- For those locations where there is an existing violation of the 8-hour standard (i.e., under the Future No-Build Alternative), an increase in the severity or frequency of the modeled impact.

Meeting any of these criteria would indicate that the proposed Legacy Parkway/500 South interchange would not be in conformance with air quality regulations. Therefore, to support a conclusion of no adverse impacts, modeled CO emission must be less than the applicable 1-hour and 8-hour CO NAAQS.

Microscale Air Quality Impact Results

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions (2004), there would be no project-related air quality impacts under the No-Build Alternative. Air quality trends would continue, as described above in Section 4.8.2 of this document.

Table 4.8-4 presents existing 1-hour and 8-hour CO concentrations for the proposed Legacy Parkway/500 South interchange, Legacy Parkway mainline, and the Legacy Parkway Trail. These concentrations are based on mandated assumed background conditions for purposes of the air quality model and represent, likely worst-case scenario conditions. These concentrations were not measured in the field.

Future Conditions (2020)

Concentrations of CO and PM would be greater under the future conditions (2020) No-Build Alternative than under the build alternatives because congested flow conditions would increase vehicle travel times, adversely affecting air quality.

These increased concentrations, however, are not represented in Table 4.8-4 because concentrations in the table for future no-build conditions are based on assumed background concentrations, as provided in UDOT air quality guidance (Utah Department of Transportation 2003c). Although the actual concentrations are not known, it is likely that they would be higher than the current background conditions at the modeled locations.

Build Alternatives

Carbon Monoxide

As illustrated in Table 4.8-4 and the subsequent text, detailed CO modeling for the proposed Legacy Parkway/500 South interchange, including sensitive receptors along the Legacy Parkway mainline and the Legacy Parkway Trail in the area of the interchange, indicate that CO concentrations would be below the NAAQS for both the 1-hour and 8-hour standards. Historical data also indicate that CO emissions are decreasing, despite a substantial increase in population and VMT in the county, as older vehicles are replaced and the vehicle fleet becomes more efficient.

Table 4.8-4 Carbon Monoxide Concentrations at Proposed Legacy Parkway and 500 South Interchange, Legacy Parkway Mainline, and Legacy Parkway Trail

	1-Hour Concentration (ppm)				8-Hour Concentration (ppm)			
Location	Existing Conditions (2004)[1]	Future Conditions (2020)[1]	Build Alternatives (2020)[2]	NAAQS	Existing Conditions (2004)[1]	Future Conditions (2020)[1]	Build Alternatives (2020)[3]	NAAQS
Legacy Parkway/500 South Interchange	8.0 ppm	8.0 ppm	11.7 [4]	35	5.0 ppm	5.0 ppm	7.6 [4]	9
Legacy Parkway Mainline	8.0 ppm	8.0 ppm	12.6 [4]	35	NA	NA	8.2 [4]	9
Legacy Parkway Trail	8.0 ppm	8.0 ppm	9.9	35	NA	NA	6.3	9

Notes:

[1] Under existing (2004) and future (2020) conditions, Legacy Parkway has not been built. Although there would be no emission associated with the parkway at these locations (e.g., because it would not exist), the 1-hour and 8-hour concentrations listed in the table are based on assumed background concentrations as provided in UDOT air quality guidance (Utah Department of Transportation 2003c).

[2] Includes 1-hour background concentration of 8.0 ppm.

[3] Includes 8-hour background concentration of 5.0 ppm.

[4] Highest modeled CO concentration for all model configurations.

NA = Not applicable.

Source: CAL3QHC line source dispersion model (version 2.0).

Legacy Parkway/500 South Interchange

Under all proposed build alternatives, the highest modeled 1-hour CO concentration at the Legacy Parkway/500 South interchange was 11.7 ppm, which is below the 35 ppm 1-hour NAAQS (Table 4.8-4). The highest modeled 8-hour CO concentration was 7.6 ppm, which is below the 9 ppm 8-hour NAAQS. Both of these modeled concentrations were located near the southbound off-ramp, adjacent to both the off-ramp and the Legacy Parkway mainline.

Given that NAAQS are the standards that have been established to protect public health, it is anticipated that health effects associated with project implementation would be minimal because the build alternatives would not result in a violation of these standards.

Legacy Parkway Mainline

Under all proposed build alternatives, the highest modeled 1-hour CO concentration on the Legacy mainline was 12.6 ppm, which is below the 35 ppm 1-hour NAAQS. The highest modeled 8-hour CO concentration on the mainline was 8.2 ppm, which was below the 9 ppm 8-hour NAAQS. The highest modeled CO concentration on the Legacy Parkway mainline occurred near the southbound off-ramp of the Legacy Parkway/500 South interchange.

Given that NAAQS are the standards that have been established to protect public health, it is anticipated that health effects associated with project implementation would be minimal because the build alternatives would not result in a violation of these standards.

Legacy Parkway Trail

At receptor locations along the proposed pedestrian/equestrian trail, 1-hour modeled CO concentrations ranged from 9.0 to 9.9 ppm, which is below the 35 ppm 1-hour NAAQS. The 8-hour concentrations at these locations along the trail ranged from 5.7 to 6.33 ppm, which is below the 9 ppm 8-hour NAAQS.

Given that NAAQS are the standards that have been established to protect public health, it is anticipated that health effects associated with project implementation would be minimal because the build alternatives would not result in a violation of these standards.

Particulate Matter (PM10)

A qualitative analysis of local conditions within the study area was completed for the PM10 microscale analysis. As shown above in Table 4.8-2, both the City of Ogden and Salt Lake County are nonattainment areas for PM10. A large proportion of the through-corridor traffic that would use Legacy Parkway would originate in north Davis County or Weber County and would travel to Salt Lake County or Utah County. Microscale traffic patterns in Ogden are not expected to change as a result of the Proposed Action; therefore, no impacts are expected on the PM10 nonattainment area in Ogden (Rifkin pers. comm.[a]). As a result, the only PM10 nonattainment area that would require a qualitative assessment of PM10 impacts is the portion of the study area located in Salt Lake County.

PM10 monitors are generally located in or near areas with known PM10 problems. The nearest PM10 monitors to the parkway corridor are in North Salt Lake and Ogden. The North Salt Lake monitoring station is approximately 107 m (350 ft) from I-15 and reflects PM10 contributions from high-volume roadways, including I-15, and can accurately measure I-15 contributions to the PM10 concentrations.

Ambient PM10 monitoring data for the North Salt Lake facility are shown below in Table 4.8-5. As illustrated in the table, there have been no violations of the PM10 standards at this facility since 1996, and annual average concentrations of PM10 have declined since 2000. (The value of 153 ug/m3 in 2001 does not constitute an exceedance because of EPA's rounding conventions for air quality data.) According to the Utah traffic volume data for 2000, 2001, and 2002 (Utah Department of Transportation 2005b), average annual daily traffic volumes on I-15 near the North Salt Lake monitoring station facility were measured at approximately 99,700 vehicles per day (vpd), 115,700 vpd, and 121,600 vpd, respectively. These trends illustrate that as annual traffic volumes on I-15 have continued to increase in the study area, average annual PM10 concentrations have declined.

Table 4.8-5 PM10 Air Quality Data at North Salt Lake Monitoring Station (ug/m^3)

Year	Annual Average[1]	24-Hour High[2]	24-Hour Second High	Exceedances
2003	38	111	107	0
2002	41	121	120	0
2001	44	153	141	0
2000	46	118	117	0
1999	45	136	113	0
1998	40	99	95	0
1997	44	107	104	0
1996	47	162	157	2
1995	45	130	129	0

Notes:

[1] Annual average standard = 50 ug/m^3.

[2] 24-hour standard = 150 ug/m^3.(exceedances determined by the 24-Hour Second High).

ug/m^3 = microgram per cubic meter

Source: Utah Department of Environmental Quality 2004.

Average annual daily traffic volumes on Legacy Parkway are expected to be at least 20,000 vpd (Shingleton pers. comm.). This volume would be similar to approximately 16.4 percent of the daily volume currently experienced on I-15 near the North Salt Lake monitoring station. Since existing traffic volumes on I-15 are much higher than those expected on the Legacy Parkway and do not cause violations of the PM10 standard at the North Salt Lake monitoring station (which is about 350 feet from I-15), it is unlikely that traffic volumes associated with the proposed project would cause violations of the PM10 standard..

Mitigation Measures

Non-tailpipe PM10 emissions would be minimized through street sweeping, minimal use of sand for snow and ice control (see 4.10, *Water Quality*), and other general maintenance measures performed by UDOT.

Section 4.9
Noise

This section provides an update on existing noise conditions in the study area. It has been updated to reflect new noise monitoring completed in October 2003, and new noise impact information and abatement analyses based on application of the revised 2003 FHWA traffic noise model (TNM), version 2.1.

4.9.1 Approach and Methodology

4.9.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with noise in the study area, Sections 3.9 and 4.9 of the Final EIS were reviewed to determine what changes had occurred since publication of the Final EIS. The study area for the noise section encompassed a corridor spanning approximately 457 m (1,500 ft) on each side of the proposed build alternative alignments; the northern and southern boundaries of the study area are defined in Section 4.0.1, *Study Area*. The 457-m (1,500-ft) study area width is consistent with the validation limits of the TNM, which are described in more detail in the following text.

The following section summarizes the approach and methodology used to incorporate information generated from the updated TNM and to reevaluate proposed noise abatement measures. This section also provides supplemental information on how noise is generated and measured, as well as the federal and state regulatory requirements that govern noise abatement criteria. It should be noted that noise impacts on 4(f)/6(f) resources, including the Farmington Bay Waterfowl Management Area (FBWMA), the Jordan River Off-Highway Vehicle (OHV) Center, and Bountiful City Pond, are discussed in Chapter 5 of this document. A brief discussion of noise abatement measures for these resources is included below in 4.9.3.2, *Noise Abatement Measures*. Noise impacts on wildlife are discussed in Section 4.13 of this document.

4.9.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of noise impacts since the Draft Supplemental EIS was published in December 2004. Those changes were made because the total number of affected residences within the 65-dB contour has been revised to include platted lots.[1] See Section 4.9.3.1, *Operational Noise Impacts.*

[1] A platted lot is an individual lot within a subdivided parcel legally dedicated for development.

4.9.1.3 Background Information on Noise

As described in the Final EIS, sound travels through the air as waves of minute air pressure fluctuations caused by vibration. Sound level meters are used to measure the actual pressure fluctuation caused by sound waves, taking into consideration different sound frequency ranges. The decibel scale used to describe sound is a logarithmic scale that accounts for the large range of sound pressure levels. The A-weighted decibel scale (dB[A]) is the composite decibel scale most widely used to approximate the way the human ear responds to noise levels. Table 3-20 in the Final EIS lists typical A-weighted noise levels for various types of sound sources.

Varying noise levels are often described in terms of the equivalent sound level (Leq). Equivalent sound levels are used to develop single-value descriptions of average noise exposure over stated periods of time. The Leq data used for these average noise exposure descriptors are generally based on A-weighted sound-level measurements. Most often, units of hourly Leq values are used to describe traffic noise.

The nature of decibel (dB) scales is such that individual dB ratings for different noise sources cannot be added directly to give the sound level for the combined noise source. Examples of this are given below.

- Two noise sources producing equal dB ratings at a given location produce a combined noise level 3 dB greater than either sound alone.
- When two noise sources differ by 10 dB, the combined noise level is 0.4 dB greater than the louder source alone.
- People generally perceive a 10-dB increase in a noise source as a doubling of loudness. For example, a 70-dB sound level is perceived by an average person as twice as loud as a 60-dB sound.
- People generally cannot detect differences of 1 to 2 dB between noise sources. Under ideal listening conditions, differences of 2 or 3 dB can be detected by some people. A 5-dB change would probably be perceived by most people under normal listening conditions.

When distance is the only factor considered, sound levels from isolated point sources of noise typically decrease by about 6 dB for every doubling of distance from the noise source. When the noise source is a continuous line (for example, vehicle traffic on a highway), sound levels decrease by about 3 dB for every doubling of distance away from the roadway. In traffic studies, an attenuation rate of 4.5 dB per doubling of distance is often used when the roadway is at ground level and the intervening ground is effective in absorbing sound (for example, ground vegetation, scattered trees, clumps of bushes). When the roadway is elevated, 3-dB noise attenuation per doubling of distance is used because the sound-absorbing effects of the intervening ground are limited.

Noise levels at different distances can also be affected by factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can increase or decrease noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) can also affect the degree to which sound is attenuated over distance.

Reflections off topographical features or buildings can sometimes result in higher sound levels (lower sound attenuation rates) than would be normally expected. Temperature inversions and altitudinal changes in wind conditions can also diffract and focus a sound wave to a location at considerable distance from the noise source. Focusing effects are usually noticeable only for very intense noise sources, such as blasting operations. As a result, the existing noise environment can be highly variable depending on local conditions.

4.9.1.4 Methods Used to Update Noise Analysis

The following methods were used to update the noise analysis presented in the Final EIS. Supplemental information regarding noise monitoring and application of the TNM is described in more detail below.

- Existing activities, developed land, and undeveloped land for which development is planned, designed, or programmed and that could be affected by noise from the proposed build alternatives were identified from field surveys and aerial photographs of the alignment corridor.

- Short-term (15-minute) sound level measurements typical of existing conditions were collected at selected representative locations throughout the study area to characterize the existing noise environment adjacent to the proposed alignments.

- Potential noise impacts associated with construction and operation of the proposed build alternatives were predicted using the updated TNM, version 2.1, which was approved by FHWA and UDOT in February 2003.[2]

- Project related noise impacts were identified at residential and recreational locations within about 457 m (1,500 ft) of each build alternative alignment. These impacts were identified using the relative and absolute criteria specified in Title 23, Part 772 of the Code of Federal Regulations (23CFR 772), "Procedures for Abatement of Highway Traffic Noise," and UDOT's Noise Abatement Policy (UDOT 08A2-1) (see Section 4.9.1.5 below).

- Where appropriate, noise abatement measures for reducing or eliminating noise impacts were identified and evaluated using UDOT guidelines and the Noise Abatement Policy for determining feasibility, reasonableness, and cost-effectiveness.

Noise Monitoring

As stated above, short-term (15-minute) noise monitoring was conducted at 17 locations throughout the study area. Noise monitoring was conducted between 11:00 a.m. and 4:00 p.m. on October 2, 3, and 7, 2003. During the monitoring period, the skies were clear and the wind was minimal. Sound level monitoring locations are shown in Figures 4.9-1 through 4.9-6, and the results of the monitoring effort are presented in Section 4.9.2.2 of this document.

Monitored sound levels were also used to calibrate the revised TNM prior to modeling with project-related traffic volumes. Because the proposed action would be a new alignment constructed primarily

[2] The location of the proposed berm was not incorporated into the TNM because it was located in an area that had no residential receptors at the time the model was run. As described in Section 4.1, *Land Use*, development has recently begun on some of the platted lots in the study area. Noise attenuation benefits associated with the berm would only be applicable to those lots and proposed future development within the study area for which construction has not begun.

through undeveloped terrain, noise monitoring locations were selected that represent areas adjacent to the proposed alignments without being unduly influenced by traffic from major nearby sources of noise, such as I-15. Ambient noise monitoring was conducted using a Larson-Davis model 712 sound-level meter. Instrument calibration was verified with a Larson-Davis acoustic calibrator before each measurement session. At each monitoring position, the meter was held by a tripod approximately 1.5 m (5 ft) above the ground.

Traffic Noise Model

As stated above, project-related traffic noise levels were modeled using version 2.1 of the TNM. The TNM estimates acoustic intensity at receiver locations based on the level of sound energy generated from a series of straight-line roadway segments. Where appropriate, the effects of local shielding from existing structures, vegetation, terrain, and other adjustment factors were included in the model to provide a higher level of detail and accuracy.

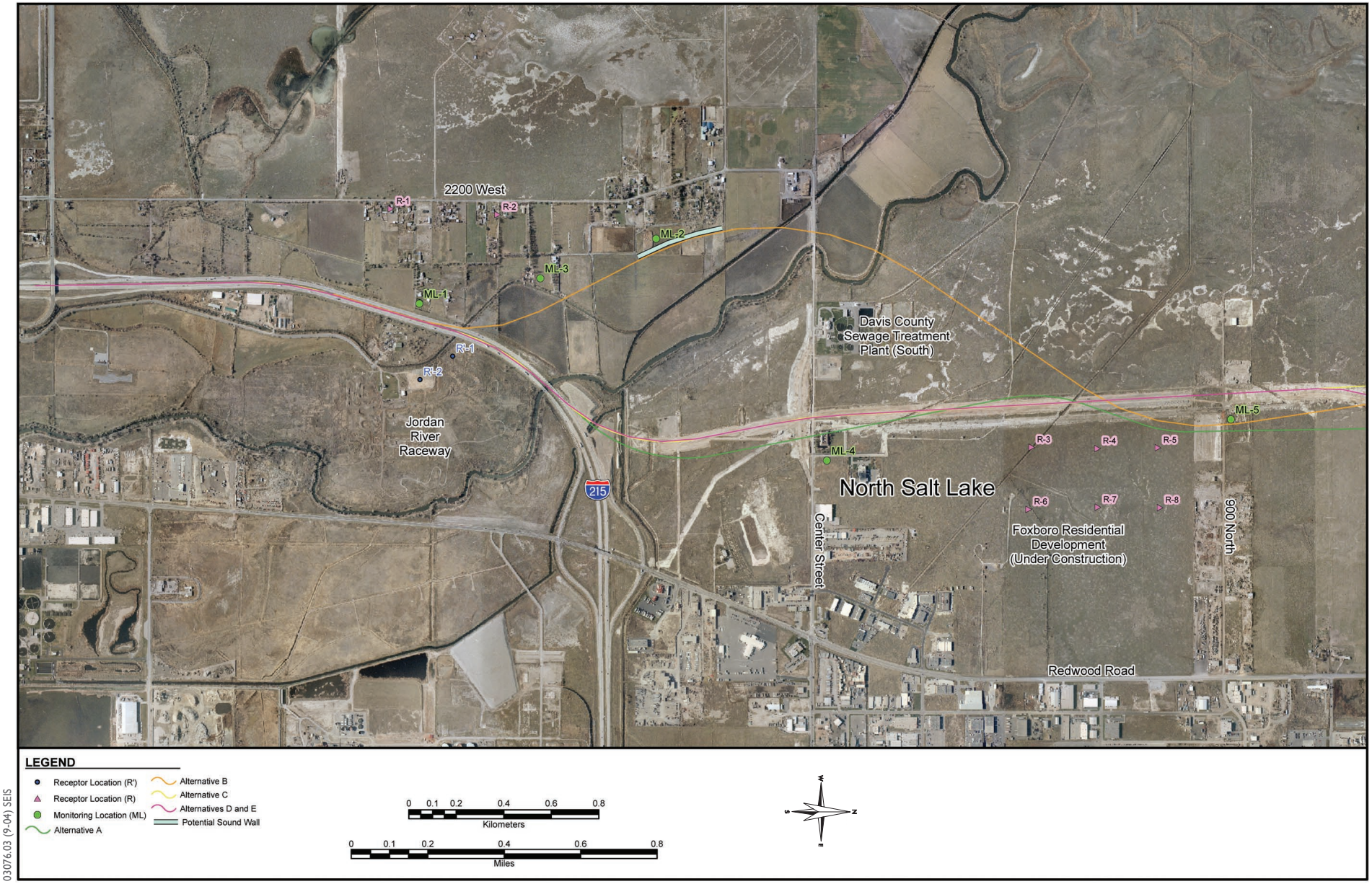
Because the proposed action would extend over a relatively large area, much of which is undeveloped, the focus of the analysis was on those areas with a substantial number of residential dwellings. For each alternative alignment, the center of the travel lanes was delineated in the model. Noise levels were modeled to reflect traffic conditions expected in 2020 after the project is completed. Vehicle volumes and speeds modeled for the alternative alignments were based on level of service (LOS) C operations (1,680 vehicles per hour per lane), which represent the typical worst-case noise conditions where per-lane vehicle volumes are maximized under free-flow travel speeds (105 kilometers per hour (kph) (65 miles per hour [mph]) for this analysis). This modeling methodology results in worst-case noise impacts and may overstate noise impacts if traffic operations are worse than LOS C (i.e., LOS D, E, or F) where speeds are slower, or if traffic operations are LOS A and B where there is less traffic operating at higher speeds.

The noise model also requires assumptions about the percentage of automobiles (two-axle, four-tire vehicles), medium trucks (two-axle, six-tire vehicles), and heavy trucks (three or more axles) using each individual roadway. Vehicle mixes vary depending on the roadway segment, time of day, and proximity to commercial or light-industrial land uses. Since there is no existing roadway, a vehicle mix of 90 percent automobiles, 5 percent medium trucks, and 5 percent heavy trucks was assumed on the mainline for each alternative alignment.[3] This vehicle mix is similar to what has been observed on I-15 for other projects.

Limitations of the Traffic Noise Model

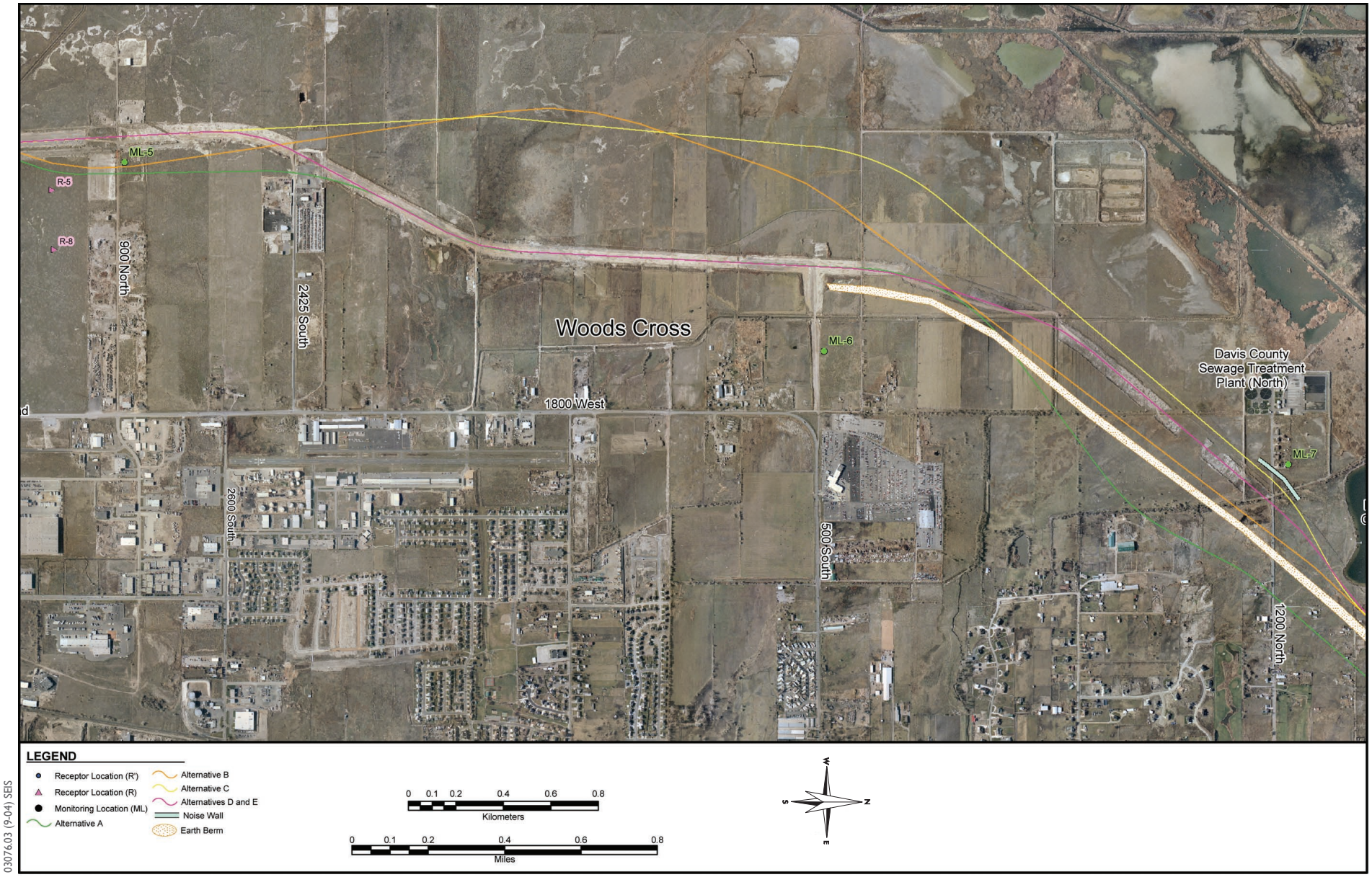
Validation studies have been conducted for the TNM out to distances of about 396 m (1,300 ft) from a given roadway. However, it is acknowledged that TNM predication accuracy decreases with increasing distances due largely to the effects of wind and temperature gradients and approximations in the ground propagation algorithms. Most highway traffic noise analyses consider receptor locations within 30 to 91 m (100 to 300 ft) of the highway right-of-way. Project noise analyses are normally limited to distances of less than 305 m (1,000 ft) from the roadway. Some state Departments of Transportation (DOTs) will not model any distance greater than 152 m (500 ft) from a roadway, and FHWA is not aware of any noise model that will be accurate for distances of 610 to 914 m (2,000 to 3,000 ft) from a roadway.

[3] Vehicle mix used for the noise analysis was based on videotaped traffic volumes for I-15 during representative traffic periods.



03076.03 (9-04) SEIS

Figure 4.9-1
Legacy Parkway Noise Impact Assessment,
Segment 1: I-215 to 900 North



03076.03 (9-04) SEIS

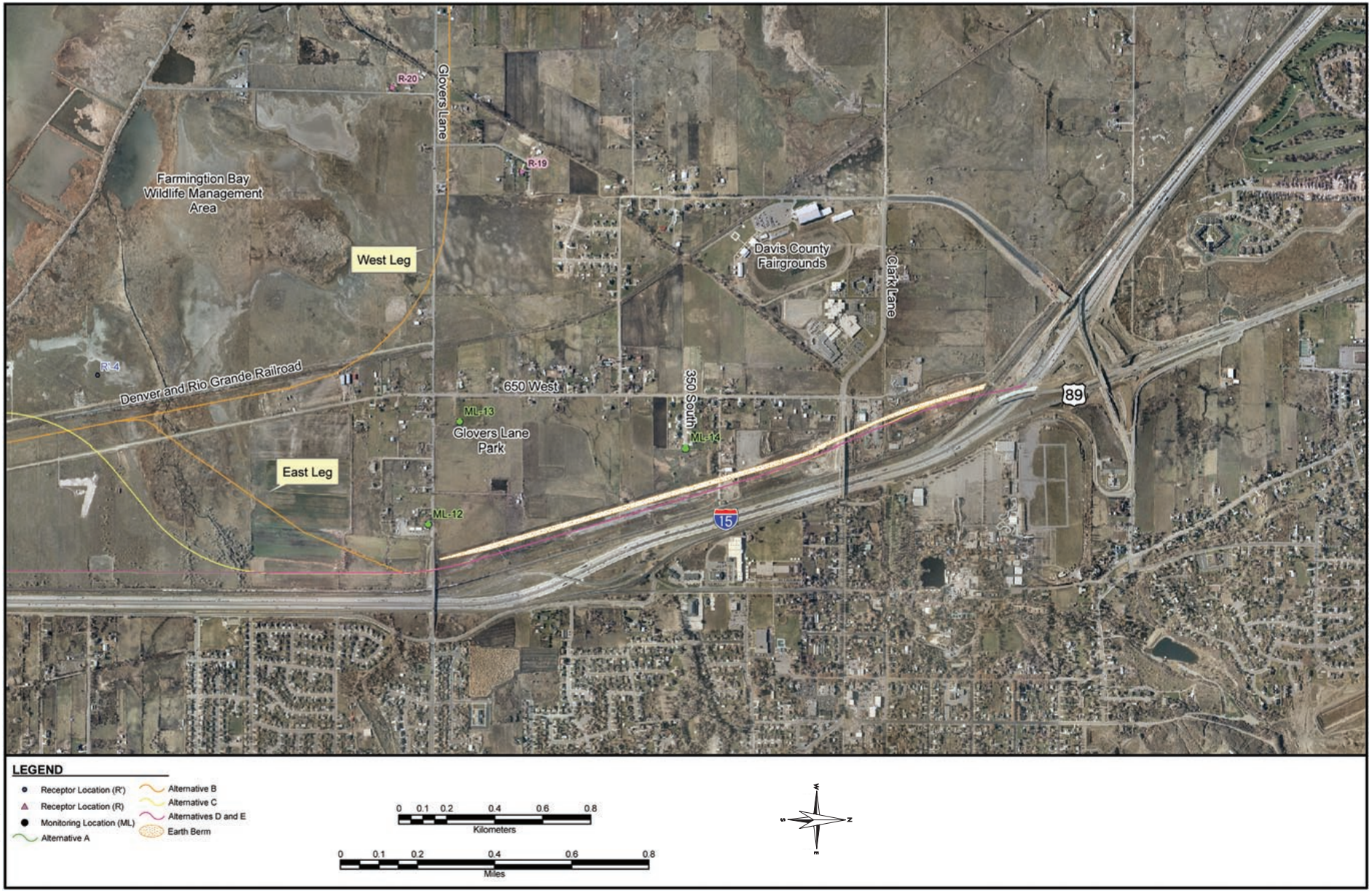
Figure 4.9-2
Legacy Parkway Noise Impact Assessment,
Segment 2: 900 North to 1200 North

03076.03 (11-04) SEIS

Figure 4.9-3
Legacy Parkway Noise Impact Assessment,
Segment 3: 1200 North to Parrish Lane

03076.03 (9-04) SEIS

Figure 4.9-4
Legacy Parkway Noise Impact Assessment,
Segment 4: Parrish Lane to Glovers Lane



03076.03 (10-04) SEIS

Figure 4.9-5
Legacy Parkway Noise Impact Assessment,
Segment 5: Glovers Lane to US-89/I-15 Interchange

03076.03 (10-04) SEIS

Figure 4.9-6
Legacy Parkway Noise Impact Assessment,
Segment 5: Glovers Lane to Northern Terminus (Alternative B Only)

As described above, the study area for the noise analysis encompasses a corridor 457 m (1,500 ft) wide on either side of the centerline of the proposed build alternatives. This study area boundary is consistent with the validation limits of the TNM and provides a conservative and accurate estimate of potential noise impacts on receptors within that area.

4.9.1.5 Regulatory Requirements

Federal Highway Administration Noise Standards

As described in the Final EIS, the Federal Noise Control Act of 1972 (Public Law 92-574) requires that all federal agencies administer their programs in a manner that promotes an environment free from noises that could jeopardize public health or welfare. 23 CFR 772 implements this requirement and specifies procedures and criteria for evaluating noise impacts associated with highway projects, and for determining whether such impacts are sufficient to justify funding noise abatement measures. FHWA noise abatement criteria (NAC) specified in 23 CFR 772 are summarized in Table 3-21 in the Final EIS.

Under 23 CFR 772, a traffic noise is considered an impact when a predicted traffic noise level approaches or exceeds the NAC (see Table 3-21 in the Final EIS) or when the predicted traffic noise level substantially exceeds the existing noise levels. 23 CFR 772 does not specifically define what constitutes a substantial increase or the term “approach”; instead, it leaves interpretation of these terms to the states (see *Utah State Noise Guidelines*). Finally, FHWA NEPA guidance (Federal Highway Administration 1995) states that the significance of noise impacts identified under 23 CFR 772 must be identified based on the context and intensity of the noise impacts, where *context* refers to the extent of the noise impact (i.e., number of affected residences) and the existing noise environment, and *intensity* refers to the noise levels associated with the impact (i.e., predicted absolute noise level and predicted increase over existing noise level). Noise abatement measures that are reasonable and feasible and likely to be incorporated into the project, as well as noise impacts for which no apparent solution is available, must be identified before adoption of the final environmental document for a project.

This information has not changed since publication of the Final EIS.

Utah State Noise Guidelines

UDOT has established a Noise Abatement Policy (UDOT 08A2-1) that details highway traffic noise prediction requirements, noise analysis procedures, and noise abatement criteria consistent with the requirements of 23 CFR 772. According to this policy, a design year noise level within 2 dB(A) of the NAC is considered to approach the NAC, a design year noise level greater than or equal to the NAC is considered to exceed the NAC, and a 10-dB(A) increase over existing noise levels is considered to substantially exceed the NAC. This information has not changed since publication of the Final EIS. It should be noted that in 2004, UDOT published an updated Noise Abatement Policy. However, since the noise analysis conducted for this Supplemental EIS was initiated prior to the date of publication of the revised policy, the policy that was in effect in April 2000 was used to analyze abatement for traffic-related noise impacts.

4.9.2 Affected Environment

This section provides updated noise monitoring data that was collected along the proposed action corridor in October 2003.

4.9.2.1 Existing Noise Levels

Land uses adjacent to and within the study area encompass a mix of residential, commercial, agricultural, public recreational, and light-industrial activities (see Section 4.1, *Land Use.*) Although many of these land uses exhibit low background noise levels (e.g., open space agricultural land, pastureland, wetlands), there are several specific land uses in the area that have the potential to contribute more to ambient noise levels. Examples of such land uses are listed below.

- The Davis County sewage treatment plant, located at the west end of 1200 North in Woods Cross.
- The Bountiful Sanitary Landfill, located at the western edge of Pages Lane near West Bountiful.
- The Davis County Fairgrounds, located southeast of the 100 North and 1100 West intersection.
- The Salt Lake City International Airport.
- Light industrial businesses in the study area, including the South Bountiful Auto Salvage Yard and Quality Plating Facility, located at the west end of 2425 South in Woods Cross, and a small industrial area located south of State Street, adjacent to I-15, in Farmington.

As described above in Section 4.9.1.2, short-term noise monitoring was conducted at 17 locations in the study area (Figures 4.9-1 through 4.9-6). These locations were selected to represent residential and recreational locations in the study area where people could spend a substantial amount of time and where the impacts of the proposed action would be experienced. These areas do not necessarily represent atypically quiet or loud locations.

Table 4.9-1 shows the results of the noise monitoring at each location. Because large portions of each build alternative would be constructed in relatively undeveloped terrain in an area of few background noise sources, background noise levels are generally low throughout the corridor. Noise sources in the undeveloped portion of the alignment include farming operations, vehicle pass-by trips on minor arterials, and occasional aircraft overflights.

As illustrated in Table 4.9-1, existing noise levels met or exceeded the UDOT noise abatement criteria of 65 dB(A) at one location (ML-1 in Figure 4.9-1) due to the proximity of the monitoring site to I-215. Monitored noise levels at all other locations were below the residential NAC and ranged from 39 to 62 dB(A).

Table 4.9-1 Existing Noise Levels October 2003

Monitoring Location	Site Description	Date	L_{eq}	Approaches or Exceeds Residential NAC, 67 dB(A) or above
ML-1	Farmstead near I-215	10/07/2003	67	Yes
ML-2	Residences east of 2200 West	10/07/2003	52	No
ML-3	Residences on Century Farm Road east of 2200 West	10/07/2003	55	No
ML-4	Commercial/industrial site at 1100 West Center Street	10/02/2003	58	No
ML-5	West end of 900 North	10/02/2003	48	No
ML-6	500 South	10/03/2003	51	No
ML-7	1200 North; residences east of sewage treatment plant	10/02/2003	43	No
ML-8	Picnic area at Bountiful City Pond	10/02/2003	46	No
ML-9	Residences north of Porter Lane	10/02/2003	39	No
ML-10	Residences on Porter Lane	10/02/2003	48	No
ML-11	Undeveloped area at south end of 650 West	10/03/2003	45	No
ML-12	Residences on Glovers Lane	10/03/2003	59	No
ML-13	Glovers Lane Park	10/03/2003	56	No
ML-14	Residences east end of 350 South cul-de-sac	10/03/2003	62	No
ML-15	Residences, Farmington Ranch 100 South 1800 West	10/03/2003	45	No
ML-16	Burke (Park) Lane, north of residences	10/03/2003	57	No
ML-17	LDS Church, Farmington	10/03/2003	50	No

4.9.3 Environmental Consequences and Mitigation Measures

This section discusses updated operational noise impacts associated with the proposed build alternatives based on new noise monitoring, noise modeling, and abatement analyses completed since publication of the Final EIS. As described in Section 4.9.1.3, 23 CFR 772 specifies procedures and criteria for evaluating noise impacts associated with highway projects, and for determining whether such impacts are sufficient to justify funding noise abatement measures. In addition, UDOT has established a Noise Abatement Policy (UDOT 08A2-1) that is consistent with the 23 CFR 772 federal mandate that details highway traffic noise prediction requirements, noise analysis procedures, and noise abatement criteria. Both the federal regulations and the state guidance were used to assess whether operational noise impacts on residential and recreational receptors would require noise abatement to mitigate potential impacts.

See Section 4.20, *Construction Impacts*, for a discussion of construction-related noise impacts.

4.9.3.1 Operational Noise Impacts

Both modeled noise levels ("model receptors" designated R in Figures 4.9-1 through 4.9-6) and monitored noise levels from field measurements ("monitored levels" designated ML in Figures 4.9-1 through 4.9-6) were used in the noise model to characterize project-related noise impacts in the study area (i.e., both model locations and field locations were coded as receptor locations in the model). Data collected from the model was then used to determine whether predicted noise levels associated with the proposed action would approach or exceed the applicable residential NAC (65 dB[A]) or result in a 10-dB(A) increase over existing noise levels (a substantial increase according to UDOT criteria).

To ensure model accuracy, monitored noise levels were calibrated to within 2 dB(A) of the field measurements in those locations where existing traffic noise from I-15 and I-215 were predominant noise sources. In those locations where there were no existing sources of noise, the monitored noise levels were used as the background noise level.

Operational noise impacts associated with the No-Build Alternative and build alternatives are described below and summarized in Table 4.9-2. These impacts are described based on representative receiver locations that would potentially be affected by traffic volumes associated with the build alternatives, and have been categorized into five segments to facilitate their identification. These five segments, and some of the typical land uses associated with them, are summarized below.

- **Segment 1: I-215 to 900 North**. As illustrated in Figure 4.9-1, the southern portion of this segment is characterized primarily by undeveloped terrain, with scattered residences located in the general vicinity of I-215 (ML-1, ML-2, ML-3, R-1, and R-2). Just north of Center Street, a new residential development, the Foxboro residential development (R-3 through R-8), is under construction. Between the northern limit of the Foxboro development and 900 North, land use is either undeveloped or industrial in nature. The Davis County sewage treatment plant (south) and the Jordan River Raceway are also located in Segment 1.

- **Segment 2: 900 North to 1200 North**. This segment is characterized primarily by undeveloped terrain, as illustrated in Figure 4.9-2. There are scattered residences west of 1800 West just south of 500 South (ML-6), as well as five residences on 1200 North (ML-7), east of the Davis County sewage treatment plant (north).

- **Segment 3: 1200 North to Parrish Lane**. Segment 3 includes Bountiful City Pond (ML-8) and a residential neighborhood south of 1100 West (R-9 through R-18) (Figure 4.9-3). Residences are also located north of Porter Lane (ML-9) and South of Parish Lane (ML-10). As with Segments 1 and 2, the remaining land in Segment 3 is primarily undeveloped.

- **Segment 4: Parrish Lane to Glovers Lane**. North of Parrish Lane, Segment 4 is characterized by relatively undeveloped areas (ML-11) with scattered commercial and industrial facilities interspersed (Figure 4.9-4). There are no residences between Parrish Lane and Glovers Lane to the north; however several scattered residences (ML-12) and Glovers Lane Park (ML-13) are located in the vicinity of Glovers Lane and 650 West. The Farmington Bay Wildlife Management Area (FBWMA) is also located in Segment 4.

- **Segment 5: Glovers Lane to US-89/I-15 Interchange (Glovers Lane to Northern Terminus Alternative B only)**. As depicted in Figure 4.9-5, for Alternatives A, C, D, E and the east leg of B, Segment 5 extends between Glovers Lane and the US-89/I-15 interchange. In this segment, there is a

Table 4.9-2 Modeled Noise Levels at Sensitive Receptors

					Alternative A			Alternative B			Alternative C			Alternatives D and E		
Receptor	Number of Dwelling Units	Other Land Use Descriptor	Modeled Existing Sound Level (L_{eq})	Existing SL or SE	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (Approach SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)
Segment 1: I-215 to 900 North																
ML-1	6		67	SL	67	0	SL	68	1	SL	67	0	SL	69	2	SL
ML-2	7		53	No	56	3	No	72	19	Both	56	3	No	55	2	No
ML-3	2		56	No	59	3	No	65	9	SL	59	3	No	58	2	No
ML-4	—	Industrial	57	No	76	19	Both	63	6	No	73	16	Both	73	16	Both
ML-5	—	Undeveloped	50	No	80	30	Both	—	—	—	76	26	Both	76	26	Both
R-1	7		54	No	57	3	No	58	4	No	57	3	No	58	4	No
R-2	3		54	No	57	3	No	59	5	No	58	4	No	58	4	No
R-3	3	Foxboro Development	47	No	72	25	Both	69	22	Both	73	26	Both	73	26	Both
R-4	3	Foxboro Development	48	No	73	25	Both	72	24	Both	72	24	Both	73	25	Both
R-5	3	Foxboro Development	52	No	77	25	Both	75	23	Both	71	19	Both	72	20	Both
R-6	3	Foxboro Development	43	No	67	24	Both	66	23	Both	67	24	Both	68	25	Both
R-7	3	Foxboro Development	43	No	68	25	Both	67	24	Both	67	24	Both	68	25	Both
R-8	3	Foxboro Development	44	No	69	25	Both	68	24	Both	67	23	Both	67	23	Both
Segment 2: 900 North to 1200 North																
ML-6	1		50	No	69	19	Both	66	16	Both	64	14	SE	69	19	Both
ML-7	5		44	No	68	24	Both	73	29	Both	78	34	Both	78	34	Both
Segment 3: 1200 North to Parrish Lane																
ML-8	—	Bountiful City Pond	46	No	70	24	Both	78	32	Both	78	32	Both	78	32	Both
ML-9	6		41	No	73	32	Both	66	25	Both	68	27	Both	74	33	Both
ML-10	3		48	No	74	26	Both	71	23	Both	74	26	Both	75	27	Both
R-9	2		40	No	67	27	Both	66	26	Both	68	28	Both	67	27	Both
R-10	3		40	No	65	25	Both	65	25	Both	67	27	Both	66	26	Both
R-11	2		40	No	64	24	SE	64	24	SE	66	26	Both	65	25	Both
R-12	2		39	No	63	24	SE	64	25	SE	65	26	Both	64	25	SE
R-13	3		40	No	64	24	SE	65	25	Both	66	26	Both	65	25	Both

					Alternative A			Alternative B			Alternative C			Alternatives D and E		
Receptor	Number of Dwelling Units	Other Land Use Descriptor	Modeled Existing Sound Level (L_{eq})	Existing SL or SE	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (Approach SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)	Modeled Sound Level (2020 L_{eq})	Change From Existing	Noise Impact (SL or SE)
R-14	2		40	No	65	25	Both	65	25	Both	67	27	Both	66	26	Both
R-15	3		38	No	62	24	SE	63	25	SE	64	26	SE	63	25	SE
R-16	2		39	No	63	24	SE	64	25	SE	65	26	Both	64	25	SE
R-17	2		41	No	65	24	Both	66	25	Both	67	26	Both	66	25	Both
R-18	2		41	No	67	26	Both	66	25	Both	68	27	Both	67	26	Both
Segment 4: Parrish Lane to Glovers Lane																
ML-11	—	Undeveloped	48	No	70	22	Both	74	26	Both	70	22	Both	69	21	Both
ML-12	3		60	No	73	13	Both	62	2	No	73	13	Both	72	12	Both
ML-13	—	Glovers Park	56	No	66	10	Both	66	10	Both	66	10	Both	65	9	SL
ML-14	6		62	No	72	10	Both	—	—	—	72	10	Both	71	9	SL
Segment 5: Glovers Lane to US-89/I-15 Interchange (Glovers Lane to Northern Terminus, Alternative B Only)																
ML-15	12		44	No	—	—	—	75	31	Both	—	—	—	—	—	—
ML-16	6		58	No	—	—	—	72	14	Both	—	—	—	—	—	—
ML-17	8		49	No	—	—	—	76	27	Both	—	—	—	—	—	—
R-19	1		48	No	—	—	—	69	21	Both	—	—	—	—	—	—
R-20	1		44	No	—	—	—	71	27	Both	—	—	—	—	—	—

Notes:

SL = sound level impact (approaches or exceeds 65 dB[A])

SE = substantial exceedance (greater than 10 dB[A] increase over existing conditions)

ML = monitoring location

R = noise model receptor location

— = receptor not applicable to the alternative

residential development south of Clark Lane just east of 650 West (ML-14). The remaining land is primarily undeveloped.

Since the west leg of the Alternative B alignment extends north and west of the other build alternatives, the receptors potentially affected by the alternative are slightly different. A new residential development, Farmington Ranches, is located in this expanded area at the west end of Clark Lane (ML-15) (Figure 4.9-6). Scattered residences are also located along Glovers Lane (R-19 and R-20) and north of Farmington Ranches (ML-16). The remaining land is primarily undeveloped, including the northern terminus (ML-17).

No-Build Alternative

Existing Conditions (2004)

No project-related noise impacts would occur under the No-Build Alternative. Noise levels illustrated in Table 4.9-2 under existing conditions would continue as described.

Future Conditions (2020)

If none of the build alternatives is implemented, future projects will likely be undertaken to improve access to land in the project area, although the nature and timing of these projects are not known at this time. It is likely that these future projects would result in increased noise from traffic and human use in the study area.

Build Alternatives

The impacts discussion presented below for each of the build alternatives includes sound-level changes at the representative receptor locations listed in Table 4.9-2 and the total number of affected residences, including platted lots, located within the 65-dB contour.

Alternative A

Modeled sound levels and project-related impacts under Alternative A are shown in Table 4.9-2. Depending on receptor location relative to the proposed alignment, modeled sound levels would increase by 0 to 32 dB(A) as a result of Alternative A. About 486 residences, including platted lots, in the 65-dB contour would be affected. Noise levels in the vicinity of these residences would increase between 10 and 32 dB(A), and this outcome would represent a substantial exceedance of the NAC (see Section 4.9.1.3).

Alternative B

Modeled sound levels and project-related impacts under Alternative B are shown in Table 4.9-2. As with Alternative A, modeled sound levels would increase between 1 and 32 dB(A) as a result of Alternative B, depending on receptor location relative to the proposed alignment. About 250 residences, including platted lots, in the 65-dB contour would be affected. Noise levels in the vicinity of these residences would increase between 10 and 32 dB(A); such levels would represent a substantial exceedance of the NAC.

Alternative C

Modeled noise levels and project-related impacts under Alternative C are shown in Table 4.9-2. Under Alternative C, modeled sound levels would increase between 0 and 34 dB(A), depending on receptor location relative to the proposed alignment. About 203 residences, including platted lots, in the 6 5dB-

contour would be affected. Noise levels in the vicinity of these residences would increase between 10 and 34 dB(A) over existing noise levels, and this result would represent a substantial exceedance of the NAC.

Alternatives D and E

Modeled sound levels and project-related impacts under Alternatives D (Final EIS Preferred Alternative) and E are shown above in Table 4.9-2. Under Alternatives D and E, modeled sound levels would increase between 2 and 34 dB(A), depending on receptor location relative to the proposed alignment. About 431 residences, including platted lots, in the 65-dB contour would be affected. Noise levels in the vicinity of these residences would increase between 10 and 34 dB(A); such levels would represent a substantial exceedance of the NAC.

Summary of Receptors Affected by Noise

Table 4.9-3 summarizes by alternative the number of receptors that would exceed the NAC standard (67 dB[A]) or result in a substantial exceedance of the NAC standard (e.g., an increase of greater than 10 dB[A] over existing conditions) in the modeled year 2020.

Table 4.9-3 Total Number of Modeled Receptors Affected by Proposed Build Alternatives

Alternative	Total Number of Modeled Receptors	Number of Receptors with SL Impact[1]	Number of Receptors with SEs[2]	Total Number of Receptors Affected [3]
No-Build Alternative	37	1	NA	1
Alternative A	32	23	27	28
Alternative B	35	27	29	31
Alternative C	32	26	27	28
Alternatives D and E	32	25	25	28

Notes:

SL = sound level impact

SE = substantial exceedance

[1] An SL impact occurs anytime noise levels at a receptor approach or exceed 65 dB(A). For all build alternatives, this impact would occur at modeled year 2020.

[2] An SE occurs anytime the noise level increases more than 10 dB(A) over existing conditions.

[3] Represents total number of modeled receptors with either an SL impact or an SE.

4.9.3.2 Noise Abatement Measures

Noise Abatement Criteria

This section discusses methods for abating the operational traffic noise impacts identified in the previous section. Noise abatement for construction-related noise impacts is discussed in Section 4.20.3.3 of this document. According to the UDOT noise abatement policy in effect at the time this analysis was completed (UDOT 08A2-1, April 2000), noise abatement will be considered for Type I projects (i.e., new highway construction) where traffic noise impacts are identified. To be eligible for consideration of noise

abatement measures, a new or proposed subdivision or other development must have a recorded plat prior to the earliest of the following occurrences.

- The earliest environmental approval date of the highway improvement as per completion of Activity 79d (Record of Decision [ROD] for an EIS) or Activity 67d (prepare final environmental document) of the UDOT *Design Process Manual*.

- The date that the local municipality's general plan or master plan has designated the highway for major improvements.

The following noise abatement measures can be included to reduce impacts from traffic noise.

- Traffic management measures (such as restricting vehicle speeds and prohibiting compression braking).

- Altering horizontal and vertical alignments (for example, depressing roadway alignments to create shielding effects).

- Constructing noise barriers when reasonable and feasible.

- Installing noise insulation in public-use or nonprofit institutional buildings.

Because the proposed roadway would act as a primary north-south connector between I-215 in Salt Lake City and the northern terminus at I-15 in Farmington, substantial speed restrictions would not meet the overall objectives of the project. Altering horizontal and vertical alignments would not be feasible because of the costs associated with excavations, other geotechnical considerations, and the potential for additional impacts on wetland areas. As a result, this section focuses on considering noise barriers as a primary means of abating project-related noise impacts.

According to the UDOT noise abatement policy (08A2-1, April 2000), several factors go into the determination of whether noise abatement measures, and specifically, noise barriers, are reasonable and feasible for abating noise impacts. These factors include the following.

- **Effectiveness of noise barrier**. The noise barrier has to achieve at least 5 dB(A) of exterior noise reduction at typical affected residences nearest the roadway.

- **Cost to install noise barrier**. The cost per residence to install a noise barrier (based on the severity of the noise impact, i.e., the increase in project-related noise levels over existing noise levels), not including other direct costs (e.g., acquiring new right-of-way, landscaping), must not exceed the abatement limit established for the project. At the time of this analysis, the noise abatement limit was based on a standard noise barrier 3 m high by 70 m long (10 ft high by 230 ft long) at an installed cost of $107.64 per square meter, or $10.00 per square foot (Adams pers. comm.). The noise abatement limit of $22,604 for this analysis was calculated based on the number of residences that would benefit (i.e., receive an improvement of at least 5 dB[A]) from construction of a noise barrier. This figure represents an increase from the abatement limit of $20,000 disclosed in the Final EIS.

- **Views and opinions of affected residents**.

- **Engineering considerations**. Engineering considerations such as abatement design, performance, and roadway safety must be taken into account.

The effectiveness of noise barriers is generally limited to areas within about 152 m (500 ft) of the proposed right-of-way. Beyond this distance, barriers do not effectively reduce noise levels at individual residences. Therefore, the noise abatement analysis was limited to those areas adjacent to each alignment where clustered residences would potentially benefit from the barrier (i.e., achieve at least a 5-dB[A] reduction in project-related noise levels) and would meet the UDOT cost-effectiveness criteria. The selection of feasible noise barrier locations is described in the following section.

Selection of Feasible Noise Barrier Locations

Based on aerial photographs of land uses in the study area, seven locations were evaluated to determine whether noise barriers would be feasible and effective, given noise levels associated with specific build alternatives (indicated in parenthesis). As described below, noise barriers were considered potentially feasible at three of these locations (R-3 through R-8, ML-7, and ML-2).

The potential locations for noise barriers evaluated in this document are different than those evaluated in the Final EIS. The differences are attributable to updated noise monitoring data; application of the revised FHWA TNM (versus the STAMINA model used for the Final EIS), which takes into consideration terrain features, the height of the highway embankment, and the shielding effects of intervening rows of residences; and application of UDOT's revised Noise Abatement Policy.

- **Residences near ML-3: (Alternative B)**. The Alternative B alignment passes residences near ML-3 (Figure 4.9-1). Although the alignment does not lie within 152 m (500 ft) of these residences (i.e., the limit to which barriers are typically considered effective), a noise barrier was modeled near ML-3 to determine its noise abatement potential. It was determined that a barrier at this location would not provide the 5 dB(A) of noise reduction required by UDOT's Noise Abatement Policy. As a result, a barrier at this location was eliminated from consideration.

- **Residences near ML-9 (Alternatives A, D, and E)**. The Alternatives A, D, and E alignments pass residences near ML-9 (Figure 4.9-3). Although these alignments do not lie within 152 m (500 ft) of these residences, a noise barrier was modeled near ML-9 to determine its noise abatement potential. It was determined that a barrier at this location would not provide the 5 dB(A) of noise reduction required by UDOT's Noise Abatement Policy. As a result, a barrier at this location was eliminated from consideration.

- **Residences near ML-15 and ML- 17 (Alternative B)**. As described in Section 4.9.3.1, Alternative B passes through a relatively new residential development (Farmington Ranches) that was platted after the original ROD for Legacy Parkway was completed (October 1, 2000). The local jurisdiction made land use planning decisions following selection of Alternative D (Final EIS Preferred Alternative), and did not take into consideration that a supplemental environmental process could result in selection of an alignment at a different location, including that associated with Alternative B. Construction of noise barriers in the vicinity of ML-15 and ML-17 (Figure 4.9-6) would require the removal of more than 20 residences, as well as a middle school and possibly a church. As a result, noise barriers were not modeled and are not considered feasible at this location.

- **Residences near R-9 through R-18 (Alternative A)**. The Alternative A alignment passes within 244 m (800 ft) of the residential neighborhood south of 1100 West (R-9 through R-18). A noise barrier was modeled near these receptors to determine its potential effectiveness. It was determined that a barrier at this location would not provide the 5 dB(A) of noise reduction required by UDOT's Noise Abatement Policy. As a result, a barrier at this location was eliminated from consideration.

- **Residences near R-3 to R-8 (All Alternatives)**. All the proposed build alternatives pass residences near R-3 through R-8 (Figure 4.9-1) (the Foxboro development). The noise model demonstrated that a noise barrier at this location could be feasible. The following section describes how a noise barrier at this location would function under each of the build alternatives.

- **Residences near ML-7 (Alternative B, C, D, and E)**. Alternatives B, C, D, and E pass residences near ML-7, which is located on 1200 North, near the Davis County sewage plant (Figure 4.9-2). The noise model demonstrated that a noise barrier at this location could be feasible under some of the alternative alignments. The following section describes how a noise barrier at this location would function under those build alternatives.

- **Residences near ML-2 (Alternative B)**. The Alternative B alignment passes residences near ML-2, which is located south of center Street and east of 2200 West (Figure 4.9-1). The noise model demonstrated that a noise barrier at this location could be feasible. The following section describes how a noise barrier at this location would function under Alternative B.

- **Recreational Locations (All Alternatives)**. There are several recreational resources located throughout the project corridor including the Jordan River OHV Center, Bountiful City Pond, the FBWMA, and Glovers Lane Park. Noise abatement measures for recreational resources are considered for those areas where "frequent human use occurs and a lower noise level would be of benefit" (23 CFR 772.11). The recreational facilities located near the proposed build alternatives are active facilities and are generally associated with higher noise levels. Relatively noisy activities are associated with both Bountiful City Pond and the FBWMA (e.g., boating, hunting). In addition, Bountiful City Pond is located next to an active landfill (i.e., an industrial noise source), which also contributes to the noise environment at the pond. Glovers Lane Park includes a baseball field and is located adjacent to an arterial with pass-by traffic. Finally, all the recreational resources are affected to some extent by aircraft overflights from the Salt Lake City International Airport. For all these reasons, a pristine noise environment is not a significant attribute of the recreational resources in the study area. It is unlikely that there would be any benefit from implementation of noise abatement measures in these locations. Chapter 5, *Section 4(f) and 6(f) Evaluation*, provides an additional discussion of noise impacts on recreational resources in the study area that qualify for protection under Section 4(f) of the Department of Transportation Act of 1966. Receptor locations for these resources, shown on Figures 4.9-1, 4.9-3, 4.9-4, and 4.9-5, are noted by R' (R'-1, -2, -3, and -4).

Noise Barrier Analysis by Alternative Alignment

This section evaluates the effectiveness and feasibility of noise barriers in the three residential locations that, according to the model, would likely benefit from the implementation of noise abatement measures (e.g., residences near R-3 through R-8, ML-7, and ML-2). This discussion is presented by build alternative. Potential noise abatement for construction activities is also described.

Alternative A

Residences near R-3 through R-8 (Foxboro Residential Development)

The Foxboro development was platted in 2003 after the original ROD for Legacy Parkway was completed (October 31, 2000). According to UDOT's Noise Abatement Policy, because the development was platted after the ROD was issued, the development is not eligible for noise barriers.

Residences near ML-7

Under Alternative A, the proposed alignment would be more than 152 m (500 ft) from these residences; therefore, a noise barrier was not modeled at this location for this alternative.

Residences near ML-2

Under Alternative A, the proposed alignment would be more than 152 m (500 ft) from these residences; therefore, a noise barrier was not modeled at this location for this alternative.

Alternative B

Residences near R-3 through R-8 (Foxboro Residential Development)

As described for Alternative A, the Foxboro development was platted in 2003 after the original ROD for Legacy Parkway was signed (October 31, 2000) ; therefore, the development is not eligible for consideration of noise barriers.

Residences near ML-7

The Alternative B alignment would be located approximately 200 m (656 ft) closer to residences near ML-7 than under Alternative A. However, a noise barrier at this location, modeled at a height of 10 m (32.8 ft), would not provide an acoustic benefit of 5 dB(A) or more, and would, therefore, not meet UDOT's feasibility criteria.

Residences near ML-2

The Alternative B alignment would pass within 152 m (500 ft) of a group of residences near the southern terminus of the project, east of 2200 West (near ML-2). A noise barrier was modeled in the vicinity of these residences (Figure 4.9-1), and noise barrier heights were evaluated to determine what height would provide the most cost-effective abatement for affected receptors (i.e., the point at which increasing the height further would not provide more acoustic benefit).

At this location and under this alternative, a noise barrier 377 m (1,237 ft) long and 5 m (16.4 ft) high would provide an acoustic benefit to five residences at a cost of $202,900. The cost per dwelling of $13,527 would be less than the abatement limit ($22,600 per affected residence). Therefore, a noise barrier at this location would be reasonable and feasible according to UDOT's Noise Abatement Policy. Table 4.9-4 summarizes the proposed use of a barrier at this location if Alternative B is implemented.

Table 4.9-4 Noise Abatement for Legacy Parkway

Location	Noise Levels (No Barrier)	Noise Levels (With Barrier)	Change in Noise Levels	Wall Height (m)	Wall Length (m)	Cost of Barrier	Cost per Residence	Meets UDOT Noise Abatement Criteria
Alternative B								
Residences Near ML-2 (2200 West)	73 to 75	67 to 69	4 to 7	5	377	$202,900	$13,527	Yes
Alternative C								
Residences near ML-7 (1200 North)	69 to 71	63 to 66	5 to 6	5	225	$121,095	$10,031	Yes

Alternative C

Residences near R-3 through R-8 (Foxboro Residential Development)

As described for Alternative A, the Foxboro development was platted in 2003 after the original ROD for Legacy Parkway was signed (October 31, 2000); therefore, the development is not eligible for consideration of sound walls.

Residences near ML-7

The Alternative C alignment would pass within 152 m (500 ft) of the residences near ML-7 at 1200 North. At this location and under this alternative, a noise barrier 225 m (738 ft) long and 5 m (16.4 ft) high would provide an acoustic benefit to four residences at a cost of $121,095. The cost per dwelling of $10,091 (based on the severity of the noise impact) would be less than the abatement limit ($22,600 per affected residence). Therefore, a noise barrier at this location, as illustrated in Figure 4.9-2, would be reasonable and feasible according to UDOT's Noise Abatement Policy. Table 4.9-4 summarizes the proposed use of a barrier at this location if Alternative C is implemented.

Residences near ML-2

Under Alternative C, the proposed alignment would be more than 152 m (500 ft) from these residences, so a noise barrier was not modeled at this location.

Alternatives D and E

Residences near R-3 through R-8 (Foxboro Residential Development)

As described for Alternative A, the Foxboro development was platted in 2003 after the original ROD for Legacy Parkway was signed (October 31, 2000); therefore, the development is not eligible for consideration of sound walls.

Residences near ML-7

The alignments of Alternatives D and E would pass within 152 m (500 ft) of one residence on 1200 North, in the vicinity of ML-7. At this location and under this alternative, a noise barrier 1 to 10 m (3.3 to 33 ft) high and about 350 m (1,148 ft) long would provide acoustic benefit to only that one residence, at a cost of between $37,674 and $376,740. Such cost exceeds the UDOT cost abatement limit of $22,600 per affected residence, making a noise barrier at this location infeasible according to UDOT's Noise Abatement Policy.

Residences near ML-2

Under Alternatives D and E, the proposed alignment would be more than 152 m (500 ft) from these residences, so a noise barrier was not modeled at this location.

Section 4.10
Water Quality

This section discusses the quality of surface water and groundwater in the study area. It includes information on UDOT de-icing practices and how these practices could affect water quality, as well as information on other contaminants of concern evaluated that were in the Final EIS. This section also presents new information on groundwater rights in the study area and a discussion of the newly designated drinking water source protection (DWSP) zones.

4.10.1 Approach and Methodology

4.10.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with water quality in the study area, Sections 3.10 and 4.10 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for water quality is described in Section 4.0.1, *Study Area*, of this document.

Recent research on how the operation of roadways affects water quality was reviewed to determine whether new information was available that would update or change any of the conclusions or methodology presented in the Final EIS.[1] Research on de-icing methods was included in this literature review, and UDOT was contacted to determine what de-icing practices are typically implemented in the State of Utah (Berhard pers. comm.). The most recent water quality regulations and Clean Water Act Section 303(d) list of impaired waters was obtained from the UDEQ (Utah Department of Environmental Quality 2004), and updated information on groundwater right locations in the study area was obtained from the UDNR Division of Water Rights (Utah Department of Natural Resources, Division of Water Rights 2004). UDEQ, Division of Water Quality, and UDEQ, Division of Drinking Water were also consulted regarding updated drinking water protection zones and potential changes to the Clean Water Act Section 401 Water Quality Certification for the proposed action (see Section 4.11, *Permits and Clearances*). The U.S. Environmental Protection Agency (EPA) STORET database, EPA's largest computerized environmental data system, was also reviewed for new water quality information on modeled waterways.

In addition, both the affected environment and environmental consequences sections of the Final EIS were reviewed to determine whether the decision to narrow the proposed right-of-way from 100 m (328 ft) to 95m (312 ft) would change information disclosed in the Final EIS specific to water quality (see Chapter 3, *Alternatives*).

[1] This research included review of 31 papers and reports in various scientific journals and records. See Chapter 8, *References*, of this document for specific references for this literature.

4.10.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of water quality impacts since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- A correction was made to the tolerance level of domestic livestock and poultry to salinity. See Section 4.10.3.2, *Surface Water Quality*.
- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. Where applicable, impact information presented in this Final Supplemental EIS has been updated to reflect those modifications. See Section 4.10.3.4, *Groundwater Rights and Wells*, Table 4.10-3.
- The number of groundwater rights and wells that would be located in the right-of-way of each build alternative has been updated, and the impact assessment revised as appropriate. See Table 4.10-3 in Section 4.10.3.4, *Groundwater Rights and Wells*.

4.10.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to the quality of surface water and groundwater in the study area. Topics discussed include water quality regulations applicable in the study area, the quality of water in Great Salt Lake, the quality of surface water conveyances and groundwater, and groundwater rights and wellhead protection zones. This section also provides information on typical de-icing methods used by government agencies, and those specifically used by UDOT in the Salt Lake Valley. Updated information on the use of gray water and the biogeochemical function of wetlands is also provided in this section.

4.10.2.1 Water Quality Regulations

As stated in the Final EIS, water quality in the study area is regulated by the EPA, the Corps, and UDEQ under Sections 303, 401, 402, and 404 of the CWA. (See Section 4.11, *Permits and Clearances*, of this document for a more complete discussion of these regulations.) To meet CWA goals, the State of Utah has implemented the Utah Water Quality Act and classified surface waters in Utah into Beneficial Use Classifications (see Table 3-25 in the Final EIS). Each classification has an associated numerical or narrative standard, both of which are explained in detail in Section 3.10.1 and Table 3-26 in the Final EIS. One of UDEQ's goals is to ensure that projects like the Legacy Parkway project do not cause the quality of the receiving waters to degrade such that the numerical standards are exceeded.

None of the applicable water quality regulations mentioned above has changed since publication of the Final EIS, with the exception of the standards for metals and aquatic wildlife. These revised standards are discussed below in Section 4.10.3.2, *Surface Water Quality*.

4.10.2.2 Great Salt Lake Water Quality

As stated in the Final EIS, relative to water quality, Great Salt Lake is best known for its high salinity, which ranges from 9 to 28 percent, depending on location. Other water quality constituents in the lake

include magnesium, potassium, calcium, chloride, and sulfate. Under the Utah Water Quality Act, UDEQ classifies Great Salt Lake as a Class 5 water, which means it is protected for primary and secondary contact recreation, aquatic wildlife, and mineral extraction.

4.10.2.3 Water Quality of Surface Conveyances

As stated in the Final EIS, each of the proposed build alternatives would cross numerous creeks and stream channels in the study area (see Figure 3-18 and Table 3-27 in the Final EIS). These rivers and creeks currently receive runoff from I-15, and were receiving runoff from I-15 at the time the Final EIS was published.

In April 2004, UDEQ updated its CWA Section 303(d) list of impaired waters to include portions of the Jordan River that are in the study area (Utah Department of Environmental Quality 2004). Specifically, the Jordan River from Farmington Bay upstream 9.8 km (6.1 mi) is now listed for low dissolved oxygen concentrations and high total dissolved solids (TDS). Figure 4.10-1, which updates Figure 3-18 in the Final EIS, shows the segment of the Jordan River that is impaired. This update to the impaired list means that the standards for beneficial use Classification 3C, nongame fish and other aquatic wildlife, and Classification 4, agricultural uses, in this portion of the Jordan River are not being met, and that UDEQ may limit discharges by Utah Pollutant Discharge Elimination System (UPDES) permit holders into this segment of the Jordan River that lower levels of dissolved oxygen (i.e., nutrients) or increase levels of TDS. This limitation would be based on a total maximum daily load (TMDL) analysis conducted by UDEQ and could apply to UPDES construction permits associated with construction projects, such as Legacy Parkway. UDEQ has not yet completed the TMDL for this portion of the Jordan River. The UDEQ report lists the Jordan River as low priority for further analysis.

No other changes to the surface water quality have occurred since publication of the Final EIS.

4.10.2.4 Groundwater Quality

As described in the Final EIS, a multilayered groundwater flow system underlies the study area. A shallow, unconfined (i.e., not under pressure) aquifer lies under the ground surface up to a depth of 3 m (10 ft). This shallow aquifer is recharged by precipitation, upward leakage from the principal aquifer, and river infiltration. It exhibits higher concentrations of dissolved solids, sodium, and chloride than does the principal aquifer.

The principal aquifer, which is typically located over 60 m (200 ft) below the ground surface, is separated from the shallow aquifer by a layer of fine-grained soil. It is a confined aquifer (i.e., under pressure) that is recharged through precipitation from the base of the Wasatch Mountains. As stated in the Final EIS, it is currently used for public supply and irrigation. The water quality of the principal aquifer varies with depth and location, but it is generally characterized by lower concentrations of dissolved solids than the shallow aquifer (i.e., generally less than 500 milligrams per liter) (Baskin et al. 2002).

No supplemental information or research has been collected to indicate that the groundwater quality in the study area has substantively changed since publication of the Final EIS.

4.10.2.5 Groundwater Rights

As described in the Final EIS, a number of private and municipal wells are located in the study area. The UDNR Division of Water Rights tracks groundwater rights according to an inventoried water right

number. Each water right number represents one or more actual groundwater wells. Figure 4.10-2 illustrates the current location of existing private wells in the study area, both domestic and non-domestic (i.e., irrigation, stock watering, municipal, or recreational) (Utah Department of Natural Resources, Division of Water Rights 2004). Several of the wells in the study area are no longer in the footprint of the proposed build alternative alignments because of the narrowed right-of-way. Figure 4.10-2 updates Figure 3-20 in the Final EIS to reflect changes in well status since publication of the Final EIS.

At the time the Final EIS was published, UDEQ was responsible for establishing wellhead protection areas around municipal wells to protect public water supplies. UDEQ now refers to wellhead protection areas as drinking water source protection (DWSP) zones. UDEQ requires that owners of wells that are used to supply public drinking water (i.e., serve more than 25 people) prepare a DWSP plan (UAC R309-600). The plan must identify four distinct protection zones, each of which has different management requirements, as described below.

- Zone 1 is the area within a 30-m (100-ft) radius of the wellhead.
- Zone 2 is the area within a 250-day groundwater time of travel to the wellhead.
- Zone 3 is the area within a 3-year groundwater time of travel to the wellhead.
- Zone 4 is the area within a 15-year groundwater time of travel to the wellhead.

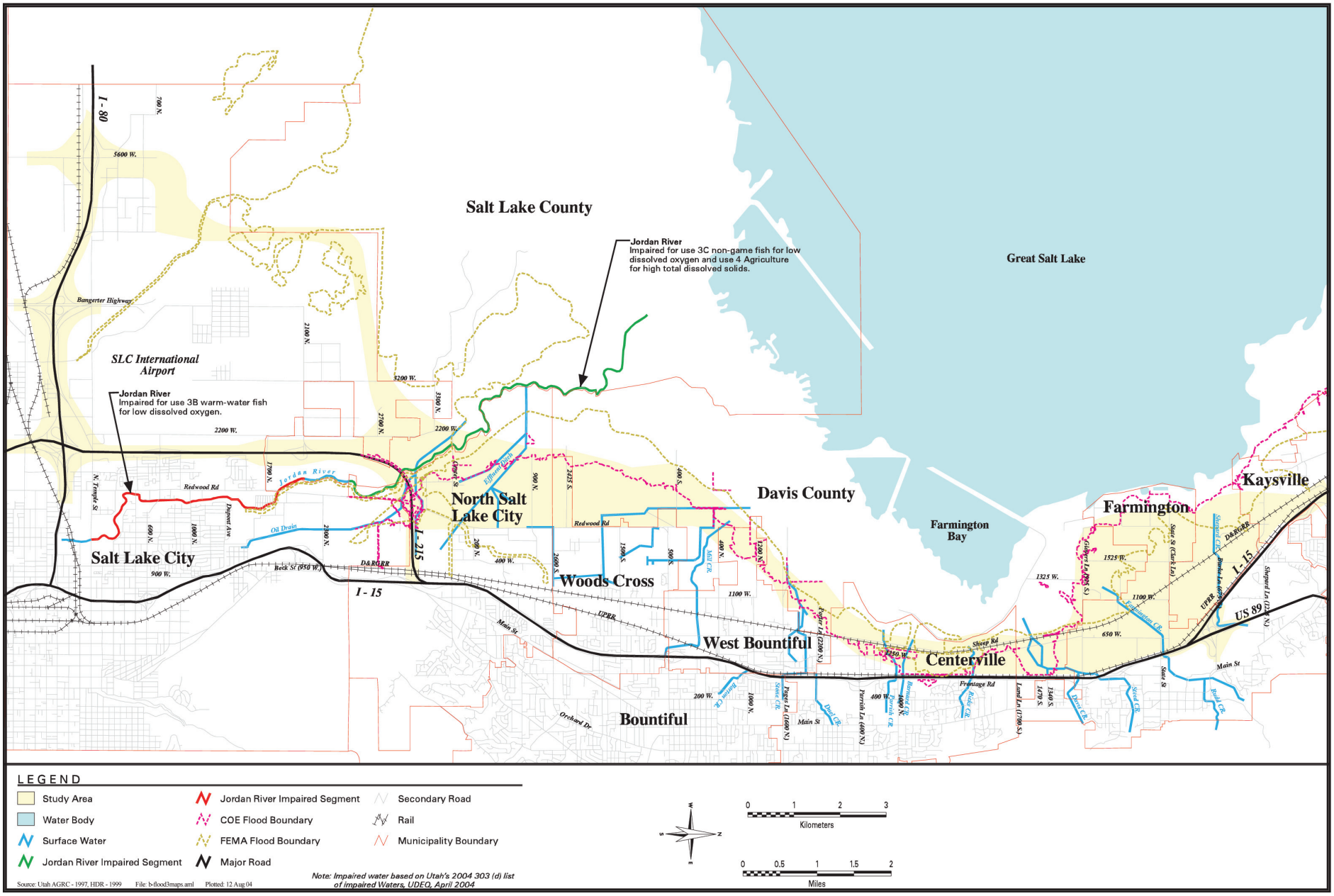
In general, development is not allowed within a designated DWSP zone unless the development is consistent with the DWSP plan. Figure 4.10-3 updates Figure 3-21 in the Final EIS to reflect designation of the new DWSP zones (Utah Department of Natural Resources, Division of Water Rights 2004). One DWSP zone (a Zone 4) illustrated on Figure 4.10-3 encroaches into the study area; this DWSP zone is associated with a well owned by the City of Woods Cross. DWSP zones associated with inactive wells were not analyzed in this document.

4.10.2.6 De-icing Operations

The following provides a brief discussion of typical de-icing methods employed by UDOT in the Salt Lake Valley, which includes Salt Lake and Davis Counties and encompasses the study area. Although de-icing operations were not described in detail in the Final EIS, this section is presented to provide additional information on what constituents could be introduced into surface and shallow groundwater systems in the study area if any of the proposed build alternatives were constructed. UDOT uses all the methods described below throughout the state to prevent ice from building up on roads.

Salt

The application of granular salt (NaCL) to a roadway is the most widely used de-icing method. UDOT uses two main types of salt on roads: solar salt and Redmond Mineral salt. Solar salt is derived from evaporation beds, such as Great Salt Lake, and typically consists of over 99 percent sodium chloride. Redmond Mineral salt comes from an underground salt deposit near Redmond, Utah, and consists of approximately 93–98 percent sodium chloride, with the remainder attributed to trace minerals (Anderson pers. comm.). Both products contain anti-caking compounds according to UDOT specifications, which include small amounts of ferryl cyanide (50 parts per million) (Berhard pers. comm.).



03076.03 (9-04) SEIS

Figure 4.10-1
Impaired Segment of the Jordan River within the Study Area

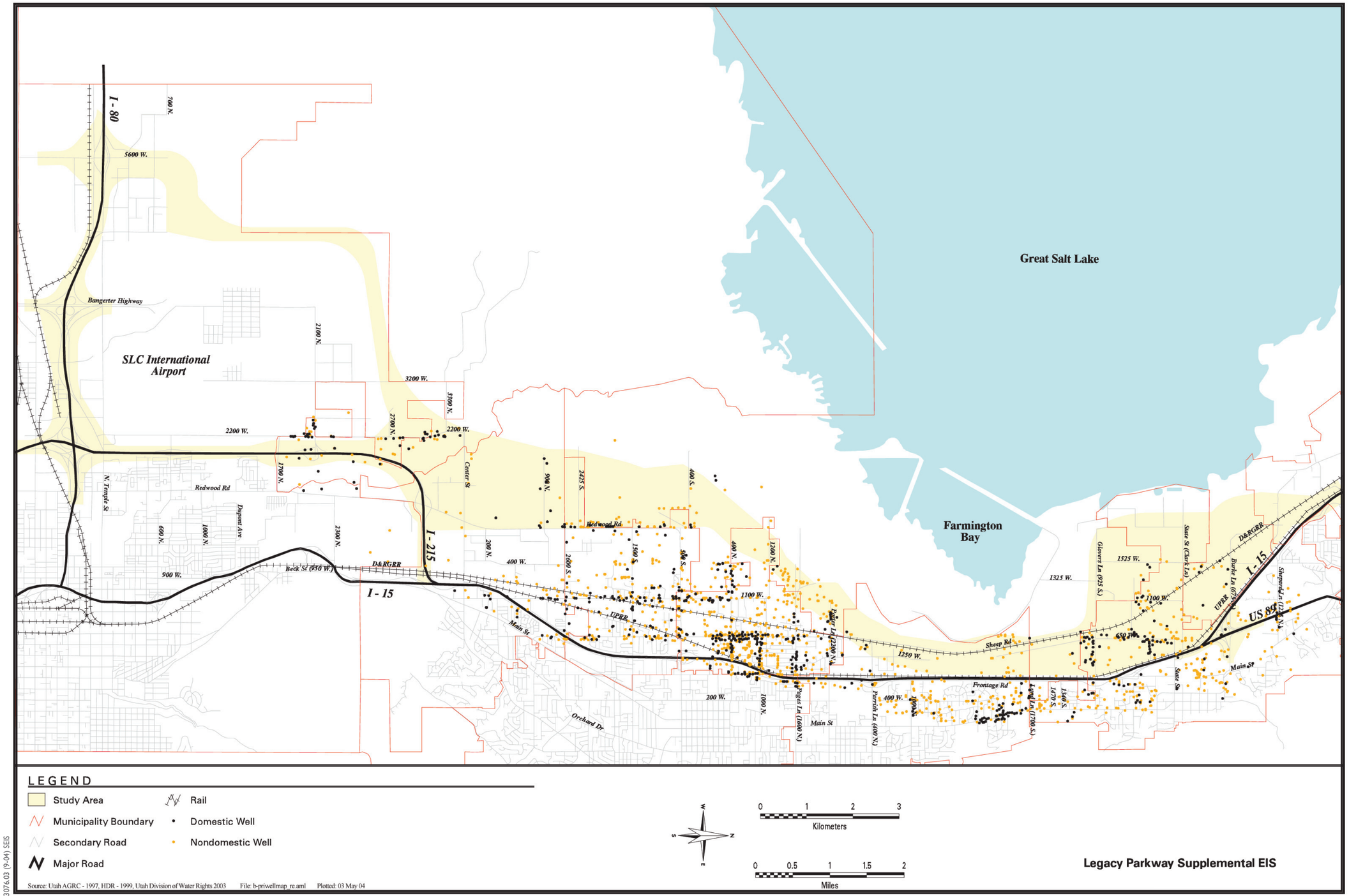
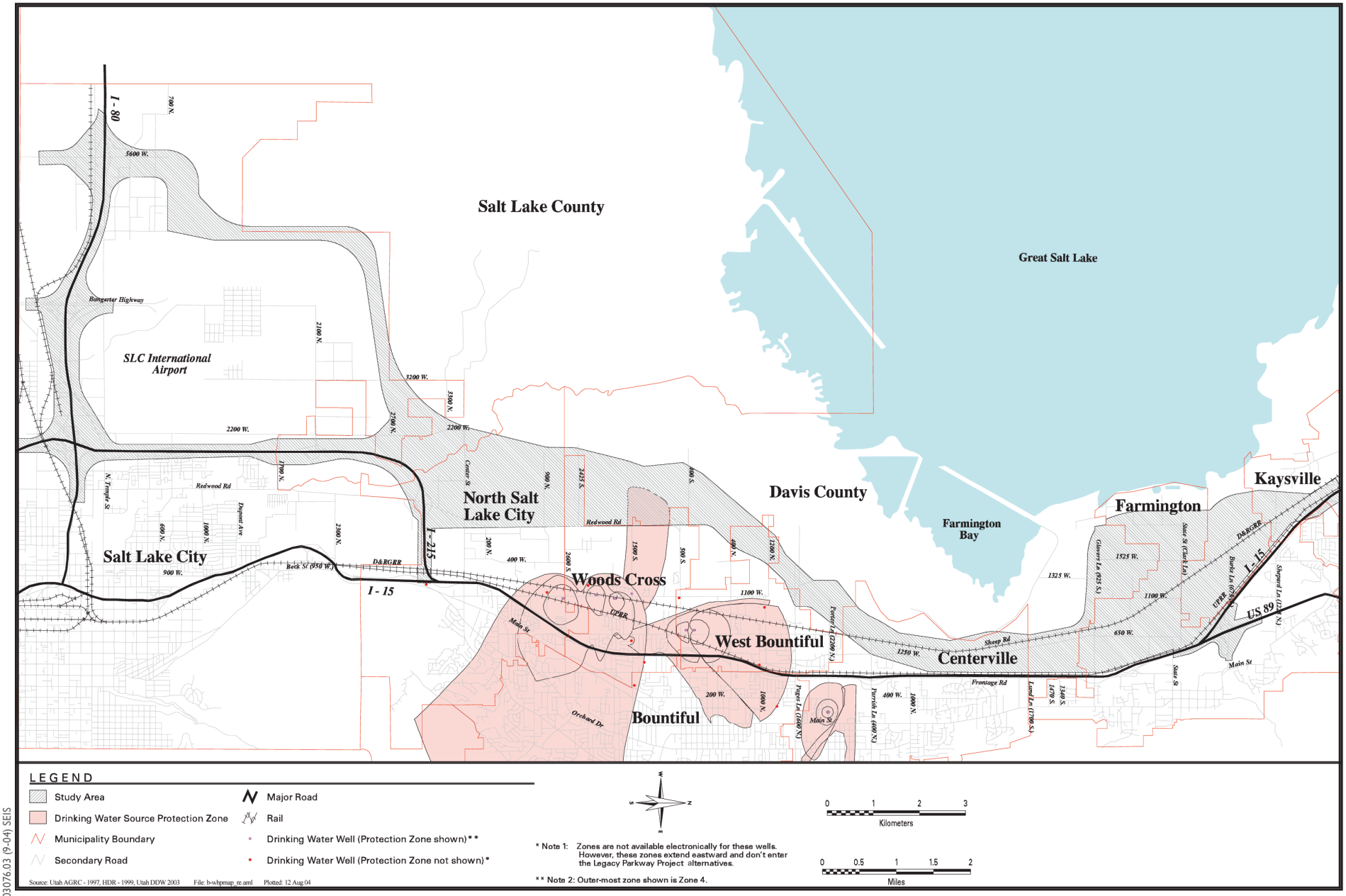


Figure 4.10-2
Existing and Private Wells



03076.03 (9-04) SEIS

Figure 4.10-3
Drinking Water Source Protection Zones Relative to the Study Area

With the exception of applying abrasives alone, all de-icing methods employ some form of salt. UDOT minimizes the use of salt to the extent possible for economic and environmental reasons (Berhard pers. comm.).

Abrasives (Sand)

Abrasives can also be applied to a roadway as a de-icing method, although they have not been proven effective unless combined with salt. Studies suggest that at highway speeds, abrasives can be swept off the road after eight to 12 vehicle passes and that friction benefits are minimal (Nixon 2001). The use of abrasives can also degrade local air quality and can result in an accumulation of sand in gutters (Nixon 2002, Schlup and Ruess 2002).

UDOT avoids using abrasives in the Salt Lake Valley because, when airborne, they can contribute to particulate matter 10 microns in diameter or less (PM10) in the air and degrade local air quality (Berhard pers. comm.).

Abrasives and Salt

Salt typically will not melt ice at cooler temperatures (e.g., below –9 degrees Celsius [15 degrees Fahrenheit]). Abrasives are therefore sometimes added to salt when temperatures are anticipated to be very low. As stated above, UDOT avoids the use of abrasives in the Salt Lake Valley because of air quality concerns.

Pre-wetting

Pre-wetting refers to mixing liquid brine (e.g., salt water, typically magnesium chloride) at the spreading disk just before the salt is spread on the road. When the salt is wet, it binds more effectively to the roadway and is less likely to be blown off the road by passing vehicles. Pre-wetting increases the effectiveness of using salt as a de-icing method and reduces the overall quantity of salt required.

UDOT uses pre-wetting, as appropriate, throughout the state to prevent build up of ice on roads.

Anti-icing

Anti-icing refers to spreading liquid brine before the snow and/or ice accumulate on the road. This method requires anticipating weather cycles, precipitation, and temperatures. If liquid brine is applied to a road and it doesn’t snow or freeze, or if it only rains, the liquid brine can actually make the road more slippery.

UDOT uses anti-icing, as appropriate, throughout the state to prevent ice build up on roads.

Temperature Monitoring

All the methods described above have temperature ranges within which they are more effective. For this reason, it is important to know the temperature of the road surface before selecting a particular de-icing method. Monitoring road surface temperatures and weather forecasting and then selecting the proper de-icing method based on those conditions increases the effectiveness of the de-icing method and reduces the quantity of salt introduced into the environment.

UDOT uses state-of-the-art methods to monitor road temperatures, including snow removal trucks outfitted with built-in infrared temperature sensors to monitor road temperatures. In recent years, UDOT has reduced the annual salt usage in Salt Lake County from 100,000 tons per year to 80,000 tons per year by using these technologies (Berhard pers. comm.).

4.10.2.7 Use of Gray Water for Landscaping

During the design-build phase for the proposed action, UDOT disclosed that it was considering using treated wastewater (gray water) to maintain landscaping along the proposed build alternative alignments. Although gray water is treated adequately to be released into a receiving stream, it is not treated to drinking water standards. UDOT has not decided whether to use gray water to maintain landscaping in the project area, but the potential impacts associated with its use are described in Section 4.10.3.2 below.

4.10.2.8 Biogeochemistry of Wetlands

As described in the Final EIS, the biogeochemistry function of a wetland is related to water quality. Section 3.10.6 and Table 3-28 in the Final EIS describe how well wetlands in the study area are performing this function. Although some wetlands in the study area have been filled, the ability of the remaining wetlands to perform this function has not changed since publication of the Final EIS. See Section 4.12, *Wetlands*, of this document for additional information regarding wetlands in the study area.

4.10.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, implementation of any proposed build alternative could affect the quality of both surface water and groundwater. This section provides supplemental information documenting why certain contaminants were evaluated as contaminants of primary concern in both the Final EIS and this document. In addition, this section presents updated information on potential impacts on the quality of surface water and groundwater, as well as impacts on groundwater rights, including how the proposed action would affect DWSP zones in the study area.

4.10.3.1 Contaminants Evaluated

Section 4.10.1 in the Final EIS describes the typical contaminants found in highway runoff and the source of the contaminants. The source of the data in the table is FHWA Report, *Evaluation and Management of Highway Runoff Water Quality* (Federal Highway Administration 1996). Since publication of the Final EIS, the U.S. Geological Survey (USGS) published a report titled *The National Highway Data and Methodology Synthesis* that reviews the data and methodology of FHWA's highway runoff research (U.S. Geologic Survey 2003). The USGS report indicates that organic compounds, including semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs), such as petroleum hydrocarbons, oil, and grease, can also be present in highway runoff. The source of the organic compounds is generally crankcase oil and vehicle emissions.

Table 4.10-1 provides an update of Table 4-15 in the Final EIS to reflect these organic compounds and their sources.

Table 4.10-1 Typical Highway Runoff Contaminants

Contaminant	Source
Particulates	Pavement wear, vehicles, atmosphere, maintenance, snow/ice abrasives, sediment disturbance
Nitrogen, Phosphorous	Atmosphere, roadside fertilizer use, sediments
Lead	Leaded gasoline, tire wear, lubricating oil and grease, bearing wear, atmospheric fallout
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, engine parts
Copper	Metal plating, bearing wear, engine parts, brake lining wear, fungicide and insecticide use
Cadmium	Tire wear, insecticide use
Chromium	Metal plating, engine parts, brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, brake lining wear, asphalt paving
Manganese	Engine parts
Bromide	Exhaust
Cyanide	Anticake compound used to keep de-icing salt granular
Sodium, Calcium	De-icing salts
Sulphate	Roadway beds, fuel, de-icing salts
Petroleum	Spills, leaks, blow-by motor lubricants, antifreeze, hydraulic fluids, asphalt surface leachate
PCBs, pesticides	Spraying of highway rights-of-way, atmospheric deposition, PCB catalyst in synthetic tires
Pathogenic bacteria	Soil litter, bird droppings, trucks hauling livestock/stockyard waste
Rubber	Tire wear
Asbestos	Clutch and brake lining wear
Organic compounds	Crankcase oil and vehicle emission (U.S. Geological Survey 2003)

Source: Federal Highway Administration 1996, except as noted in table.

The Final EIS states that the primary contaminants of concern in the study area are TDS, metals, chlorides, and total suspended solids (TSS). Although these contaminants are not the only contaminants present in highway runoff, they were determined to be the primary contaminants of concern based on the existing water quality of the streams that would receive runoff from the proposed highway, the potential of these contaminants to affect aquatic wildlife, and the fact that they are the most common contaminants found in highway runoff in Utah. As stated in the Final EIS, identification of the contaminants of concern was completed through consultations with the Corps, UDEQ, and UDOT.

Bill Moellmer, a water quality management scientist with UDEQ, Division of Water Quality, was contacted in November 2003 to verify that the primary contaminants of concern identified in the Final EIS were appropriate for evaluation in the Supplemental EIS. Mr. Moellmer reviewed the relevant section

of the Final EIS and stated that the list of primary contaminants of concern and the analysis of the water quality impacts in the Final EIS were valid for evaluating the proposed action in the Supplemental EIS (Moellmer pers. comm.).

4.10.3.2 Surface Water Quality

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on surface water quality would occur under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, residential, commercial, and industrial development will continue in the study area regardless of whether Legacy Parkway is constructed. Although the nature and timing of such future projects are not known at this time, these projects will increase the amount of impervious area, change runoff characteristics, and potentially degrade surface water quality.

Build Alternatives

Each of the proposed build alternatives would cross surface water bodies in the study area, as described in Section 4.10.2 in the Final EIS. The analysis of impacts in the Final EIS was based on information contained in two FHWA documents: *Effects of Highway Runoff on Receiving Waters* and *Sources and Migration of Highway Runoff Pollutants.* A wide range of more recent literature was reviewed to supplement and clarify water quality information for the Supplemental EIS, as described in the following sections on primary contaminants of concern. However, none of the more recent literature cited resulted in a change to the original impact conclusions for surface water quality in the Final EIS.

Impacts associated with hazardous material spills and the use of gray water for landscaping are also discussed below.

In coordination with UDEQ, the lead agencies determined that, with implementation of the proposed mitigation measures, the Legacy Parkway project would not cause water quality standards to be exceeded. These mitigation measures, which are described in detail below, include construction of vegetated filter strips, a retention pond at Center Street to prevent discharges to the Jordan River, minimization of salting to the extent practicable, and other best management practices (see *Mitigation Measures*).

Total Suspended Solids

As stated in the Final EIS, all proposed build alternatives would increase the amount of impervious surface in the study area and, therefore, the amount of stormwater runoff during rainstorms. This would result in an increase in sediment loads in surface waters. Construction activities could also erode soil and temporarily increase sediments in receiving waters. These conclusions have not changed since publication of the Final EIS.

Chlorides and Total Dissolved Solids

The Final EIS states that de-icing salts could increase chlorides and TDS loading in downstream environments. Although UDOT has updated and expanded its snow removal policy to minimize the introduction of de-icing salt to the environment (see Section 4.10.2.5. above), de-icing salt would still be used on the proposed Legacy Parkway. The snow removal specifications described in the Final EIS are still current (i.e., salt would be applied at a lane rate of 57 kg per km [200 lb per mile], which would equate to 227 kg per km [800 lb per mile] for the proposed four-lane highway).

As described in the Final EIS, salt left on the road after the snow and ice have melted and evaporated would either be blown off the roadway onto the shoulder or dissolved into roadway runoff, which would be subject to stormwater treatment prior to entering adjacent streams and creeks. None of the literature reviewed quantified how much of this salt would remain on the shoulder and how much would pass into the surrounding surface waters; however, several studies provide measurements of the concentrations of chlorides and TDS found in roadside streams. Table 4.10-2 provides a representative sample of recent data on chloride and TDS concentrations in roadside streams.

The data in Table 4.10-2 indicate that chloride and TDS concentrations in direct runoff from roadways that have been de-iced can vary widely in winter months, and that chloride concentrations can be very high. However, the amount of runoff from a roadway is generally small compared to the runoff from the entire watershed of the stream.

UDEQ has determined that, other than the Jordan River (see Section 4.10.2.3, *Water Quality of Surface Conveyance*), the streams in the study area are not impaired and can still meet the standards for their beneficial use classifications if the mitigation measures proposed in this document are implemented (see *Mitigation Measures* below). Although implementation of the proposed action would further increase TDS and chloride concentrations in the affected surface water systems, the CWA Section 401 water quality certification issued to UDOT in December 2000 for Alternative D (Final EIS Preferred Alternative) states that these increases could be mitigated through specified best management practices (BMPs) (Federal Highway Administration et al. 2000).

It should be noted that, although the increase in chlorides would not affect the beneficial uses of surface waters in the study area, the increase could affect the vegetative and aquatic ecosystem. Chlorides accumulating on the roadway shoulder could kill vegetation, as disclosed in the Final EIS. Increased chloride concentrations could indirectly affect the aquatic ecosystem by causing shifts in algal communities, loss of food plants, or changes in protozoa invertebrate communities (Sorenson et al. 1996). Aquatic birds are anticipated to have a similar tolerance to salinity as domestic livestock and poultry (e.g., about 2,000 mg/L according to UDEQ standards) (Sorenson et al. 1996), and salinity at these levels would not have any adverse effects on these species.

Table 4.10-2 Recent Data on Chloride and TDS Concentrations in Highway Runoff and Roadside Streams Compared to UDEQ Water Quality Standards

Source of Data	Chloride Concentration	TDS Concentration
UDEQ Surface Water Standard (Utah Administrative Code R317-2 as in effect July 1, 2004)		
Class 1 – Drinking Water	No standard	No standard
Utah's Secondary Drinking Water Standards (aesthetic standard)	250 mg/L	500 mg/L
Class 2 – Recreation	No standard	No standard
Class 3 – Aquatic Wildlife	No standard	No standard
Class 4 – Agriculture	No standard	1,200 mg/L
Runoff directly from Roadways (Federal Highway Administration 1996)		Average: 356 mg/L
St. Johnsbury, Vermont		
Stream adjacent to three-lane highway (Sorenson et al. 1996)	Maximum: 100 mg/L Mean: less than 50 mg/L	
California		
Streams downstream of I-180 (Sorenson et al. 1996)	Mean: 22mg/L Maximum: 121 mg/L	
Runoff from I-80 (Sorenson et al. 1996)	Average: 270 mg/L	
Jamesville, New York		
Rural streams downstream of U.S. Hwy 20 (Sorenson et al. 1996)	Range: 10 to 235 mg/L	
Runoff directly from Hwy 20 (Sorenson et al. 1996)	Range: 20 to 5,500 mg/L	
Cincinnati, Ohio		
Runoff from roadway (Sansalone et al. 1998)		Range: 21.8 to 333.2 mg/L Number of events: 13 Mean: 158.4 mg/L Standard deviation: 110.8
Snow from roadside (Sansalone and Buchberger 1999)		Range: 50 to 200 mg/L
Residential Road I-75		Range: 0 to 2,200 mg/L

Metals

As described in the Final EIS, FHWA's numerical water quality model was used to quantify the impacts on surface waters from metals in the runoff associated with the proposed build alternatives. Copper, lead, and zinc were selected as the specific metal contaminants of concern for analysis based on the availability of the required data. Table 4.16 in the Final EIS lists the EPA acute criterion that was used at the time the Final EIS was published. The current UDEQ numeric water quality criteria are 13 micrograms per liter for copper and 65 micrograms per liter for lead. There has been no change to the zinc standard (Utah

Administrative Code, R317-2-14). The data collected from the model show that the one-time-every-3-year concentration of these metals would not exceed the updated acute criteria. No new methodologies for quantitatively modeling impacts on surface water from roadways have been developed since publication of the Final EIS. Further, EPA's STORET database did not have any new water quality data that could be used to update the modeling results (U.S. Environmental Protection Agency 2003c), and UDEQ did not have concerns regarding possible exceedences of the revised metals standards.

Hazardous Material Spills

As described in the Final EIS, a hazardous material spill could affect surface water quality under the No-Build Alternative or any proposed build alternative. An estimated five incidents involving hazardous materials could occur on the proposed highway or roads accessing the highway per year, based on existing I-15 data.[2] Impacts associated with hazardous material spills are difficult to quantify because their location, severity, and conditions are not known in advance; however, immediate action by the party responsible and spill response teams would minimize adverse impacts.

Use of Gray Water for Landscaping

The use of gray water to maintain landscaping in the proposed build alignments would minimize the use of treated tap water. If the gray water were not treated sufficiently, however, it could contribute contaminants to soil and water. Although UDOT has not decided whether to use gray water in the project area, any gray water would be used only with UDEQ's approval and in accordance with wastewater treatment and water quality regulations that would significantly minimize the possibility of such contamination.

Mitigation Measures

As stated in the Final EIS, mitigation measures for minimizing impacts on the quality of surface water resulting from implementation of the build alternatives were developed in coordination with the Corps, UDEQ, and UDOT. Information relative to the mitigation measures identified in the Final EIS has been updated and is summarized below.

The Final EIS states that stormwater would be concentrated (i.e., routed to a ditch or a pipe) only where necessary (e.g., drainage from the overpasses). This concentrated stormwater would not be discharged directly into surface water bodies but would be routed over the vegetated filter strips (see below), or dissipated back to sheetflow. The vegetated filter strips would reduce flow, capture contaminants, and minimize discharges by allowing some volume of water to percolate into the ground as it traverses the vegetated strips. Water that does not percolate into the soil would either sheetflow off the right-of-way or drain into a culvert that carriers surface water under the roadway. No additional stormwater pipes are proposed other than those associated with surface water conveyance and/or floodplain equalization. The individual components of this mitigation are described in the following subsections.

[2] This estimate was used in Section 4.3.4 of the Final EIS and was projected by analyzing 8 years of data between 1991 and 1998 on incidents occurring on I-15 that were reported to the UDEQ Division of Environmental Response and Remediation.

Minimization of Salting

UDOT would minimize salting on the roadway to the extent practicable.

Retention Pond

UDOT would construct a retention pond near Center Street to retain sufficient runoff from a 100 year-storm to prevent discharge to the Jordan River.

Minimization of Concentrated Discharges

As described in the Final EIS, all the proposed build alternatives would be constructed without curbs to allow stormwater runoff to sheetflow off the highway. This mitigation measure has not changed since publication of the Final EIS.

Vegetated Filter Strips

As described in the Final EIS, road design would include vegetated filter strips to improve the quality of runoff from the highway, as recommended by the Corps and UDEQ. In response to the remand of the U.S. Court of Appeals for the Tenth Circuit since publication of the Final EIS, documentation has been compiled on the effectiveness of the vegetated filter strips in removing TSS and other contaminants from highway runoff. This information is presented in the right-of-way technical memorandum (HDR Engineering 2005a), and in Section 2.1 of this document. The technical memorandum states, in summary, that vegetated filter strips would be more effective and would mimic existing hydrologic patterns more closely than other means of water treatment (e.g., detention basins). The location of the proposed vegetated filter strips are illustrated in the typical cross section figures presented in Chapter 3, *Alternatives*, of this document. It should be noted that the narrower right-of-way would not affect the ability of the vegetated filter strips to treat water quality to the standards required in the CWA Section 401 water quality certification (see the right-of-way technical memorandum [HDR Engineering 2005a]).

Floodplain Equalization Culverts, Surface Water Conveyances, and Groundwater Conveyances

The Final EIS states that equalization culverts would be installed to maintain sheetflow conditions across the study area to the extent practical. This mitigation measure was proposed to limit concentrated discharges and reduce erosion and impacts on water quality. Equalization culverts would be designed to limit culvert discharges to less than 0.14 cubic meters (5 cubic feet) per second. In addition, for costing purposes, the Final EIS stated that equalization culverts would be positioned every 150 m (492 ft) to maintain sheetflow conditions in the study area.

The Final EIS also states that equalization culverts would be used to mitigate impacts on wetland hydrology (e.g., to allow free movement of water in either direction and to minimize concentrated discharges) and floodplains (e.g., to allow floodwater to pass back and forth beneath the roadway to preserve the natural and beneficial floodplain.).

The conveyance structures that would be used to minimize impacts on water quality in the study area are described further in the following subsections. The equalization culverts described in the Final EIS and above are identified in the Supplemental EIS as surface water conveyances (designed to allow the free movement of water, maintain sheetflow conditions outside the Corps floodplain boundary, and minimize concentrated discharges to wetlands) and floodplain equalization culverts (designed to maintain flows within the Corps floodplain boundary). Groundwater conveyance structures are also described below to

indicate how potential impacts on groundwater flows and therefore groundwater slope and depressional wetlands would be mitigated.

Figure 4.10-4 graphically depicts how surface water and groundwater would be conveyed in and around the roadway, as described below. The floodplain equalization culverts are depicted in Figure 4.14-2 of this document.

Surface Water Conveyances

Surface water conveyance structures would be used to allow free movement of water in either direction, maintain sheetflow conditions to the extent practical, and minimize concentrated discharges to waterways and wetlands in the study area. Although the Final EIS may have implied that surface water conveyances would be installed at regular intervals along the project alignment, surface water conveyances would actually be installed in areas where an existing hydrologic connection would be cut off by the proposed highway. The surface water conveyances would be designed to pass surface water through the road in the direction or directions of its existing flow. The conveyances could be manifest as many types of drainage structures, including culverts, series of small culverts, French drains, corrugated strip drains, synthetic drainage nets, and gravel layers.

The mechanism used for surface water conveyance is shown in Figure 4.10-4.

Floodplain Equalization Culverts

Based on more specific hydraulic design information obtained during the design-build process, UDOT and the Corps have determined that equalization culverts for the purpose of equalizing floodwaters across the road would be needed only within the Corps floodplain boundary rather than along the entire length of the proposed roadway as is described in the Final EIS (Parker pers. comm.[a]). These floodplain equalization culverts depicted and discussed in Section 4.14, *Floodplains*, of this document.

Groundwater Conveyances

Groundwater conveyance structures would be installed to mitigate the potential impact of the road embankment consolidating underlying soils and impeding groundwater flows. Groundwater conveyances would be installed in areas where fill heights exceed approximately 3 m (10 ft), and would extend from the eastern fill limit to the western fill limit. UDOT would also monitor groundwater levels during construction.

Scour and Erosion Protection

As described in the Final EIS, scour protection to mitigate downstream erosion will be provided at all culvert outlets and stream crossings, if warranted. This mitigation measure has not changed since publication of the Final EIS.

4.10.3.3 Groundwater Quality

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on ground water quality would occur under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

In none of the build alternatives is implemented, recent conditions and trends in the quality of groundwater will likely continue. In the shallow aquifer, the chemistry of the groundwater will continue to vary considerably, based on location and future adjacent land use. In the deeper principal aquifer, sodium and chloride levels will likely continue to increase, particularly given that historical increases have been attributed in part to increased urban development and population growth in the Salt lake Valley. The extent and nature of these changes are not known at this time.

Build Alternatives

As described in the Final EIS, certain pollutants (i.e., chlorides, TDS) could be generated during construction or operation of any proposed build alternative, which could affect the water quality of the shallow aquifer in the study area. The Final EIS stated that chloride concentrations in the shallow aquifer are already high but did not specifically state that TDS concentrations were also high (i.e., as much as 20,300 mg/L in the northwestern part of the Salt Lake Valley near the study area [see Section 3.10.4 in the Final EIS]). As illustrated in Table 4.10-2 above, TDS in highway runoff does not typically exceed 2,200 mg/L, and is usually much less. Given the existing high concentrations of TDS and chlorides in the shallow aquifer, the representative TDS and chloride concentration information presented in Table 4.10-2, and the relatively small surface area affected by the road compared to the overall extent of the aquifer, it is unlikely that the proposed build alternatives would adversely affect the water quality of the shallow aquifer in the study area.

Similarly, as stated in the Final EIS, the deeper principal aquifer is separated from the shallow upper aquifer by a layer of fine-grained soil. This barrier, and the fact that the deeper aquifer has an upward gradient, makes it unlikely that surface runoff could infiltrate the principal aquifer and affect the water quality.

Hazardous Waste Spills

As described in the Final EIS, an accidental spill of a large quantity of hazardous material could affect groundwater quality in the study area if it not immediately contained and cleaned up. Containment and cleanup would be facilitated by the flat terrain and vegetation on the right-of-way.

4.10.3.4 Groundwater Rights and Wells

No-Build Alternative

Existing Conditions (2004)

No project-related impacts on groundwater rights and wells would occur under the existing conditions (2004) No-Build Alternative.

Future Conditions (2020)

In none of the build alternatives is implemented, ground water rights and wells in the study area may be affected by future development, although the nature and timing of any such impacts are not known at this time.

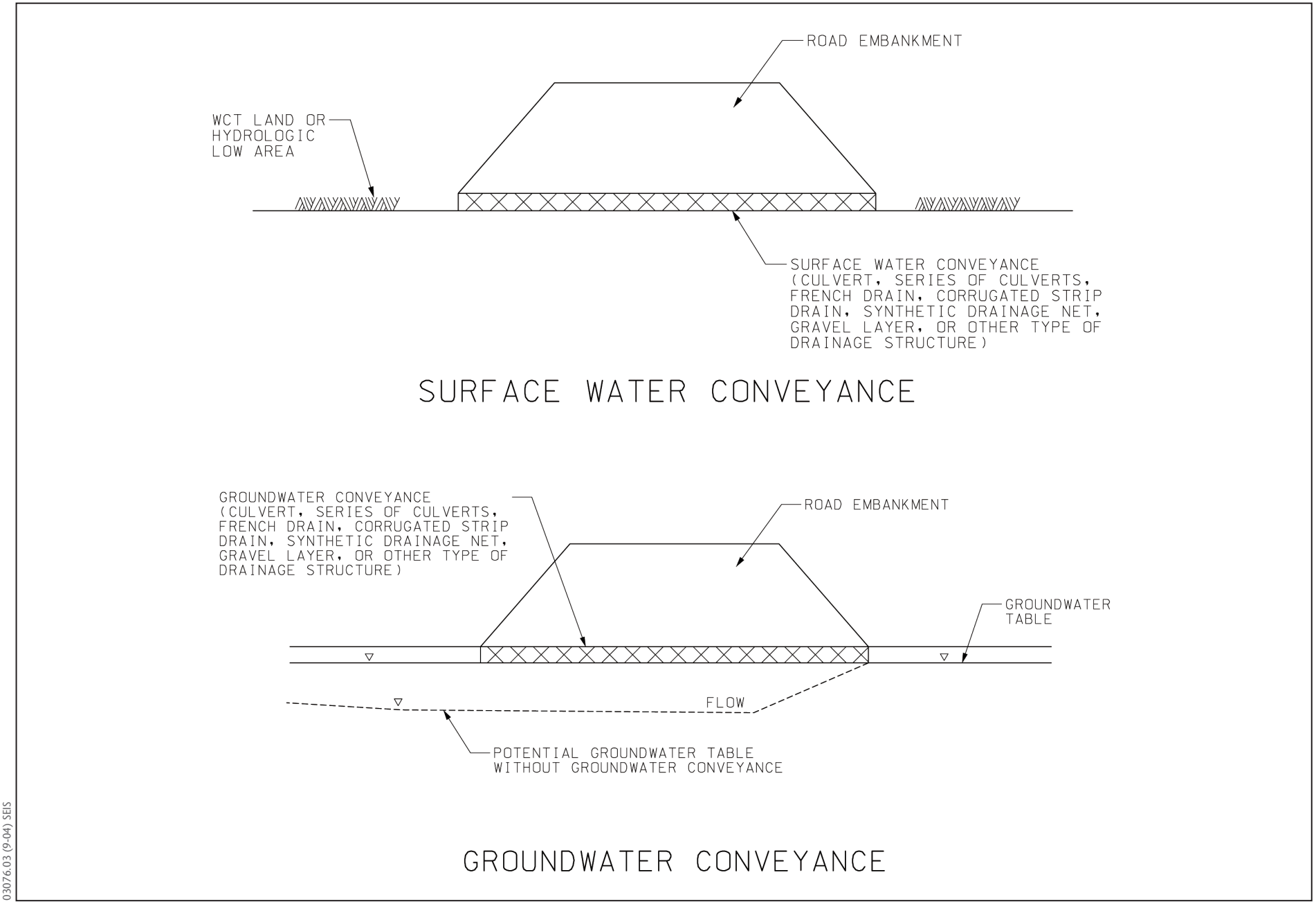


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Figure 4.10-4
Surface Water and Groundwater Conveyance Structures

Build Alternatives

Wells

As described in Section 4.10.2.5 above, UDNR's Water Rights Division tracks groundwater rights by inventoried water right numbers, each of which can include one or more groundwater wells. All water rights and their associated wells that fall within the rights-of-way of the proposed build alternatives are shown in Figure 4.10-5, which updates Figure 4-13 in the Final EIS. Wells located in the right-of-way of a build alternative would be affected by implementation of that build alternative because the owner of the well would not be able to maintain ownership.

The number of wells that would be located in the right-of-way of each build alternative is indicated in Table 4.10-3, which updates Table 4-17 in the Final EIS. These numbers are smaller than those presented in the Final EIS because the right-of-way associated with each build alternative has been narrowed from 100 m (328 ft) to 95 m (312 ft) (see Chapter 3, *Alternatives*).

As stated in the Final EIS, runoff from Legacy parkway could not affect wells located upgradient (east) of the highway and outside of the proposed rights-of-way. In addition, it is unlikely that highway runoff would have any impact on wells located outside the proposed rights-of-way on the downgradient (west) side of the highway.

Table 4.10-3 Affected Groundwater Right[1]

Water Right Classification	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Groundwater Rights within Proposed Rights-of-Way					
Domestic	15	15	8	8	8
Irrigation	39	44	34	38	35
Stock Watering	39	45	41	34	32
Municipal	2	2	2	2	2
Other[2]	3	3	3	3	4
Total[3]	65	69	49	56	53

Notes:

1 *Affected groundwater rights* represents groundwater rights located within a build alternative right-of-way.

2 Other constitutes a range of uses not classified above, such as cooling, recreational, or industrial.

3 The totals shown in the table are different than the actual number of water rights in the study area because some water rights have more than one classification and some have no classification. Additional groundwater and surface water rights may be acquired to provide water to the proposed Legacy nature Preserve. As of June 2004, UDOT has acquired surface water rights from North Canyon Creek and the Jordan River.

Source: UDNR Division of Water Rights 2005

Drinking Water Protection Zones

As described in Section 4.10.2.5 above, UDEQ now refers to wellhead protection areas as DWSP zones. Since publication of the Final EIS, owners of public drinking water sources have delineated DWSP zones and submitted DWSP plans to UDEQ, Division of Drinking Water. Development is not allowed within DWSP zones unless the development is consistent with the DWSP plan. Alternatives A, D, and E are

located within a DWSP zone (Zone 4) for a public well owned by the City of Woods Cross. The City of Woods Cross has stated, however, that the proposed action would be consistent with its DWSP plan for this well (St. Jeor pers. comm.). Weber Basin Conservancy District also owns a DWSP zone located in the study area near Farmington. This well is not in use, however, and would not be affected by any proposed build alternative.

Mitigation Measures

As stated in the Final EIS, for wells located in the right-of-way of a build alternative, UDOT would either purchase the groundwater right from the owner or pay for a transfer of the right.

4.10.3.5 Biogeochemical Functions of Wetlands

As stated in the Final EIS, potential impacts on wetland biogeochemical functions were assessed using the Legacy Parkway wetland functional assessment model and quantified in functional capacity units (FCUs). See Section 4.12 of the Final EIS and Section 4.12, *Wetlands*, of this document for a detailed discussion of the results.

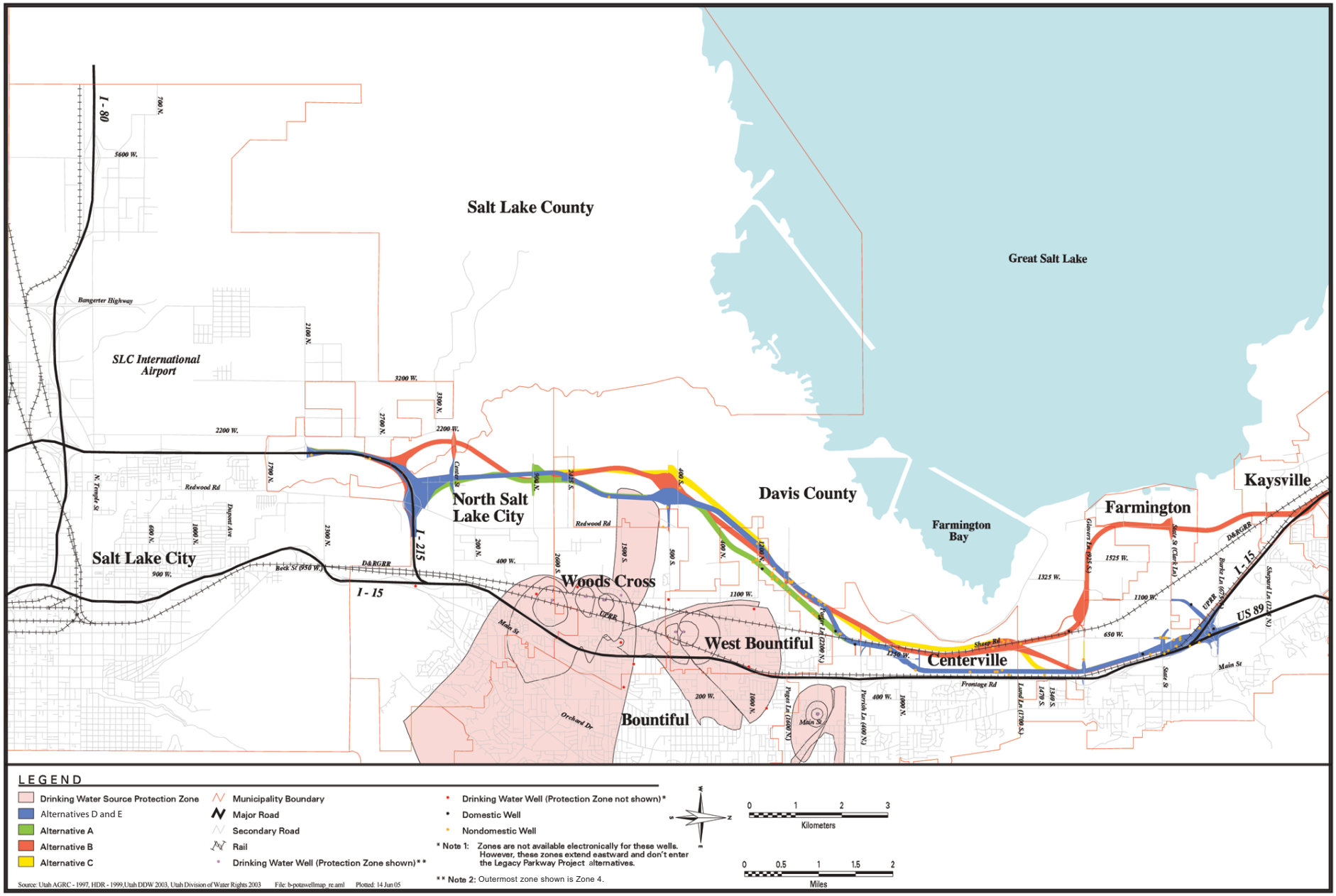

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Figure 4.10-5
Potentially Affected Wells

Section 4.11

Permits and Clearances

This section discusses the permits and clearances that would be required to construct any proposed build alternative. The information presented in this section represents an update of the information presented in Section 4.11 of the Final EIS. Updated information on the federal, state, and local permits and clearances that have been obtained to date for Alternative D (Final EIS Preferred Alternative) is also presented herein and summarized in Table 4.11-1 at the end of this section. The terms and conditions for the permits and clearances obtained for Alternative D will be reassessed by the responsible agencies after the federal lead agencies have determined which, if any, of the build alternatives presented in the Supplemental EIS will be approved for implementation by UDOT.

4.11.1 Approach and Methodology

4.11.1.1 Changes since June 2000 Final EIS

Federal, state, and local regulatory requirements specific to resource areas that would be affected by proposed build alternatives were reviewed to determine whether they had been updated or changed since publication of the Final EIS. In addition, permits and clearances obtained to date for Alternative D were reviewed to determine their current status.

4.11.1.2 Changes since Draft Supplemental EIS

Since the Draft Supplemental EIS was published in December 2004, Table 4.11-1 and Section 4.11.2 have been updated to indicate the current permit status. Several permits that were previously obtained for Legacy Parkway have expired.

4.11.2 Affected Environment

Table 4.11-1 at the end of this section provides updated information on the status of permits and clearances obtained to date for Alternative D (Final EIS Preferred Alternative). As stated above, the types of permits and clearances listed in Table 4.11-1 and in the following text would apply to all build alternatives; however, the terms and conditions of these permits could change based on which, if any, of the alternatives presented in the Supplemental EIS is selected by the federal lead agencies for implementation. There have been no regulatory changes since 2000 that change the type of permits and clearances addressed in the Final EIS.

4.11.2.1 Federal Permits and Clearances

Section 404, Clean Water Act, Individual Permit (Corps)

As stated in the Final EIS, the Corps requires project applicants to obtain a Clean Water Act (CWA) Section 404 permit if a proposed action would result in the discharge of dredged or fill material into waters of the United States, including wetlands. All the build alternatives presented in the Final EIS and the Supplemental EIS would require placement of fill material in waters of the United States (see Section 4.12, *Wetlands*, and Section 4.13, *Wildlife*). As a result, authorization would have to be obtained from the Corps prior to implementation of any build alternative.

On January 9, 2001, the Corps issued a CWA Section 404 permit for Alternative D. Based on the narrower right-of-way associated with Alternative E, UDOT submitted a request for a permit modification to the Corps in November 2004. The public hearing for the permit modification was held in January 2005, concurrent with the release of the Draft Supplemental EIS. The Corps will reevaluate the decision to modify the CWA Section 404 permit based on information presented in the Supplemental EIS. The permit decision will be presented in the Record of Decision (ROD) at the completion of the Supplemental EIS process.

Section 401, Clean Water Act, Water Quality Certification (UDEQ)

Section 401 of the CWA requires federal agencies to ensure that their proposed actions (e.g., issuance of a permit) do not violate state water quality standards. The Section 404 permit is an action that requires evaluation by Utah Department of Environmental Quality (UDEQ), Division of Water Quality, for water quality certification.

All the build alternatives presented in the Final EIS and the Supplemental EIS would require placement of fill material in waters of the United States, as described above. As a result, water quality certification pursuant to Section 401 of the CWA would have to be obtained from UDEQ.

A CWA Section 401 permit was issued by UDEQ for Alternative D on December 5, 2000. The permit does not have an expiration date, but UDEQ will reevaluate it prior to or concurrent with the Corps' permit decision.

Section 402, Clean Water Act, Utah Pollution Discharge Elimination System Permit (UDEQ)

Section 402 of the CWA regulates discharges of pollutants to surface waters. Construction projects that disturb 0.4 or more ha (1 or more ac) of land must be covered under the statewide Utah Pollution Discharge Elimination System (UPDES) stormwater permit. All the build alternatives presented in the Final EIS and the Supplemental EIS would disturb more than 0.4 ha (1 ac) of land and would require coverage under the UPDES stormwater permit.

UPDES permits are also required for industrial discharges associated with the operation of a facility. However, because highways are not considered industrial discharges, a UPDES permit would not be required for operation of Legacy Parkway.

The UPDES stormwater permit for Legacy Parkway has two main sections: the UPDES general construction stormwater permit and the UPDES general permit for construction dewatering or hydrostatic testing. The UPDES general construction stormwater permit, which covers actual construction activities,

was granted on July 1, 2001, and expired December 31, 2004. UDEQ has extended coverage under this permit for continued maintenance and reporting of stormwater controls within previously disturbed portions of the Alternative D (Final EIS Preferred Alternative) right-of-way.

The UPDES general permit for construction dewatering or hydrostatic testing, which covers construction dewatering or hydrostatic testing, was granted on June 29, 2003, and expired December 31, 2003. UDOT received a 6-year extension with UDEQ for the construction dewatering and hydrostatic testing permit that expires December 31, 2009. Alternative D is covered under these extended permits.

Of note, UDEQ will require that UDOT implement best management practices (BMPs), including construction of vegetative strips and swales, to remove total suspended solids (TSS) prior to issuance of the General Construction Storm Water Permit for the proposed Legacy Parkway project. In addition, UDEQ will require that UDOT specify BMPs for the long term maintenance of stormwater treatment facilities in the Phase II MS4 General Storm Water Permit for UDOT.

Approval of Addition or Modification of Access Points (FHWA)

As described in the Final EIS, changing access points to the interstate highway system requires approval from FHWA. All the build alternatives presented in both the Final EIS and the Supplemental EIS would require access to I-215 in North Salt Lake and to I-15 and US-89 in either Kaysville or Farmington.

The technical criteria in the interchange design/justification report (IJR) for Alternative D was approved by FHWA in August 1999 (Utah Department of Transportation 1999), with final approval of the IJR provided with publication of the ROD. UDOT is updating the IJR for FHWA review in conjunction with preparation of this Supplemental EIS. FHWA is reevaluating the decision to allow these access points, as described in the revised IJR, concurrently with the Supplemental EIS process.

Endangered Species Act (USFWS) Authorization

Section 7 of the federal Endangered Species Act (ESA) requires that federal agencies ensure that their actions neither jeopardize the continued existence of species listed as endangered or threatened nor result in destruction or adverse modification of the critical habitat of these species. Federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) if an action would result in “take” of a listed species, where *take* is defined as to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect…[an individual of a species]” (16 USC 1531 et seq.). The consultation can result in an incidental take statement establishing conditions under which a project that results in take may go forward.

All the build alternatives in the Final EIS and the Supplemental EIS could affect bald eagles, a species listed under the ESA as threatened (see Section 4.15, *Threatened and Endangered Species*). During the Final EIS process, the federal lead agencies initiated formal consultation with USFWS to assess the potential for take of bald eagles resulting from implementation of Alternative D. This consultation resulted in a biological opinion and incidental take statement issued by USFWS in February 1999 (U.S. Fish and Wildlife Service 1999a), which allowed the project to proceed under certain terms and conditions. The incidental take statement and biological opinion also cover the regulatory requirements of the Migratory Bird Treaty Act and the Bald Eagle Protection Act, as required under each of those federal statutes.

FHWA received a letter from USFWS on December 3, 2003, stating that the terms and conditions of the biological opinion are still in effect. The biological opinion may be reevaluated during or after the Supplemental EIS process.

Section 106, National Historic Preservation Act Consultation (Utah SHPO & ACHP)

As stated in the Final EIS, Section 106 of the National Historic Preservation Act (NHPA) requires that historical and archeological resources eligible for listing on the National Register of Historic Places (NRHP) be considered during planning and implementation of federal projects. Specifically, the Section 106 process requires that the federal lead agencies consult with the Utah State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), and the Utah Division of Indian Affairs to determine a proposed project's effects on properties listed or eligible for listing on the NRHP, as well as ways to minimize and mitigate adverse impacts on such properties.

All the build alternatives presented in the Final EIS and the Supplemental EIS would require consultation with the Utah SHPO prior to implementation (see Section 4.16, *Historic and Archaeological Resources*). Consultation with the Utah SHPO on Alternative D was completed prior to publication of the Final EIS. A Memorandum of Agreement (MOA) specific to NRHP-eligible resources affected by the proposed action was signed on August 1, 2000. A revised MOA has been updated, was circulated to signatories and consulting parties for comment, and has been executed (see Appendix A).

Blanket Certificate (FERC)

As stated in the Final EIS, changes in the connections of major natural gas lines require notification of and approval by the Federal Energy Regulatory Commission (FERC). All the build alternatives in the Final EIS and the Supplemental EIS could affect one natural gas pipeline company under the jurisdiction of FERC: the Kern River Gas Transmission Company. If a blanket certification is required, it will be requested prior to starting construction activities.

Material Site Right-of-Way Permit (BLM)

As stated in the Final EIS, use of Bureau of Land Management (BLM) mineral reservations (e.g., gravel for fill material) requires a material site right-of-way permit from BLM. The project applicant has not determined whether mineral reservations would be used to construct any build alternative presented in the Final EIS or the Supplemental EIS. The necessity for this permit will be determined after the Supplemental EIS process has been completed. None of the construction work completed in 2001 required use of BLM mineral reservations.

4.11.2.2 State Permits and Clearances

Utah State Stream Alteration Permit (UDNR)

The Utah Department of Natural Resource (UDNR), Division of Water Rights, requires project applicants to obtain a stream alteration permit if a stream crossing would result in a major stream alteration or modification. As described in the Final EIS, stream alteration permit applications are typically combined with the Corps Section 404 permit application to facilitate a streamlined permitting process.

All the build alternatives in the Final EIS and the Supplemental EIS would require one or more stream crossings, which would trigger the need for the project applicant to obtain a stream alteration permit from UDNR. Stream alteration permits granted in 2001 for crossings of Salt Lake Canal, Farmington Creek, Steed Creek, Davis Creek, and Shepard Creek as a result of Alternative D (Final EIS Preferred

Alternative) alignment have expired. UDOT will submit revised stream alteration permits, as appropriate, after the Supplemental EIS process has been completed.

Air Quality Approval Order (UDEQ)

An air quality approval order is required to build, own, or operate a facility that pollutes the air. To obtain an air quality approval order, a notice of intent (NOI) must be submitted to UDEQ, Division of Air Quality, describing construction activities and emissions that would be associated with operating equipment. As stated in the Final EIS, the permit application must include provisions for controlling dust and emission sources.

All the build alternatives in the Final EIS and the Supplemental EIS would generate fugitive dust and emissions and would require an air quality approval order from UDEQ. The air quality approval order for Alternative D was granted on January 25, 2001; this approval does not have an expiration date. UDEQ may have to reevaluate this permit after the Supplemental EIS process has been completed.

Water Rights (UDNR)

As stated in the Final EIS, an application must be made to UDNR, Division of Water Rights, if an existing groundwater well (i.e., point of diversion) within the right-of-way of a build alternative needs to be relocated. In addition, if the rights to a well were purchased by UDOT, the deed record at UDNR would have to be updated.

All the build alternatives in the Final EIS and the Supplemental EIS, as well construction of the Legacy Nature Preserve, could require relocation of points of diversion, based on the right-of-way that is purchased to support construction of the proposed highway and preserve. UDOT would have to apply to UDNR to change the location of any points of diversion and to change the deed record for purchased groundwater wells.

UDOT has purchased the majority of the right-of-way, including the associated water rights, necessary for construction of Alternative D (Final EIS Preferred Alternative) and the Legacy Nature Preserve (West pers. comm. [d and c]). To date, no changes in the location of points of diversion have been proposed. Applications to change the location of points of diversion will be made to UDNR, as appropriate, after the Supplemental EIS process has been completed. Some additional groundwater and surface water rights may be acquired to provide water to the Legacy Nature Preserve.

Certificate of Registration (UDNR)

As stated in the Final EIS, a certificate of registration is required by UDNR, Division of Wildlife Resources, if a proposed action could affect raptor nests. All the build alternatives evaluated in the Final EIS and the Supplemental EIS could affect raptor nests (see Section 4.13, *Wildlife*). Therefore, UDOT would have to obtain a certificate of registration from UDNR prior to implementing any proposed build alternatives.

A certification of registration must be renewed annually; it was last renewed for Alternative D on January 1, 2004, and expired December 31, 2004. UDOT will be required to submit a new certificate of registration to UDNR after the Supplemental EIS process has been completed and prior to construction activities.

Approval of Remediation Work Plan (UDEQ & EPA)

As stated in the Final EIS, a remediation work plan must be submitted and approved by UDEQ or the U.S. Environmental Protection Agency (EPA) if construction activities would occur on existing hazardous waste sites. All the build alternatives in the Final EIS and the Supplemental EIS would require construction of components on existing hazardous waste sites (see Section 4.17, *Hazardous Waste Sites*). Therefore, a remediation work plan specifying clean-up levels and protective measures for construction personnel would have to be submitted to UDEQ and/or EPA for approval.

An MOA between UDEQ and UDOT was signed in 2000 (Appendix A). The applicability of the remediation plan and required approvals will be determined after the Supplemental EIS process has been completed.

4.11.2.3 Local Permits & Clearances

Floodplain Development Permit (Local Jurisdiction)

As described in the Final EIS, all the proposed build alternatives in the Final EIS and the Supplemental EIS would require construction of components within the Federal Emergency Management Agency (FEMA) 100-year floodplain boundary, including placement of highway fill and drainage structures at stream crossings (see Section 4.14, *Floodplains*). As a result, floodplain development permits would have to be obtained from local jurisdictions in the area for work within the 100-year floodplain.

No floodplain development permits have been obtained for Alternative D (Final EIS Preferred Alternative) (Adams pers. comm.). The necessity for these permits will be determined after the Supplemental EIS process has been completed.

Development Permit for Critical Flood Areas (Davis County)

As stated in the Final EIS, Davis County requires permits for development in “critical flood areas,” where *critical flood areas* are defined as areas within 30 m (100 ft) of certain creeks and channels. All the build alternatives in the Final EIS and the Supplemental EIS would cross one or more of these designated critical flood areas, which would require a development permit from Davis County.

No development permits for critical flood areas have been obtained for Alternative D. The necessity for these permits will be determined after the Supplemental EIS process has been completed.

Construction-Related Permits and Clearances (Various Agencies)

All the build alternatives identified in the Final EIS and the Supplemental EIS could require construction-related permits and clearances for activities occurring outside the right-of-way, such as staging of construction areas, borrow areas, or concrete batch plant sites.

Permits for a crusher and for a concrete batch plant associated with implementation of Alternative D were granted on September 20, 2001 by UDEQ, Division of Air Quality. The necessity for reevaluating these permits or obtaining additional construction-related permits will be determined after the Supplemental EIS process has been completed.

Table 4.11-1 Required Permits and Clearances

Permit	Granting Agency(ies)	Applicant	When Application Must Be Filed	When Application Is Granted	Applicable Portion of Project	Updated Status (January 2004)
Federal						
Section 404 Individual Permit (Clean Water Act) (Joint application with Stream Alteration Permit)	Corps	UDOT	Concurrent with Final EIS	Concurrent with ROD	Portions of roadway in waters of the U.S.	Granted 1/9/01. UDOT has submitted a request for permit modification to the Corps to reflect narrower right-of-way associated with Alternative E. The Corps will reevaluate the decision to issue and/or modify the Section 404 permit.
Section 401 Water Quality Certification (Clean Water Act)	UDEQ, Division of Water Quality	UDOT	Concurrent with Final EIS	Concurrent with ROD	Required for issuing Section 404 permit to ensure proposed action will comply with state water quality standards	Granted 12/5/2000. No expiration date.
Section 402 (UPDES) Permit (Clean Water Act)	UDEQ, Division of Water Quality	Contractor	Design-build phase	Prior to construction	Stormwater quality during construction phrase	UPDES Stormwater General Permit for Construction Activities was granted 7/1/01 and expired 12/31/04. UDEQ has extended coverage under this permit for continued maintenance and reporting of stormwater controls within previously disturbed portions of the Alternative D right-of-way. UPDES Dewatering/Hydrostatic Testing Permit was granted 6/29/03. UDOT received a 6-year extension that expires 12/31/09.
Approval of Addition or Modification of Access Points	FHWA	UDOT	EIS phase	Concurrent with ROD	Interstate access changes	Technical criteria in the interchange design/justification report (IJR) approved 8/99; final approval in ROD. UDOT is updating the IJR for FHWA review in conjunction with preparation of this Supplemental EIS. FHWA will reevaluate the decision to allow these access points, as described in the revised IJR.

Permit	Granting Agency(ies)	Applicant	When Application Must Be Filed	When Application Is Granted	Applicable Portion of Project	Updated Status (January 2004)
Incidental Take Statement (Section 7, Endangered Species Act)	USFWS	FHWA and the Corps	EIS phase	Final EIS	Project affects on migratory birds, eagles, and threatened and endangered species	An incidental take statement was included in the biological opinion for Alternative D, which was issued on 2/11/99. On 12/3/03, USFWS verified that the terms and conditions of the biological opinion were still in effect.
Section 106 Permit (National Historic Preservation Act)	SHPO and ACHP	UDOT	Concurrent with Final EIS	Final EIS	Impacts on historic and archaeological resources	A memorandum of agreement (MOA) between the federal lead agencies, SHPO, and ACHP was signed on 8/1/00. A revised MOA has been updated in September 2005, was circulated to signatories and consulting parties for comment, and has been executed (see Appendix A). The Section 106 permit was issued prior to the release of the Final EIS.
Blanket Certificate (prior notice)	FERC	Gas company	Design-bid-build phase	Prior to construction	Major gas line relocations	Will be obtained as needed.
Material Site Right-of-Way Permit	BLM	UDOT (prepared by contractor)	Prior to use	Prior to use	Required if fill is to be taken from areas with BLM mineral reservations	Will be obtained as needed.
State						
Stream Alteration Permit (Joint application with Section 404 Permit)	UDNR, Division of Water Rights	UDOT	Concurrent with Final EIS	Concurrent with ROD	Structures at stream crossings	Stream alteration permits granted in 2001 for Salt Lake Canal, Farmington Creek, Steed Creek, Davis Creek, and Shepard Creek have expired. UDOT will submit revised stream alteration permits, as appropriate, after the Supplemental EIS process has been completed.
Air Quality Approval Order	UDEQ Division of Air Quality	Contractor	Design-build phase	Prior to construction	Air quality during construction phase (emissions from equipment)	Granted 1/25/01. No expiration date. An Emissions Control Plan (EMC) was prepared for this permit.

Permit	Granting Agency(ies)	Applicant	When Application Must Be Filed	When Application Is Granted	Applicable Portion of Project	Updated Status (January 2004)
Water Rights (change deed record or apply for change in point of diversion)	UDNR, Division of Water Rights	UDOT	Right-of-way acquisition phase	Right-of-way acquisition phase	Changes in point of diversion or in use associated with wells in the right-of-way or water required for wetland mitigation	UDOT has purchased water rights along with property for right-of-way. Changes in points of diversion will be coordinated with UDNR as necessary.
Certificate of Registration	UDNR, Division of Wildlife Resources	Contractor	Design-bid-build phase	Prior to construction	Impacts on raptor nests	A certification of registration must be renewed annually; it was last renewed for Alternative D on January 1, 2004, and expired December 31, 2004. UDOT will be required to submit a new certificate of registration to UDNR after the Supplemental EIS process has been completed and prior to construction activities.
Approval of Remediation Work Plan	UDEQ or EPA	UDOT	EIS and design-build phases	Prior to construction	Hazardous waste, CERCLA, and NPL sites	An MOA was signed between UDEQ and UDOT in 2000. Specific permits will be submitted on a case-by-case basis.
Local						
Floodplain Development Permit (local floodplain coordinator)	Davis County, North Salt Lake, Woods Cross, West Bountiful, Centerville, Farmington	UDOT (prepared by contractor)	Design-bid-build phase	Design-bid-build phase	Portions of roadway or structures in FEMA floodplain for creeks or Great Salt Lake	Will be obtained on a case-by-case basis prior to construction.
Development Permit for Critical Flood Areas	Davis County	UDOT (prepared by contractor)	Design-bid-build phase	Design-bid-build phase	Portions of roadway or structures within 30 m (100 ft) of certain channels	Will be obtained on a case-by-case basis prior to construction.

Permit	Granting Agency(ies)	Applicant	When Application Must Be Filed	When Application Is Granted	Applicable Portion of Project	Updated Status (January 2004)
Off-site Construction-related permits	Various	Contractor	Contractor	Prior to construction	Impacts associated with offsite activities such as construction staging, borrow areas, batch plant sites, etc.	Permits for a crusher and a concrete batch plant were both granted on 9/20/01 by UDEQ, Division of Air Quality. Other permits will be obtained as needed.

Notes:

All the listed permits would be required for construction of Legacy Parkway under all proposed build alternatives and options. However, the terms and conditions listed in this table for permits obtained to date are specifically for the Alternative D alignment. These terms and conditions will be reassessed by the responsible agencies after the federal lead agencies have determined which, if any, of the build alternatives presented in the Supplemental EIS will be approved for implementation by UDOT.

ACHP = Advisory Council on Historic Preservation

BLM = Bureau of Land Management

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

Corps = U.S. Army Corps of Engineers

Draft EIS = Draft Environmental Impact Statement

EIS = Environmental Impact Statement

EPA = U.S. Environmental Protection Agency

FEMA = Federal Emergency Management Agency

FERC = Federal Energy Regulatory Commission

FHWA = Federal Highway Administration

Final EIS = Final Environmental Impact Statement

NPL = National Priorities List

NRHP = National Register of Historic Places

ROD = Record of Decision

SHPO = State Historic Preservation Office

Supplemental EIS = Supplemental Environmental Impact Statement

UDEQ = Utah Department of Environmental Quality

UDNR = Utah Department of Natural Resources

UDOT = Utah Department of Transportation

UDWR = Utah Department of Wildlife Resources

UPDES = Utah Pollution Discharge Elimination System

USFWS = U.S. Fish and Wildlife Service

Section 4.12
Wetlands

This section describes the wetlands and other aquatic resources in the study area. It presents information regarding changes in wetland type and function that have occurred since publication of the Final EIS and provides supplemental information to define and describe more clearly the vegetation types present in the wetland areas in the study area. Specifically, this section

- describes wetland impacts that have occurred to date as a result of initial project construction;
- identifies all direct and indirect impacts of the No-Build and build alternatives on wetlands in the study area;
- describes wetland succession, both in general and in the context of Great Salt Lake flooding;
- discusses the role of flooding on the temporal variation in wetland functions;
- quantifies direct and indirect impacts in terms of acres affected;
- characterizes direct and indirect impacts in terms of wetland functions;
- discloses cumulative effects on wetland resources; and
- updates the status of proposed wetland mitigation and the Legacy Nature Preserve.

Appendix D, *Wetlands Functional Assessment*, provides detailed technical data to supplement the information presented in this section. Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation*, provides a detailed analysis of the effectiveness of the proposed mitigation to replace wetland and wildlife functions that would be lost or reduced from direct and indirect impacts of implementation of Legacy Parkway. Appendix E provides an accounting of impacts relative to mitigation in a variety of formats including functional capacity units, vegetation cover type, and wildlife habitat. Appendix F provides a wetlands mitigation and monitoring plan for activities performed on the Legacy Nature Preserve.

4.12.1 Approach and Methodology

4.12.1.1 Changes since June 2000 Final EIS

This section presents updated and supplemental information on wetland resources in the study area. The study area for the wetlands analysis has changed since publication of the June 2000 Final EIS. The

revised study area (Figure 4.12-1) includes wetland resources north of the I-215/I-5 interchange (i.e., it previously extended south to I-80 and west past the Salt Lake City International Airport), as well as wetland resources within the entire area associated with the Legacy Nature Preserve. Consequently, the acreage of wetland resources described in this section is less than that discussed in the Final EIS.

Wetland Delineation and Reverification

As described in the June 2000 Final EIS, wetlands in the study area were originally characterized and mapped between April and July 1997, as documented in the *Legacy–West Davis Wetlands Delineation Technical Report* (Baseline Data Inc. 1998). Delineated wetlands were then classified and subjected to a wetlands functional assessment, which was described in the *Legacy Parkway Wetland Final HGM Technical Report* (Baseline Data Inc. 2000). Both technical reports were summarized in Appendix B of the June 2000 Final EIS. In August 1998, the Corps approved the delineation and the proposed wetlands functional assessment concept. Additional wetland mapping was done to identify wetlands present in the Legacy Nature Preserve.

To verify the accuracy of the wetland delineation and to provide updated information for the Supplemental EIS analysis, wetlands within and bordering the proposed right-of-way for Alternative D (the Final EIS Preferred Alternative) were visually inspected between October 28 and November 7, 2003. Changes noted during these field surveys were documented in a wetlands reverification letter report and submitted to the Corps on March 16, 2004 (Preston pers. comm.). This report determined that approximately 58 of the 124 wetland polygons located within or intersected by (i.e., cut or divided) the right-of-way of Alternative D (Final EIS Preferred Alternative) had been entirely or partially filled during clearing and grading of the 100-m (328-ft) right-of-way prior to the court-ordered suspension of construction activities associated with the Legacy Parkway project. The remaining 66 wetlands intersected by the right-of-way have not been altered since the previous wetland delineation, with the exception of one wetland polygon that had been filled with concrete rubble as a result of an action not related to the proposed Legacy Parkway project. This updated information was verified by the Corps on November 8, 2004 (Kang pers. comm.).[1]

Of note, aerial photography used to determine elevation contours on the Legacy Nature Preserve was collected in 2004. These contours were used in conjunction with the verified wetland delineation to design mitigation activities proposed for the Legacy Nature Preserve.

Wetlands Functional Assessment

As presented in the Final EIS, the wetlands functional assessment for wetlands in the study area was developed from the hydrogeomorphic (HGM) method for evaluating wetland functions initially developed by the Corps (Brinson 1993). The HGM method categorizes wetlands by their water sources, hydrodynamics, and geomorphic setting, and then evaluates wetland functions based on physical and biological attributes. The wetlands functional assessment was used to quantitatively measure how well wetlands in the study area function. This measurement was used, in part, to determine how much mitigation would be needed, rather than basing that determination on wetland acreage alone. At the time this Supplemental EIS was prepared, an updated regional HGM model was in progress but was not complete enough to offer the accuracy or precision needed to update the wetlands functional assessment information presented in the Final EIS. As a result, the quantitative information on wetland functions

[1] It should be noted that Table 4-20 in the Final EIS indicates that there are 80 wetland polygons within the Alternative D right-of-way, which is fewer polygons than described herein (i.e., 124 wetland polygons) because wetland complexes in the Final EIS were, in some cases, aggregated; that is, some wetland complexes in the Final EIS comprised several wetland polygons.

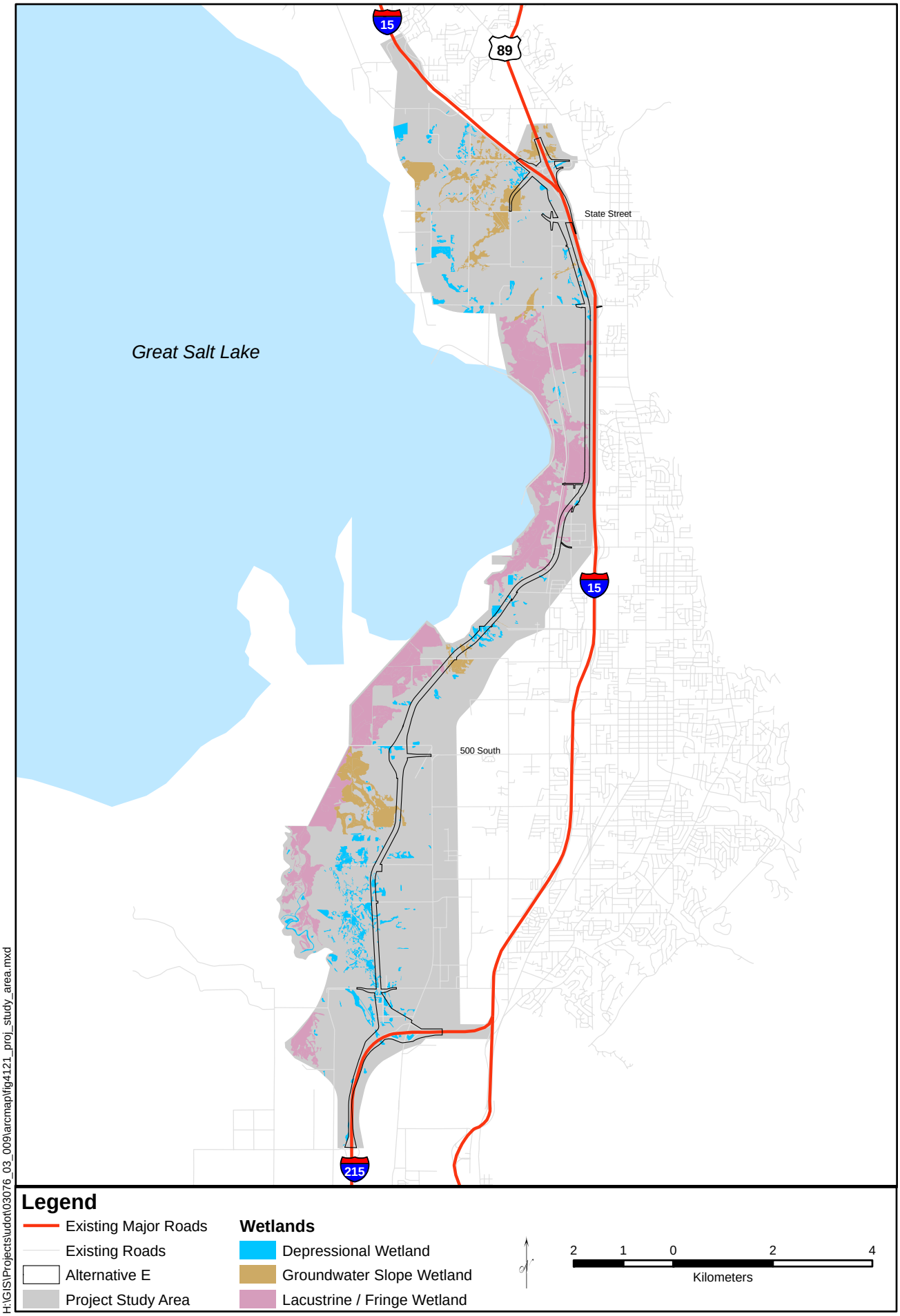

Figure 4.12-1
Study Area for the Analysis of Impacts on Wetlands

presented in this document continues to be based on the wetlands functional assessment conducted for the Final EIS.

Additional information about wetland types in the study area and further clarification about how the wetlands functional assessment was performed, including the type of data used, the rationale for the approach to assessing indirect impacts on wetland functions, and the method for scaling the variables used in the assessment models, are included in Appendix D, *Wetlands Functional Assessment*.

Regulatory Update

Since publication of the Final EIS, a Supreme Court ruling (*Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, No. 99-1178 [January 9, 2001]) (SWANCC) addressed the issue of whether certain wetlands are subject to federal jurisdiction under Section 404 of the federal Clean Water Act (CWA). In the SWANCC decision, the Supreme Court ruled that, for nonnavigable, isolated, intrastate wetlands, providing habitat for migratory birds was insufficient as the sole basis for assertion of federal jurisdiction under the CWA. This ruling removed a part of the regulatory definition of "waters of the United States" under which many small isolated wetlands have been afforded CWA protection. Other criteria for establishing jurisdiction under the CWA remain unaffected by the SWANCC case, including having a connection with interstate commerce or being adjacent or tributary to other waters of the United States (33 CFR Section 328.3[a]).

The Corps has determined that Great Salt Lake and the wetlands adjacent to it are jurisdictional waters of the United States. Specifically, the Corps has determined that Great Salt Lake is a water of the United States because it is navigable-in-fact and has been found to have substantial connections with interstate commerce, as noted in the 2001 memorandum concerning isolated waters from the General Counsel of the Environmental Protection Agency and the Corps Chief Counsel. Great Salt Lake is fed by the Bear River, the Weber River, and the Jordan River. The Bear River is an interstate water that originates in Utah, flows though a portion of Idaho, then returns to Utah before entering Great Salt Lake. Wetlands in the study area have been determined by the Corps to be adjacent to Great Salt Lake. Although most of the wetlands in the study area have been designated as groundwater slope or depressional wetlands, many of them form extensive wetland complexes and lie within Great Salt Lake's historic high-water elevation (1,283 m [4,212 ft]), and most are within the area of influence of maximal lake flooding (1,286 m [4,220 ft]). Many of the groundwater slope wetlands are interconnected by surface water flow and are connected to Great Salt Lake by direct flow or by streams and drainage channels. In addition, the wetlands in the Legacy Parkway project study area help sustain the water quality, habitat support, and other functions of the Great Salt Lake Ecosystem (GSLE). Accordingly, the Corps has determined that all the delineated wetlands in the study area remain jurisdictional and are subject to regulation under Section 404 of the CWA; the SWANCC ruling did not affect this protection.

4.12.1.2 Changes since Draft Supplemental EIS

Several changes have been made to the text in this section since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- The acreage of direct impacts on wetlands disclosed in Table 4.12-5 have been updated to reflect minor modifications that were made to the alignments of Alternative A and E (Final Supplemental EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. A description of these modifications are provided in Section 4.0, *Introduction*, and Section 3.4.2, *Modified Build Alternatives A, B, C, and D/E*, of this document.

- Some information in this section were found to be based on incorrect calculations and has been subsequently revised. These calculations include the percentage of wetlands in the study area that would be converted to open water at high lake levels (see Section 4.12.2.4, *Wetlands and Great Salt Lake Flooding*), the percentage of wetlands in the study area that would be indirectly affected by future development not related to Legacy Parkway (see Section 4.12.3.2, *Indirect Impacts*), and the acreage of wetlands that would be directly affected by Alternative B.

- A description of the adequacy of the proposed mitigation package (i.e., the Legacy Nature Preserve) to offset impacts associated with Alternative E (Final Supplemental EIS Preferred Alternative) has been added to Section 4.12.3.4, *Mitigation Measures.* Section 4.12.3.4 has also been updated to include a discussion of how Great Salt Lake inundation levels would affect the Legacy Nature Preserve.

4.12.2 Affected Environment

The study area, which is described above in Section 4.12.1, *Methodology*, encompasses 987 ha (2,439 ac) of wetlands in three HGM wetland classes (depressional, groundwater slope, and lacustrine fringe) and seven wetland cover types (forested wetland, shrub-scrub, marsh, wet meadow, playa, unconsolidated shore, and open water) (Figure 4.12-1). Table 4.12-1 provides information on the acreage of each wetland class, according to cover type. The baseline information on wetlands and land use in the study area used in this analysis was collected between 1997 and 1999. Therefore, *existing conditions*, as used in this section, refers to the extent, character, and functions of wetlands in the study area as they existed in 1997–1999.

The Final EIS based all quantitative discussion of wetland functions, impacts, and mitigation on the three wetland classes mentioned above—depressional, groundwater slope, lacustrine fringe (Figure 3-22 in the Final EIS). However, this Supplemental EIS separates wetland functions, impacts, and mitigation by wetland cover type to provide additional ecological context by which to interpret the analysis. Table 4.12-1, which updates and supplements Table 3-30 in the Final EIS, summarizes the quantities and functional ratings that characterize these wetland classes and cover types. Functional ratings assigned to the wetlands were based on the average functional value for all wetland functions. These functional ratings can range from low to high in accordance with the average functional values shown in Table 4.12-2.

Section 4.12.2.4, *Wetlands and Great Salt Lake Flooding*, of this document provides a discussion of how wetlands are affected by Great Salt Lake flooding.

Table 4.12-1 Wetland Cover Types, Quantities, and Functional Ratings for the Study Area

HGM Class	Wetland Cover Type	Quantity in Hectares (acres)											
		Total		High		High-to-Medium		Medium		Medium-to-Low		Low	
Depressional	Forested Wetland	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Groundwater Slope		0.2	(0.4)	0.0	(0.0)	0.0	(0.0)	0.2	(0.4)	0.0	(0.0)	0.0	(0.0)
Lacustrine Fringe		0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Depressional	Shrub-Scrub	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Groundwater Slope		0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Lacustrine Fringe		1.4	(3.6)	0.0	(0.0)	1.4	(3.6)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Depressional	Marsh	14.5	(35.8)	0.7	(1.7)	5.5	(13.6)	8.0	(19.7)	0.3	(0.8)	0.0	(0.0)
Groundwater Slope		42.3	(104.5)	6.4	(15.8)	2.1	(5.3)	26.3	(64.9)	7.5	(18.5)	0.0	(0.0)
Lacustrine Fringe		233.2	(576.1)	0.0	(0.0)	206.3	(509.7)	26.9	(66.4)	0.0	(0.0)	0.0	(0.0)
Depressional	Wet Meadow	115.3	(284.9)	2.6	(6.5)	84.0	(207.6)	26.7	(66.0)	1.9	(4.8)	0.0	(0.0)
Groundwater Slope		152.4	(376.6)	80.8	(199.6)	18.2	(45.1)	48.9	(120.9)	4.5	(11.1)	0.0	(0.0)
Lacustrine Fringe		148.1	366.0	0.0	(0.0)	98.9	(244.5)	49.2	(121.5)	0.0	(0.0)	0.0	(0.0)
Depressional	Playa	46.4	(114.6)	3.5	(8.6)	31.3	(77.3)	10.5	(26.0)	0.0	(0.0)	1.1	(2.6)
Groundwater Slope		18.1	(44.7)	15.2	(37.6)	0.0	(0.0)	2.7	(6.6)	0.2	(0.4)	0.0	(0.0)
Lacustrine Fringe		124.5	(307.6)	0.0	(0.0)	99.7	(246.3)	24.8	(61.3)	0.0	(0.0)	0.0	(0.0)

HGM Class	Wetland Cover Type	Quantity in Hectares (acres)											
		Total		High		High-to-Medium		Medium		Medium-to-Low		Low	
Depressional	Unconsolidated Shore	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Groundwater Slope		0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Lacustrine Fringe		38.9	(96.2)	0.0	(0.0)	36.5	(90.1)	2.5	(6.1)	0.0	(0.0)	0.0	(0.0)
Depressional	Open Water	2.5	(6.2)	0.0	(0.0)	1.4	(3.5)	1.1	(2.7)	0.0	(0.0)	0.0	(0.0)
Groundwater Slope		0.1	(0.2)	0.0	(0.0)	0.0	(0.0)	0.1	(0.2)	0.0	(0.0)	0.0	(0.0)
Lacustrine Fringe		49.4	(122.1)	0.0	(0.0)	25.1	(62.0)	24.3	(60.1)	0.0	(0.0)	0.0	(0.0)
Total		987.2	(2439.3)	109.2	(269.8)	610.5	(1508.5)	252.1	(622.9)	14.4	(35.5)	1.1	(2.6)

Table 4.12-2 Average Functional Values for Functional Rating

Functional Rating	Average Functional Value
High	0.88 to 1.0
High-to-Medium	0.63 to 0.87
Medium	0.38 to 0.62
Medium-to-Low	0.18 to 0.37
Low	0.00 to 0.17

4.12.2.1 Hydrogeomorphic Wetland Classes

As described in the Final EIS, wetlands in the study area can be categorized by geomorphic setting, water source, and hydrodynamics. As mentioned above, three wetland classes, which were defined on the basis of these characteristics, are present in the study area: depressional, groundwater slope, and lacustrine fringe. It is presumed that wetlands above the 4,212-ft elevation (i.e., the FEMA floodplain elevation) would more likely be subject to development in the future, with or without the proposed action, than would wetlands below this elevation.

Depressional Wetlands

As described in the Final EIS, depressional wetlands are characterized by topographic depressions or basins where surface waters collect. The primary hydrology source is precipitation, both direct and from surface runoff, although the deeper basins may also intersect the groundwater table. The hydrodynamics are primarily vertical, although horizontal flow may occur when basins fill to capacity and overflow via one or more outlets. Depressional wetlands vary in depth, and because the lower elevations remain wet for longer periods of time, the deeper parts of the wetlands support vegetation types that require more water than the margins or the shallower wetlands.

The areas west of Redwood Road have many depressional wetlands where precipitation is the major hydrological source. Wetland hydrology of these depressional wetlands usually peaks in March and April, when snowmelt and precipitation events are most frequent. The rest of the depressional wetlands derive their hydrology from a combination of precipitation, groundwater, and surface flows.

There are approximately 178 ha (441 ac) of depressional wetlands in the study area, comprising 18 percent of all wetlands in the study area. They are scattered throughout the study area, mostly above the 4,212-ft elevation. The largest concentration in the study area occurs west of Redwood Road, between Center Street and 500 South. Most of these wetlands have a high-to-medium functional rating score.

Groundwater Slope Wetlands

As described in the Final EIS, groundwater slope wetlands are found in areas where the subsurface groundwater intersects the soil surface. The hydrodynamics are primarily horizontal and unidirectional, with flow moving from the groundwater table through the wetlands to an outlet. Some groundwater slope wetlands in the study area are associated with small surface streams or creeks that have their origins in small seeps and springs near the foot of the Wasatch Mountains. Most groundwater slope wetlands are found west of Farmington and, to a lesser extent, west of Redwood Road

There are approximately 213 ha (526 ac) of groundwater slope wetlands in the study area, comprising 21 percent of all wetlands in the study area. Most of the groundwater slope wetlands are located above the 4,212-ft elevation in two areas: west of Redwood Road between 2425 South and 500 South, and west of I-15 north of Glovers Lane. Most groundwater slope wetlands have a high functional rating score.

Lacustrine Fringe Wetlands

As described in the Final EIS, lacustrine fringe wetlands are found at the edge or fringe of Great Salt Lake. The hydrodynamics are bidirectional, with wetland hydrology derived directly from the lake or impoundment. The lake (impoundment) level fluctuates, depending on the time of year. During the spring, water is at the highest level and may slowly draw down through the summer and fall. Water

depths are usually 2 m (6.5 ft) or less. There are approximately 596 ha (1,472 ac) of lacustrine fringe wetlands in the study area. Lacustrine fringe wetlands comprise 60 percent of all wetlands in the study area. These wetlands occur along the western border of the study area south of Glovers Lane, mostly at or below the 4,212-ft elevation. As noted in Section 4.12.2.4, *Wetlands and Great Salt Lake Flooding*, lacustrine fringe wetlands farther from the lake may be supported only by precipitation or by groundwater when the lake level is low. When not subject to lake inundation, they perform similarly to depressional wetlands. Most of the lacustrine fringe wetlands have a high-to-medium functional rating score.

The wetlands that surround the Farmington Bay Waterfowl Management Area (FBWMA) are lacustrine fringe wetlands of Great Salt Lake. These wetlands are important because the area is used heavily by waterfowl and shorebirds and functions as flood storage for Great Salt Lake during high-water years.

4.12.2.2 Wetland Cover Types

Within each of the three HGM wetland classes described in Section 4.12.2.1, *Hydrogeomorphic Wetland Classes*, there can be several different wetland vegetation cover types. As mentioned above, there are seven cover types present in the study area; these cover types are listed in Table 4.12-3 and described in detail in Appendix D, *Wetlands Functional Assessment*. Section 4.13, *Wildlife*, also presents information on the wildlife use of these wetland cover types. Because the wetlands analysis focused more on the vegetation and physical properties of the wetlands and the wildlife analysis focused primarily on wildlife use of the wetlands, the approach, methodology, and habitat types for the wildlife analysis differed from those used for the wetlands analysis. Table 4.12-3 presents a comparison of wetland cover types analyzed in this section and corresponding wildlife habitat types analyzed in Section 4.13 of this document. Although only wetland cover types are discussed in this section, surrounding uplands also affect the ability of wetlands to perform their functions. Section 4.13, *Wildlife*, of this document discusses uplands more specifically.

Table 4.12-3 Comparison of Wetland Cover Types and Corresponding Wildlife Habitat Types

Wetland Cover Type	Wildlife Habitat Type
Forested wetland	Riparian*
Scrub-shrub	Riparian*
Marsh	Sedge Cattail
Wet meadow	Hydric Meadow
Playa	Mudflat/pickleweed
Unconsolidated shore	Mudflat/pickleweed
Open water	Open water

Note:
*Riparian wildlife habitat contains uplands as well as wetlands.

4.12.2.3 Wetland Functions

For this Supplemental EIS, the lead agencies reviewed the wetlands functional assessment conducted for the Final EIS and all available information pertinent to the nature and function of the wetlands in the study area. Appendix D, *Wetlands Functional Assessment*, provides a detailed description of wetland functions and functional capacity units. In summary, as described in the Final EIS, wetlands in the study area perform functions in three basic categories: hydrology, biogeochemistry, and flora and fauna habitat

support. For this evaluation, these three function categories were quantified by measuring five specific functions.

- Function 1: Wetland hydrology maintenance.
- Function 2: Dissolved elements and compounds removal.
- Function 3: Particulate retention.
- Function 4: Habitat structure.
- Function 5: Habitat connectivity, fragmentation, and patchiness.

Hydrology is quantified under Function 1, biochemistry is quantified under Functions 2 and 3 (although Function 3 also quantifies physical properties), and flora and fauna habitat support are quantified under Functions 4 and 5. A discussion of wetland functions in the study area is provided in Appendix D, *Wetlands Functional Assessment*.

4.12.2.4 Wetlands and Great Salt Lake Flooding

Lacustrine fringe wetlands adjacent to Great Salt Lake are subject to Great Salt Lake's natural long-term cycles of rising and falling.[2] As a consequence, wetland functions in the lacustrine fringe wetlands change naturally in accord with the varying hydrologic regime and are not constant. The effects of changing lake levels are analyzed in detail in the wildlife technical memorandum (Jones & Stokes 2005) and summarized in Section 4.13.3.2, *Changes in Lake Level and Habitat Availability*, of this document.

The natural flood-drought cycle alters the composition and structure of the vegetation in the wetlands adjacent to Great Salt Lake, with subsequent changes in wetland functions that are vegetation-dependent. In the initial stages, abundant runoff into the wetlands adjacent to the lake promotes the development of marsh vegetation. Salts are leached from the soil, and the plant community becomes less halophytic. As Great Salt Lake rises, however, vegetation on the lake margins is affected by increased salinity and prolonged submersion. As floodwaters expand the lake margin eastward, the vegetation east of the lake becomes more hydrophytic. Areas dominated by upland vegetation are converted to wetlands under the new hydrologic regime. Wave action breaks up the dead vegetation and scours the now-denuded lake margins, converting vegetated wetlands to open water. At high lake level (i.e., 4,212 ft), more than 64 percent of the wetlands in the study area would be converted to open water (Jones & Stokes 2005).

As the lake waters recede, bare ground and mudflats are left. At first, halophytic vegetation is established. The influx of salts during flood events is important for maintaining the playas. In depressional areas, salts accumulate as the surface water evaporates, maintaining playas and wet meadows dominated by halophytes. Freshwater marsh and wet meadow develop where groundwater discharge supports wetland vegetation and where salt-laden runoff is exported by surface drainage. As salts are flushed from the soil by surface runoff or by groundwater discharge, the plant communities change over time to become less halophytic. Areas no longer subject to wetland hydrology are colonized by upland species.

Changing lake levels also affect other wetland functions. Lacustrine fringe wetlands are supported by lake water. During extended drought periods, when lake levels fall, wetlands immediately adjacent to the lake

[2] In addition to lacustrine fringe wetlands, depressional and slope wetlands can be affected by changes in the level of Great Salt Lake, depending on the elevation of the lake and the elevation of the particular wetlands.

may still receive some hydrologic input from the lake water. However, lacustrine fringe wetlands farther from the lake may be supported only by precipitation or by groundwater when the lake level is low and will function similarly to depressional wetlands.

The ability of wetlands to remove dissolved substances and retain particulates is directly related to the cover and biomass of the wetland vegetation. At the highest lake levels, much of the area once covered by wetlands has been converted to open water habitat. Consequently, the ability of wetlands along the east shore of the lake to filter dissolved substances and retain particulates is greatly reduced during flood events, and their function as a buffer between development and the lake is also greatly reduced.

Wetlands east of Great Salt Lake are important for providing a diversity of habitats. This habitat diversity is maintained to a large degree by variation in the lake level. When the lake floods, the wildlife habitat function of the wetlands changes greatly. As the lake levels drop, these changes begin to reverse. Playas and other saline wetlands become reestablished, together with the wildlife dependent on them. At other locations, large unvegetated areas are exposed, and there is a lag period before the wetland and upland habitat becomes reestablished. This natural cycle of flood disturbance also makes the wetlands more vulnerable to invasion by exotic species, which displace native plant species and do not provide the same habitat value as native species.

The wetlands functional assessment was conducted for current conditions, i.e., low lake levels. Under a different hydrologic regime, i.e., high or intermediate lake levels, there would be differences in the quantity and relative abundance of each wetland type in every wetland category and differences in wetland functions.

4.12.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, all the build alternatives would affect wetland resources in the study area. Two categories of wetland impacts would occur, direct and indirect, both of which are characterized in this discussion according to which wetland functions are being affected. The Final EIS based the quantitative discussion of wetland impacts on the three HGM wetland classes described in Section 4.12.2.1. This section separates wetland impacts according to wetland cover types to provide additional ecological context by which to interpret the analysis. This section also provides updated information on the following topics.

- The acreage of wetlands filled due to construction of the Legacy Parkway project since publication of the Final EIS (i.e., Alternative D [Final EIS Preferred Alternative]).
- Additional acres of wetlands located on parcels added to the proposed Legacy Nature Preserve after publication of the Final EIS.
- Updated information relative to direct wetland impacts based on the narrowed right-of-way width proposed for the build alternatives (95 m [312 ft] vs. 100 m [328 ft]).

Wetlands directly affected (i.e., filled) by projects not related to the Legacy Parkway project were included in the cumulative effects analysis and are discussed in Section 4.21, *Cumulative Effects*.

The following sections describe wetland impacts for all the proposed build alternatives.

4.12.3.1 Direct Impacts

Direct impacts are impacts that would occur as a result of ground disturbance, including earthwork (clearing, grading, excavation, and fill) to create the road bed, the landscaped berm, and the trail; construction of bridges and other structures; utility relocations; construction vehicle traffic; and staging and storage areas.

For the initial impact analysis calculations made for the Final EIS, it was assumed that direct impacts associated with the build alternatives would be limited to the area within the proposed action right-of-way, and that all the area within the project right-of-way would be directly affected. This Supplemental EIS makes the same assumption; the impact analysis was carried out by assuming that all wetlands within the project right-of-way would be filled. However, site-specific conditions at some locations within the right-of-way could allow the final design to incorporate a narrower footprint (i.e., narrower than the proposed 95 m (312-ft) right of way); consequently, some wetland areas within the right-of-way may not actually be filled. As a result, estimated impacts on wetlands are considered a worst-case analysis. A separate analysis was carried out for each proposed build alternative.

Fifty-eight wetlands were entirely or partially filled by the initial clearing and grading for Legacy Parkway or by Legacy-related construction activities associated with the I-15/US-89 interchange in Farmington; the total extent of project-related fill was 19.4 ha (47.9 ac). Five other wetlands were partially filled by construction of temporary access roads in the Legacy Nature Preserve; the total extent of project-related fill in the Legacy Nature Preserve was 0.1 ha (0.3 ac). Because these wetlands were filled in conjunction with the Legacy Parkway project, their condition prior to the construction activities was used for assessing baseline conditions.

Table 4.12-4, which updates Table 4-20 in the Final EIS, summarizes the potential direct impacts in terms of the total area affected by each proposed build alternative, assuming the 100-m (328-ft) right-of-way used for evaluation in the Final EIS. Figures 4-14a through 4-14d in the Final EIS show the wetland polygons that would be directly affected by the right-of-way of each build alternative, assuming a 100-m (328-ft) right-of-way.

Table 4.12-4 Direct Impacts on Wetlands by Wetland Class and Wetland Cover Type (for 100-m [328-ft] Right-of-Way)

		Area in Hectares (Acres)							
Wetland Class	Wetland Cover Type	Alternative A		Alternative B		Alternative C		Alternative D	
Depressional		0	(0)	0	(0)	0	(0)	0	(0)
Groundwater Slope	Forested Wetland	0	(0)	0	(0)	0	(0)	0	(0)
Lacustrine Fringe		0	(0)	0	(0)	0	(0)	0	(0)
Depressional		0	(0)	0	(0)	0	(0)	0	(0)
Groundwater Slope	Shrub-Scrub	0	(0)	0	(0)	0	(0)	0	(0)
Lacustrine Fringe		0	(0)	1	(3)	0	(0)	0	(0)
Depressional	Marsh	1	(2)	2	(4)	1	(2)	1	(3)

Wetland Class	Wetland Cover Type	Area in Hectares (Acres)							
		Alternative A		Alternative B		Alternative C		Alternative D	
Groundwater Slope		1	(2)	4	(10)	1	(4)	1	(3)
Lacustrine Fringe		8	(19)	16	(38)	7	(17)	7	(18)
Depressional		17	(43)	15	(38)	17	(42)	17	(42)
Groundwater Slope	Wet Meadow	8	(19)	11	(26)	7	(16)	6	(14)
Lacustrine Fringe		4	(9)	7	(16)	9	(23)	4	(9)
Depressional		2	(5)	4	(10)	6	(14)	5	(12)
Groundwater Slope	Playa	0	(0)	2	(5)	1	(4)	1	(2)
Lacustrine Fringe		1	(2)	2	(5)	6	(14)	2	(4)
Depressional		0	(0)	0	(0)	0	(0)	0	(0)
Groundwater Slope	Unconsolidated Shore	0	(0)	0	(0)	0	(0)	0	(0)
Lacustrine Fringe		0	(0)	6	(15)	5	(13)	0	(0)
Depressional		0	(0)	0	(0)	0	(0)	0	(0)
Groundwater Slope	Open Water	0	(0)	0	(0)	0	(0)	0	(0)
Lacustrine Fringe		3	(7)	7	(16)	0	(0)	3	(7)
Totals*		44	(108)	76	(187)	60	(148)	46	(114)

Note:
* Includes acreage of wetlands already filled during previous construction activities.

Reduction of the right-of-way width from 100 m (328 ft) to 95 m (312 ft) would reduce impacts on wetlands under all proposed build alternatives, as illustrated in Table 4.12-5. Because the HGM model was not re-run to account for the proposed narrower right-of-way (i.e., 95 m [312 ft]), the discussion of indirect impacts and impacts on wetland functions presented below is based on the 100-m (328-ft) right-of-way analyzed in the Final EIS. As a result, for those impact categories, a discussion of impacts associated with Alternative E is not specifically presented. Given the narrower right-of-way of Alternative E, it can be assumed that indirect impacts and impacts on wetland functions are somewhat less than those presented for Alternative D. The acreage of direct impacts on wetlands associated with Alternatives D and E has been differentiated and is shown in Table 4.12-5.

Table 4.12-5 Direct Impacts on Wetlands under 328-ft Right-of-Way and 312-ft Right-of-Way

	Build Alternatives in hectares (acres)			
	Alternative A	Alternative B	Alternative C	Alternatives D and E*
Acreage of Wetlands Impact – 100-m (328-ft) Right-of-Way	44 (108)	76 (187)	60 (147)	46 (114)
Reduction in Wetlands Impact Associated with Narrower 95-m (312-ft) Right-of-Way	1 (1)	2 (5)	1 (2)	1 (1)
Acreage of Wetland Impact – 95-m (312-ft) Right-of-Way	43 (107)	74 (182)	59 (145)	45 (113)

Notes:

All conversions have been rounded.

* Alternative D represents the 100-m (328-ft) right-of-way alignment from the Final EIS; Alternative E represents the 95-m (312-ft) right-of-way alignment evaluated in the Supplemental EIS.

Design flexibility, or the opportunity for the designer to modify facility components (consistent with design standards), was used during the design-build phase to reduce the project footprint and subsequent impact on wetland resources. The design-builder identified 6 ha (14 ac) of wetlands in the right-of-way of Alternative D (Final EIS Preferred Alternative) that would not be affected during construction (i.e., would not need to be filled to construct the highway or associated facilities). The updated analysis of the design shows that the design flexibility would be somewhat less available, although it could result in a reduction of 3.2 ha (8 ac) of impacts on wetlands under Alternative A and a reduction of 4.0 ha (10 ac) under Alternative E, primarily in the area associated with the southern interchange. It is likely that a similar amount of wetland area would be avoided during construction of Alternatives B and C. Although design flexibility during project construction would reduce impacts on wetlands, the exact acreage that could be avoided under Alternatives B and C is not known, and therefore the wetlands impact analysis presented below for the build alternatives is based on the impact acreage figures in Table 4.12-5.

No-Build Alternative

Existing Conditions

Under the No-Build Alternative, there would be no project-related direct impacts on wetland resources. If none of the build alternatives is chosen, wetlands affected by project-related impacts to date (2005) would either be restored to preconstruction conditions or the impacts would be mitigated, at the instruction of the Corps. Areas currently designated for incorporation into the Legacy Nature Preserve that are not used to mitigate project-related impacts on wetlands would, under current law, be required to be made available (i.e., sold) to either the original property owner or the general public. Accordingly, these lands would be made accessible to a variety of future uses, including potential development (see *Future Conditions [2020]* below).

Future Conditions (2020)

At the current rate of development, developable lands between the existing developed areas east of Legacy Parkway and Great Salt Lake will likely be developed by 2020.[3] Wetland resources will likely be affected, although the nature, timing, and location of specific impacts were not known at the time the wetlands functional assessment was done or at the time of this Supplemental EIS (see Table 4.13-5). Projects that have occurred since the Final EIS was published and the location of planned development are discussed in Section 4.1, *Land Use*, of this document. Any proposed fill of wetland resources would have to be authorized under Section 404 of the CWA before impacts could occur.

Build Alternatives

Alternative A

Alternative A would have the lowest amount of direct impacts on wetlands of the build alternatives. In the Final EIS, it was calculated that a total of 44 ha (108 ac) of wetlands in the study area would be filled under this alternative. As a result of the reevaluation and project changes, the total acres of direct wetlands impact for this alternative have been reduced to 43 ha (107 ac) (Table 4.12-5). This acreage is based on the assumption that all the wetlands within the reduced right-of-way would be affected by Alternative A; however, as described above, design flexibility would enable UDOT to avoid approximately 3 ha (8 ac) of wetlands within the right-of-way of Alternative A that are not within the construction footprint. As a result, the actual impact on wetlands that would be associated with Alternative A would be 39 ha (99 ac).

Affected wetlands would be at the higher elevations along the east side of the study area, with direct impacts primarily on wet meadow in depressional and groundwater slope wetlands and on marsh in the lacustrine fringe wetlands adjacent to Great Salt Lake.

Alternative B

Alternative B would have the highest amount of direct impacts on wetlands of the build alternatives. In the Final EIS, it was calculated that a total of 76 ha (187 ac) of wetlands in the study area would be filled under this alternative. As a result of the reevaluation and project changes, the total acreage of wetlands subject to direct impacts by this alternative has been reduced to 74 ha (182 ac) (Table 4.12-5). The primary impacts would be on lacustrine fringe wetlands and wet meadow. Marsh, wet meadow, unconsolidated shore, and open water habitats would be filled in the lacustrine fringe wetlands at the lower elevations along the west side of the study area. Wet meadow would also be filled in depressional and groundwater slope wetlands.

Alternative C

Alternative C would have more direct impacts on wetlands than Alternative A or Alternative D, but less than Alternative B. In the Final EIS, it was calculated that a total of 60 ha (147 ac) of wetlands in the study area would be affected under this alternative. As a result of the reevaluation and project changes, the total acreage of wetlands subject to direct impacts by this alternative has been reduced to 59 ha (145 ac) (Table 4.12-5). The primary impacts would be on lacustrine fringe wetlands and wet meadow. Marsh, wet meadow, unconsolidated shore, and open water habitats would be filled in the lacustrine fringe wetlands at the lower elevations along the west side of the study area. Wet meadow would be filled in depressional and groundwater slope wetlands, and playa would be filled in depressional wetlands.

[3] As described in Appendix D, the term *developable lands* does not include any jurisdictional wetlands or areas below the FEMA floodplain elevation of 4,212 feet.

Alternatives D and E

It was disclosed in the Final EIS that Alternative D would have more direct impacts on wetlands than Alternative A but less than Alternatives B and C. A total of 46 ha (114 ac) of the wetlands in the study area would be filled under this alternative. As a result of modifying Alternative D to create Alternative E with a reduced right-of-way width, the total acres of direct impacts on wetlands for Alternative E would be 45 ha (113 ac) (Table 4.12-5). This acreage is based on the assumption that all the wetlands within the reduced right-of-way would be affected by Alternative E; however, as described above, design flexibility would enable UDOT to avoid approximately 4 ha (10 ac) of wetlands within the right-of-way of Alternative E that are not within the construction footprint. As a result, the actual impact on wetlands that would be associated with Alternative E would be 41 ha (103 ac).

Affected wetlands would be at the higher elevations along the east side of the study area, with direct impacts primarily on wet meadow and playa in depressional wetlands, on wet meadow in groundwater slope wetlands, and on marsh in the lacustrine fringe wetlands adjacent to Great Salt Lake.

4.12.3.2 Indirect Impacts

Indirect impacts are impacts that occur later in time and impacts that could affect the function of wetlands located outside the project footprint. The following effects are examples of indirect impacts that the Legacy Parkway project could have on wetlands.

- During construction, ground disturbance would create wind-blown dust and potential for erosion of sediments into study area wetlands, which could adversely affect wetland hydrology and vegetation.
- Soil disturbance and removal of existing vegetation would increase the potential for the spread of invasive exotic plant species into the study area and potentially into wetlands.
- Construction materials, such as fuel, oil, lubricants, and concrete that may be spilled into study area wetlands, could have adverse affects on vegetation and aquatic invertebrates.
- Construction of a new roadbed could create a barrier to surface water flows, altering the size or character of wetlands. The impervious road surface would also alter the local runoff pattern, affecting the hydrology of depressional wetlands.
- The roadbed may compact underlying soils, altering horizontal groundwater flows immediately adjacent to the proposed highway right-of way.
- De-icing substances (salt, sand, and other substances) could be conveyed into the wetlands, with subsequent adverse effects on the vegetation and supported fauna. Traffic on the new road would generate particulates and contaminants, which could also have adverse effects on wetland habitat.
- Spills of hazardous materials transported on the Legacy Parkway could have adverse affects on vegetation and aquatic invertebrates if the materials enter wetlands.

Many of these indirect effects are discussed in more detail in this document in Section 4.10, *Water Quality*, and Section 4.13, *Wildlife*.

The effects of specific impact mechanisms were not addressed by the wetlands functional assessment conducted for the Final EIS. Instead, an estimate of the general level of wetland function indirectly lost

because of project construction was calculated for wetlands within 305 m (1,000 ft) of the project footprint. A separate analysis of indirect impacts was carried out for each alternative, as summarized below. Table D-5 in Appendix D summarizes quantitatively the potential indirect impacts in relation to the total area affected under each proposed alternative. These indirect impacts are in addition to the direct impacts shown in Table 4.12-5. Figures 4-14a through 4-14c in the Final EIS show the wetlands that would be indirectly affected by each alternative. Indirect impacts on wetland functions are discussed in more detail in Section 4.12.3.3, *Impacts on Wetland Functions*, below. As with direct impacts, indirect impacts were assessed assuming the worst-case scenario. Impacts were assessed without accounting for design features of the roadway (e.g., vegetated median and sides slopes, culverts, and drainage structures) that would be used to reduce impacts on adjacent wetlands.

No-Build Alternative

Existing Conditions

Under the No-Build Alternative, there would be no project-related indirect impacts on wetland resources. If none of the build alternatives is selected, wetlands affected by project-related impacts to date (2005) would either be restored to preconstruction conditions or the impacts would be mitigated at the instruction of the Corps. However, areas currently designated for incorporation into the Legacy Nature Preserve that are not used to mitigate project-related impacts on wetlands would be, under current law, beyond UDOT's authority to retain.

Future Conditions (2020)

Currently, open space in Davis County is being developed at a rate of approximately 280 ha (700 ac) per year (Sommerkorn pers. comm. [a]). If growth continues at this rate, which it is projected to do (see Section 4.1, *Land Use*), all the developable land within the study area will be developed by 2020.[4] Even assuming that no wetlands in the study area are filled and therefore directly affected, it is likely that many wetlands in the area will be indirectly affected by this other predicted development. Based on the wetlands functional assessment completed for the No-Build Alternative in the 2000 Final EIS (i.e., to determine the benefits of preservation on wetland function), about 97 percent of the wetlands in the study area would be indirectly affected by 2020 by future development not related to Legacy Parkway (see D.4.1, *Credit for Preservation*, in Appendix D).

Build Alternatives

Alternative A

Of the build alternatives, Alternative A would have the lowest amount of indirect impacts on wetlands. About 218 ha (539 ac) (approximately 22 percent) of wetlands in the study area would be indirectly affected under this alternative. In depressional wetlands, the indirect impacts would be primarily on wet meadow and playa. In groundwater slope wetlands, the indirect impacts would be primarily on wet meadow and marsh. In lacustrine fringe wetlands, the indirect impacts would be on marsh, wet meadow, unconsolidated shore, and open water.

Alternative B

Of the build alternatives, Alternative B would have the greatest amount of indirect impacts on wetlands. About 409 ha (1,011 ac) (approximately 41 percent) of wetlands in the study area would be indirectly

[4] As described in Appendix D, the term *developable lands* does not include any jurisdictional wetlands or areas below the FEMA floodplain elevation of 4,212 feet.

affected under this alternative. This alternative would have substantial indirect effects on all three wetland classes. Much of the indirect effect on wetlands would be on wet meadow, but there would also be substantial indirect effects on marsh, playa, unconsolidated shore, and open water habitats.

Alternative C

Alternative C would have more indirect impacts on wetlands than Alternative A or Alternative D but less than Alternative B. About 367 ha (907 ac) (approximately 37 percent) of wetlands in the study area would be indirectly affected under this alternative. The distribution of effects would be similar to those under Alternative B.

Alternatives D and E

Alternative D would have more indirect impacts on wetlands than Alternative A but less than Alternatives B and C. About 233 ha (575 ac) (approximately 24 percent) of wetlands in the study area would be indirectly affected under this alternative. The distribution of effects would be similar to those under Alternative A. Indirect impacts resulting from Alternative E would be the same as or slightly less than those resulting from Alternative D.

4.12.3.3 Impacts on Wetland Functions

Impacts on wetland functions were quantified using the wetlands functional assessment models developed for the Final EIS (discussed in Section 4.12.1.2, *Wetlands Functional Assessment*). These impacts were calculated as the change in wetland function multiplied by the area of affected wetlands. All wetland functions would be reduced to zero for wetlands or portions of wetlands that would be directly affected within the right-of-way.

Impacts on wetland functions were calculated for each wetland category and each wetland cover type and are summarized below by alternative. Tables E-6 to E-10 in Appendix D, which update and supplement Tables 4-20 and 4-22 in the Final EIS, present these impacts quantitatively by wetland function. As noted above, indirect impacts were assessed without accounting for design features of the roadway (e.g., vegetated median and sides slopes, culverts, and drainage structures) that would be used to reduce impacts on adjacent wetlands.

No-Build Alternative

Existing Conditions

Under the No-Build Alternative, there would be no project-related direct or indirect impacts on wetland functions. If none of the build alternatives is selected, wetlands affected by project-related impacts to date (2005) would either be restored to preconstruction conditions or the impacts would be mitigated at the instruction of the Corps. Areas currently designated for incorporation into the Legacy Nature Preserve that are not used to mitigate project-related impacts on wetlands would, under current law, be required to be made available (i.e., sold) to either the original property owner or the general public. Accordingly, these lands would be made accessible to a variety of future uses, including potential development (see *Future Conditions [2020]* below).

Future Conditions (2020)

As described above, it is likely that, by 2020, all the wetland resources in the study area will be either directly or indirectly affected by planned development. Although the nature and timing of this

development is not definitive, such development would affect functions of all the wetland resources in the study area.

Build Alternatives

The following describes how each of the different wetland functions would be affected by the proposed build alternatives.

Hydrology

Function 1: Maintain Wetland Hydrology

The ability of wetlands in the study area to maintain wetland hydrology would be altered by construction of Legacy Parkway. Wetlands that would be filled would lose the ability to perform this function. The impervious road surface would increase the amount of surface runoff in the vicinity of the roadbed, potentially changing the habitat to a more hydric type. The new roadbed would create a barrier to surface water flows, altering the size and/or character of wetlands. Ponding on the upslope side of the roadbed would cause wetlands to pond more deeply and for longer periods, potentially shifting the habitat character toward a more aquatic type, whereas wetlands downslope of the roadbed would become drier, shifting the habitat character to a more upland type. The proposed ground water conveyance structures (see Section 4.10, *Water Quality*) should yield a drainage system that removes barriers to surface water flows and adequately mimics the westward flow of shallow groundwater beneath the right-of-way.

A similar effect on wetland hydrology would be expected if the roadbed compacted underlying soils and altered the subsurface water flows in groundwater seep wetlands. In 2001, between 1.5 m and 1.8 m (5 ft and 6 ft) of fill were placed along the Alternative E alignment between I-215 and 500 South, and up to 6 m (20 ft) of fill were placed in the I-215 interchange area. To determine empirically how these activities would affect local wetland hydrology, a network of piezometers (soil water-pressure gauges) were installed parallel to the fill areas (Forster and Neff 2002). The preliminary results of this study suggest that most water found in the shallow subsurface is likely derived from water discharging upward from underlying deeper aquifers, rather than from water contributed by direct precipitation. Thus, groundwater moving from deeper aquifers is the principal source of water supplying groundwater wetlands near and west of the proposed highway right-of-way. Therefore, it is unlikely that the groundwater supply to those types of wetlands in the project area would be seriously affected by highway construction. Groundwater levels within the project right-of-way would be monitored during project construction to assess potential impacts on wetland hydrology.

Table D-6 in Appendix D quantitatively summarizes the potential impacts of Legacy Parkway in the functional capacity units (FCUs) lost under each build alternative. Because roadway designs that include culvert and drainage structures to facilitate movement of surface and groundwater across the roadway were added after the wetlands functional assessment was completed, the mitigating effects of these features were not included in the FCU calculations.

Alternative A

Alternative A would have the least effect on wetland hydrology. Most direct effects on wetland hydrology would be in depressional wetlands, and most of the indirect effects would be in groundwater slope and lacustrine fringe wetlands. Most wetland cover type affected would be wet meadow, although a large proportion of the indirect effects would be on marsh.

Alternative B

Alternative B would have the largest effect on wetland hydrology. Most direct effects on wetland hydrology would be on wet meadow and marsh cover types in all three wetland classes. Indirect effects would be on wet meadow and marsh cover types, primarily in lacustrine fringe wetlands, but also in groundwater slope wetlands.

Alternative C

Alternative C would have less effect on wetland hydrology than Alternative B but more than Alternatives A and D. Most direct effects on wetland hydrology would be in lacustrine fringe and depressional wetlands, and most of the indirect effects would be on lacustrine fringe wetlands. Most wetland cover types affected would be wet meadow, but much marsh and playa habitat would also be affected.

Alternatives D and E

Alternative D would have less effect on wetland hydrology than Alternatives B and C but more than Alternative A. Most direct effects on wetland hydrology would be in wet meadow in depressional wetlands. Most indirect effects would be on wet meadow in all three wetland classes, although a large proportion of the indirect effects would be on marsh and unconsolidated shore in lacustrine fringe wetlands. The impacts on wetland hydrology resulting from Alternative E would be the same as or slightly less than the impacts resulting from Alternative D.

Biogeochemistry

Function 2: Removal of Dissolved Elements and Compounds

The ability of wetlands in the study area to remove dissolved elements and compounds would be altered by construction of Legacy Parkway. Wetlands that would be filled would lose the ability to perform this function. This function would also be impaired in wetlands adjacent to the build alternatives, where the character of the vegetation would shift to a more upland type or where vegetation cover would decrease. This function would be enhanced where the character of the vegetation would shift to a more wetland type or where vegetation cover would increase. In addition, an increase in the level of dissolved elements and compounds is expected in wetlands adjacent to the road, possible to levels exceeding the wetlands' capacity to perform this function. Table D-7 in Appendix D quantitatively summarizes the potential impacts of Legacy Parkway in the total FCUs lost under each build alternative. Because roadway designs—including vegetated medians and side slopes to capture and absorb roadway runoff, which would minimize the level of dissolved elements and compounds that adjacent wetlands could receive—were added after the wetlands functional assessment was completed, the mitigating effects of these features were not included in the FCU calculations.

Alternative A

Alternative A would have the least effect on the ability to remove dissolved elements and compounds. Most direct effects on this function would be in wet meadows, primarily in depressional wetlands. Most indirect effects on this function would also be in wet meadows, but primarily in groundwater slope wetlands.

Alternative B

Alternative B would have the largest effect on the ability to remove dissolved elements and compounds. Most direct effects on this function would be on wet meadow habitat and on marsh in lacustrine fringe

wetlands. Indirect effects would be on wet meadow, primarily in groundwater slope and lacustrine fringe wetlands, and on marsh habitats in lacustrine fringe wetlands.

Alternative C

Alternative C would have less effect on the ability to remove dissolved elements and compounds than Alternative B but more than Alternatives A and D. Most direct effects on this function would be in wet meadow habitat. Most indirect effects on this function would be on wet meadow habitat and on marsh in lacustrine fringe wetlands.

Alternatives D and E

Alternative D would have less effect on the ability to remove dissolved elements and compounds than Alternatives B and C but more than Alternative A. Most direct effects would be in wet meadow, primarily in depressional wetlands. Most indirect effects would be on wet meadow in depressional and groundwater slope wetlands. The impacts on removal of dissolved elements and compounds resulting from Alternative E would be the same as or slightly less than the impacts resulting from Alternative D.

Function 3: Particulate Retention

The ability of wetlands in the study area to retain particulates would be altered by construction of Legacy Parkway. Wetlands that would be filled would lose the ability to perform this function. This function would also be impaired in wetlands adjacent to the Parkway where the character of the vegetation would be shifted to a more upland type or where vegetation cover would decrease. This function would be enhanced where the character of the vegetation would shift to a more wetland type or where vegetation cover would increase. An increase in the input of particulates is expected in wetlands adjacent to the road; such an increase could cause the wetlands to silt in.

Although not addressed by the wetlands functional assessment models, depressional wetlands would respond differently than non-depressional wetlands to an increased influx of particulates. Depressional wetlands would initially have a high capacity to retain particulates, but because water flow is primarily into the wetlands, over time they would silt in and lose this and other functions. In contrast, non-depressional wetlands have a limited capacity to retain particulates and could be overwhelmed by particulate-laden water, so that particulates would pass through them unrestrained. However, because water flows through non-depressional wetlands, particulate-free water would remove particulates from the wetlands, and over time the ability to retain particulates would be restored.

Table D-8 in Appendix D quantitatively summarizes the potential impacts of Legacy Parkway in the total FCUs lost under each build alternative. Because roadway designs—including vegetated medians and side slopes to capture and absorb roadway runoff, which would minimize the level of dissolved elements and compounds that adjacent wetlands could receive—were added after the wetlands functional assessment was completed, the mitigating effects of these features were not included in the FCU calculations.

Alternative A

Alternative A would have less effect on the ability to retain particulates than Alternatives B and C but more than Alternative D. Although Alternative A would have fewer direct effects than Alternative D, it would have more indirect effects than Alternative D. Most direct effects on this function would be in wet meadows, primarily in depressional wetlands. Most indirect effects on this function would be in wet meadows, marsh, and unconsolidated shore.

Alternative B

Alternative B would have the largest effect on the ability to retain particulates. Most direct effects on this function would be on wet meadow habitat and on marsh in lacustrine fringe wetlands. Indirect effects would be on wet meadow, primarily in groundwater slope and lacustrine fringe wetlands, and on marsh habitats in lacustrine fringe wetlands.

Alternative C

Alternative C would have less effect on the ability to retain particulates than Alternative B but more than Alternatives A and D. Most direct effects on this function would be in wet meadow habitat. Most indirect effects on this function would be on wet meadow habitat and on marsh in lacustrine fringe wetlands.

Alternatives D and E

Alternative D would have the least effect on the ability to retain particulates. Most direct effects on wetland hydrology would be in wet meadow, primarily in depressional wetlands. Most indirect effects would be on wet meadow in depressional and groundwater slope wetlands. The impacts on particulate retention resulting from Alternative E would be the same as or slightly less than the impacts resulting from Alternative D.

Flora and Fauna Habitat Support

Function 4: Habitat Structure

The Legacy Parkway project would result in changes in the cover, composition, and hydrophytic character of the wetland vegetation in the study area, which would alter the ability of the wetlands to provide habitat to wildlife. Altering wetland hydrology would change the vegetation type or convert the wetland to upland. Soil disturbance and removal of existing vegetation would increase the potential for spread of invasive exotic plant species into study area wetlands, which would displace the native wetlands plants. If spills of construction materials or hazardous materials into study area wetlands occurred, they would adversely affect both vegetation and aquatic invertebrates. De-icing substances (salt, sand, and other substances) could be conveyed into the wetlands, with consequent adverse effects on the vegetation and supported fauna. Although soils in the project area have naturally high salinity, salts from the roadway would be expected to accumulate in the wetlands.

Contaminants entering the wetland ecosystem at low levels, although not exceeding water quality standards for acute toxicity, would nevertheless be expected to accumulate in the wetland ecosystem. Depressional wetlands, especially those which lack outlets, would be particularly subject to buildup of these substances. The effects of these impacts on wildlife are discussed in more detail in Section 4.13, *Wildlife*, of this document. Table D-9 in Appendix D quantitatively summarizes the potential impacts of Legacy Parkway in the total FCUs lost under each build alternative. Because roadway designs—including vegetated medians and side slopes to capture and absorb roadway runoff, which would minimize the level of dissolved elements and compounds that adjacent wetlands could receive—were added after the wetlands functional assessment was completed, the mitigating effects of these features were not included in the FCU calculations.

Alternative A

Alternative A would have the least effect on habitat structure. Most direct and indirect effects on this function would be in wet meadow, primarily in depressional and groundwater slope wetlands.

Alternative B

Alternative B would have the largest effect on habitat structure. Most direct and indirect effects on this function would be on wet meadow habitat in all wetland classes. There would also be substantial direct and indirect effects on marsh in lacustrine fringe wetlands.

Alternative C

Alternative C would have less effect on habitat structure than Alternative B but more than Alternatives A and D. Most direct effects on this function would be in wet meadow habitat. Most indirect effects on this function would be on marsh in lacustrine fringe wetlands.

Alternatives D and E

Alternative D would have less effect on habitat structure than Alternatives B and C but more than Alternative A. Most direct and indirect effects on habitat structure would be in wet meadow in all three wetland classes. The impacts on habitat structure resulting from Alternative E would be the same as or slightly less than the impacts resulting from Alternative D.

Function 5: Habitat Connectivity, Fragmentation, and Patchiness

The Legacy Parkway project would have adverse impacts on wetland habitat by fragmenting existing wetlands and creating a barrier between the resulting habitat fragments and other adjacent wetlands. In addition to creating a physical barrier, the road would alter the wetland hydrology of wetland complexes, causing some to become drier and others wetter, creating barriers that would prevent some species from moving between the wetlands. Loss of wetland character would also result in the loss of permanent habitat and foraging area. The effects of these impacts on wildlife are discussed in more detail in Section 4.13, *Wildlife*.

Table D-10 in Appendix D summarizes quantitatively the potential impacts of Legacy Parkway in the total FCUs lost under each build alternative. Because roadway design that includes culvert and drainage structures to facilitate movement of surface and groundwater across the roadway were added after the wetlands functional assessment was completed, the mitigating effects of these features were not included in the FCU calculations.

Alternative A

Alternative A would have the least effect on habitat connectivity, fragmentation, and patchiness. Most direct and indirect effects on this function would be in wet meadow, primarily in depressional and groundwater slope wetlands.

Alternative B

Alternative B would have the largest effect on habitat connectivity, fragmentation, and patchiness. Most direct and indirect effects on this function would be on wet meadow habitat in all wetland classes. There would also be substantial direct and indirect effects on marsh in lacustrine fringe wetlands.

Alternative C

Alternative C would have less effect on habitat connectivity, fragmentation, and patchiness than Alternative B but more than Alternatives A and D. Most direct and indirect effects on this function would be on wet meadow habitat in all wetland classes. There would also be substantial direct and indirect effects on marsh in lacustrine fringe wetlands.

Alternatives D and E

Alternative D would have less effect on habitat connectivity, fragmentation, and patchiness than Alternatives B and C but more than Alternative A. Most direct and indirect effects would be in wet meadow in all three wetland classes. The impacts on habitat connectivity, fragmentation, and patchiness resulting from Alternative E would be the same as or slightly less than the impacts resulting from Alternative D.

4.12.3.4 Mitigation Measures

The following sections describe the measures proposed to mitigate impacts on wetland resources associated with implementation of Alternative E. The mitigation measures are described in terms of the three-step sequencing analysis used by the Corps to prioritize what measures are adopted to mitigate wetland impacts: avoidance, minimization, and compensation (e.g., restoration, enhancement, creation). Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation*, provides a more detailed review of the mitigation package, presented in terms of function, vegetation cover type, wildlife habitat type, and change in level of Great Salt Lake.

The mitigation package proposed in this section is based on the assumption that all the wetlands within the right-of-way of Alternative E would be filled. While there are 45 ha (113 ac) of wetlands within the maximum (reduced) right-of-way involved in the project, as described in Section 4.12.3.1, *Direct Impacts*, design flexibility would enable UDOT to avoid filling approximately 4 ha (10 ac) of wetlands that are within the right-of-way but would not be within the construction footprint. The proposed mitigation package described below is based on acreages of wetland impacts and estimates of loss of wetland functions that would result from implementation of Alternative E. Since indirect impacts on wetland hydrology and water quality functions may be overstated (i.e., the calculated loss in function was not reduced to reflect incorporation of culverts and drain structures in the roadway) the assessment of project impacts may, in fact, reflect greater impacts than what would actually occur during project construction.

Avoidance and Minimization

As described in Chapter 3, *Alternatives*, five regional alignments were considered in the Final EIS, three of which were eliminated from additional analysis, in part, because of their impacts on wetlands. Within the Great Salt Lake Corridor (i.e., the regional corridor containing the build alternatives evaluated in this Supplemental EIS), avoidance and minimization measures were used as much as possible in designing the alignment for each alternative. As described in the Final EIS, it would not be reasonable to build Legacy Parkway and avoid all impacts on wetlands. The build alternatives analyzed in this section and the Final EIS were evaluated in part because they represented alignments designed specifically to avoid wetland resources. In most cases, these alternatives represented the alternatives with less impacts than the alternatives evaluated and eliminated in previous studies, although some alternatives with lower wetland impacts were eliminated because of cost or relocation impacts or because the alternative failed to meet the project purpose and need (see Chapter 3, *Alternatives*).

Under all proposed build alternatives, measures to minimize wetland impacts would also be implemented during project construction and would be incorporated into the final project design. Floodplain equalization culverts would be placed under the road within the Corps floodplain boundary to maintain hydrologic connections between the east and west sides of the parkway during high lake levels. Surface water conveyance structures would be installed wherever existing hydrologic connections would be cut off by the highway, and groundwater conveyance structures would be installed in areas where fill heights exceed approximately 3 m (10 ft). The roadway design has also been modified to lower the embankment

height in non-floodplain areas, which further minimizes the minor effect of soil compaction on the subsurface water table. Best management practices (BMPs) would be used to limit the amount of eroded sediment and other materials that leave the right-of-way. Other mitigation measures for minimizing water quality impacts, such as vegetated filter strips, are discussed in Section 4.10, *Water Quality*.

Compensation

The federal Clean Water Act and its associated guidelines direct the Corps to require compensatory mitigation to replace wetland functions unavoidably lost or adversely affected by a proposed action (after avoidance and minimization measures have been considered). A 1990 MOA between EPA and the Corps states that the Corps should strive to achieve a goal of no overall net loss of wetland functions and values, recognizing, however, that the no net loss of wetland functions and values goal may not be achieved in each and every Corps permit action (U.S. Environmental Protection Agency 1990). The 1990 MOA states that the Section 404 regulatory program should, in the broader sense, consider and contribute to the national goal of no overall net loss of the nation's remaining wetland base.

Additional guidance from the Corps states that a project applicant may be given compensatory mitigation credit for preservation activities when existing wetlands are preserved in conjunction with establishment, restoration, and enhancement activities (Regulatory Guidance Letter No. 02-2, December 24, 2002). This supplementary guidance letter states that, in exceptional circumstances, the preservation of existing wetlands or other aquatic resources may be authorized as the sole basis for mitigation if the wetlands (1) perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and (2) are under demonstrable threat of loss or substantial degradation from human activities that might not be otherwise avoided. The existence of a demonstrable threat should be based on clear evidence of destructive land use changes that are consistent with local and regional land use trends, and that are not the consequence of actions under the permit applicant's control.

The proposed compensatory mitigation package for Legacy Parkway includes restoration and enhancement, creation, and preservation of wetland habitats, as described below.

Preservation

An important component of the mitigation for wetland impacts would be protection in perpetuity of 315 ha (778 ac) of wetlands in the Legacy Nature Preserve. As mitigation, preservation would allow a net loss of wetland acres, but would remove future development threats that could result in the loss or decline of wetland functions. As described below, preservation was recognized as a valuable component of the Legacy Nature Preserve because of the importance of shorelands habitat to the region and a demonstrable threat that wetlands within the Preserve area would be lost and/or degraded in the future.

The wetland complexes along the eastern shore of Great Salt Lake perform important physical, chemical, and biological functions. They are a buffer between the lake and developed lands in the I-15 corridor, provide flood storage during high-water years, and serve as a filter for surface waters flowing into the lake from the east. They provide nesting and foraging habitat for waterfowl and shorebirds and upland refuge habitat during flood events. Proposed mitigation lands would protect and maintain this buffer between the lake and developed lands in perpetuity.

Wetlands in the study area are under demonstrable threat of loss or substantial degradation from human activities not associated with the Legacy Parkway project. Most of these wetlands already have been degraded by agricultural conversion, development, and other land use changes. They face continued threats from projected growth and development in and to the west of the study area. The wetlands are

interspersed with substantial areas of uplands that can be developed without obtaining wetland permits. The threats, therefore, are not only from direct changes to the wetlands but from the indirect effects that may result if available upland is, as projected, fully developed. As described in Section 4.1, *Land Use*, open space in Davis County is being developed at the rate of approximately 280 ha (700 ac) per year (Davis County 2003f). If this rate of development continues, which it is projected to do, most of the study area will be developed by 2020. As explained in the Final EIS, this development is projected to occur on uplands and does not account for possible authorized direct wetland filling for future development.

The Final EIS proposed establishing the Preserve to protect and maintain a buffer between Great Salt Lake and future development. A conceptual preserve was originally designed for each alternative that would preserve wetlands at a mitigation ratio of approximately 3:1 (three times as much area of wetlands preserved as wetlands lost) as well as providing wetland enhancement and restoration in addition to preservation. Four different conceptual preserves were developed, each configured according to the location of the alternative alignment and the amount of affected wetlands (see Figures 4-14a through Figure 4-14d in the Final EIS).

This document identifies Alternative E as the Final Supplemental EIS Preferred Alternative. Accordingly, the following description of the Legacy Nature Preserve is based on impacts that would be associated with Alternative E. If the lead agencies were to authorize construction of a build alternative other than Alternative E, a mitigation package commensurate with the package proposed for Alternative E (i.e., based on a comparable analysis, the same principles, and the same mitigation ratios) would be proposed, with input from the Corps and other regulatory agencies.

Legacy Nature Preserve

As described in the Final EIS, the Legacy Nature Preserve was proposed to protect the large tracts of wetland complexes adjacent to Great Salt Lake that are at risk of being lost or impaired by future development.

Section 4.12.4 of the Final EIS described the areal extent of the Legacy Nature Preserve associated with each build alternative. Based on the wetlands functional assessment in combination with an established ratio of area preserved wetlands to wetlands lost, the Legacy Nature Preserve was proposed to encompass approximately 506 ha (1,251 ac) for Alternative D (Final EIS Preferred Alternative). An additional 126 ha (317 ac) of mitigation lands proximate to the FBWMA were added to the Legacy Nature Preserve associated with Alternative D (Final EIS Preferred Alternative) at the request of USFWS. This area is important to wildlife when the level of Great Salt Lake is high, was a major bird use area during the 1983 flood event, and would provide a buffer to FBWMA from future development. In addition, after publication of the Final EIS and during preparation of the respective Records of Decision (RODs) by the Corps and FHWA, four additional parcels totaling 217 ha (530 ac) were added to the Legacy Nature Preserve to address EPA's concerns regarding the adequacy of the mitigation package proposed for Alternative D. Consequently, the size of the Legacy Nature Preserve approved by the lead agencies for construction of Alternative D totaled 849 ha (2,098 ac) and included 315 ha (778 ac) of wetland habitat. This mitigation package, which is shown in Figure 4.12-2 and Figure 2 of Appendix F, is also proposed for Alternative E, despite the fact that Alternative E would result in less direct and indirect wetland impacts than Alternative D (see Section 4.12.3, *Environmental Consequences and Mitigation Measures*). Properties associated with the Legacy Nature Preserve would be acquired by the state in fee simple title, deed restricted, and managed in perpetuity according to a management plan coordinated with the resource agencies and other interests.

Restoration and Enhancement

Wetland restoration and enhancement in the Legacy Nature Preserve was proposed in the Final EIS as a viable mitigation method that could be used to offset impacts on wetland resources due to the historical alteration and degradation of wetlands in the study area, including past alterations of wetland hydrology. Since publication of the Final EIS, a number of restoration and enhancement activities have occurred in the Legacy Nature Preserve. Implementation of each of these measures will be subject to the terms of the revised Section 404 permit and the conceptual mitigation plan approved by the Corps pursuant to that permit. Specific restoration and enhancement actions taken in the Legacy Nature Preserve to date are presented below.

- **Restoration of Wetland Hydrology.** Wetland hydrology within the Preserve has historically been altered by farming, draining, flood irrigation, and water development practices. Since publication of the Final EIS, several measures have been implemented to restore wetland hydrology in the Preserve. Roads not required for maintenance have been removed and contoured to match the adjacent land. Most removed roads in the Preserve are minor roads, and removing them has restored local hydrology by removing a barrier to overland water flow. Ditches, which were functioning as storm drainage conduits and effectively lowering the adjacent water table, have been filled and contoured to match the adjacent land. This action will stop draining of adjacent lands and raise the water table in the area. In addition, one tile drain within the southern portion of the Preserve was identified and plugged in order to raise the water table.

- **Restoration of Habitat Structure.** Several areas of wetland habitat structure within the Preserve have been restored as a result of restricting traditional grazing practices; removal of trash, debris, illegal fill, and structures; and relocation of utility infrastructure. The removal of trash and debris from one area within the Preserve has resulted in the reestablishment of wetland hydrology and the subsequent physical restoration of approximately 3 ha (8 ac) of wetlands. The wetland functional capacity resulting from the physical restoration of these of wetlands has not been determined and is not included in the total mitigation FCU calculations described below.

- **Reestablishment of Historic Hydrologic Connections.** Old channels and sloughs of the Jordan River within the Preserve were historically partially filled and/or cut off from the main stem by levees, thereby preventing the Jordan River from flowing into its floodplain. The net effect during the last 100 years was a gradual drying of the floodplain, less inundation of wetland areas, and species shifts in vegetative communities resulting from disturbance by livestock and farming activities. Restoration of this historic hydrology is being completed through reconstruction of historic channels to near natural states, returning water flows into the sloughs, providing a water delivery system into the floodplain, and controlling where the water pools and flows to restore and maintain fresh, brackish, and saline wetland habitats.

  Achieving the maximum benefits for the wildlife function of the Jordan River floodplain wetlands requires the ability to provide optimum timing, depths, and duration of delivery to the wetlands. Accordingly, an active water management plan, which includes utilization of a water delivery system (i.e., an inlet diversion, overflow weirs, and water control structures), has been developed for the 121 ha (300 ac) Jordan River floodplain within the Preserve. The water delivery system will be used to provide periods of flooding, timely draw-downs, and drying.

- **Acquisition of Water Rights.** To facilitate restoration of Jordan River floodplain hydrology within the Preserve, UDOT has purchased the water rights to 1,400 acre-feet (af) of water from the South Davis detention basin, which is fed by water from North Canyon Creek and South Davis storm

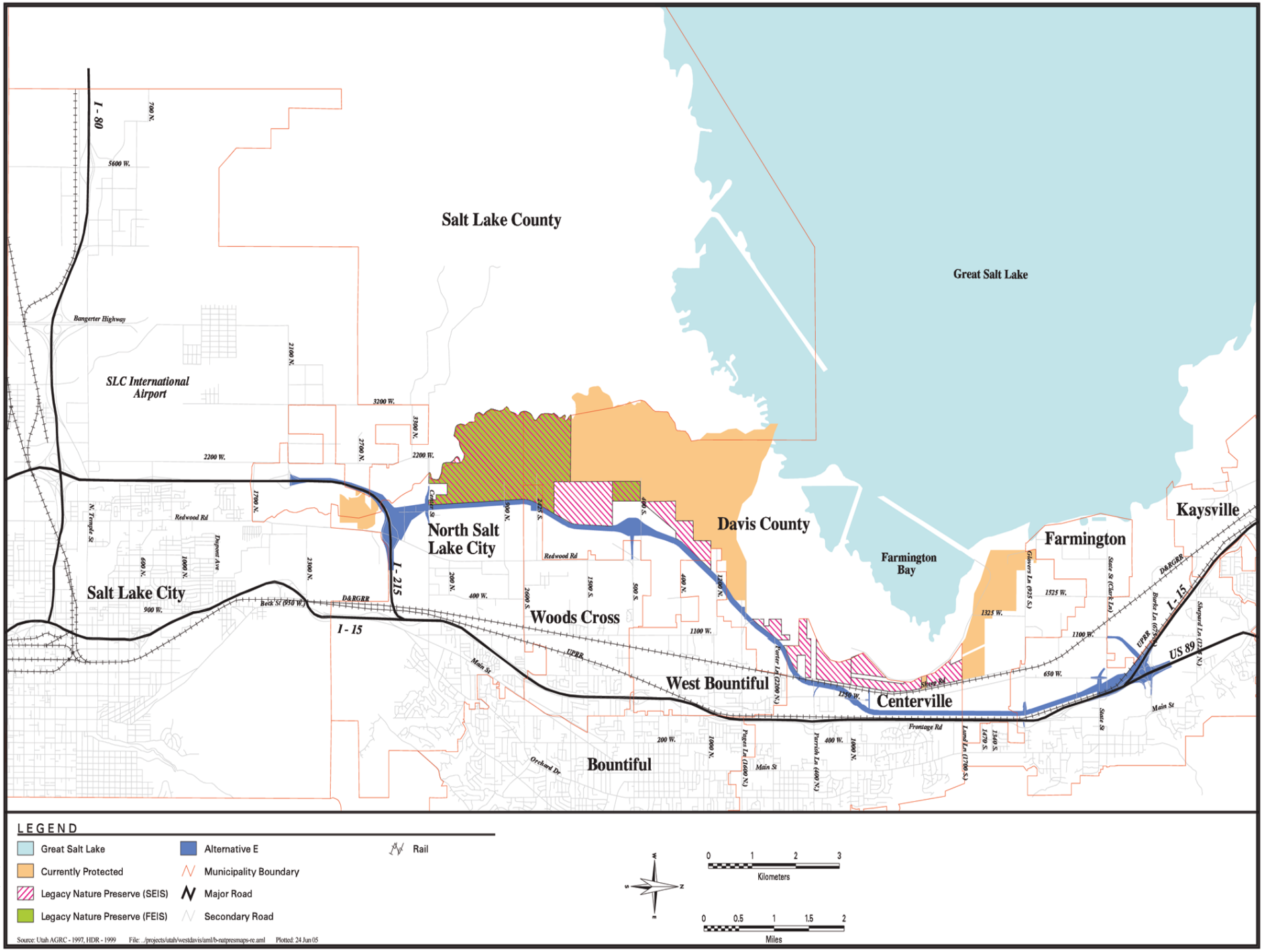

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Figure 4.12-2
Parcels Associated with the Legacy Nature Preserve

drainage. This water will provide flows of up to 6 cubic feet per second (cfs) from April through October. UDOT is seeking to obtain an additional 20 cfs from the South Davis Detention Basin, which would be available year-round. Twelve additional shares (about 48 af) of North Point Consolidated Company water rights have also been purchased.

- **Removal and Control of Noxious and Invasive Plants.** Large stands of noxious species of weeds have invaded the Great Salt Lake region, degrading the habitat support functions of the wetlands and uplands surrounding Great Salt Lake. These species are typically introduced species that were not historically part of the landscape, but that are capable of spreading and taking over areas in relatively short periods of time, pushing out other, more desirable native species. Southern Davis County, including the area that would encompass the Legacy Nature Preserve, has large areas of largely uncontrolled and spreading noxious weeds—including poison hemlock (*Conium maculatum*) and perennial pepperweed (*Lepidium latifolium*)—that are invading wetland habitats. Although not as widespread, purple loosestrife (*Lythrum salicaria*) can increasingly be found along the Jordan River and drainage ditches. Other species more typical of upland habitats may also form dense stands along wetland margins, including Scotch thistle (*Onopordum acanthium*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), white top (*Caradaria draba*), and field bindweed (*Convolvulus arvensis*).

  As part of the proposed mitigation plan (Appendix F) for the Preserve, UDOT has developed and will implement a noxious and/or invasive plant control plan. The noxious and/or invasive plant control plan includes inventory, initial eradication, and ongoing control of identified target species. To date, UDOT has used goats in an attempt to eradicate noxious and invasive species in portions of the Preserve; ongoing monitoring will be used to determine if this experimental, adaptive approach is effective and should be applied more broadly to the mitigation area.

Creation

After evaluating the mitigation contained in the ROD of the 2000 Final EIS, the Corps added a condition to the project 404 permit requiring that UDOT create slope wetlands by drilling a minimum of two groundwater wells. Under the revised permit, therefore, two artesian wells would be drilled in the Legacy Nature Preserve to create the wetland hydrology necessary to support wetland habitat. Approximately 4.9 ha (12 ac) of groundwater slope wetlands would be created within the Preserve. The 4.9 ha (12 ac) of created wetlands are not included in the Table D-11 because the level of wetland function has not been determined.

Monitoring

The Section 404 permit for Alternative D (Final EIS Preferred Alternative) requires that existing playa, wet meadow, and marsh be quantified within the Legacy Nature Preserve, with the goal of retaining the relative percentages of these diverse habitats to within 25 percent of the baseline percentages. Five years of baseline vegetation and wildlife monitoring have been completed; monitoring will continue to verify that these goals are being met and to determine vegetation and wildlife responses to management. An adaptive approach will be incorporated to increase productivity of wildlife.

Adequacy of the Wetland Mitigation Package

Table 4.12-6 provides a comparison of the wetland acreage and functional capacity units that would be lost under Alternative E relative to the wetland acreage and functions that would be gained at the Legacy Nature Preserve. A more detailed comparison by wetland cover type is presented in Appendix D,

Wetlands Functional Assessment, and Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation.* Appendix E provides an accounting of impacts relative to mitigation in a variety of formats, including functional capacity units, vegetation cover type, and wildlife habitat.

Table 4.12-6 Alternative E Wetland Impacts (Lost) and Wetlands Provided (Gained) at the Legacy Nature Preserve

	Lost (Gained) [1]					
Wetland Class	Acreage [2]	Function 1[3]	Function 2 [3]	Function 3 [3]	Function 4 [3]	Function 5 [3]
Lacustrine Fringe	318 (481)	67 (105)	45 (105)	46 (132)	40 (249)	47 (174)
Depressional	222 (157)	53 (32)	53 (33)	56 (43)	32 (69)	51 (59)
Slope (Without Created Wetlands)	169 (141)	30 (23)	30 (24)	24 (41)	27 (36)	32 (35)
Slope (With Created Wetlands)[4]	169 (153)	30 (35)	30 (36)	24 (53)	27 (48)	32 (47)

Notes:

[1] Figures representing acres and/or functional capacity units (FCUs) *lost* are based on direct and indirect impacts associated with Alternative E (Final Supplemental EIS Preferred Alternative). Figures representing acres and/or FCUs *gained* are based on the proposed acreage and configuration of the Legacy Nature Preserve (Figure 4.12-2).

[2] Acreage impact numbers are based on the 312-ft right-of-way width.

[3] FCU impact numbers are based on the 328-ft right-of-way width because the HGM model was not re-run for the narrower right-of-way width associated with Alternative E. Consequently, these numbers overstate the amount of FCUs that would be directly and indirectly affected by Alternative E.

[4] Creation of 12 ac of slope wetlands in the Legacy Nature Preserve would add up to 12 FCUs of mitigation credits to each wetland function.

In summary, the wetland acreage mitigation-to-impact ratio for Alternative E is 6.8:1, that is, the Legacy Nature Preserve would provide 6.8 acres of wetland habitat for each acre of wetland habitat directly affected under Alternative E. By wetland class, the ratio is 2.8:1 for depressional wetlands, 7.4:1 for groundwater slope wetlands, and 12.6:1 for lacustrine fringe wetlands.

For wetland functions, Table 4.12-6 illustrates that there would be a net gain for all five wetland functions within the lacustrine fringe wetland class, a net loss in functions 1, 2, and 3 for the depressional wetland class (net gain in functions 4 and 5), and a net loss in functions 1 and 2 for the groundwater slope wetland class (net gain in functions 3, 4, and 5). Creation of 12 ac of groundwater slope wetlands would result in a net gain in all wetland functions in that wetland class (See Table 4.12-6). In addition, some of the wetland functions lost in the depressional wetland class (i.e., those functions mitigated at less than a 1:1 mitigation-to-impact ratio) would be compensated by mitigating at higher ratios in the lacustrine fringe wetland class. Using a different wetland class to compensate for the loss of another type is considered out-of-kind mitigation. Federal wetlands mitigation guidelines generally require in-kind replacement of wetland habitat when the affected resource is of local importance. Although mitigation for the Legacy Parkway would be carried out on site (the Legacy Nature Preserve is contiguous with or adjacent to the Alternative E alignment), only part of the mitigation would be in kind. Mitigating all the wetlands in kind is not feasible because wetland types and functions are not uniform across the study area. The Legacy Nature Preserve is located on the west side of the study area and consists primarily of lacustrine fringe wetlands, whereas Alternative E would primarily affect wetlands along the east side of the study area,

most of which are depressional and groundwater slope wetlands. In addition, not all wetland functions would respond to the proposed restoration and enhancement activities to the same degree. For example, wildlife habitat functions would gain substantially more from the restoration measures than would wetland hydrology or water quality functions.

Federal guidelines allow out-of-kind mitigation when the environmental benefit it provides is greater than that provided by in-kind mitigation. For example, the Preserve under-mitigates wet meadows in the depressional class but, as shown in Appendix D (tables D-11 and D-12), over-mitigates playa across all functions and wetland classes. Playa wetlands are uncommon compared to marsh or meadow wetlands, and preserving and restoring playa wetlands provides greater benefit than preserving and restoring marsh or meadow wetlands. The trade-off between meadow wetlands for playa could be acceptable because playas are important and unique. Because the wildlife habitat function of Great Salt Lake and its wetland ecosystem is highly valued, restoring wildlife habitat functions provides greater benefit than restoring hydrology or water quality functions, which may already be functioning at high levels. Moreover, many of the wetlands classified as lacustrine fringe wetlands function as depressional wetlands except when lake levels are very high. Because they are not frequently inundated and therefore are dependant on precipitation, their hydrology and the vegetation cover are similar to depressional wetlands. Therefore, viewing the mitigation as out-of-kind may be overstating the differences between the two wetland classes. See subsection *Summary Comparison of Wetland Impacts to Mitigation* in Section 2.1.3 of Appendix E for detailed discussion of how lacustrine fringe wetlands function as depressional wetlands.

Inundation Effects on the Legacy Nature Preserve

The study area is subject to natural cyclic inundation from changes in the water level of Great Salt Lake (see Section 4.12.2.3, *Wetlands and Great Salt Lake Flooding*). This natural fluctuation in lake level has helped to create and maintain the valuable Great Salt Lake ecosystem, such that the type and quantity of wetlands and wildlife habitat available in the study area depend on the prevailing level of the lake. A discussion of wildlife habitat changes due to rising lake levels is presented in Chapter 4.13, *Wildlife* (see Section 4.13.3.2), and frequency of historic inundation is discussed in Appendix E (Table 3-1). The following discussion focuses on wetlands and wetland functions.

Table 4.12-7 and Figures 4A and 4B in Appendix E illustrate the effects that changes in the level of Great Salt Lake have on mitigation credits in the Legacy Nature Preserve, based on elevation contours determined from aerial photography done in 2004. Specifically, these tables present the amount of FCUs by wetland class available within the Legacy Nature Preserve under three different inundation scenarios. These calculations represent the mitigation credits generated by restoration and preservation that would be lost when the lake rises, after the highway has been built, if certain areas (i.e., areas attributed to specific elevation contours) were inundated. These tables do not predict how wetlands would function after inundation (i.e., function associated with open water habitat); instead, it has been assumed that the existing wetland functions would simply cease.

The FCU values shown in Table 4.12-7 represent “snapshots in time” rather than permanent changes in wetland functions. The greatest FCU changes are for extremely rare events. For example, although the tables show substantial loss of wetland functions when areas higher than 4,212 feet above sea level are inundated, the lake level has not historically been recorded above that elevation.

Table 4.12-7 Functional Capacity Unit Credits Affected by Inundation at Various Great Salt Lake Levels on the Legacy Nature Preserve[3]

Wetland Class	Total FCUs	Contour Level to 4,212 ft		Contour Level to 4,216 ft		Contour Level to 4,220 ft	
		FCU[1]	%[2]	FCU[1]	%[2]	FCU[1]	%[2]
Function 1—Wetland Hydrology and Maintenance							
Lacustrine Fringe	105.5	9.7	90.8	0	100	0	100
Depressional	32.0	30.6	4.3	22.7	29.1	0.4	98.8
Slope[3]	22.8	19.4	14.9	8.8	61.4	0.5	97.8
Function 2—Dissolved Elements and Compounds Removal							
Lacustrine Fringe	104.8	5.5	94.8	0	100	0	100
Depressional	33.1	30.3	8.5	16.8	49.2	0.3	99.1
Slope[3]	24.2	20.4	15.7	9.4	61.2	0.5	97.9
Function 3—Particulate Retention							
Lacustrine Fringe	132.8	11.4	91.4	0.1	99.9	0	100
Depressional	43.0	41.3	4.0	24.7	42.6	0.4	99.1
Slope[3]	40.8	35.2	13.7	17.7	56.6	1.1	97.3
Function 4—Habitat Structure							
Lacustrine Fringe	249.5	25.1	89.9	0.4	99.8	0	100
Depressional	69.6	65.6	5.7	35.9	48.4	1.0	98.6
Slope[3]	36.1	31.1	13.8	15.5	57.1	1.0	97.2
Function 5—Habitat Connectivity, Fragmentation, and Patchiness							
Lacustrine Fringe	174.0	13.3	92.4	0.2	99.9	0	100
Depressional	59.1	56.4	4.6	33.3	43.6	0.7	98.8
Slope[3]	35.2	30.1	14.5	14.3	59.4	0.8	97.7

Notes:

[1] *FCU* represents the FCU credits available on Legacy Nature Preserve land at each lake level.

[2] *%* represents the percentage of FCU credits affected by inundation at each lake level.

[3] FCUs do not include the 12 ac of groundwater slope wetlands that would be created because their location on the Preserve has not been determined.

Section 4.13
Wildlife

This section discusses wildlife and wildlife habitats in the project study area, the regional study area, and the Great Salt Lake Ecosystem (GSLE), as defined below. It updates the affected environment, potential environmental consequences on wildlife, and proposed mitigation measures presented in the Final EIS. The discussion of environmental consequences considers development since publication of the Final EIS, including construction activities associated with Alternative D (Final EIS Preferred Alternative; see Section 4.20), unrelated development in the study area, and the revised right-of-way width and typical cross section associated with all the proposed build alternatives (see Chapter 3, *Alternatives*).

4.13.1 Approach and Methodology

As described in Section 2.5, *Wildlife Impacts Analysis*, in response to the tenth circuit court remand of the Final EIS for the Legacy Parkway project and comments received during public scoping, the federal lead agencies have expanded the scope of the wildlife analysis presented in the June 2000 Final EIS. The wildlife analysis presented herein expands the analyses of direct, indirect, and cumulative impacts on wildlife presented in the Final EIS, particularly analyses of impacts on migratory bird species, within 305 m (1,000 ft) of the project right-of-way and beyond to include various broad geographical zones pertinent to particular wildlife issues. To help develop the approach and methodology for addressing the wildlife issues raised by the court and other wildlife issues raised during scoping, the lead agencies and UDOT formed a science technical team (STT) consisting of resource agency scientists. The *Legacy Parkway Wildlife Impacts Analysis Technical Memorandum* (wildlife technical memorandum) (Jones & Stokes 2005) was prepared to document the process, methodology, and analysis for addressing wildlife impacts. This section of the Supplemental EIS is based on the results of that wildlife technical memorandum, as well as on review of the Final EIS and the administrative record.

To fully evaluate the potential impacts of the proposed Legacy Parkway on wildlife within and beyond 305 m (1,000 ft) of the project right-of-way, the effects were analyzed at two geographic levels within the GSLE, each of which extends beyond 305 m (1,000 ft) of the right-of-way: the project level (project study area) and the regional level (regional study area). These areas are described below and shown in Figures 4.13-1, 4.13-2 and 4.13-3. Additional analysis of wetland and wildlife impacts and mitigation on the Legacy Nature Preserve is provided in Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation Technical Report*.

As described in the following sections, impacts were identified and assessed in this Supplemental EIS on both a habitat and a species-specific basis. Habitat-based impact analysis is a standard, scientifically valid, and widely accepted method for evaluating project effects on wildlife. This methodology was fully reviewed and approved by the Legacy Parkway STT, and was based on the best available biological information on bird species in the project study area. Local surveys of bird populations in both the regional and project study areas (Dolling 2003, Paul and Manning 2002) and scientific literature were

used to estimate species densities and to verify the effects of habitat loss and change. (See the wildlife technical memorandum for a detailed assessment of bird population densities and abundances in the project and regional study areas.) It was determined that habitat availability and quality are key determinants of long-term viability of species within the project and regional study areas. Therefore, the analysis of impacts on wildlife in the Supplemental EIS was designed to provide specific quantitative or qualitative information on the effects of the proposed action on wildlife species and their habitats, and in particular migratory birds.

4.13.1.1 Project Study Area

The study area for the project-level analysis encompassed the Final EIS wildlife study area, the proposed Legacy Nature Preserve mitigation area, and additional lands included in the wetland delineation study (Baseline Data, Inc. et al. 1998) (Figures 4.13-1 and 4.13-2). The project study area encompasses 4,186 ha (10,344 ac), which is also the total area for which high-resolution geographic information system (GIS) data was available for mapping wildlife habitats. This enabled the project-level analysis to be conducted using this high-resolution dataset. The footprints of all the proposed build alternatives are entirely within the project study area.

4.13.1.2 Regional Study Area

The regional study area was used to evaluate all project-related effects on wildlife beyond the project study area. Many migratory birds that use the project study area move seasonally along the Wasatch Front, stopping at other wetland areas from Utah Lake to the Bear River National Wildlife Refuge. Utah Lake was included in the regional study area because approximately 156 migratory bird species found around Utah Lake also use habitats around Great Salt Lake (Utah Department of Natural Resources and Energy, Division of Wildlife Resources 1982; Jones & Stokes 2005), and many of their populations are likely connected by regular movement between the two areas. It is recognized, however, that Utah Lake is a freshwater ecosystem, while Great Salt Lake is primarily saline. Bird species that rely heavily on brine shrimp and brine flies in their diet (e.g., Eared Grebe; Wilson's Phalarope; and various duck, gull, and shorebird species) naturally concentrate on Great Salt Lake, where these foods are exclusively located. Other migratory birds, including other waterbirds, raptors, and migratory songbirds not dependent on these foods, are likely to find needed resources in suitable habitats common to either Utah Lake or Great Salt Lake.

To capture the areas that all of these species are likely to use, the study area for the regional-level wildlife analysis was defined by three parameters: (1) a subset of USGS hydrologic units in the eastern portion of the GSLE, (2) the extent of these units for which comprehensive regional GIS land-use data were available, and (3) the portion of these areas below 1,433 m (4,700 ft) in elevation (Figures 4.13-1 and 4.13-3). The 1,433-m (4,700-ft) elevational boundary was selected to include wetland habitats associated with Utah Lake that could potentially be used by migrating birds that also use the project study area, as described above.

4.13.1.3 Great Salt Lake Ecosystem

The proposed Legacy Parkway project is located on the southeast shore of Great Salt Lake. In this report, the GSLE refers to Great Salt Lake, its floodplains, and all adjacent wildlife habitats that are used by migratory bird species (Figure 4.13-4), as mapped in Aldrich and Paul (2002).

4.13.1.4 Methods Used to Acquire Information

The analysis and methodology presented in the wildlife technical memorandum was used to update the affected environment and environmental consequences information presented in Sections 3.13 and 4.13 of the Final EIS. The wildlife technical memorandum and supplemental wildlife analysis presented in this document were prepared with input from the science technical team, which comprised ecologists and biologists from FHWA, the Corps, UDOT, and their representative technical consultants, as well as wildlife biologists and technical experts from the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), and Utah Department of Natural Resources (UDNR). This inclusive approach was intended to ensure that the best available scientific information was acquired and appropriately analyzed in the Supplemental EIS. The following methods were used to acquire information on migratory birds, upland and wetland habitats, and special-status species in the GSLE.

- **Habitat Delineation.** The following wildlife habitats within the project study area were delineated and mapped: open water, riparian, sedge cattail, hydric meadow, mudflat/pickleweed, pasture, cropland, salt desert scrub, and developed (urban landscaping). For an explanation of the correspondence of wildlife habitats and wetland cover types, see Table 4.12-3.

- **GIS Mapping.** Wildlife habitats within the GSLE for which GIS data were available were mapped.

- **Species Identification**. Wildlife species that use or could potentially use the delineated habitats were identified, and their ecological status (seasonal occurrence, breeding and migratory status, habitat requirements, etc.) within the project study area and the GSLE was documented using available data. A thorough review of scientific literature identified and provided information about wildlife species in the project study area, regional study area, and GSLE.

- **Habitat Evaluation**. The ecological importance of the different habitats to migratory wildlife within the project study area and the GSLE was evaluated.

- **Literature Review**. Scientific literature on the potential impacts of highway noise, artificial light, highway mortality, habitat modification, and human disturbance on wildlife was reviewed.

4.13.1.5 Methods Used in the Analysis

Information collected from the above data sources and data-collecting methods was used to evaluate the potential impacts of the proposed action on wildlife resources within the project study area, regional study area, and GSLE. On the basis of this information, a list of species that occur or that could potentially occur in the project study area was prepared. Because of the importance of the project and regional study areas and the GSLE to migratory birds, these taxa were the focus of the evaluation of impacts on wildlife. The wildlife impact analysis emphasized habitat types; most wildlife species utilize multiple habitat types, and such habitat-based analysis is a widely accepted basis for assessing potential impacts.

Several analyses were conducted to complete this evaluation; these analyses are briefly summarized below to provide context for the impact assessment presented in Section 4.13.3. A complete discussion of the methods used to complete these analyses is presented in the wildlife technical memorandum.

GIS Analysis of Habitat Change

A GIS analysis was conducted to determine how wildlife habitat would change within the project study area with implementation of the Legacy Parkway project, and how these changes could potentially affect species that use the habitats locally and regionally around Great Salt Lake. Measures of habitat change included habitat loss, habitat fragmentation (see Section 4.13.2.5, *Existing Conditions Related to Wildlife Habitats in Project Study Area*, for a definition of this term), and habitat degradation. The following text describes the methods used to assess these parameters.

The GIS analysis was based on 4-foot contours interpolated from a USGS 10-meter digital elevation model. Additional elevation data was obtained in 2004 from aerial photographs of the Legacy Nature Preserve to facilitate development of the proposed mitigation plan. Section 3.0 of Appendix E, *Analysis of the Adequacy of the Wetlands and Wildlife Mitigation Technical Report*, of this Supplemental EIS provides a detailed discussion of how these different data sets were used for the wildlife analysis.

Habitat Loss

Direct habitat loss that would occur as a result of highway construction was determined by overlaying the right-of-way boundary for each build alternative onto the wildlife habitat map and using GIS software to measure the total area of each habitat within those boundaries.

Habitat Fragmentation

Several different habitat fragmentation metrics, including mean patch size, mean perimeter-to-area ratio, and mean nearest neighbor distance, were used to evaluate the fragmentation effects of changes in size and distribution of suitable habitats resulting from the build alternatives. FRAGSTATS, a fragmentation analysis software, and Patch Analyst, an ArcView3.2 extension, in combination with GIS analysis, were used to determine the existing number of habitat patches in the project study area, the number of habitat patches (by patch size) that would be fragmented by a build alternative, and the number of habitat patches (by patch size) that would result after fragmentation associated with a build alternative. The habitat fragmentation analysis also considered trends in fragmentation (i.e., trends in the number of patches in each size group and of the total extent of each habitat type by patch size) and mean and median patch size.

Habitat Degradation

A qualitative assessment of potential changes in air quality and water quality resulting from construction and operation of the proposed build alternatives was completed to determine potential habitat degradation effects on wildlife species in the project study area. This assessment included a qualitative evaluation of potential wildlife mortality resulting from exposure to a new roadway system, as well as how changes to the wetland hydrology and addition of artificial lighting and landscaping could further affect existing wildlife habitat. These assessments were supported through review of recent and relevant literature and input from the wildlife technical team, as described in the wildlife technical memorandum.

GIS Analysis of Changes in Lake Level and Dynamics of Habitat Availability and Distribution

A GIS analysis was conducted to evaluate the interaction of changes in the level of Great Salt Lake with the direct habitat availability and losses that would result from each build alternative. The wildlife habitat maps were combined with an inundation zone dataset for Great Salt Lake (U.S. Geologic Survey 2003) to illustrate the potential combined habitat loss from natural lake level fluctuation and the proposed

alternatives. Details of these calculations are provided in Appendix B of the wildlife technical memorandum.

Highway Noise Disturbance

To assess the potential impacts of highway noise on wildlife in the project vicinity, including the potential indirect impacts on bird species both within and beyond 305 m (1,000 ft), two approaches were used. First, to estimate the distance at which project highway noise could potentially affect wildlife communication, an analysis was conducted of the bioacoustics requirements of representative birds and the masking potential of highway noise on those species' communications. Species analyzed were selected to represent the range of sound frequencies present in the bird songs and calls.

Second, to assess the area of each habitat type within and adjacent to the project study area that could potentially be affected by highway noise, noise contours were modeled for each project alternative and delineated on a map of the habitats in the project study area. From this map, the approximate area of noise effect for each build alternative could be calculated.

A detailed description of the methods used to complete the bioacoustics analysis and the highway noise model analysis are presented in Appendix F of the wildlife technical memorandum.

4.13.1.6 Changes since Draft Supplemental EIS

Changes have been made to the wildlife section since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- The acreage of habitat loss for the American avocet was found to be based on incorrect calculations, which have been subsequently revised. See Section 4.13.3.12, *Potential Effects on Species of Concern*.

- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. In addition the 1997 developed lands dataset and the wildlife habitat map have been updated (Keller pers. comm. 2005). These modifications and updates have resulted in changes to the following information.

  - Acreage of direct habitat loss associated with each of the build alternatives (see 4.13.1, *Direct Habitat Loss*).

  - Acreage of potential impacts of future development and the build alternatives (see Table 4.13-5).

  - Comparative acreage of habitat within the regional study area, project study area, and build alternative alignments (see Table 4.13-6).

  - Percentage of regionally available wildlife habitat lost under each build alternative (see Table 4.13-7).

  - Acreage of habitat that would be fragmented under each build alternatives (see Table 4.13-10).

- Acreage of habitat loss (e.g., direct habitat loss, loss of foraging habitat, loss of habitat as a percent of the regional habitat available) for species of concern in the project study area (see 4.13.3.12, *Potential Effects on Species of Concern*).

- Number of pairs of American avocet, Wilson's phalarope, burrowing owl, and short-eared owl affected by the proposed build alternatives, as well as the number of loggerhead shrike territories and the number of Brewer's sparrows affected (see 4.13.3.12, *Potential Effects on Species of Concern*).

- Modifications to the watershed boundaries associated with the regional study area (see Section 4.13.1.2, *Regional Study Area*) resulted in changes to the assessment of regional wildlife habitat available at low and high levels of Great Salt Lake (Table 4.13-8), and to the assessment of availability of wildlife habitat within the project study area at low and high lake levels (Table 4.13-9).

- Nomenclature of wildlife habitats was revised to avoid confusion with wetland cover types. Table 4.12-3 describes the name changes.

- Grasshopper sparrow was removed from the analysis presented in Section 4.13.3.12, *Potential Effects on Species of Concern*, because it was determined that it was unlikely to occur in the project study area (see Section 3.0, *Effects on Special-Status Wildlife*, of the wildlife technical memorandum).

4.13.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to wildlife and the occurrence of special-status species in the GSLE and in the project study area. The description of existing conditions accounts for recent land development since publication of the Final EIS, including initial construction activities associated with Alternative D (Final EIS Preferred Alternative; see Section 4.20, *Construction Impacts*) and unrelated development in the study area, and the revision in the width of the right-of-way and typical cross section associated with all the proposed build alternatives (see Chapter 3, *Alternatives*). A description of historic conditions is included to provide context for the discussion of cumulative impacts in the environmental consequences section.

4.13.2.1 Changes in Habitat since Final EIS

Project activities that have resulted in changes in habitat in the project study area since the Final EIS was published are described in detail in Section 4.20, *Construction Impacts*. In summary, UDOT began construction on Legacy Parkway in summer 2001. The project under construction was Alternative D (Final EIS Preferred Alternative). UDOT implemented a design-build delivery system to construct the project until construction was halted in November 2001 because of an injunction from the U.S. Court of Appeals for the Tenth Circuit.

The following habitat modifications have occurred to date.

- Approximately 4.9 ha (12 ac) of vegetation (hydric meadow, sedge cattail, and mudflat/pickleweed habitat patches scattered in upland pasture) at the I-215 interchange location at the southern terminus of the proposed action were cleared and grubbed (all vegetation removed). Fill of varying heights (up to 6 m [20 ft]) was also placed in this area. These areas are treated as having essentially no wildlife habitat value.

- Vegetation (largely cropland and pasture with intermittent patches of hydric meadow, sedge cattail, and mudflat/pickleweed) was cleared from a segment about 6 km (3.7 mi) long by 98 m (320 ft) wide at the southern terminus of the project near I-215. This area was graded and fill (about 0.6 m to 0.9 m [2 ft to 3 ft] in height) was added. A segment about 1 km (0.7 mi) long by 98 m (320 ft) wide just north of 500 South was also cleared of pasture/cropland vegetation. These areas are treated as having essentially no wildlife habitat value.

- The entire interchange at I-15 at the northern terminus of the project has been cleared of all vegetation (hydric meadow and pasture habitat with a mixture of sedge cattail, open water, and cropland habitat patches). These areas are treated as having essentially no wildlife habitat value.. Construction activities, with associated habitat disturbance and modification, continue on the extension of Park Lane (formerly Burke Lane) and all ramps from Park Lane to I-15 and US-89 and the Shepard Lane project. Construction of drainage facilities also continues in this area. The Park (formerly Burke) Lane and drainage facility construction has been completed. Some bridge construction (piers and abutments) was initiated for the Legacy Parkway mainline over I-15, but it was not completed before the court injunction halted construction.

4.13.2.2 Historic Habitat Conditions

There has been a 58 percent reduction in wetland/wildlife habitats[1] from estimated historic conditions (pre-settlement; before 1847) to current conditions in the regional study area. The amount of loss varies by hydrologic unit. The Ogden hydrologic unit, which has the second highest historic wetland/wildlife extent in the regional study area and where the majority of the proposed action would be located, has already lost nearly 70 percent of its estimated historic wetland/wildlife habitats. The comparison of estimated historic conditions to current conditions illustrates the downward trend in the extent of wetland/wildlife habitats in the regional study area. The extent of remaining estimated historic wetland/wildlife habitats is provided below and detailed in the wildlife technical memorandum.

- **Regional study area**. Forty-two percent of the estimated historic wetland/wildlife habitats is still available in the regional study area.

- **Hydrologic unit**. The extent of remaining habitat varies by hydrologic unit. Some examples are listed below.

  - Tooele Valley hydrologic unit: 80 percent (22,652.7 ha [56,370 ac]) of historic habitat remains.

  - Utah Lake hydrologic unit: 17 percent (3,870 ha [11,018 ac]) of historic habitat remains.

[1] The term *wetland/wildlife habitat* refers to a mapping category comprising polygons that include soils suitable for wetland vegetation, as well as associated upland areas, as defined by the Natural Resource Conservation Service Soil Survey Geographic (SSURGO) database and the USFWS National Wetlands Inventory (NWI) dataset. These datasets were used to establish a baseline of historic wetland and associated upland habitat distribution for use in evaluating temporal changes in habitat distribution and availability. Accordingly, this term pertains only to quantitative analysis involving historic conditions. These datasets are explained in greater detail in Section 3.11.1, *Historic Conditions: Cumulative Habitat Loss/Degradation from Past Activities*, of the wildlife technical memorandum.

- Ogden hydrologic unit: 30 percent (14,898 ha [35,043 ac]) of historic habitat remains.
- Jordan River hydrologic unit: 38 percent (12,477 ha [37,333 ac]) of historic habitat remains.

4.13.2.3 Existing Wildlife in Project Study Area

Great Salt Lake and the wetlands surrounding its shoreline provide important habitat for a great variety of amphibians, reptiles, birds, and mammals, some of which are rare and have small geographical distributions. In total, 12 fish species, 8 amphibians, 10 reptiles, 219 birds, and 50 mammals have been documented as occurring within the project study area or are believed to have the potential to occur there based on the presence of suitable habitat and the general abundance of the species in the GSLE. Of these species, 223 (215 birds, 8 bats) are migratory. A total of 136 species are known to occur in the project right-of-way areas, and an additional 139 species could potentially occur there. Up to 120 of these species could potentially breed within the project study area. Tables 4.13-1a and b describe the abundance of these species in the GSLE and the project study area, as well as the migratory, breeding, foraging, and other habitat use patterns of these species in these areas. In addition, Section 2.4, *Ecological Setting*, of the wildlife technical memorandum provides a detailed description of how different species use the existing wildlife habitat in the project study area (see 4.13.2.4, *Existing Wildlife Habitats in the Study Area*) for migration, breeding, foraging, escape cover, and other habitat uses.

Twenty-eight species, including 24 migratory birds, two bats, one shrew, and one fox are classified as special-status species, or species that are protected by one or more state or federal environmental laws (Table 4.13-2). For the purposes of this section, *special-status species* include species identified on the following lists and/or covered by the following regulations.[2]

- Federal.
  - Federally listed endangered and threatened species.
  - Federal candidate species.
  - Migratory Bird Treaty Act species (16 USC 703–711).
  - Fish and Wildlife Conservation Act species (16 USC 2901–2911).
- State of Utah.
  - Utah State Species of Concern (Utah Administration Rule R657-48).
  - State of Utah Conservation Agreement Species.

Table 4.13-2 summarizes the legal and protected status, habitat use, and seasonal occurrence of each special-status species. The table also describes the abundance of each species within the GSLE and the project study area, as well as their migratory, breeding, foraging, and other habitat use patterns in these areas. As noted above, Section 2.4 of the wildlife technical memorandum also provides a detailed description of how specials-status species use existing wildlife habitat in the study area.

[2] Of note, Section 4.15, *Threatened and Endangered Species*, provides a specific discussion of impacts on species protected under the federal Endangered Species Act and as species of special concern by the Utah Division of Wildlife Resources that could occur in the study area, defined in Section 4.0.1, *Study Area*.

Table 4.13-1a. **Habitat Matrix of Bird Species in the GSLE and Project Study Area**

	Migratory Species	GSL Ecosystem					Legacy Parkway Project Study Area							Farmington Bay WMA					Bear River NWR					Habitat Use								
		Seasonal Abundance				Breeds in GSLE	Seasonal Abundance				Breeds in Project Study Area	Documented Occurrence within Project Study Area	Could Potentially Occur within Project Study Area	Seasonal Abundance				Breeds in FBWMA	Seasonal Abundance				Breeds in BRNWR	Open Water	Riparian	Sedge Cattail	Hydric Meadow	Mudflat/Pickleweed	Pasture	Cropland	Salt Desert Scrub	Developed
		P	S	W	T		P	S	W	T				P	S	W	T		P	S	W	T										
Loons																																
Pacific Loon	X				RT								X									RT		F								
Common Loon	X				RT								X									UT		F								
Grebes																																
Pied-billed Grebe	X		CS	UW		X		US	RW		X	X			CS	UW		X		CS	UW		X	F		FB	F					
Horned Grebe	X			RW	RT								X			RW	RT				RW	RT		F		F						
Eared Grebe	X		CS	RW		X		RS		CT		X			CS	RW		X		US		CT	X	FB		B						
Western Grebe	X		CS	RW		X				RT		X			CS			X		CS	RW		X	FB		B						
Clark's Grebe	X		CS			X							X		CS			X		CS	RW		X	FB		B						
Pelicans and Cormorants																																
American White Pelican (SPC)	X		CS			X		RS				X			CS					CS				F		F						
Double-crested Cormorant	X		CS			X		RS			X	X			CS			X		CS				F	B	F						
Wading Birds																																
American Bittern	X		RS			X							X		RS			X		RS						FB						
Great Blue Heron	X	CP				X	CP				X	X		CP				X	CP					F	FB	FB	F					
Great Egret	X		RS		RT								X				RT			RS				F		F						
Snowy Egret	X		CS			X		US				X			CS			X		CS			X	F	B	FB	F	F	F			
Cattle Egret	X		CS			X				RT		X			US					CS						B	F		F	F		
Black-crowned Night-heron	X		CS	RW		X		CS			X	X			CS	UW		X		CS			X	F	B	FB	F	F	F			
White-faced Ibis	X		CS			X		CS				X			CS			X		CS			X	F		FB	F	F	F	F		
Swans, Geese, Ducks																																
Tundra Swan	X			RW	CT`								X			RW	CT				RW	CT		F								
Trumpeter Swan	X			RW									X				O				RW			F								
Greater White-fronted Goose	X				RT								X				RT					A		F						F		
Snow Goose	X				UT								X				UT					UT				F				F		
Ross' Goose	X				RT								X				RT					RT				F				F		
Canada Goose	X	CP				X	CP				X	X		CP				X	CP				X	F		F	F	F	FB	F	F	F
Wood Duck	X	RP											X	RP							RW			F								F
Green-winged Teal	X		US	CW	CT	X				UT		X			US	CW	CT			US	CW	CT	X	F		FB	FB	F	F	F		
Mallard	X	CP				X	UP				X	X		CP				X	CP				X	F	F	FB	FB	F	FB	FB		F
Northern Pintail	X		RS	RW	CT	X				UT		X			RS	UW	CT	X		RS	UW	CT	X	F		FB	FB	F	F	F	B	
Blue-winged Teal	X		US			X		RS				X			US		UT	X		US			X	F		FB	FB	F	F			
Cinnamon Teal	X		CS	RW		X		RS				X			CS	RW		X		CS	RW		X	F		FB	FB	F	F	F		
Northern Shoveler	X		RS	UW	CT	X				UT		X			RS	UW	CT	X		RS	UW	CT	X	F		FB	FB	F	F		B	
Gadwall	X		CS	UW		X		US	UT		X	X			CS	UW		X		CS	UW		X	F		FB	FB	FB	FB	FB	B	
Eurasian Wigeon	X				RT					RT		X										RT		F		F	F	F	F	F		
American Wigeon	X			UW	CT					RT		X				UW	CT				UW	CT		F		F	F	F	F	F		
Canvasback	X		RS	RW	CT	X							X		RS	RW	CT	X		RS	RW	UT	X	F		FB						
Redhead	X		CS	RW		X							X		CS	UW		X		CS	RW		X	F		FB						
Ring-necked Duck	X			RW	RT								X			RW					RW	RT		F								
Greater Scaup	X				UT								X				RT					RT		F								
Lesser Scaup	X			CW									X			UW	CT				UW	CT		F								
Long-tailed Duck	X			RW									X				O				RW			F								
White-winged Scoter	X			RW									X				O				RW			F								
Surf Scoter	X			RW									X				O				RW			F								
Common Goldeneye	X			CW					RW			X				UW	CT				UW	CT		F								
Barrow's Goldeneye	X			RW									X			RW					RW			F								
Bufflehead	X			CW									X			UW	CT				UW	CT		F								
Hooded Merganser	X			RW	RT								X			RW	RT				RW	RT		F								
Common Merganser	X			UW	CT								X			UW	CT				RW	CT		F								
Red-breasted Merganser	X			UW	CT								X			RW	CT				RW	CT		F								
Ruddy Duck	X		CS	UW		X				RT		X			CS	UW		X		CS	UW		X	F		FB						
Diurnal Raptors																																
Turkey Vulture	X		CS					US				X			US					CS								F	F	F	F	F
Osprey	X				RT					RT		X					RT					RT		F								
Bald Eagle (FT)	X		RS	CW		X		RS	CW		X	X				CW					CW				FB	F	F	F	F		F	
Northern Harrier	X	CP				X	CP				X	X		CP				X	CP				X		F	FB	F	F	FB	F	FB	F
Sharp-shinned Hawk	X			UW	UT					RT		X					RT				UW	UT			F			F	F	F	F	F
Cooper's Hawk	X			UW	UT					RT		X					RT				UW	UT			F			F	F	F	F	F
Northern Goshawk (CAS)	X				RT							(X)									RW	RT			F						F	
Swainson's Hawk (BCC)	X		RS		UT	X		RS			X	X					UT			CS					B		F	F	F	F	F	
Red-tailed Hawk	X	CP				X	UP				X	X		CP				X	CP				X		B		F	F	F	F	F	F
Ferruginous Hawk (BCC; SPC)	X		RS										X				RT			US							F	F	F	F	F	
Rough-legged Hawk	X			CW					CW			X				CW					CW						F	F	F	F	F	F
Golden Eagle (BCC)	X	RP								RT		X		RP					UP								F	F	F	F	F	
American Kestrel	X	CP				X	CP				X	X		CP				X	CP						B		F	F	F	F	F	F

		GSL Ecosystem					Legacy Parkway Project Study Area							Farmington Bay WMA					Bear River NWR					Habitat Use								
	Migratory Species	Seasonal Abundance				Breeds in GSLE	Seasonal Abundance				Breeds in Project Study Area	Documented Occurrence within Project Study Area	Could Potentially Occur within Project Study Area	Seasonal Abundance				Breeds in FBWMA	Seasonal Abundance				Breeds in BRNWR	Open Water	Riparian	Sedge Cattail	Hydric Meadow	Mudflat/Pickleweed	Pasture	Cropland	Salt Desert Scrub	Developed
		P	S	W	T		P	S	W	T				P	S	W	T		P	S	W	T										
Merlin	X			RW					RW			X				RW					UW							F	F	F	F	F
Peregrine Falcon (BCC)	X	RP				X	RP				X	X		UP				X	UP					F		F	F	F	F	F	F	F
Prairie Falcon (BCC)	X	RP				X	RP					X		UP					UP								F	F	F	F	F	
Pheasant and Quail																																
Ring-necked Pheasant		UP				X	RP				X	X		CP				X	UP						F		F	F	FB	FB	FB	FB
California Quail		RP											X	UP											FB					F		FB
Gruiformes																																
Virginia Rail	X		CS	RW		X		RS			X	X			CS	UW		X		CS			X			FB	F	F	F			
Sora	X		CS			X		RS			X	X			CS			X		CS			X			FB	F	F	F			
Common Moorhen	X	RP				X							X		RS			X	RP				X	F		FB						
American Coot	X	CP				X	UP				X	X		CP				X	CP				X	F		FB	FB	F	F	F		
Sandhill Crane	X		RS		UT	X				RT		X			RS			X		US		CT		F		FB	F	F	F	F		
Shorebirds																																
Black-bellied Plover	X				CT					RT		X					UT					UT					F	F	F			
American Golden-plover (BCC)	X				RT								X				RT					RT					F	F	F			
Snowy Plover (BCC)	X		CS			X							X		US			X		CS			X					FB				
Semipalmated Plover	X				UT								X				UT					RT						F				
Killdeer	X	CP				X	CP				X	X		CP				X		CS	RW		X				FB	FB	FB	FB	FB	FB
Black-necked Stilt	X		CS			X		CS			X	X			CS			X		CS			X	F		FB	FB	FB	FB			
American Avocet (BCC)	X		CS			X		CS			X	X			CS			X		CS			X	F		FB	FB	FB	FB			
Greater Yellowlegs	X				CT					UT		X					CT					CT		F			F	F	F			
Lesser Yellowlegs	X				CT					UT		X					CT					CT		F			F	F	F			
Solitary Sandpiper (BCC)	X				RT					RT		X					RT					UT			F		F	F	F			
Willet	X		CS			X		RS			X	X			CS			X		CS			X				FB	FB	FB	FB	FB	
Spotted Sandpiper	X		US			X				RT		X			CS			X				UT			FB			F				
Whimbrel (BCC)	X				RT								X				RT					RT						F	F			
Long-billed Curlew (BCC)	X		US		CT	X				RT		X			US			X		CS			X				F	FB			FB	
Marbled Godwit (BCC)	X				CT					RT		X					CT					CT		F			F	F	F			
Ruddy Turnstone	X				RT								X				RT					RT						F				
Red Knot	X				UT								X				RT					RT						F	F			
Sanderling (BCC)	X			RW	UT								X				UT				UW	RT						F				
Semipalmated Sandpiper	X				RT								X				UT					RT						F				
Western Sandpiper	X				CT					RT		X					CT					CT						F				
Least Sandpiper	X			RW	CT					RT		X				RW	CT				RW	CT						F				
Baird's Sandpiper	X				CT					RT		X					UT					UT						F				
Pectoral Sandpiper	X				UT					RT		X					UT					RT					F	F	F			
Dunlin	X				RT								X				RT					RT						F				
Stilt Sandpiper	X				RT								X				RT					RT						F				
Short-billed Dowitcher	X				RT								X				RT					RT		F		F	F	F				
Long-billed Dowitcher	X				CT					RT		X					CT					CT		F		F	F	F				
Wilson's Snipe	X	CP				X	CP				X	X			CS	UW		X		CS	UW		X			F	FB	F	FB			
Wilson's Phalarope (BCC)	X		US		CT	X		RS		UT	X	X			CS			X		US		CT		F		F	FB	F	F			
Red-necked Phalarope	X				CT					RT		X					CT					CT		F								
Gulls and Terns																																
Franklin's Gull	X		CS			X				CT		X			CS			X		CS				F		FB	F	F	F	F		
Bonaparte's Gull	X				UT					RT		X					UT					UT		F		F						
Ring-billed Gull	X		RS	CW		X			UW			X				CW				US	CW		X	F		F	F	F	F	F		F
California Gull	X	CP				X	UP					X		CP				X	CP				X	F		F	F	F	F	F	F	F
Herring Gull	X			UW									X			UW					UW			F								F
Thayer's Gull	X			RW									X			RW					RW			F								F
Glaucous Gull	X			RW									X			RW					RW			F								F
Caspian Tern	X		US			X		RS					X		US									F								
Common Tern	X				RT								X				RT					RT		F								
Forster's Tern	X		CS			X		CS			X	X			CS			X		CS			X	F		FB						
Black Tern	X		US			X		RS				X			US					US		CT		F								
Pigeons and Doves																																
Rock Pigeon	X	CP				X	UP				X	X							CP				X									FB
Mourning Dove	X		US	RW		X		US	RW		X	X			CS			X		CS			X		FB			F	F	F	F	FB
Cuckoos																																
Yellow-billed Cuckoo (FC)	X				RT								X												FB							FB
Owls																																
Barn Owl	X	UP				X	RP				X	X		RP					UP								F	F	F	F	F	FB
Great Horned Owl	X	UP				X	UP				X	X		CP					UP						FB	F	F	F	F	F	F	FB
Burrowing Owl (BCC; SPC)	X		RS			X		RS			X	X								US			X					F	F		FB	
Long-eared Owl	X				RW								X												F		F	F	F		F	
Short-eared Owl (SPC)	X	CP				X	UP				X	X		UP				X	UP				X			F	F	F	F	F	FB	

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		P	S	W	T		P	S	W	T				P	S	W	T		P	S	W	T										
Goatsuckers and Swifts																																
Common Nighthawk	X				UT					UT		X					CT			CS				F	F	F	F	F	F	F	F	F
Common Poorwill	X			US						RT			X							US				F	F	F	F		F	F	F	F
White-throated Swift	X			US						RT			X				RT			US					F	F	F		F	F	F	F
Hummingbirds																																
Black-chinned Hummingbird	X		RS		RT					RT		X					UT			US					F		F	F	F	F	F	F
Calliope Hummingbird	X				RT								X				RT								F		F	F	F	F	F	F
Broad-tailed Hummingbird	X		RS		RT					RT		X					RT			US					F		F	F	F	F	F	F
Rufous Hummingbird	X				RT					RT		X					RT					UT			F		F	F	F	F	F	F
Kingfishers																																
Belted Kingfisher	X	UP				X	UP				X	X		UP					UP					F	FB							
Woodpeckers																																
Red-naped Sapsucker	X				RT								X				RT								F							F
Downy Woodpecker	X	RP				X							X	RP					UP						F							F
Northern Flicker	X	RP				X				RT		X		UP				X	UP						FB						F	FB
Flycatchers																																
Olive-sided Flycatcher	X				RT					RT		X													F						F	F
Western Wood-peewee	X				RT					RT		X										RT			F						F	F
Cordilleran Flycatcher	X				RT					RT		(X)										RT			F						F	F
Willow Flycatcher	X				RT					RT		(X)										RT			F						F	F
Hammond's Flycatcher	X				RT					RT		(X)										RT			F						F	F
Dusky Flycatcher	X				RT					RT		(X)										RT			F						F	F
Gray Flycatcher	X				RT					RT		(X)										RT			F						F	F
Say's Phoebe	X	RP				X							X				O		UP												FB	
Ash-throated Flycatcher	X				RT					RT		(X)										RT			F						F	F
Western Kingbird	X		CS			X		US			X	X			RS			X		US			X		FB		F	F	F	F	F	FB
Eastern Kingbird	X				RT								X				O								F							F
Shrikes																																
Northern Shrike	X			UW					UW			X				RW					UW				F	F	F	F	F	F	F	F
Loggerhead Shrike (BCC)	X	UP				X	UP					X		RP					RP						F	F	F	F	F	F	FB	F
Vireos																																
Plumbeous Vireo	X				RT								X				RT					RT			F							F
Warbling Vireo	X				RT					RT		X					RT					RT			F						F	F
Jays, Crows, and Allies																																
Black-billed Magpie	X	UP				X	UP				X	X		UP				X	CP				X		FB		F	F	F	F	F	FB
American Crow	X			RW									X								RW						F		F	F	F	F
Common Raven	X	CP				X	CP				X	X		CP				X	CP				X		B	F	F	F	F	F	F	FB
Larks																																
Horned Lark	X	CP				X	CP				X	X		CP				X	CP				X				F	FB	F		FB	
Swallows																																
Purple Martin	X				RT								X				O							F	F	F	F	F	F	F	F	F
Tree Swallow	X				CT					CT		X					CT			US		CT		F	F	F	F	F	F	F	F	F
Violet-green Swallow	X				UT					UT		X					CT			US		CT		F	F	F	F	F	F	F	F	F
Northern Rough-winged Swallow	X				UT					UT		X					CT			US		CT		F	F	F	F	F	F	F	F	F
Bank Swallow	X				CT					CT		X					CT			US		CT		F	F	F	F	F	F	F	F	F
Cliff Swallow	X		CS			X		CS			X	X					CT	X		CS			X	F	F	F	F	F	F	F	F	B
Barn Swallow	X		CS			X		CS			X	X					CT	X		CS			X	F	F	F	F	F	F	F	F	B
Chickadees																																
Black-capped Chickadee	X			RW	UT				RW	RT		X				RW						UT			F						F	F
Mountain Chickadee	X			RW									X			RW						RT			F							F
Wrens																																
Rock Wren	X				RT								X									UT									F	
House Wren	X				UT								X				UT					UT			F						F	F
Marsh Wren	X		CS	RW		X		US			X	X			CS			X		CS	UW		X			FB						
Kinglets and Thrushes																																
Ruby-crowned Kinglet	X			UW						RT		X				RW						UT			F						F	F
Blue-gray Gnatcatcher	X				RT								X									RT			F						F	F
Mountain Bluebird	X				RT					RT		X					UT					UT					F	F	F	F	F	
Townsend's Solitaire	X				RT					RT			X									RT					F		F	F	F	
Hermit Thrush	X				RT								X				RT					UT			F							F
Swainson's Thrush	X				RT								X				RT								F							F
American Robin	X	UP				X	UP				X	X		UP				X	UP						FB		F	F	F	F		FB
Mimids																																
Gray Catbird	X		RS			X							X												FB							
Northern Mockingbird	X				RT								X							US		RT			F						F	F
Sage Thrasher	X		US			X		RS				X					RT			US		CT	X								FB	

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		P	S	W	T		P	S	W	T				P	S	W	T		P	S	W	T										
Starlings																																
European Starling		CP				X		US	CW		X	X		CP				X	CP				X		FB		F	F	F	F	F	FB
Pipits																																
American Pipit	X			UW	CT					CT		X				UW	CT				UW	CT			F		F	F	F	F		
Waxwings																																
Bohemian Waxwing	X			UW					RW			X				RW					RW				F							F
Cedar Waxwing	X			UW					RW			X				RW					RW				F							F
Wood-Warblers																																
Orange-crowned Warbler	X				RT					RT		X					RT					UT			F						F	F
Nashville Warbler	X				RT					RT		X					RT					RT			F							F
Virginia's Warbler (BCC)	X				RT								X				RT					RT			F						F	F
Yellow Warbler	X				UT					UT		X					UT					UT			F	F					F	F
Yellow-rumped Warbler	X				CT					CT		X					CT					UT			F	F					F	F
Townsend's Warbler	X				RT					RT		X					RT								F							F
American Redstart	X												X												F							F
Northern Waterthrush	X				RT								X				RT								F							
MacGillvray's Warbler	X				UT					RT		X										RT			F	F					F	F
Common Yellowthroat	X		CS		CT	X		US			X	X			CS			X		CS		CT	X		F	FB						
Wilson's Warbler	X				UT					RT		X					RT					UT			F	F					F	F
Tanagers, Grosbeaks and Cardinaline, Buntings																																
Western Tanager	X				RT								X				UT					UT			F							F
Black-headed Grosbeak	X				RT								X				RT					UT			F							F
Lazuli Bunting	X				UT					UT		X					RT					UT			F						F	F
Emberizine Sparrows and Allies																																
Green-tailed Towhee	X				RT								X				RT					UT			F							F
Spotted Towhee	X				UT					RT		X					RT					UT			F						F	F
American Tree Sparrow	X			UW					UW			X				UW					UW				F	F	F	F	F	F	F	F
Chipping Sparrow	X				CT					CT		X					RT					UT			F		F	F	F	F	F	F
Brewer's Sparrow (BCC)	X		CS		CT	X		RS				X					RT			CS		CT	X		F		F	F	F	F	FB	F
Vesper Sparrow	X		US		UT	X				RT		X					RT			CS		CT	X		F		F	F	F	F	F	F
Lark Sparrow	X		US		UT	X				RT		X					RT			US		UT			F		F	F	F	F	F	F
Lark Bunting	X				RT								X									RT									F	
Savannah Sparrow	X		CS		CT	X		US			X	X			CS			X		CS		CT	X				FB		F			
Song Sparrow	X	CP				X	UP				X	X		CP				X	CP				X		FB	F	F		F			F
Lincoln's Sparrow	X				RT					RT		X					RT					UT			F		F		F	F	F	F
Harris' Sparrow	X			RW									X				O				RW				F		F	F	F	F	F	F
White-throated Sparrow	X			RW									X								RW				F		F	F	F	F	F	F
White-crowned Sparrow	X			CW	CT				CW			X				UW					CW	CT			F	F	F	F	F	F	F	F
Dark-eyed Junco	X			CW	CT				CW			X				UW					CW	CT			F	F	F	F	F	F	F	F
Lapland Longspur	X			RW									X								UW						F	F			F	
Snow Bunting	X			RW									X								UW						F	F			F	
Icterids																																
Red-winged Blackbird	X	CP				X	CP				X	X		CP				X	CP				X		F	FB	F	F	F	F		F
Western Meadowlark	X	CP				X	CP				X	X		CP				X	CP				X				F	F	FB	F	FB	F
Bobolink (SPC)	X		RS		RT	X							X									RT					FB		F	F	F	
Yellow-headed Blackbird	X		CS			X		CS			X	X			CS			X		CS			X		F	FB	F	F	F	F	F	F
Brewer's Blackbird	X	UP				X	UP				X	X		CP				X	CP				X		F	F	F	F	FB	FB	F	F
Brown-headed Cowbird	X	CP				X	UP				X	X			RS					CS			X		FB	FB	FB	FB	FB	FB	FB	FB
Northern Oriole	X		US			X		US			X	X			RS							UT			FB							FB
Finches and Old World Sparrows																																
Cassin's Finch	X			RW									X				O								F							F
House Finch	X	CP				X	CP				X	X		CP					CP				X		FB	F	F	F	F	F	FB	FB
Pine Siskin	X			CW					CW			X				UW						UT			F					F	F	F
American Goldfinch	X		RS	CW					UW			X				UW			CP						F	F	F			F	F	F
Evening Grosbeak	X			RW					RW				X				O					RT			F							F
House Sparrow		UP				X			UP		X	X							CP				X		F				F	F		FB
Summary																																
Total number of cells with values	215	38	60	62	109	88	29	34	20	67	51	140	79	32	44	44	96	61	34	62	54	105	59	78	107	79	100	109	103	85	99	107

Table 4.13-1b. Habitat Matrix of Non-Bird Species in the GSLE and Project Study Area

	Species Status						Habitat Use									
	GSLE		LP Project Study Area													
	Occurrence Status	Potential Occurrence	Project Study Area	Breeds in Project Study Area	Documented Occurrence within Project Study Area	Could Potentially Occur within Project Study Area	Open Water	Riparian	Stream/River	Sedge Cattail	Hydric Meadow	Mudflat/Pickleweed	Pasture	Cropland	Salt Desert Scrub	Developed
Fish																
Brown trout	A			P		X			X							
Rainbow trout	A			P		X			X							
Carp	C		C	X	X		X		X	X						
Speckled dace	D			P		X			X							
Long-nose dace	D			P		X			X							
Utah sucker	D			P		X	X		X	X						
Channel catfish	D			P		X	X		X	X						
Bullhead	D			P		X	X		X	X						
White bass	D		C	P		X			X							
Green sunfish	D		C	X		X	X		X	X						
Bluegill	D		C	P		X			X							
Walleye	D		C	P		X			X							
Amphibians																
Tiger salamander	R			P		X				X	X					
Great Basin spadefoot	U			P		X				X	X	X			X	
Woodhouse's toad	R			P		X		X		X	X		X			
Western chorus frog	C		C	P	X					X	X					
Northern leopard frog	U			P		X			X	X	X					
American bullfrog	U		R	P		X				X	X					
Reptiles																
Common sagebrush lizard	D			P		X									X	
Side-blotched lizard	D			P		X									X	
Desert horned lizard	D		P	P	X										X	
Tiger whiptail	D		P	P	X										X	
Eastern racer	C		C	P	X						X		X		X	
Gopher snake	C		C	P	X			X					X	X	X	
Common garter snake	C		C	P	X			X		X	X		X			
Terrestrial garter snake	D			P	X			X		X	X		X			
Night snake	D		P	P		X									X	
Western rattlesnake	D		P	P		X									X	
Mammals																
Vagrant shrew	D		P	P		X				X						
Masked shrew	D		P	P		X				X						
Preble's shrew (SPC)	D		P	P		X				X						
Western small-footed myotis		X				X		X		X	X		X		X	
Little brown bat		X				X		X		X	X		X		X	
Long-legged myotis	C					X		X		X	X		X		X	
Western pipistrelle	C					X		X		X	X		X		X	
Big brown bat	C					X		X		X	X		X		X	
Hoary bat		X		P		X		X								
Spotted bat (SPC)	R					X							X		X	
Townsend's big-eared bat (SPC)	C					X		X		X	X		X		X	
Brazilian free-tailed bat	C			P		X		X		X	X		X		X	
Nuttall's cottontail		X		P		X							X	X	X	
White-tailed jackrabbit		X		P	X								X			
Black-tailed jackrabbit	C		C	X	X								X	X	X	
Least chipmunk	D		P	P		X		X							X	
Piute ground squirrel	D		P	P		X							X	X	X	
Rock squirrel	C		C	X	X								X	X	X	
Northern pocket gopher		X		P		X		X					X	X		
Botta's pocket gopher		X		P		X		X					X	X	X	
Great Basin pocket mouse	D		P	P		X									X	
Ord's kangaroo rat		X		P		X									X	
Beaver	R		R	P		X		X	X							
Western harvest mouse		X		X		X		X					X		X	
Deer mouse	C		C	X	X			X					X	X	X	X
Northern grasshopper mouse	U			P		X									X	
Desert woodrat		X	D	P		X							X		X	
Bushy-tailed woodrat		X	D	P		X							X		X	
Meadow vole	C		C	X	X			X			X		X		X	
Montane vole	D		P	P		X				X	X			X		
Long-tailed vole	D			P		X		X					X			
Sagebrush vole	R		P	P		X									X	
Muskrat	C		C	X	X		X	X	X	X	X					X

	Species Status						Habitat Use									
	GSLE		LP Project Study Area													
	Occurrence Status	Potential Occurrence	Project Study Area	Breeds in Project Study Area	Documented Occurrence within Project Study Area	Could Potentially Occur within Project Study Area	Open Water	Riparian	Stream/River	Sedge Cattail	Hydric Meadow	Mudflat/Pickleweed	Pasture	Cropland	Salt Desert Scrub	Developed
House mouse	C		C	X	X			X					X	X	X	X
Black rat	U			X		X		X								X
Norway rat		X		P	X			X		X	X		X	X		X
Porcupine	R			P		X		X								
Coyote	C		R	X	X							X	X	X	X	X
Red fox	C		C	X	X			X				X	X	X	X	X
Kit fox (SPC)	A					X									X	
Raccoon	C		C	X	X			X		X	X	X	X	X	X	X
Long-tailed weasel	C		R	X	X			X					X		X	X
Mink	U			P		X		X	X	X	X					
Badger	U		D	P		X							X		X	
Spotted skunk	R		R	P	X			X					X			
Striped skunk	C		C	X	X			X				X	X	X	X	X
Mountain lion	R					X										
Bobcat	U			P		X									X	X
Mule deer	C		C	X	X			X		X			X	X	X	
Pronghorn	R			P		X							X		X	
Summary																
Fish (12 species)	12	0	5	12	1	11	5	0	12	5	0	0	0	0	0	0
Amphibians (6 species)	6	0	2	6	1	5	0	1	1	6	6	1	1	0	1	0
Reptiles (10 species)	10	0	7	10	4	6	0	3	0	2	3	0	4	1	8	0
Mammals (50 species)	38	12	25	41	15	35	1	28	3	16	13	4	32	15	34	11

Special-Status Species

- Federally Listed as Threatened
- Federal Candidate Species
- Birds of Conservation Concern
- Conservation Agreement Species
- Wildlife Species of Concern
- Breeds in Project Study Area

Abundance Status

C = Common: Found consistently in fair numbers in appropriate habitat and season
U = Uncommon: Found consistently in small numbers in appropriate habitat and season
R = Rare: Found infrequently bur regularly in very small numbers in appropriate habitat and season
D = Within species range but insufficient data to determine abundance
A = Accidental
X = Column heading status applies

Residence Status

P = Permanent Resident: Found year-round
S = Summer visitant: Present during the nesting season
W = Winter visitant: Present during January and February
T = Transient: Migrates through the area in the spring and/or fall
X = Column heading status applies
(X) = Very few GSLE records; low probability of occurrence at LP Site

Examples of Combined Codes

CP = Common Permanent Resident
RW = Rare Winter Visitant
UT = Uncommon Transient

Habitat Use Codes

F = Foraging Habitat
B = Breeding Habitat
FB = Foraging and Breeding Habitat

Table 4.13-2. Special-Status Wildlife Species of the Legacy Parkway Project Study Area/Great Salt Lake Ecosystem

Species	Migratory Species[1]	GSL Ecosystem: Seasonal Abundance				Breeds in GSLE	Legacy Parkway Project Study Area: Seasonal Abundance				Breeds in Project Study Area	Documented on Proposed Build Alternative ROWs	Could Potentially Occur on Proposed Build Alternatives ROWs	Habitat Use: Open Water	Riparian	Sedge Cattail	Hydric Meadow	Mudflat/Pickleweed	Pasture	Cropland	Salt Desert Scrub	Developed
Federally Listed Species[2]		P	S	W	T		P	S	W	T												
Bald Eagle (Threatened)	X		RS	CW		X		RS	CW		X	X			FB	F	F	F	F		F	
Federal Candidate Species[2]		P	S	W	T		P	S	W	T												
Yellow-billed Cuckoo	X				RT								(X)		F							F
Conservation Agreement Species[3]		P	S	W	T		P	S	W	T												
Northern Goshawk	X				RT							(x)			F						F	
USFWS Birds of Conservation Concern[4]		P	S	W	T		P	S	W	T												
Swainson's Hawk	X		RS		UT	X		RS			X	X			B		F	F	F	F	F	
Ferruginous Hawk (also SPC species)	X		US		RT								X				F	F	F	F	F	
Golden Eagle	X	RP								RT		X					F	F	F	F	F	
Peregrine Falcon	X	RP				X	RP				X	X				F	F	F	F	F	F	F
Prairie Falcon	X	RP				X	RP					X					F	F	F	F	F	
American Golden-Plover	X				RT								X				F	F	F			
Snowy Plover	X		CS			X							X					FB				
American Avocet	X		CS			X		CS			X	X		F		FB	FB	FB	FB			
Solitary Sandpiper	X				RT					RT		X			F		F	F	F			
Whimbrel	X				RT								X					F	F			
Long-billed Curlew	X		US		CT	X				RT		X					F	FB			FB	
Marbled Godwit	X				CT					RT		X		F			F	F	F			
Sanderling	X			RW	UT								X					F				
Wilson's Phalarope	X		US		CT	X		RS		UT	X	X		F		F	FB	F	F			
Burrowing Owl (also SPC species)	X		RS			X		RS			X		X					F	F		FB	
Loggerhead Shrike	X	UP				X	UP					X			F						FB	F
Virginia's Warbler	X				RT								X		F						F	F
Brewer's Sparrow	X		CS		CT	X		RS				X			F		F	F	F	F	FB	F
Utah DWR Wildlife Species of Concern[3]																						
American White Pelican	X		CS			X		RS					X	F		F						
Short-eared Owl	X	CP				X	UP				X	X				F	F	F	F	F	FB	
Bobolink	X		RS		RT	X							X				F		F	F	F	
Preble's shrew		D											(x)				X					
Spotted bat		R											X		X		X	X		X		X
Townsend's big-eared bat		C											X		X		X	X		X		X
Kit fox		A											X								X	
Summary: Total number of cells with values	24	9	11	2	14	14	4	7	1	5	7	14	14	4	10	6	18	20	16	10	14	7

[1] Species identified in the Migratory Bird Treaty Act
[2] Species listed under the Endangered Species Act
[3] UDWR (2003)
[4] USFWS (2002)

Bird Codes

Abundance Status

C = Common: Found consistently in fair numbers in appropriate habit and season
U = Uncommon: Found consistently in small numbers in appropriate habitat and season
R = Rare: Found infrequently but regularly in very small numbers in appropriate habitat and season

Residence Status

P = Permanent Resident: Found year-round
S = Summer visitant: Present during the nesting season
W = Winter visitant: Present during January and February
T = Transient: Migrates through the area in the spring and/or fall
X = Column heading status applies
(X) = Very few GSLE records; low probability of occurrence at Legacy Parkway project study area

Habitat Use Codes

F = Foraging Habitat
B = Breeding Habitat
FB = Foraging and Breeding Habitat

Codes for Amphibians, Reptiles, and Mammals

C = Common
R = Rare
D = Within species range but insufficient data to determine abundance
A = Accidental
X = Column heading status applies

As discussed in the Final EIS, the predominance of migratory birds that use the GSLE highlights the ecological importance of this area to these species (Jones & Stokes 2005). Great Salt Lake, with its unique mosaic of wetland, upland, mudflat, river delta, brackish and freshwater marsh, and ephemeral pond habitats, has long been recognized for its importance to migratory birds (Behle 1958, Knopf 1975, Jehl 1988, Paton 1994, Shuford et al. 1995, Paul and Manning 2002). These habitats, and the ecological features of this large inland oasis, provide important refuge and resources for up to approximately 5 million birds a year. The wetlands of Great Salt Lake that these birds use account for 75 percent of all wetlands in Utah (Jensen 1974). The GSLE is internationally important because it is an integral part of the Pacific and Central Flyways for migratory waterfowl and is a key link of the Western Hemisphere Shorebird Reserve Network. Brine shrimp (*Artemesia fransiscana*) and brine flies (*Ephydra cinerea*) produced in Great Salt Lake provide a vital food source for these birds.

4.13.2.4 Existing Wildlife Habitats in Project Study Area

The proposed Legacy Parkway project alignments cross a complex of wetlands and uplands that includes the following habitat types.

- Wetland/riparian wildlife habitat categories.
  - Open water.
  - Riparian.
  - Sedge cattail.
  - Hydric meadow.
  - Mudflat/pickleweed.
- Upland wildlife habitat categories.
  - Pasture.
  - Cropland.
  - Salt desert scrub.
  - Developed (including urban landscaping).

Figure 4.13-5 shows the distribution of these habitats in the project study area. Figure 4.13-6 shows the total acreage of each habitat. Detailed descriptions of each habitat and their associated wildlife are presented in Section 2.4.1 of the wildlife technical memorandum.

The amounts of direct loss of wetland/riparian habitat quantified in this Supplemental EIS differ from the extent of direct loss of jurisdictional wetlands specified in Section 4.12, Wetlands, and the Final EIS. These differences are primarily the result of a dissimilarity between the habitat classification system developed by the wildlife technical team for the wildlife technical memorandum and the classification system used to identify jurisdictional waters (including wetlands). Specifically, the wildlife technical memorandum examined wildlife habitats, whereas the wetland delineation follows Corps delineation standards. Accordingly, open water and riparian habitats have been mapped differently for purposes of the

wildlife habitat analysis; consequently, the habitats mapped for this analysis include areas excluded from the wetland delineation in the Final EIS analysis because they did not qualify as jurisdictional waters. Moreover, the mapping undertaken in the preparation of the wildlife technical memorandum encompassed all habitats in the project study area, resulting in a different dataset than that produced for the wetland delineation. The mapping methodologies are discussed in detail in Appendix B of the wildlife technical memorandum.

The wetland/riparian habitats around the lake are formed and maintained by a complex interplay of surface and subsurface fresh water and the fluctuating dynamics of Great Salt Lake's surface elevation. Many of the habitats directly associated with the shoreline, such as mudflats, nearshore playas, and sedge cattail habitats, develop and subside with the rise and fall of the lake. Other more interior habitats, including hydric meadows, permanent and ephemeral ponds, and riparian corridors, are more responsive to seasonal precipitation patterns and fluctuations in the water table. The upland habitats are more stable, providing important refuge, resting, and foraging habitat for many species, particularly when the lake level is high and the lower elevation habitats are flooded.

4.13.2.5 Existing Conditions Related to Wildlife Habitats in Project Study Area

This section describes the following existing conditions in relation to wildlife habitat in the project study area.

- Habitat fragmentation.
- Habitat quality (water and air).
- Wetland hydrology.
- Artificial landscaping.
- Wildlife mortality.
- Noise.
- Artificial light.
- Human disturbance.

Existing Habitat Fragmentation

By definition, habitat fragmentation results in the formation of smaller patches of habitat where larger, more contiguous patches once existed (Meffe et al. 1997). As a result of fragmentation, a larger population of a species that inhabited the original patch may become divided into several smaller subpopulations that are connected only by movement of individuals migrating between disjunct patches rather than along contiguous habitat (Primack 2000). Habitat fragmentation results in direct habitat loss and in changes in the geometry and biological connectivity between patches (Meffe et al. 1997). These changes can result in modifications of the availability and suitability of habitat to extant wildlife in an affected area. Over time, extinction rates in smaller, more isolated populations are generally higher than those in larger populations because of loss of genetic variation, inbreeding, genetic drift, and greater

susceptibility to random population fluctuations and environmental changes, all of which ultimately affect the long-term viability of wildlife populations (Soulé 1987; Forman 1995; Primack 2000). However, such effects are most likely to impact relatively sedentary species with low dispersal capabilities such as amphibians, reptiles, small mammals, and many invertebrates.

The existing habitats within the project study area exhibit extensive fragmentation today due to previous construction of railroad corridors (UPRR and D&RG), I-15, and many smaller roads, as well as other previous development and disturbance (e.g., farming, grazing, dikes, and fences) in many areas in the project vicinity. These and other land use changes in the project study area and the GSLE have resulted in marked fragmentation of wildlife habitats along the Wasatch Front. In particular, these changes have resulted in movement barriers to wildlife between the Wasatch Mountains and Great Salt Lake. Rural and urban road networks in the intervening uplands, agriculture, and development have also significantly fragmented historic wildlife habitats in the GSLE. The wildlife populations now present in these areas are likely to have already experienced many of the population changes typically associated with habitat fragmentation (e.g., reduced carrying capacity, lower reproductive success, higher susceptibility to predation). However, aside from GIS information documenting habitat changes, no data are available to substantiate or detail these changes. Existing conditions represent highly modified populations from historic times. Based on observed changes in other fragmented wildlife populations described in the literature (e.g., Soulé 1987; Forman 1995; Primack 2000), it is presumed that wildlife in the project study area has experienced reduced species diversity, population densities, and distributions in response to cumulative long-term effects of these land use changes.

Existing Habitat Quality

Section 4.10, *Water Quality*, provides an updated description of water quality in the study area, as described in Section 4.0.1, *Study Area*. Relative to existing wildlife habitat quality, since publication of the Final EIS, the Jordan River has been listed as an impaired water that does not meet Class 3B (warm-water species of game fish) or Class 3C (non-game fish) standards under the Clean Water Act because of low dissolved oxygen.

As described in Section 4.8, *Air Quality*, air quality in the project and regional study areas is generally considered good. The air quality monitoring stations nearest the project study area are in North Salt Lake and Ogden. Levels of ozone, sulfur dioxide, carbon monoxide, and particulate matter (PM10 and PM2.5) are monitored at these stations. Salt Lake and Davis Counties are designated maintenance areas for ozone (1 hour-average) Salt Lake County is in moderate nonattainment for PM10. PM10 monitoring data indicate that the PM10 standard has not been exceeded in Salt Lake County since 1994 (Bird pers.comm).

Existing Wetland Hydrology

The hydrology of the project study area is a function of both seasonal and spatial patterns of water flow, both on the surface and underground. The surface water bodies within the project study area include the Jordan River, nine creeks, wetlands associated with Great Salt Lake, and several ditches and canals.

The Jordan River meanders for approximately 93 river km (58 river mi) from the outlet of Utah Lake north to Great Salt Lake. Each of the Jordan River's seven major tributaries (Little Cottonwood Creek, Big Cottonwood Creek, Mill Creek, Parley's Creek, Emigration Creek, Red Butte Creek, and City Creek) originates in the Wasatch Mountains and flows west to the Jordan River. No major streams originate in the western side of the valley. The watershed drains a total area of about 2085 square km (805 square mi).

Many of the wetlands in the project study area respond to a shallow water table associated with groundwater discharge and periodic precipitation. As described in Section 4.10, Water Quality, the project study area is located over a multilayered groundwater flow system consisting of a shallow

unconfined aquifer and a deeper principal aquifer that is part of a larger aquifer system on the eastern shore. The depth of the shallow groundwater varies between 0 and 3 m (9 ft). The principal aquifer lies at a depth of approximately 60 m (200 ft) and is separated from the shallow groundwater by a layer of fine-grained soil of varying thickness. It is recharged primarily by precipitation at the base of the Wasatch Mountains outside the project study area. Subsurface groundwater flow generally moves from this recharge area westward toward Great Salt Lake, but there is also an equal or greater component of vertical flow from deeper confined zones of the principal aquifer (Forster and Neff 2002).

Substantial modification of the natural surface hydrology of the wetlands associated with the Jordan River Delta has occurred with the creation and management of numerous duck clubs and the Farmington Bay Waterfowl Management Area (FBWMA). These changes have benefited many migrating waterfowl and shorebird species through enhancement of wetlands formerly affected by historic water diversion and management projects.

Existing Artificial Landscaping in Project Vicinity

Portions of the project study area have been artificially landscaped in residential, commercial, and industrial areas. Some of this landscaping also exists in rural residential areas, including around ranch houses and other ranch buildings. Artificial landscaping incorporates many nonnative and native trees, shrubs, and other vegetation. The urban landscaping in the project study area provides useable habitat for a variety of native and introduced migratory species.

Existing Sources of Direct Wildlife Mortality in Project Vicinity

There is little information on existing sources of wildlife mortality within the project study area. Aside from natural causes of death, such as predation, disease, and limited longevity, there is undoubtedly some roadkill associated with existing roads in the area, particularly for amphibians, reptiles, and small mammals found in adjacent habitats, as well as predatory birds and mammals that may be attracted to the carcasses.

Existing Sources and Levels of Noise in Project Vicinity

The noise levels within the project study area were sampled July 1 to 2, 2003, to estimate existing conditions. This analysis included both short-term (1-hour) and long-term (3-day) measurements at various locations within the project study area (Figure 4.13-7) and up to approximately 6 km (3.7 mi) beyond the project study area. Existing noise levels in the project study area are elevated by traffic noise from I-15, wind, and aircraft overflights from Salt Lake City International Airport. As illustrated in Tables 4.13-3 and 4.13-4, although existing background noise levels in the project vicinity are generally low, maximum short- and long-term noise levels were measured at levels as high as 79 dBA and 78 dbA, respectively. A complete discussion of the noise impacts analysis is provided in Section 4.9, *Noise*.

Existing Sources of Artificial Light in Project Vicinity

Increased lighting can affect wildlife in a variety of ways, both positive and negative. Some species such as bats may benefit from artificial light because it attracts aerial insects, their primary prey. Artificial light may also benefit various predators such as foxes by making prey species such as mice more visible at night. Other species, including some fish, amphibians, birds, mammals, and invertebrates, may have their diurnal or reproductive cycles interrupted or may experience direct mortality and increased predation rates because of artificial light.

The project study area is affected by artificial lighting from residential and commercial developments in the greater Salt Lake City region. Some of the major industrial sources of artificial light in the project vicinity are listed below.

- Chevron USA, Inc. petroleum refinery in Salt Lake City.
- Amoco Oil Company petroleum refinery in Salt Lake City.
- Tesoro petroleum refinery in Salt Lake City.
- Flying J petroleum refinery in North Salt Lake.
- Portland Cement plant in North Salt Lake.
- Phillips 66 petroleum refinery in Woods Cross.
- Crysen Refining petroleum refinery in Woods Cross.
- Golden Eagle Refinery, Inc. petroleum refinery in Woods Cross.
- Utah Power and Light substation in Centerville.
- Salt Lake City International Airport, located just west of the project's southern terminus (runway, building, and control tower lights, as well as aircraft lights).

Existing Sources of Human Disturbance in Project Vicinity

Human disturbance can have adverse effects on wildlife, and many bird species are sensitive to some level of direct disturbance of their nest sites or intrusions into their nesting territories. Portions of the project study area have already been converted to residential, commercial, and industrial uses; wildlife using these areas often experiences frequent disturbance from human activities and domestic pets. Human and domestic pet access to the wildlife habitat within the project study area would likely result in some level of habitat degradation and wildlife mortality; domestic and feral cats pose a particular threat to wildlife (especially avian) mortality.

Other portions of the project study area are currently low-density, rural residential areas or ranches. In those areas, potential human sources of wildlife disturbance include vehicle traffic on the unsurfaced roads and off-highway vehicle use in unroaded areas. The grazing, trampling, etc. of cattle and horses also are likely to remove cover and alter species habitat. In addition, unauthorized hunting and shooting may occur in some areas and can result in direct wildlife mortality.

Table 4.13-3 Short-Term Sound Level Measurements

Recording Location	Date	Start Time	Duration (min)	Average Wind Speed (mph)	Leq[1]	Lmin[2]	L90[3]	L50[3]	L10[3]	Lmax[4]	Distinct Noise Sources
5	1 Jul	12:43	16:00	8.4	52.2	41.8	43.9	47.1	53.5	67.3	Vehicle passages, crickets, wind in vegetation
6	1 Jul	13:50	16:00	11.6	52.3	40.2	44.8	49.3	56.3	62.6	Aircraft, wind in vegetation
7	1 Jul	14:48	10:00	14.8	52.3	45	47.1	51.3	55.1	66.6	Wind in vegetation, no audible human sound
8	1 Jul	15:36	15:00	8.6	59.5	39.2	42.3	48	60.5	79.1	Vehicle passages, distant traffic, aircraft, wind in vegetation
9	1 Jul	18:40	18:00	11.1	48.3	32.2	39.7	44.7	52.4	60.9	Wind in vegetation, aircraft
10	1 Jul	19:20	15:00	2.7	59.9	33.2	36.2	45	62	76.5	Aircraft, birds
11	1 Jul	19:59	15:00	4.4	51.9	33.1	40.2	45.4	51.5	71.4	Aircraft, birds
12	2 Jul	7:02	19:00	2.2	43.9	32	33.7	36.1	44	61.6	Aircraft, birds
13	2 Jul	7:57	14:00	2.8	46.8	39.8	41.8	43.4	46.6	61	Aircraft, distant birds
1	2 Jul	9:36	17:00	1.2	42.6	33.4	36.5	40.6	45.8	52.6	Aircraft, birds
2	2 Jul	10:33	18:00	2.9	45.1	31.2	33.8	40.8	49.2	57.1	Aircraft, crickets
6	2 Jul	12:33	15:00	4.1	40.8	31.7	33.8	36.7	42.1	57.6	Wind in vegetation, birds, aircraft
14	2 Jul	13:29	16:00	4.5	47.2	31.8	33.7	36.6	52.3	61.2	Wind in vegetation, birds, aircraft
4	2 Jul	14:53	15:00	4.8	37.1	30.8	31.6	33.6	38.4	53.1	Distant construction activity, aircraft
				Mean	48.6	35.4	38.5	42.8	50.7	64.3	
				STDEV	6.6	4.7	5.0	5.5	6.8	7.6	
				Min	37.1	30.8	31.6	33.6	38.4	53.1	
				Max	59.9	45	47.1	51.3	62	79.1	
				Range	22.8	14.2	15.5	17.7	23.6	26.0	

[1] **Leq.** Equivalent Sound Level. The equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy.
[2] **Lmin.** Minimum Sound Level. The minimum sound level measured during the measurement period.
[3] **Lxx.** Percentile-Exceeded Sound Level. The sound level exceeded "x" percent of a specific time period. L10 is the sound level exceeded 10 percent of the time.
[4] **Lmax.** Maximum Sound Level. The maximum sound level measured during the measurement period.

Table 4.13-4 Mean, Standard Deviation, Minimum, and Maximum Noise Levels

SPL[1] (dBA)[2]	Leq[3]				L10[4]				L50[4]				L90[4]			
	L1	L2	L3	L1–L3	L1	L2	L3	L1–L3	L1	L2	L3	L1–L3	L1	L2	L3	L1–L3
Mean	53	45	52	50	55	48	54	51	47	41	46	45	43	36	41	40
SDEV	11	8	8	10	11	8	9	11	8	7	8	8	7	5	6	7
Minimum	41	36	40	36	42	37	41	35	37	34	36	34	36	32	35	32
Maximum	78	69	71	78	81	73	75	81	71	67	69	71	65	58	64	65

[1] **SPL.** Sound Pressure Level.
[2] **dBA.** A-Weighted Decibel. An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
[3] **Leq.** Equivalent Sound Level. The equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy.
[4] **Lxx.** Percentile-Exceeded Sound Level. The sound level exceeded "x" percent of a specific time period. L10 is the sound level exceeded 10 percent of the time.

4.13.3 Environmental Consequences and Mitigation Measures

This section discloses potential direct, indirect, and cumulative effects of each project alternative on wildlife, including species of concern to federal agencies and the State of Utah. As described in Section 4.0.3, *Alternatives Evaluated*, the alternatives analyzed in this document represent modifications, based on a reduced right-of-way width of 95-m (312-ft), of the alternatives analyzed in the Final EIS.

As disclosed in the Final EIS, all the proposed build alternatives would adversely affect wildlife populations and their upland and wetland/riparian habitats in the project study area. In addition, since publication of the Final EIS, construction activities associated with Alternative D (Final EIS Preferred Alternative) and new development unrelated to the proposed action have affected wildlife habitat in the project study area. This section provides an updated discussion of the following wildlife impacts for each proposed build alternative; these impacts are examined in more detail in the wildlife technical memorandum.

- Direct habitat loss.
- Changes in habitat availability relative to changes in lake level.
- Habitat fragmentation.
- Changes in habitat quality, including
  - air quality and
  - water quality.
- Habitat modification, including

  - wetland hydrology and
  - artificial landscaping.
- Wildlife mortality.
- Artificial light disturbance.
- Highway noise disturbance.
- Human disturbance.
- Effects on wildlife species of concern.
- Cumulative effects.

In summary, the adverse direct, indirect, and cumulative effects described in this section would contribute to declines in the amount of available wildlife habitat and would likely result in declines in local density of affected species. In addition, traffic noise could potentially affect the behavior and reproductive capacity of various migratory bird species in the project study area and parts of the regional study area.

The area of wildlife habitat affected by direct habitat loss would be small—approximately 0.1 percent of the total amount of wildlife habitat available throughout the regional study area. Highway noise would affect a larger area—approximately 1.3 percent of existing wildlife habitat in the regional study area. Loss or degradation of these areas of wildlife habitat and diminution of biological functions of certain species (e.g., reproductive capacity of birds affected by noise) would add to the cumulative historic and foreseeable future habitat loss and associated impacts on wildlife in the GSLE. The impacts resulting from the proposed action alone, however, would not likely affect the long-term viability of any wildlife species in the GSLE.

4.13.3.1 Direct Habitat Loss

Construction of any build alternative would result in direct loss of wildlife habitat in the project right-of-way or footprint. Habitat losses would be caused by such activities as excavation, grading, highway construction, and development and use of staging and access areas. The extent and character of these losses would be a function of the location of the alignment within the matrix of habitats in the project study area and the placement of the highway footprint within the right-of-way in relation to sensitive habitats.

Total Available Habitat

The total amount of each habitat that occurs in the project area is shown above in Figure 4.13-6. Upland habitats (pasture, cropland, and salt desert scrub) comprise much larger areas than do wetland/riparian habitats (hydric meadow, sedge cattail, mudflat/pickleweed, open water, and riparian). Pasture is the most extensive upland habitat; hydric meadow is the most extensive wetland/riparian habitat. Developed lands are excluded from this discussion because construction of any build alternative would cause a net increase of this habitat category.

As explained in Footnote 3 above, the mapping methodology for the wildlife analysis accounts for the differences between the apparent extent of habitats described in Section 4.12, *Wetlands*, and this section.

Wetland/riparian habitats used for the wildlife analysis include delineated wetlands and non-delineated riparian areas. Including these habitats in the wetland/riparian category enabled the wildlife analysis to focus on land areas actually used by wildlife, rather than areas defined strictly by the technical wetland delineation boundaries.

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related loss of wildlife habitat in the project study area. There also would be no mitigation in the form of the proposed Legacy Nature Preserve, which is described below in Section 4.13.3.14.

Future Conditions (2020)

Even without construction of Legacy Parkway, under the future conditions No-Build Alternative, reasonably foreseeable future land use changes would add to the historic loss and fragmentation of wildlife habitat (see Section 4.13.2.2, *Historic Habitat Conditions*). Approximately 47 percent of the wetland/wildlife habitat remaining in the regional study area (55,002 ha [135,915 ac] of 117,027 ha [288,181 ac]) is on private land, which is subject to reasonably foreseeable future land use changes. The percentage of historical wetland/wildlife habitat remaining in the region varies locally by hydrologic unit, as described above in Section 4.13.2.2.

Table 4.13-5 illustrates the potential impact of future development on wetland/wildlife habitat in the study area, both with and without the proposed build alternatives. Two categories of development were identified to illustrate potential impacts of future development in the project study area: areas developed subsequent to 1997 (developed), and areas potentially developable in the future (developable).[3] As indicated in Table 4.13-5, the Legacy Parkway project is not the only potential source of future loss of wetland/riparian and upland habitats. For example, in 1997 there were approximately 839.2 ha (2,073.7 ac) of developable pastureland in the project study area. Since 1997, 269.2 ha (665.2 ac) of pasture, or 47 percent of this acreage, were developed as a result of other actions in the project study area not related to the Legacy Parkway project. It is possible that areas designated as developable could be set aside as protected in the future. Areas west of the critical protection areas line (Figure 4.13-8) have been designated as priority lands for conservation in the *Wetlands Preservation Plan: a Plan for Protection of the Great Salt Lake Wetlands Ecosystem in Davis County* (Wetland Protection Plan Steering Committee 1996).

[3] As noted in Table 4.13-5, the term *developable lands* does not include any jurisdictional wetlands or land below the FEMA floodplain elevation of 4,212 feet.

Table 4.13-5 Potential Impact (acres) of Future Development and the Build Alternatives in the Project Study Area

Habitat	Total Project Study Area	Build Out		Alternative A and Build Out		Alternative B and Build Out		Alternative C and Build Out		Alternative E and Build Out	
		Developed[1]	Developable[2]	Developed	Developable	Developed	Developable	Developed	Developable	Developed	Developable
Pasture	2,908.7	665.2	1,408.9	827.1	1,280.7	903.6	1,264.1	841.5	1,277.5	850.7	1,267.0
Cropland	1,725.1	312.0	995.4	433.1	882.1	524.1	847.6	413.3	916.0	421.7	896.6
Scrub	1,260.7	145.8	531.4	258.0	462.2	210.5	510.0	281.2	464.4	258.1	465.3
Hydric Meadow	1,161.4	87.4	28.7	153.0	27.2	173.8	26.0	175.2	24.8	157.3	22.5
Sedge cattail	709.5	64.0	0.0	72.9	0.0	92.3	0.0	80.8	0.0	74.5	0.0
Mudflat/Pickleweed	439.8	12.2	0.0	17.8	0.0	28.5	0.0	43.5	0.0	27.8	0.0
Open Water	284.8	13.1	0.9	21.4	0.7	28.2	0.9	13.6	0.9	21.8	0.7
Riparian	70.9	18.4	11.2	20.5	10.5	20.9	10.3	22.2	10.7	21.0	10.4
Developed	1,783.3	1,109.3	251.8	1,166.9	234.0	1,165.6	235.5	1164.6	234.8	1,166.8	234.6
Total Upland[3]	5,894.5	1,123.0	2,935.8	1,518.2	2,625.0	1,638.2	2,621.7	1,535.9	2,657.9	1,530.5	2,628.9
Total Wetland[4]	2,310.7	163.6	28.7	243.7	27.2	294.5	26.1	299.5	24.8	259.6	22.6
Total[5]	10,344.2	2,427.5	3,228.4	2,970.8	2,897.4	3,147.4	2,894.4	3,035.8	2,929.0	2,999.8	2,897.1

[1] *Developed* refers to areas developed since 1997.

[2] *Developable* refers to areas within the project study area (including the Legacy Nature Preserve) that were identified as undeveloped as of 2005; it does not include jurisdictional wetlands; land below the FEMA floodplain elevation of 4,212 ft; or lands owned by duck clubs, used for recreation, or owned by state or federal government.

[3] *Total Upland* comprises desert salt scrub, cropland, and pasture.

[4] *Total Wetland* comprises sedge cattail, hydric meadow, and mudflat/pickleweed.

[5] *Total* is the sum of all habitat types.

Build Alternatives

The total area of upland, wetland/riparian, and combined habitats that would be directly lost as a result of each build alternative is described below and summarized in Figure 4.13-9.

Alternative A

Alternative A would result in the following direct habitat loss within the right-of-way.

- Loss of 46.6 ha (115.1 ac) of wetland/riparian habitat, comprising
  - 29.7 ha (73.3 ac) of hydric meadow,
  - 9.1 ha (22.6 ac) of sedge cattail,
  - 2.5 ha (6.2 ac) of mudflat/pickleweed,
  - 3.7 ha (9.1 ac) of open water, and
  - 1.6 ha (3.9 ac) of riparian habitat.
- Loss of 195.3 ha (482.5 ac) of upland wildlife habitat, comprising
  - 85.0 ha (210.0 ac) of pasture,
  - 57.3 ha (141.7 ac) of cropland, and
  - 52.9 ha (130.8 ac) of salt desert scrub habitat.

The total amount of land in the developed habitat category in the Alternative A right-of-way would be 119.8 ha (296.1 ac).

Alternative B

Alternative B would result in the following direct habitat loss within the right-of-way.

- Loss of 78.8 ha (194.6 ac) of wetland/riparian, comprising
  - 41.7 ha (103.0 ac) of hydric meadow,
  - 19.9 ha (49.2 ac) of sedge cattail,
  - 7.5 ha (18.6 ac) of mudflat/pickleweed,
  - 7.4 ha (18.2 ac) of open water, and
  - 2.3 ha (5.6 ac) of riparian habitat.

- Loss of 261.9 ha (647.1 ac) of upland wildlife habitat, comprising
  - 129.6 ha (320.3 ac) of pasture,
  - 100.1 ha (247.3 ac) of cropland, and
  - 32.2 ha (79.6 ac) of salt desert scrub habitat.

The total amount of land in the developed habitat category in the Alternative B right-of-way would be 109.0 ha (269.4 ac).

Alternative C

Alternative C would result in the following direct habitat loss within the right-of-way.

- Loss of 63.3 ha (156.5 ac) of wetland/riparian habitat, comprising
  - 39.7 ha (98.1 ac) of hydric meadow,
  - 8.1 ha (20.0 ac) of sedge cattail,
  - 12.9 ha (32.0 ac) of mudflat/pickleweed,
  - 0.6 ha (1.4 ac) of open water, and
  - 2.0 ha (4.9 ac) of riparian habitat.
- Loss of 188.7 ha (466.2 ac) of upland wildlife habitat, comprising
  - 79.3 ha (196.0 ac) of pasture,
  - 47.7 ha (117.8 ac) of cropland, and
  - 61.7 ha (152.5 ac) of salt desert scrub habitat.

The total amount of land in the developed habitat category in the Alternative C right-of-way would be 100.8 ha (249.0 ac).

Alternative E

Alternative E would result in the following direct habitat loss within the right-of-way.

- Loss of 52.4 ha (129.5 ac) of wetland/riparian wildlife habitat, comprising
  - 30.6 ha (75.6 ac) of hydric meadow,
  - 9.8 ha (24.3 ac) of sedge cattail,
  - 6.6 ha (16.3 ac) of mudflat/pickleweed,
  - 3.9 ha (9.6 ac) of open water, and

- 1.5 ha (3.8 ac) of riparian habitat.

- Loss of 185.5 ha (458.3 ac) of upland wildlife habitat, comprising
  - 81.7 ha (201.8 ac) of pasture,
  - 52.3 (129.3 ac) of cropland, and
  - 51.5 ha (127.2 ac) of salt desert scrub.

The total amount of land in the developed habitat category in the Alternative E right-of-way would be 112.1 ha (277.1 ac).

Regional Context: Proportion of Available Habitat Loss under Build Alternatives

As described in Section 4.13.2, although all the wildlife habitats found in the project study area are also found in other areas of the GSLE, the project study area is located within a system of extensive wetlands that includes the Jordan River Delta and the FBWMA, which is used by many thousands of migratory birds each year. In total, the project study area represents 0.88 percent of the regional study area, and 0.8 percent of the wildlife habitat in the region is located in the project study area. Table 4.13-6 presents a summary of the acreage of each habitat type in the project and regional study areas for each project alternative.

Table 4.13-6 Areal Comparison of Build Alternatives within Regional Study Area[1]

	Regional Study Area	Project Study Area		Alternative A		Alternative B		Alternative C		Alternative E	
Habitat	acres	acres	%	acres	%	acres	%	acres	%	acres	%
Cropland	285,165	3,372	1.18	318	0.11	351	0.12	213	0.07	264	0.09
Developed	113,742	83	0.07	1	0.00	3	0.00	1	0.00	1	0.00
Sedge cattail	206,017	2,469	1.20	270	0.13	283	0.14	293	0.14	278	0.14
Mudflat/Pickleweed	22,084	707	3.20	79	0.36	101	0.46	64	0.29	71	0.32
Pasture	159,416	467	0.29	107	0.07	111	0.07	105	0.07	107	0.07
Riparian	99,139	1,203	1.21	56	0.06	87	0.09	70	0.07	61	0.06
Scrub	42,817	1,212	2.83	27	0.06	110	0.26	86	0.20	45	0.11
Unclassified	184,915	341	0.18	3	0.00	12	0.01	17	0.01	3	0.00
Upland	3,728	8	0.20	0	0.00	1	0.02	0	0.01	0	0.00
Hydric Meadow	11,283	67	0.60	23	0.20	24	0.22	26	0.23	23	0.20
Total Wetland[2]	604,923	5,924	0.98	589	0.10	637	0.11	507	0.08	543	0.09
Total Upland[3]	326,871	2,756	0.84	86	0.03	209	0.06	173	0.05	109	0.03
Total[4]	1,128,305	9,929	0.88	885	0.08	1,084	0.10	874	0.08	853	0.08

Notes:
[1] Areal calculations are based on regional-scale data. Refer to the cumulative impacts analysis and Appendix B of the wildlife technical memorandum for a discussion of data limitations.
[2] *Total Wetland* comprises sedge cattail, hydric meadow, and mudflat/pickleweed.
[3] *Total Upland* comprises desert salt scrub, cropland, and pasture.
[4] *Total* is the sum of all habitat types

The wildlife technical memorandum provides a detailed discussion of the contribution of the Legacy Parkway project to habitat loss in the region. Less than 0.1 percent of regionally available wildlife habitat around Great Salt Lake that is used by migratory species would be directly lost under any build alternative. The percentage lost per alternative is summarized in Table 4.13-7 to provide the regional context for this habitat loss.

Table 4.13-7 Percentage of Regionally Available Wildlife Habitat Loss by Alternative

Alternative	Wetland/Riparian Habitats	Upland Habitats
No-Build (Existing Conditions)	0.0%	0.0%
Alternative A	0.026%	0.097%
Alternative B	0.063%	0.105%
Alternative C	0.052%	0.084%
Alternative E	0.033%	0.090%

4.13.3.2 Changes in Lake Level and Habitat Availability

No-Build Alternative

Existing Conditions and Future Conditions

As the level of Great Salt Lake rises through natural processes, existing terrestrial habitats are inundated and converted to saline, open water habitat. The lake reached a historic high of approximately 1,283.8 m (4,211.8 ft) in 1986–1987, and a low of 1277.4 m (4,191 ft) in 1963 (Aldrich and Paul 2002). As the lake level rises, the total amount of available terrestrial habitat within the project study area decreases. As the lake level naturally recedes, the former ecological communities regenerate slowly. (See Section 4.12.2.3, *Wetlands and Great Salt Lake Flooding*, for a discussion of how inundation levels of Great Salt Lake affect wetland habitats.) These conditions would continue to exist under the No-Build Alternative.

The level of Great Salt Lake (1997 average level = 4200.3 ft; 2003 average level = 4197.6 ft.) is expected to rise and fall in the future, and effects of this natural phenomenon are expected to be similar to those described above under existing conditions.

Build Alternatives

To account for the dynamics of the level of Great Salt Lake, the combined effects of natural inundation from changes in lake level and implementation of each build alternative were examined to determine how these factors act in concert to affect the temporal pattern of overall availability of wildlife habitats within the project and regional study areas. Figures 4.13-10 and 4.13-11 show the areal extent of available habitats in the project and regional study areas at low and high lake levels. These data show relatively little change in upland habitats (pasture, cropland, scrub) with lake level change, but the availability of wetland habitats (hydric meadow, sedge cattail, and mudflat/pickleweed) is markedly reduced at high lake levels. Regionally, at high water there is a 64 percent reduction in both mudflat/pickleweed habitat and sedge cattail habitat, a 30 percent change in hydric meadow, and a 15 percent reduction in available riparian habitat.

Table 4.13-8 shows the acreage of each habitat that would be lost under each alternative and the percentage of regionally available habitat the lost area represents at low and high lake levels. Proportionally, the amount of any habitat that would be lost under any proposed alternatives is very small at both low lake level (<0.3 percent) and high lake level (<0.6 percent). Because of the very large area of habitat available regionally and the comparatively small area of the proposed action, the change in lake level does not measurably affect the proportion of habitat lost under each alternative, even though the level of the lake can cause up to a 64 percent change in the regional availability of habitat. The largest proportional change in any habitat between low and high lake level is only 0.3 percent (sedge cattail, Alternative B). This level of change, while calculable, is insignificant with regard to the inherent error of the GIS polygon measurement methodology.

At the project study area level, the change in the areas of habitats that would be lost to the proposed action (Figure 4.13-10, Table 4.13-9) is proportionally greater at both low and high lake levels than that described above for the regional level (Table 4.13-8). For example, mudflat/pickleweed habitat lost under Alternative C changes from 5 percent of the available habitat in the project study area at low lake level to 27 percent of the habitat in the project study area at high lake level—a change of 22 percent. Under Alternative B, sedge cattail habitat changes 11 percent from 9 percent at low lake level to 20 percent at high lake level. Changes in other habitats are all smaller. These project study area changes represent the local effects of lake level change on habitat availability. As with the regional analysis, the greatest changes in wetland habitats are at the lower elevations.

The principal ecological effects of the dynamics of the combined effects of lake level changes and habitat loss associated with the build alternatives are summarized below. The corresponding discussion in the Section 3.2, *Combined Effects of Lake Level Change and Habitat Loss Associated with Build Alternatives*, of the wildlife technical memorandum provides a more detailed discussion of these effects.

- Except for open water habitat, the alignments of the different project alternatives are located such that the highest levels of impact from habitat loss occur mostly in the middle elevation zones (1,281.4–1,282.6 m [4,204–4,208 ft] and 1,282.6–1,283.8 m [4,208–4,212 ft]). This is characteristic of both wetland/riparian and upland habitats. Open water habitat (fresh water) is mostly affected in the lower inundation zones

- The probability of inundation, as estimated from historic conditions (pre-settlement; before 1847), is highest for the two inundation zones below 1,282.6 m (4,208 ft) (24–33 percent for these zones, contrasted with 1.7–8.3 percent for zones above 1,282.6 m [4,208 ft]). This trend indicates that when assessing the relative level of impacts of each alternative, these impacts should be evaluated relative to the probability of inundation, with emphasis on those zones subject to the greatest potential impact but with low probability of inundation (i.e., zones above 1,282.6 m [4,208 ft]).

- The relative impacts of the build alternatives change with changes in lake level. The amount of each habitat type remaining in the project study area at various inundation levels for each of the build alternatives is directly related to the actual distribution of different habitat types in the project study area and differences in the spatial alignments of each alternative.

- Upland and wetland/riparian habitats are more abundant at low lake levels than at high lake levels. With rising lake level, inundation combines with direct habitat loss that would result from the build alternatives to reduce the overall availability of habitat to wildlife. Because the portion of the highway footprint that is inundated would not be available whether or not the alternative were constructed, the direct loss of available habitat caused by the build alternatives is lowest at high lake levels and highest at low lake levels. (It should be noted that the highway itself would not be inundated because it would be raised above ground level.)

- The overall carrying capacity for wildlife species using these habitats could decrease proportionally with the decrease in resource availability as lake level rises.

- As lake level rises, the diminishing available habitat will be located progressively nearer to the alternative rights-of-way. This spatial relationship would likely increase the potential for wildlife impacts associated with the Proposed Action (e.g., noise, disturbance, highway mortality).

- The higher-elevation portions of the project study area provide important refuge habitats for many wetland species when lake levels are high. With increasing lake level, the relative impacts of the build alternatives on these refuge areas will increase (Table 4.13-9). However, large areas of the wildlife habitat that characterize the project study area are found throughout the GSLE. The wider availability of habitats makes the study area less important on a regional scale.

- The above-described effects of lake level change were determined for existing conditions. Projected future build-out within the project study area would result in a marked reduction in the amount of remaining natural habitat in the project study area (Table 4.13-5). Under the future build-out conditions, habitat will be located primarily west of the build alternatives. The combined effects of a rise in lake level, future build-out, and the proposed Legacy Parkway would leave little habitat available at high water for wildlife within the project study area. The overall habitat loss/fragmentation effects of the Proposed Action on the remaining small amount of natural habitat would be proportionally greater with future build-out.

- If increasing lake level occurs rapidly, some less mobile wildlife (e.g. mice, snakes, frogs, nonflying insects) will perish unless they can move to suitable habitat above the waterline. If the rise is gradual (e.g., over several seasons), local populations will change in size in proportion to the reduced carrying capacity of the remaining habitat.

- As the lake level recedes, the effects of inundation decrease as former habitat regenerates.

Table 4.13-8 Regional Wildlife Habitat Availability at Low and High Great Salt Lake Levels

	Alternative A				Alternative B			
Habitat	Area* (acres)	% of Regional Habitat at Low Lake Level	% of Regional Habitat at High Lake Level	Change in % Between High and Low Lake Level	Area* (acres)	% of Regional Habitat at Low Lake Level	% of Regional Habitat at High Lake Level	Change in % Between High and Low Lake Level
Pasture	318	0.11	0.11	0.00	351	0.12	0.12	0.00
Cropland	1	0.00	0.00	0.00	3	0.00	0.00	0.00
Scrub	270	0.13	0.13	0.00	283	0.14	0.14	0.00
Hydric Meadow	56	0.06	0.08	0.02	87	0.09	0.09	0.00
Sedge cattail	27	0.06	0.17	0.11	110	0.26	0.56	0.31
Mudflat/Pickleweed	3	0.00	0.00	0.00	12	0.01	0.00	0.00
Riparian	0	0.00	0.00	0.00	1	0.02	0.03	0.00

	Alternative C				Alternative E			
Habitat	Area* (acres)	% of Regional Habitat at Low Lake Level	% of Regional Habitat at High Lake Level	Change in % Between High and Low Lake Level	Area* (acres)	% of Regional Habitat at Low Lake Level	% of Regional Habitat at High Lake Level	Change in % Between High and Low Lake Level
Pasture	213	0.07	0.08	0.00	264	0.09	0.09	0.00
Cropland	1	0.00	0.00	0.00	1	0.00	0.00	0.00
Scrub	293	0.14	0.14	0.00	278	0.14	0.14	0.00
Hydric Meadow	70	0.07	0.08	0.01	61	0.06	0.09	0.03
Sedge cattail	86	0.20	0.39	0.19	45	0.11	0.29	0.18
Mudflat/Pickleweed	17	0.01	0.01	0.00	3	0.00	0.00	0.00
Riparian	0	0.01	0.00	-0.01	0	0.00	0.00	0.00

Note:

*Area represents acreage of each habitat within the build alternative right-of-way. These acreages are based on the regional dataset to facilitate regional-scale analysis.

Table 4.13-9 Wildlife Habitat Availability within the Project Study Area at Low and High Great Salt Lake Levels*

	Project Study Area			Alternative A				Alternative B			
Habitat	At Low Lake Level (acres)*	At High Lake Level (acres)	Change in Available Habitat (acres) Between Low and High Lake Level	Area (acres)	% of Project Study Area Habitat at Low Lake Level	% of Project Study Area Habitat at High Lake Level	Change in % Between High and Low Lake Level	Area (acres)	% of Project Study Area Habitat at Low Lake Level	% of Project Study Area Habitat at High Lake Level	Change in % Between High and Low Lake Level
Pasture	3,372	3,371	1	318	9.44	9.44	0.00	351.38	10.42	10.42	0.00
Cropland	83	81	1	1	0.81	0.82	0.01	3.11	3.77	3.83	0.05
Scrub	2,469	2,416	53	270	10.94	11.18	0.24	282.66	11.45	11.70	0.25
Hydric Meadow	1,203	888	315	56	4.70	6.36	1.67	87.40	7.27	9.84	2.58
Sedge cattail	1,212	541	671	27	2.22	4.98	2.76	110.09	9.08	20.36	11.28
Mudflat/Pickleweed	341	62	279	3	0.85	4.63	3.78	11.79	3.45	18.86	15.41
Riparian	8	6	2	0.00	0.00	0.00	0.00	0.89	11.76	15.38	3.62

	Alternative C				Alternative E			
	Area (acres)	% of Project Study Area Habitat at Low Lake Level	% of Project Study Area Habitat at High Lake Level	Change in % Between High and Low Lake Level	Area (acres)	% of Project Study Area Habitat at Low Lake Level	% of Project Study Area Habitat at High Lake Level	Change in % Between High and Low Lake Level
Pasture	213	6.31	6.31	0.00	263.54	7.82	7.82	0.00
Cropland	1	1.08	1.09	0.01	0.67	0.81	0.82	0.01
Scrub	293	11.86	12.12	0.26	278.44	11.28	11.52	0.25
Hydric Meadow	71	5.86	7.94	2.08	61.16	5.08	6.89	1.80
Sedge cattail	86	7.08	15.88	8.80	45.15	3.72	8.35	4.63
Mudflat/Pickleweed	17	4.95	27.05	22.10	2.89	0.85	4.63	3.78
Riparian	0	2.94	3.85	0.90	0.00	0.00	0.00	0.00

Note: * Acreages are derived from the regional GIS dataset, which is a low-resolution dataset; the acreages differ from those presented in project-level analyses.

4.13.3.3 Habitat Fragmentation

No-Build Alternative

Existing Conditions (2004)

The historic wildlife habitats of the GSLE along the Wasatch Front have been highly fragmented by urban, industrial, and agricultural development and numerous highways and roads. These land use changes have created a major barrier to movement by many species of wildlife from the Wasatch foothills to Great Salt Lake. However, under the existing conditions No-Build Alternative, there would be no project-related fragmentation of wildlife habitat in the project study area.

Future Conditions (2020)

As described in Section 4.13.3.1, regardless of whether the proposed action is implemented, future planned development is anticipated to occur throughout the project study area and vicinity, and this future development will be a source of future wildlife habitat fragmentation. This build-out of developable lands within the study area would result in additional loss and fragmentation of existing wildlife habitats from urban/industrial development and construction of associated roads. Under this scenario, most of the habitat changes would result from direct habitat loss as large blocks of existing habitat are converted to developed land. This would include most if not all of the developable wildlife habitat included in the proposed Legacy Nature Preserve (Figure 4.13-12). The roads associated with these developments would mostly be contained within these converted blocks, although some peripheral and connector roads would also likely be built. Many of the existing large habitat patches, as well as medium and small patches, would be lost, but it is not known to what extent these existing habitat patches would be fragmented into smaller patches.

Build Alternatives

All the build alternatives would dissect the matrix of wildlife habitats in the project study area into east and west areas. The area east of the proposed rights-of-way is largely modified by development and is experiencing continued rapid urban growth. Projected future growth in this area is likely to result in complete build-out. This area, however, does not appear to support any ecologically unique habitats that are not still represented west of the proposed alignments. The area west of the project rights-of-way retains a greater proportion of wetlands and wildlife habitats. This primary fragmentation effect of the project is not expected to reduce the diversity of habitat types within the project study area.

In addition to this primary fragmentation effect, all the build alternatives would result in the finer scale fragmentation of many existing wildlife habitat patches within the project study area. Each build alternative would result in a general decrease in the size of habitat patches available to wildlife in the area and a decrease in the number of larger patches, particularly in upland habitats. There would be a declining trend in the total amount of habitat in most size classes in most habitat types, with the exception of wetland habitats in the <0.4-ha (<1-ac) size class.

These changes would likely result in a number of effects on wildlife habitat, including reduction in habitat patch size, increase in the perimeter-to-area ratio of patches and associated edge effects, reduced connectivity between habitat patches, and introduction of barriers to dispersal for some species. Reduced habitat patch size can decrease the resources available to wildlife species, in turn reducing the local carrying capacity for those species. Moreover, smaller habitat patches are typically characterized by an increase in the length of the patch edge relative to the patch area, as well as a reduction in the distance

from the edge to the center of the patch. These changes can favor a reduction in the ecological buffering capacity of the patch for species sensitive to detrimental factors outside the patch (e.g., microclimate, competition from other species, predation, noise and human disturbance, pollution, and highway mortality). Construction of any build alternative could also introduce a physical barrier to movement and dispersal of some species. The wildlife species most affected by habitat fragmentation would be those with low dispersal capabilities, such as small mammals, reptiles, and amphibians (Forman et al. 2003). Birds would likely be less affected because they can generally move more readily between available habitat patches both within and outside of the project study area.

A quantitative assessment of the habitat fragmentation impacts for each alternative is provided in Table 4.13-10.

The overall effects of construction of the Legacy Parkway project on habitat fragmentation are summarized below.

- Alternatives A and E would have the least impact on fragmentation across the habitat types. Alternative A is located more to the east and would reduce the amount of habitat isolated between the right-of-way and existing development east of the alignment.

- The number of upland patches would increase under all build alternatives. Alternatives A and E would cause the least increase in the number of upland patches. Alternative B would cause the largest increase in the number of upland patches, predominantly in the smaller patch sizes. The changes in mean patch size reflect the same pattern.

- The number of wetland/riparian patches would increase under all build alternatives. Alternative E would cause the least increase in the number of wetland/riparian patches. Alternative A would cause the highest increase, but would result in very little change in mean patch size.

- In the area east of the proposed alignments, there are no unique or unusually valuable habitat types, either terrestrial or wetland/riparian, that would not still be represented in the remaining area west of the alignments. This primary fragmentation effect of the project would not therefore reduce the diversity of habitat types in the project study area or in the GSLE in general.

- The fragmentation effects of the build alternatives on local wildlife populations would be additive to existing levels of fragmentation and all reasonably foreseeable future fragmentation that is likely to occur in the area (see Section 4.13.3.3, *Cumulative Effects*). Physical segregation of upland habitats from wetlands in the project study area could potentially have an adverse regional effect on migratory shorebirds and waterfowl that traditionally use both habitats in the area.

Table 4.13-10 Summary of Habitat Fragmentation by Habitat Category Resulting from Build Alternatives

Habitat Category	Alternative		Number of Patches in Each Size Class					**Total Number of Patches**	Summary Statistics (acres)	
			<1	1–10	10–50	50–100	>100		Mean Patch Size	Median Patch Size
Upland	No Action		153	74	44	11	12	294	20.05	0.79
	Alternative A	Patches Fragmented	16	9	17	6	10	58		
		Total Patches	184	99	47	12	13	355	15.25	0.86
	Alternative B	Patches Fragmented	9	19	25	8	11	72		
		Total Patches	203	99	57	16	11	386	13.59	0.82
	Alternative C	Patches Fragmented	11	17	20	7	10	65		
		Total Patches	183	103	49	11	13	359	15.12	0.94
	Alternative E	Patches Fragmented	11	11	15	7	10	54		
		Total Patches	185	95	51	15	11	357	15.23	0.79
Wetland/ Riparian	No Action		470	226	39	6	2	743	3.21	0.59
	Alternative A	Patches Fragmented	41	58	9	1	1	110		
		Total Patches	502	215	36	6	2	761	2.99	0.47
	Alternative B	Patches Fragmented	80	77	16	3	2	178		
		Total Patches	505	206	40	7	1	759	2.91	0.48
	Alternative C	Patches Fragmented	73	73	14	2	1	163		
		Total Patches	504	209	35	8	1	757	2.94	0.45
	Alternative E	Patches Fragmented	60	64	9	1	1	135		
		Total Patches	499	214	36	6	2	757	2.99	0.45

Habitat Category	Alternative		Number of Patches in Each Size Class					**Total Number of Patches**	Summary Statistics (acres)	
			<1	1–10	10–50	50–100	>100		Mean Patch Size	Median Patch Size
Open Water	No Action		29	14	3	1	1	48	5.93	0.61
	Alternative A	Patches Fragmented	3	0	1	1	0	5		
		Total Patches	33	16	3	0	1	53	5.20	0.54
	Alternative B	Patches Fragmented	4	1	1	1	0	7		
		Total Patches	28	15	3	0	1	47	5.67	0.74
	Alternative C	Patches Fragmented	4	1	1	0	0	6		
		Total Patches	27	16	2	1	1	47	6.03	0.69
	Alternative E	Patches Fragmented	6	1	1	1	0	9		
		Total Patches	32	16	3	0	1	52	5.29	0.54

Because the existing habitat in the project study area is already highly fragmented by a diversity of human activities (e.g., agriculture, fences, roads, urban development), the additional fragmentation effects that the build alternatives would have on wildlife would likely be less than but additive to the effects of direct habitat loss. The fragmentation analysis of the build alternatives shows detectable variation among alternatives, but the differences are small and biologically indistinguishable at the scale of this analysis. The results of the assessment of the effects of direct habitat loss on species of concern indicate that while local populations of some species would be affected by loss of individuals and/or habitat, these losses alone would not result in a notable change in the long-term viability of these species in the GSLE. Similarly, because the existing condition of the project study area is highly fragmented as a result of past land use activities, the contributory effects of habitat fragmentation by the build alternatives would not likely result in any detectable change in long-term population viability of any species of concern in the area.

4.13.3.4 Air Quality

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related air quality impacts that would affect wildlife habitat in the project study area.

Future Conditions (2020)

As described in Section 4.8, *Air Quality*, of this document, regardless of whether the proposed action is implemented, mobile source air emissions in the study area are projected to decrease significantly by 2020, and emissions differences between the build and no build alternatives would be minimal. Some emissions would slightly increase under the build alternatives compared to the No Build Alternative, and others would slightly decrease. Analysis of future (2020) air quality conditions indicates that CO and PM will likely be higher in the region under the no-build conditions. Ozone is not expected to cause new exceedances of the National Ambient Air Quality Standards (Utah Department of Environmental Quality, Division of Air Quality 1997), but the potential effects of ozone on wildlife in the study area are unknown. Similarly, future concentrations of nitrogen dioxide, sulfur dioxide, and lead are not expected to change from existing conditions in the region, but their effects on wildlife are unknown.

Build Alternatives

Any effects on wildlife and the quality of wildlife habitat resulting from changes in air quality would be similar under all build alternatives and, given the forecast levels of emissions, similar to the no-build condition.

Section 4.8, *Air Quality*, describes the existing and projected air quality conditions in the project study area. Any effect on wildlife habitat quality resulting from changes in air quality would be similar for all alternatives. Virtually nothing is known about how changes in air quality affect wildlife. Existing air quality standards established for human health provide a baseline standard for potential effects on wildlife. Temperature inversions and local concentrations of air pollutants would likely effect humans and wildlife comparably, although differences in physiology (e.g., higher metabolism and proportionally larger alveolar lung/air sac surface area in birds) may exacerbate some effects in some species. Animals are exposed to air pollutants through the inhalation of gases or small particles and the absorption of gases through the skin. Amphibians and soft-bodied invertebrates (e.g., earthworms) are most susceptible to be affected by the absorption of air pollutants. An individual's response to a pollutant varies greatly and

depends on the pollutant involved, the duration and time of exposure, and the amount taken up by the animal. Pollutant fallout onto vegetation and existing water bodies in the project study area could have local effects on plant productivity, ecotoxicity of plants used for food by wildlife, and water quality (see below). The overall potential effects of critiria air pollutants on resident humans and presumably wildlife populations would likely include the following, as described by pollutant.

- **Nitrogen dioxide.** Lung damage, illnesses of breathing passages and lungs. Nitrogen dioxide is an ingredient of acid rain, which can damage vegetation and water quality for amphibians, fish, and other aquatic organisms.

- **Volatile organic compounds (VOCs).** VOCs include chemicals such as benzene, toluene, methylene chloride, and methyl chloroform. They react with nitrous oxides (NO_x) to form ozone, which can cause breathing problems, reduce lung function, irritate eyes and respiratory passages, reduce resistance to infections, and possibly speed up aging of lung tissue. VOCs can also cause cancer, and ozone can damage vegetation.

- **Carbon monoxide.** Reduces the ability of blood to bring oxygen to body cells and tissues; it is particularly hazardous to individuals that have damaged lungs or breathing passages. Can exacerbate problems created by VOCs, NO_xs, and ozone.

- **Lead-containing dust.** Can cause brain and other nervous system damage. Small and young individuals are at special risk. Some lead-containing chemicals cause cancer in animals. Lead also causes digestive problems.

- **Particulate matter (PM).** Can cause respiratory passage irritation, lung damage, and bronchitis.

4.13.3.5 Water Quality

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related impacts on water quality that would affect wildlife habitat in the project study area.

Future Conditions (2020)

If none of the build alternatives is implemented, proposed future development could affect water quality in the project study area. As described in Section 4.10.3.2, *Surface Water Quality*, if none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the project study area. In addition, residential, commercial, and industrial development will continue in the project study area regardless of whether Legacy Parkway is constructed. These projects will increase the amount of impervious surface area, change runoff characteristics, and potentially degrade surface water quality, although the nature and timing of such future projects and the BMPs that will be used to minimize water quality impacts are not known at this time.

Build Alternatives

All the build alternatives would result in similar increases in highway runoff contaminants. Section 4.10, *Water Quality*, and the wildlife technical memorandum provide a list of the primary contaminants in the

project study area and their sources. The primary contaminants are not the only contaminants present in highway runoff, but they are the contaminants of primary concern regarding effects on water quality (Moellmer pers. comm.). The primary contaminants reduce water quality and potentially affect wildlife in a variety of ways (Forman et al. 2003). Because of the increased transportability of many of these contaminants in aquatic systems, wetlands adjacent to the highway would most likely be the areas most affected. However, the design of the Legacy Parkway project includes a vegetated median and side slopes, which would minimize exposure to the primary contaminants in wildlife habitats adjacent to the highway. Any adverse effects of these contaminants would be restricted to local concentration areas where these features are present.

Hazardous waste or other chemical spills in wetland habitats could potentially have catastrophic effects on wildlife, especially when lake levels are high. Existing UDOT and FHWA/EPA requirements for safe transport of these materials and emergency spill containment programs minimize these effects under most conditions, but unavoidable accidents do occur. In the State of Utah during the 10-year period from 1994 to 2003, an average of 215 highway incidents involving hazardous materials occurred per year, but only 6.7 of these incidents on average were considered serious each year.[4] Most effects of these incidents are generally localized and would consequently vary under different build alternatives, although they would likely be the worst in aquatic habitats. The Alternative B alignment, which crosses the most wetland habitat, would be most susceptible to adverse effects on wildlife resulting from an accidental hazardous materials spill. Because the Alternative A and Alternative E alignments are located in more upland areas, they would be somewhat less susceptible than the other alternatives.

Under all build alternatives, simultaneous development would occur in areas that are not preserved east of the highway. As described above for the no-build future conditions, the effects of these projects would add to those of the proposed action with regard to increases in the amount of impervious surface area, changed runoff characteristics, and associated degradation of surface water quality.

4.13.3.6 Wetland Hydrology

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related impacts on wetland hydrology that would affect wildlife habitat in the project study area.

Future Conditions (2020)

If none of the build alternatives is implemented, future residential, commercial, and industrial development projects may be undertaken by local jurisdictions in the project study area. These projects will increase the amount of impervious surface area, changing surface water runoff characteristics and wetland hydrology. However, the nature and timing of such future projects, and their relative effect on wetland hydrology, are not known at this time.

[4] A serious incident is defined as a fatality or major injury caused by the release of a hazardous material, the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire, a release or exposure to fire which results in the closure of a major transportation artery, the alteration of an aircraft flight plan or operation, the release of radioactive materials from Type B packaging, the release of more than 11.9 gallons or 88.2 pounds of a severe marine pollutant, or the release of a bulk quantity (more than 119 gallons or 882 pounds) of a hazardous material (http://hazmat.dot.gov/files/hazmat/hmisframe.htm).

Build Alternatives

In 2001, 1.5 to 1.8 m (5 to 6 ft) of fill was placed along the Alternative E alignment between I-215 and 1500 South, and up to 6 m (20 ft) was placed in the I-215 interchange area. To determine empirically how these activities would affect local wetland hydrology, a network of piezometers (soil water-pressure gauges) were installed parallel to the fill areas in 2001 (Forster and Neff 2002). The preliminary results of this study suggest that most water found in the shallow subsurface is likely derived from water discharging upward from underlying deeper aquifers, rather than from water contributed by direct precipitation. Thus, groundwater moving from deeper aquifers is the principal source of water supplying groundwater wetlands near and west of the proposed highway right-of-way (Forster and Neff 2002). Therefore, it is unlikely that the groundwater supply to those types of wetlands in the project study area would be seriously affected by highway construction. The proposed groundwater water conveyance structures (see Section 4.10, *Water Quality*) should yield a drainage system that removes barriers to surface water flows and adequately mimics the westward flow of shallow water beneath the right-of-way. Groundwater levels within the project right-of-way would be monitored during project construction to assess potential impacts on wetland hydrology.[5]

4.13.3.7 Wildlife Mortality

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related wildlife mortality.

Future Conditions (2020)

If none of the build alternatives is implemented, proposed future development could occur such that wildlife mortality in the project study area could increase. As habitat is lost, local populations of wildlife species using that habitat will be lost either through direct mortality during development or indirectly as habitat quality changes. However, the nature, timing, and extent of these impacts would be project-specific and are not quantifiable at this time.

Build Alternatives

There may be some wildlife mortality during construction of the build alternatives, particularly for less mobile species such as amphibians and invertebrates. In addition, this Supplemental EIS addresses the issue of potential wildlife mortality from roadway operation. UDOT records of documented roadkill from roadway operations are nonspecific and generally represent only large mammals (e.g., deer), not smaller species. This information is of limited value in evaluating the full spectrum of species affected by road-related mortality.

With increased vehicular traffic in the project study area under all the build alternatives, road mortality of individuals of some species—particularly birds flying between habitat patches on different sides of the highway and dispersing amphibians, reptiles, and small mammals—is likely to increase. This would be

[5] The groundwater modeling conducted for the Final EIS indicates that the maximum decrease in groundwater elevation under any proposed build alternative would be less than 2.5 centimeters (1 inch) in areas where the fill would be up to 3 m (9 ft), which is where the majority of groundwater slope wetlands are located within the project right-of way.

particularly evident during periods of high lake level when waterfowl and shorebirds would be more likely to use upland habitats adjacent to the highway. The three fences proposed to border the highway right-of-way would help minimize these impacts by forcing some birds, particularly larger waterfowl, to take higher flight paths and/or deterring cross-highway movement of other species. Numerous drainage culverts proposed for installation under the highway could also facilitate wildlife movement without road mortality. The effects of highway-related road mortality of wildlife would likely be similar under all the build alternatives and would not likely affect the viability of any species in the project study area.

4.13.3.8 Artificial Landscaping

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no change in the extent of artificial landscaping in the project study area.

Future Conditions (2020)

If none of the build alternatives is implemented, proposed future residential, commercial, and industrial development could be undertaken in the project study area. These projects would likely remove existing natural vegetation and increase the amount of artificial landscaping in the area, removing habitat for some existing species, but replacing it with urban landscaping suitable for other species. The overall impacts would depend on the nature and extent of these changes and are not known at this time.

Build Alternatives

Artificial landscaping often attracts a diversity of species, particularly birds and small mammals (Forman et al. 2003). Migrating passerine birds frequently rest and forage on insects and fruit in landscaped areas. Fruit- and seed-producing trees and shrubs are especially attractive to these species. Planted trees also attract a variety of raptors, particularly hawks, falcons, and owls, which use them for night/day roosting and nesting sites. Raptors perch in these trees to hunt for rodents, rabbits, and other prey in adjacent fields. Some small mammals may also find suitable food and shelter in landscaped areas associated with highways (Forman et al. 2003).

According to the Landscape Baseline Plan in the Final EIS, the type and design of plantings in the artificial landscaping would be similar under all build alternatives. To minimize perching opportunities for raptor, no trees would be planted on the west side of the right-of-way, adjacent to the Legacy Nature Preserve. Trees planted east of the right-of-way, adjacent to the trail, as well as all other new landscaping, would be either native species or species that are not considered invasive.

The new landscaping would potentially have both beneficial and adverse effects on wildlife species that currently inhabit the project study area. These effects would be similar under all build alternatives. Beneficial effects would include the introduction of new trees, shrubs, and herbaceous vegetation that would provide foraging, roosting, and nesting habitats for birds and other wildlife. Adverse effects could potentially occur from the proximity of the vegetation to the highway (Forman et al. 2002). Wildlife mortality due to collisions with vehicles could potentially increase because a variety of species would be attracted to this roadside vegetation for cover and food (see Section 4.13.3.7, *Wildlife Mortality*, above). Resident owls, migrating raptors, passerine birds, and some mammals could find landscaped areas especially attractive. The artificial landscaping would also contribute to both the local and regional

cumulative effects on wildlife from all new urban landscaping, although UDOT has committed to using native vegetation for landscaping activities to the maximum extent possible.

4.13.3.9 Artificial Light Disturbance

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related change in the amount of artificial lighting in the project study area.

Future Conditions (2020)

If none of the build alternatives is implemented, artificial lighting associated with future residential, commercial, and industrial development projects in the project study area would increase. However, the overall impacts on wildlife would depend on the nature and extent of artificial lighting that is installed, and the specific impacts cannot be quantified at this time.

Build Alternatives

All build alternatives would contribute minimally to the existing effects of artificial lighting on wildlife within the project and regional study areas. New artificial lighting associated with the proposed action would be associated with localized street lamps at on-ramps and off-ramps, luminaries (lighting of highway signs), headlights, and possibly the trail system. When the lake level is high, many migratory birds are likely to use the wetlands and uplands close to the highway. During periods of low visibility, the lights at intersections could attract migratory birds that become disoriented. Under such conditions, birds could collide with moving vehicles or light poles. While such bird mortality events have been documented in the Great Salt Lake Basin and elsewhere (Jones & Stokes 2005), adverse low-visibility weather is infrequent in the project study area.

Overall, the proposed action would add a minimal amount of light to existing conditions. Potential effects of light on birds, amphibians, mammals, fish, aquatic invertebrates, and terrestrial invertebrates also are likely to be minimal (Jones & Stokes 2005). Light associated with the Legacy Parkway trail system would be minimized by shielding the lights or directing them downward.

4.13.3.10 Noise Disturbance

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related change in the level of noise disturbance in the project study area.

Future Conditions (2020)

If none of the build alternatives is constructed, future planned build-out of the project study area will still occur and will likely cause noise to rise above existing levels. Potential future growth scenarios that exclude the proposed action and related sources of noise disturbance are described in detail in the wildlife

technical memorandum. Typical noise levels for progressive phases of development are summarized below (Cowan 1994).

- Rural 40–48 decibels (dB)
- Small town and quiet suburban 45–55 dB
- Suburban and low-density urban 52–60 dB
- Urban area 58–67 dB
- Dense urban area with heavy traffic 65–74 dB
- Downtown in large city 72–80 dB

It is anticipated that under the future conditions No-Build Alternative, noise in the project study area will likely increase from that typical of the lower noise levels (rural) to typical of urban settings. However, as noted in 4.13.2.5 above, these increases would not be as dramatic in the portions of the project study area that currently experience high levels of noise. Noise sources would contribute to the future noise environment of the project study area in proportion to the temporal phasing and geographic extent of each type of development.

Build Alternatives

The modeled areal extent of potential highway noise effects on wildlife habitat is shown for each build alternative in Figures 4.13-13a and 4.13-13b). The total area of wildlife habitats exposed to the different noise levels (combined area of all habitat types within each noise level contour) within the area analyzed is summarized in Table 4.13-11. These estimates, however, are for reference comparison of alternatives only. This analysis studies potential indirect impacts beyond 305 m (1,000 ft), per the appellate court ruling; however, the noise level contours generated by the FHWA TNM have not been tested for accuracy beyond 396 m (1,300 ft). The locations of contours beyond this distance are projected estimates only and could vary significantly depending on existing background noise, atmospheric conditions, and substrate type. The noise levels shown within each contour interval, particularly those farthest from the proposed highway alignments, are likely to have only minimal, if any, effect on birds if background wind noise is prevalent (Jones & Stokes 2005).

Analysis of the total area of wildlife habitat that could be affected by highway noise in each noise contour interval showed an increase of between 42 percent and 61 percent in the 60+ dB impact area, depending on the alternative; an increase of between 19 percent and 58 percent in the 55 to 60 dB area; and an increase of between 27 percent and 47 percent in the 50 to 55 dB area. The noise level interval of 45 to 50 dB shows slight decreases in the area affected within the analysis area (Jones & Stokes 2005).

Table 4.13-11 Modeled Estimate of Wildlife Habitat Exposed to Noise under Build Alternatives

	Noise Level Interval (acres exposed to noise level[1])			
Alternative	>/= 60 dB	>/= 55 < 60 dB	>/= 50 < 55 dB	>/= 45 < 50 dB
No-Build (Existing Conditions)	6,908	5,632	8,438	26,551
Alternative A	10,501	7,848	10,726	25,333
Alternative B	11,124	8,884	12,462	25,582
Alternative C	9,814	8,041	11,669	25,298
Alternative E	10,670	6,686	11,985	25,057

Note:

[1] Noise levels measured as dBA.

Birds use vocal signals to communicate information on many aspects of their status and behavior that are important for survival, social cohesion, and reproductive success. Songs and calls function to identify the caller's species, sex, age (experienced adult vs. juvenile), territorial status, and motivational state (e.g., aggressive, submissive); to attract mates and repel rivals; to stimulate egg laying and synchronize hatching; to strengthen pair bonds; to signal change in domestic duties; to entice young to eat; and to warn of predators, maintain flock cohesion, and incite group mobbing action against intruders. Many species have complex vocal repertoires of songs and calls that can vary subtly in many ways, including frequency and timing of use, intensity (amplitude variation), and syntax (order of signal presentation). Clear transmission and reception of these signals and the subtleties of their variation are critical for maintaining the normal biological and ecological function of each species.

Highway noise typically is neither loud nor startling enough to cause marked stress effects on wildlife (Saigul-Klin et al. 1977). However, highway noise can mask important vocal communication and natural sounds important for mate attraction, social cohesion, predator avoidance, prey detection, navigation, and other basic behaviors. Masking of vocal communication occurs when highway noise interferes with signal transmission by swamping out the signal or parts of the signal (e.g., low-amplitude elements of a song) or degrading the signal to a point at which it is no longer recognizable to other members of a species. When such masking or degradation occurs, the normal communication and associated biological functions of the species can be impaired. Depending on the degree of masking and the particular species' capacity to adapt (e.g., to sing louder), masking can potentially result in abandonment of an area or reduced productivity and survival. Signal masking may result in the inability of males to effectively attract mates and/or repel territorial rivals. Excess energy may be required to physically maintain a territory and to sing louder. Predator warning and parent-offspring signals can be impaired. All these factors could potentially result in reduced survival and reproductive success of affected populations adjacent to the highway.

Traffic noise associated with all the build alternatives could potentially mask vocal communication among some birds. These masking effects are highly species-specific and depend largely on the unique bioacoustics characteristics of each species' vocal signals. The potential impact on American bitterns (*Botaurus lentiginosus*) represents the greatest distance for possible masking effects (4.8 km [3 mi]; see Appendix E of the wildlife technical memorandum), but this species is only a rare summer visitant to the GSLE that has not been observed in the project study area. Other species such as black-necked stilts (*Himantopus mexicanus*), which are common breeders within the project study area, would only be minimally affected by traffic noise close to the highway (76 m [250 ft]; see Appendix E of the wildlife technical memorandum). For territorial songbirds such as Brewer's sparrows (*Spizella breweri*), noise

would have a potential masking effect at intermediate distances. A detailed analysis of noise impacts on individual species is presented in the wildlife technical memorandum.

Potential Effects of Highway Noise on Species of Concern

Nine bird species of concern (bald eagle [*Haliaeetus leucocephalus*], Swainson's hawk [*Buteo swainsoni*], peregrine falcon [*Falco peregrinus*], prairie falcon [*Falco mexicanus*], burrowing owl [*Athene cunicularia*], short-eared owl [*Asio flammeus*], Wilson's phalarope [*Phalaropus tricolor*], bobolink [*Dolichonyx oryzivorus*], and American avocet [*Recurvirostra americana*]) are known to breed in or near the project study area.[6] The potential effects on these species of highway noise that would result from the build alternatives are described in detail in the wildlife technical memorandum. Based on a minimal vocal signal amplitude analysis, the potential effects distance of highway noise for bird species of concern could extend from less than 38 m (125 ft) to much more than 915 m (3,000 ft) from the highway depending on existing noise conditions. For example, for male bobolinks to transmit their complete territorial song they would have to be farther than 900 m (2,953 ft) from the highway, depending on existing noise conditions, to enable unmasked transmission of minimal signals in those songs. Similarly, Wilson's phalaropes would need to be more than 600 m (1,968 ft) from the highway, depending on existing noise conditions, to ensure that their low-amplitude vocal signals could be transmitted to neighboring nesting phalaropes. Burrowing owls would need to be 305 m (1000 ft) or more from the highway, depending on existing noise conditions, to avoid noise masking of inter-territorial communication.

It is not known exactly how highway noise would affect the local density and reproductive capacity of individual species of concern currently using habitats in the project study area. Highly noise-sensitive species may leave the affected areas; others may experience reduced reproductive success due to poor communication or reduced ability to detect predators and potential prey. Published research on highway noise impacts on grassland bird species in acoustic habitat (Reijnen et al. 1995) similar to that found in the project study area shows reduced bird densities in response to traffic noise levels higher than 45 dB(A). Using the modeled 45-dB(A) contour line as an outward-limit benchmark of effects, the area potentially affected by noise from the proposed action could extend on average 4 km (2.5 mi) from the highway (Jones & Stokes 2005).

4.13.3.11 Human Disturbance

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, there would be no project-related change in the level of human disturbance in the project study area.

Future Conditions (2020)

If none of the build alternatives is implemented, proposed future development could increase the level of human disturbance in the project study area. Although the nature and extent of such effects are not known at this time, it is likely that these impacts would be similar to those described for the build alternatives below given the increase in residential development planned for the study area.

[6] Table 4.13-1 above lists the special-status species known to occur or potentially occurring in the project study area. Section 4.15, *Threatened and Endangered Species*, further discusses impacts on species listed, proposed for listing, or candidates for listing, under the federal Endangered Species Act, and species listed on the Utah Sensitive Species List as wildlife species of concern.

Build Alternatives

Access of humans and domestic pets to wildlife habitats adjacent to the highway could result in some level of habitat degradation and wildlife mortality. The existing design for the Legacy Parkway project includes three fences that would restrict access to sensitive wildlife areas and should minimize these effects. Localized disturbance from human use of the proposed trail corridor is also possible, but such adverse effects would likely be secondary to traffic noise effects. Alternative B, which crosses the largest extent of wetland habitats (Figure 4.13-5), is the alternative where human disturbance would probably cause the greatest wildlife disturbance, particularly when the lake level is high. Because Alternatives A and E are located in more upland alignments than Alternatives B and C, human disturbance in these locations would probably disturb wildlife to a lesser extent. However, many wildlife species, particularly shorebirds, use these upland areas. Fencing of the highway right-of-way and protection of the Legacy Nature Preserve would reduce human impacts under all build alternatives.

4.13.3.12 Potential Effects on Species of Concern

As described in Section 4.13.2.3, *Existing Wildlife in Project Study Area*, several species analyzed in this section are protected under one or more federal or state wildlife protection law (e.g, the federal Endangered Species Act, the Migratory Bird Treaty Act, the Fish and Wildlife Conservation Act, Utah Administrative Rule R657-48). Table 4.13-2 summarizes the seasonal occurrence and abundance, migratory and breeding status, and habitat use patterns of these species within the GSLE and the project study area. This information is also described in more detail in the wildlife technical memorandum.

No-Build Alternative

Existing Conditions

Under the existing conditions No-Build Alternative, there would be no project-related impacts on special-status species. Habitat use and seasonal occurrence of special-status species in the study area would remain similar to that represented in Table 4.13-2.

Future Conditions (2020)

As described in Section 4.13.3.1, even without construction of Legacy Parkway, reasonably foreseeable future land use changes would add to the historic loss of wildlife habitat. Table 4.13-5 illustrates the potential impact of future development on wetland/wildlife habitat, both with and without the proposed build alternatives. Future losses of wildlife habitat would likely adversely affect special-status species in the study area, although the relative extent is not known.

Build Alternatives

The principal potential effects on wildlife species of concern would be similar under all the build alternatives (Jones & Stokes 2005); specific impacts on such species are addressed in Sections 4.13.1 through 4.13.11 above. These effects could include direct loss of foraging habitat, disturbance of nesting sites, and masking of vocal communication near the highway. The magnitude of these effects would be proportional to the level that individual species use each habitat. The project could result in a reduction in population of some species of concern within the project study area, but the overall impact of these losses alone would not affect the long-term viability of any of these species in the GSLE.

The following discussion provides information on how the proposed action could affect habitats for species of concern, based on input received from USFWS, EPA, and UDWR. The information presented below and correspondence from USFWS reaffirms the terms and conditions in the original biological opinion (BO), formal Section 7 consultation under the federal Endangered Species Act (ESA) for the Legacy Parkway project (see letter dated December 3, 2003, in Appendix A). Projected losses of individual habitats under each build alternative are presented in Table 4.13-6. These effects are summarized below; more detailed analyses are presented in the wildlife technical memorandum. Effects on species listed, proposed for listing, or candidates for listing under the federal ESA and wildlife species of special concern on the Utah Sensitive Species List are further discussed in Section 4.15, *Threatened and Endangered Species*.

Federally Listed Species

Bald Eagle (Status: Threatened)

Breeding. One active nest exists in an artificial nesting structure on state-owned land (i.e., the proposed Legacy Nature Preserve) within about 1.6 km (1 mi) of the project study area. UDOT constructed the artificial nesting structure after the tree that the nesting pair had previously occupied was blown down. This is the only known nesting location in northern Utah, and one of only four known in the state (Utah Division of Wildlife Resources 2002). This nest is within about 1 km (0.6 mi) of a regularly traveled country road, and the nesting pair is accustomed to some degree of human noise and disturbance (U.S. Fish and Wildlife Service 1999a). If this nest is active in the future, the pair could experience some noise disturbance from construction and operation of the Legacy Parkway project. Such disturbance could result in temporary or permanent abandonment of the site by the nesting eagles, resulting in a loss of productivity of up to two eggs or young per year during the construction period, and possibly during operation (if the nest site is abandoned permanently) (U.S. Fish and Wildlife Service 1999a). However, many raptor species nest in close proximity to highways, and they appear to habituate to highway noise. The actual effects of highway noise on this nesting pair cannot be determined without onsite analysis, but the effects are expected to be similar under all build alternatives. The USFWS biological opinion for the proposed action concludes that seasonal restrictions on construction would protect the nesting pair of bald eagles. See Table 4.15-3 for a complete listing of the terms and conditions of the USFWS biological opinion specific to bald eagle.

Raptors are often killed as a result of collisions with moving vehicles. Bald eagles often forage on carrion, and they may be attracted to highway corridors to forage on carcasses of mule deer and other large mammals and birds. The Legacy Parkway project could provide an additional source of carrion and could increase the potential for bald eagle collisions with vehicles, especially for inexperienced juvenile birds. Raptor mortality along roadways in Utah is not well documented, but 15 eagles were reported killed in Carbon and Emery Counties in 1996 and 1997, probably due to collisions with coal trucks (U.S. Fish and Wildlife Service 1999a). Direct mortality effects on bald eagles would likely be the same under all build alternatives.

Wintering. Bald eagles are common winter visitors to the project study area. Four active roost sites exist at distances of 2.3 km (1.4 mi), 2.1 km (1.3 mi), 1.6 km (1.0 mi), and 0.2 km (0.1 mi) from the project study area boundary. Some of these roost sites could be disturbed or abandoned during construction of any build alternative. The roost sites within 1 km (0.6 mi) of the project study area would be the most likely to be adversely affected (U.S. Fish and Wildlife Service 1999a).

In the project study area, bald eagles primarily forage in the following habitats: sedge cattail, hydric meadow, mudflat/pickleweed, pasture, and salt desert scrub. All the build alternatives would result in direct loss and fragmentation of suitable bald eagle foraging habitat. Alternative A would result in 184.6

ha (456.2 ac) of habitat loss; Alternative B in 235.7 ha (582.4 ac); Alternative C in 207.1 ha (511.8 ac); and Alternative E in 190.8 ha (471.5 ac). These direct habitat losses would contribute to the cumulative reduction of foraging habitat for this species in the project study area. However, according to the regional land use dataset analysis (Table 4.13-6), these losses would affect less than 0.11 percent of the overall extent of these habitats in the regional study area.

Federally Delisted Species

Peregrine Falcon

Breeding. Two nesting eyries exist in the project study area in abandoned Common Raven nests on 345 kV electric power transmission support towers; the same nesting pair uses both nests (U.S. Fish and Wildlife Service 1999a). This nesting pair is accustomed to some disturbance because their eyries are within 1.6 km (1 mi) of I-15 and within 0.2 km (0.1 mi) of a dike that supports a well-traveled, unsurfaced road in the FBWMA (U.S. Fish and Wildlife Service 1999a).

Raptors may be killed by collisions with moving vehicles. Peregrine falcons may forage for bird prey along highway corridors. The overall proximity of the Legacy Parkway project to the existing eyries increases the potential for peregrine falcon collisions with vehicles, especially for inexperienced juvenile birds (U.S. Fish and Wildlife Service 1999a). Direct mortality effects on peregrine falcons would probably be the same under all build alternatives. See Table 4.15-3 for a complete listing of the terms and conditions of the USFWS biological opinion specific to peregrine falcon.

Wintering. In winter, peregrine falcons from northern breeding populations are rare transients in the GSLE (U.S. Fish and Wildlife Service 1999a). They primarily forage in the following habitats in the project study area: sedge cattail, hydric meadow, mudflat/pickleweed, pasture, salt desert scrub, and developed areas. All build alternatives would result in direct loss and fragmentation of suitable wetland and upland peregrine falcon foraging habitat at the same levels as those described above for bald eagle.

Wintering peregrine falcons forage over large areas and are not dependent on individual habitat patches that may be lost during highway construction. Regional growth projected to occur is likely to lead to further loss and fragmentation of existing peregrine falcon foraging areas. Direct impacts of the Legacy Parkway project would affect less than 0.26 percent of any of these habitats in the regional study area (Table 4.13-6). These losses would contribute to the overall cumulative reduction of suitable foraging habitat for this species in this area.

Federal Candidate Species

Yellow-Billed Cuckoo

Yellow-billed cuckoos (*Coccyzus americanus*) are rare migrants in the GSLE; they have low potential to occur in the project study area because of limited suitable riparian breeding habitat (Table 4.13-2). Bird surveys conducted between 1999 and 2003 within the area of the proposed Legacy Nature Preserve concluded that yellow-billed cuckoos are rare migrants in the regional study area (Utah Department of Transportation 2004).). Recent documentation of a yellow-billed cuckoo in a peregrine falcon nest in Salt Lake City, however, suggests that this species still migrates through the GSLE and all remnant riparian habitats, including those available in the project study area, could potentially provide suitable roosting and foraging habitat for yellow-billed cuckoos. All build alternatives would result in direct loss of less than 2.3 ha (5.6 ac) of riparian habitat (Figure 4.13-6). Howe (1986 in Hughes 1999) reported densities of yellow-billed cuckoo in appropriate habitat in New Mexico ranging from 1 to 15 pairs per ha (0.4 to 6.1 pairs per acre). In suitable habitat, the area lost to construction of the proposed action could potentially support one to several pairs of yellow-billed cuckoos. However, the riparian habitats in the project study

area, which include areas of sparsely distributed Russian olive trees (*Elaeagnus angustifolius*), is generally degraded and of low suitability for this species. As indicated by the low number of birds detected in regional surveys mentioned above, the affected area is not likely to provide good habitat for this species. The habitat losses caused by the proposed action are unlikely to have any adverse effects on this rare transient species.

Conservation Agreement Species

Northern Goshawk

Northern goshawks (*Accipiter gentilis)* have not been observed in the project study area. However, some studies on the seasonal movement and habitat use patterns suggest that goshawks could potentially use the project study area during the winter. Moreover, the project study area supports prey species that could sustain wintering individuals that move through the GSLE. The few wintering individuals that may occur in this region probably range over a large area with a variety of grassland and shrubland habitats. Direct habitat loss under any build alternative would not likely affect this species.

U.S. Fish and Wildlife Service Birds of Conservation Concern

Swainson's Hawk

Swainson's hawks are considered rare summer breeders in the project study area, where they have been known to nest in riparian habitat. They have been observed in the areas delineated by the proposed Legacy Parkway rights-of-way. Favorable foraging conditions are common in the agricultural areas (primarily alfalfa) in and adjacent to the project study area; other crops, such as sod, corn, and wheat, also provide foraging habitat. Alternatives A and E would result in direct loss of 1.6 ha (3.9 ac) of riparian habitat, Alternative B in the loss of 2.3 ha (5.6 ac), and Alternative C in the loss of 2.0 ha (4.9 ac) (Figure 4.13-6).

Reported nesting densities for Swainson's hawks in areas with either a mixture of native habitat and agriculture or a high diversity of irrigated crops include 30.23 pairs/100 km^2 (0.001 pair/ac) in central California (England et al. 1995 in England et al. 1997); 23.1 pairs/100 km^2 (0.0009 pairs/ac) in Hanna, Alberta (Schmutz 1987); 18.0 pairs/100 km^2 (0.0007 pairs/ac) in Kindersley, Saskatchewan (Houston in England et al. 1997); and 9.5 pairs/100 km^2 (0.0003 pairs/ac) in Los Medanos, New Mexico (Bednarz et al. 1990). In northeastern California, the overall density of Swainson's hawk territories was 20 pairs/100 km^2 (0.0008 pairs/acre), but varied from 5.7 pairs/100 km^2 (0.0002 pairs/ac) in irrigated pasture to 36.8 pairs/100 km^2 (0.0014 pairs/ac) in areas dominated by alfalfa (Woodbridge et al. 1995a in England et al. 1997). These data indicate that the riparian area that would be lost under any build alternative would support at most only one pair of Swainson's hawk. Site-specific surveys would be necessary prior to construction to determine if any active Swainson's hawk nest is present within the project study area and whether any build alternative would disturb that nest.

All the build alternatives would also result in a direct loss of foraging habitat for this species. Alternative A would result in 57.3 ha (141.7 ac) of cropland habitat loss; Alternative B in 100.1 ha (247.3 ac]); Alternative C in 47.7 ha (117.8 ac); and Alternative E in 52.3 ha (129.3 ac). Based on radiotelemetry survey data in central California, Swainson's hawks forage over areas ranging between 325 ha (800 ac) and 8,500 ha (21,000 ac) (approx. average 2,750 ha [6,800 ac]; Estep pers. comm.). The foraging area that would be lost under each build alternative would comprise approximately 0.2 to 31 percent of the foraging range of a single pair, depending on the available habitat in the project study area. Loss of this habitat would result in that pair shifting to new foraging areas in the GSLE. The Legacy Parkway project

would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6).

Ferruginous Hawk

Ferruginous hawks (*Buteo regalis)* have not been observed in the project study area but could potentially occur there while moving in or through the GSLE. Suitable habitats in the project study area include hydric meadow, mudflat/pickleweed, pasture cropland, and salt desert scrub. Ferruginous hawks could possibly occur in the same habitats as Swainson's hawks and would experience similar loss of foraging habitat under all the build alternatives. Although the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6), they would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Golden Eagle

Golden eagles (*Aquila chrysaetos*) are rare permanent residents of the GSLE and rare transients in the project study area. Their preferred foraging habitats in the GSLE could include hydric meadow, pasture, cropland, and salt desert scrub habitats. All the build alternatives would result in the direct loss of foraging habitat that could potentially be used by this species. Alternative A would result in 224.9 ha (555.8 ac) of habitat loss; Alternative B in 303.6 ha (750.1 ac); Alternative C in 228.4 ha (564.4 ac); and Alternative E in 216.0 ha (533.9 ac). In the western United States, golden eagles forage over home ranges that average 20 to 33 km^2 (2,000 to 3,300 ha [4,942 to 8,154 ac]) (Kochert et al. 2002). Resident pairs tend to maintain home ranges year-round, with shifts in intensity of use from breeding season to winter (Dunstan et al. 1978 in Kochert et al. 2002; Marzluff et al. 1997 in Kochert et al. 2002). Individuals do not use all areas within their home range equally, but concentrate activity within core areas (Platt 1984 in Kochert et al. 2002; Marzluff et al. 1997 in Kochert et al. 2002). In southwestern Idaho, core area contained 95 percent of locations of radio-tagged eagles, but only 14.4 percent of the breeding-season range and 25.3 percent of the non-breeding range (Marzluff et al. 1997 in Kochert et al. 2002). The low frequency of golden eagle occurrences in the project study area suggests that the birds that use this area are either residents with core territory areas elsewhere in the GSLE or are migrants moving through the area. The direct impacts of the Legacy Parkway project could affect 7.0 to 15.2 percent of one golden eagle home range, depending on its actual size, or small portions of several territories if they overlap. These impacts would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). The proposed action would not affect the long-term viability of this species within the GSLE but would contribute to the ongoing local and regional cumulative reduction of suitable foraging habitat for this species.

Prairie Falcon

Prairie falcons are rare permanent residents and breeders in the GSLE. They are occasionally seen foraging in the project study area, but they do not breed there (Table 4.13-1). Habitats most likely to be used by this species in the project study area are sedge cattail, hydric meadow, mudflat/pickleweed, pasture, cropland, and salt desert scrub. All the build alternatives would result in the direct loss of foraging habitat that could potentially be used by this species. Alternative A would result in 236.6 ha (584.6 ac) of habitat loss; Alternative B in 331.0 ha (817.9 ac); Alternative C in 249.4 ha (616.4 ac); and Alternative E in 232.5 ha (574.4 ac). The estimated home range of this species in southwestern Idaho is 108 to 315 km^2 (10,800 to 31,500 ha [26,690 to 77,840 ac]) (Dunstan et al. 1978 in Kochert et al. 2002; Marzluff et al. 1997 in Kochert et al. 2002). The direct impacts of the Legacy Parkway project could affect 0.7 to 3.1 percent of one prairie falcon home range, depending on its actual size and overlap with the project study area. For any alternative, this area would comprise less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). The proposed action would not affect the

long-term viability of this species within the GSLE, but would contribute to the ongoing local and regional cumulative reduction of suitable foraging habitat for this species.

American Golden-Plover

American golden-plovers (*Pluvialis dominica*) are rare migrants through the GSLE and have not been observed in the project study area (Table 4.13-1). However, they could occur in the project study area during migration, where they may occasionally forage in pasture, cropland, mudflat/pickleweed, and hydric meadow habitats. All the build alternatives would result in direct loss of foraging habitats that could potentially be used by this species. Alternative A would result in 174.5 ha (431.2 ac) of habitat loss; Alternative B in 278.9 ha (689.2 ac); Alternative C in 179.6 ha (443.9 ac); and Alternative E in 171.2 ha (422.9 ac). The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6), but they would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Snowy Plover

Snowy plovers (*Charadrius alexandrinus*) are common breeders in the GSLE, but they have not been observed in the project study area (Table 4.13-1). Their preferred breeding and foraging habitats (salt flats and mudflat/pickleweed habitats) are minor components of the project study area. Because salt flats are relatively abundant in the GSLE, the local snowy plover population is unlikely to be adversely affected by the loss of 2.5 to 12.9 ha (6.2 to 32.0 ac) of mudflat/pickleweed habitat. The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6), but they would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

American Avocet

American avocets occur regularly in the project study area (Table 4.13-1). In the project study area avocets nest in sedge cattail, hydric meadow, mudflat/pickleweed, and pasture habitats. Avocets forage in these habitats as well as in open water.. All the build alternatives would result in the direct loss of foraging habitats for this species. Alternative A would result in 130.0 ha (321.2 ac) of foraging habitat loss; Alternative B in 206.1 ha (509.3 ac); Alternative C in 140.6 ha (347.5 ac); and Alternative E in 132.6 ha (327.6 ac). The breeding density of American avocets in northern Utah has been estimated to be 16–28 pairs/ha (6–11 pairs/ac). If all the habitat area lost from construction of the proposed action were suitable for nesting (not including open water), Alternative A would result in the direct loss of nesting habitat for 1,828–3,433 pairs; Alternative B in the loss of habitat for 2,947–5,402 pairs, Alternative C in the loss of habitat for 2,077–3,807 pairs, and Alternative E in the loss of habitat for 1,908–3,498 pairs. However, because of the extensive distribution of suitable breeding habitat throughout the GSLE, the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats (Table 4.13-6). Assuming the available habitat was used by avocets at the density described above, the maximum loss of breeding habitat from any alternative (i.e., habitat for 1,828–5,402 pairs for Alternatives A and B, respectively) would affect only approximately 3.4 to 10.2 percent of the estimated 53,000 breeding American avocets in the regional study area (Paul et al. 1998b in Robinson et al. 1997). The loss of habitat resulting from any build alternative would reduce the local density of breeding birds within the project study area but would not notably affect the long-term viability of American avocets in the GSLE. The project would, however, contribute to the ongoing marked cumulative loss of breeding habitat for this species throughout the region.

Solitary Sandpiper

Solitary sandpipers (*Tringa solitaria*) have not been observed in the project study area (Table 4.13-1). Patton et al. (1992 in Moskoff 1995) reported only 19 records of this species visiting Great Salt Lake; Point Reyes Bird Observatory (1995 in Moskoff 1995) recorded only three occurrences during fall migration in 1994 and 1995. Although they are unlikely to occur in the project study area in any given year, individuals may occasionally forage in emergent wetlands, shallow streams, and pools within riparian corridors, mudflat/pickleweed, and hydric meadow habitats. All the build alternatives would result in the direct loss of foraging habitats that could potentially be used by this species. Alternative A would result in 42.9 ha (106.0 ac) of habitat loss; Alternative B in 71.4 ha (176.4 ac); Alternative C in 62.8 ha (155.1 ac); and Alternative E in 48.5 ha (119.9 ac). The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). Because of the low frequency of use of the project study area by solitary sandpipers, it is unlikely that loss of foraging habitat resulting from any build alternative would affect the long-term viability of this species in the GSLE, but such loss would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Whimbrel

Whimbrels (*Numenius phaeopus*) are rare transients in the GSLE and have not been observed in the project study area (Table 4.13-1). Although they are unlikely to occur in the project study area in any given year, individuals may occasionally forage in pasture, cropland, mudflat/pickleweed, and hydric meadow habitats. All the build alternatives would result in the direct loss of foraging habitats that could potentially be used by this species. Alternative A would result in 174.5 ha (431.2 ac) of habitat loss; Alternative B in 278.9 ha (689.2 ac); Alternative C in 179.6 ha (443.9 ac); and Alternative E in 171.2 ha (422.9 ac). The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). Because of the low frequency of use of the project study area by whimbrels, it is unlikely that loss of foraging habitat resulting from any build alternative would affect the long-term viability of this species in the GSLE, but such loss would contribute to the ongoing local and regional cumulative reduction of foraging habitat for this species.

Long-Billed Curlew

Although breeding long-billed curlews (*Numenius americanus*) have not been observed in the project study area, occurrences of migrants have been documented (Table 4.13-1). They may forage in hydric meadows, mudflat/pickleweed, and areas within salt desert scrub habitat. All the build alternatives would result in the direct loss of breeding and foraging habitats that could potentially be used by species. Alternative A would result in 85.1 ha (210.4 ac) of habitat loss; Alternative B in 81.4 ha (201.2 ac); and Alternative C in 114.4 ha (282.6 ac); and Alternative E in 88.7 ha (219.1 ac). The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). As with other transient shorebirds that use the project study area, it is unlikely that loss of foraging habitat resulting from any build alternative would affect the long-term viability of long-billed curlews in the GSLE, but such loss would contribute to the ongoing local and regional cumulative reduction of foraging habitat for this species.

Marbled Godwit

Marbled godwits (*Limosa fedoa*) are rare migrants in the project study area (Table 4.13-1). They forage in mudflat/pickleweed, shallow open water, cropland, pasture, and hydric meadow habitats. All the build alternatives would result in the direct loss of foraging habitats that could potentially be used by this species. Alternative A would result in 178.2 ha (440.3 ac) of habitat loss; Alternative B in 286.3 ha (707.4 ac); Alternative C in 180.2 ha (445.3 ac); and Alternative E in 175.1 ha (432.6 ac). The habitat losses

associated with all alternatives, however, would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). This change would result in local loss of foraging habitat for this species in the project study area; it would not affect the long-term viability of this species in the GSLE, but it would contribute to the ongoing regional cumulative reduction of suitable foraging habitat for this species.

Sanderling

Sanderlings (*Calidris alba*) have not been observed in the project study area (Table 4.13-1), but could occasionally use the area. Because their foraging habitat (mudflat/pickleweed) is a minor component of the project study area and this habitat is relatively abundant in the regional study area, sanderlings are unlikely to be adversely affected by the loss of 2.5 to 12.9 ha (6.2 to 32.0 ac) of habitat. The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6), but they would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Wilson's Phalarope

Wilson's phalaropes are rare breeders and uncommon migrants in the project study area (Table 4.13-1). They nest in hydric meadow habitat and forage there and in open water, sedge cattail, and mudflat/pickleweed habitats. All the build alternatives would result in the direct loss of breeding and foraging habitats that could potentially be used by this species. Alternative A would result in loss of 29.7 ha (73.3 ac) of breeding habitat loss; Alternative B in 41.7 ha (103.0 ac); Alternative C in 39.7 ha (98.1 ac); and Alternative E in 30.6 ha (75.6 ac). Very little information is available on nesting densities of this species. Estimated nest densities in an ephemeral wetland in Saskatchewan varied between 0 and 1.1 breeding pairs/ha (0.445 pairs/ac) and between 0.55 and 1.1 pairs/ha (0.22 and 0.44 pairs/ac) in a permanent wetland (Colwell and Jehl 1994). Assuming that hydric meadow habitat in the project study area is wet during the breeding season, Alternative A would result in potential loss of habitat for 16.3 to 32.7 pairs; Alternative B in the loss of habitat for 22.9 to 45.9 pairs; Alternative C in the loss of habitat for 21.8 to 43.7 pairs; and Alternative E in the loss of habitat for 16.8 to 33.7 pairs. The impact of the proposed action on the regional population of Wilson's phalaropes within the GSLE, however, would be small. In July, the Wilson's phalarope staging population at Great Salt Lake frequently comprises more than a third of the world's population, varying between 54,000 (1984) and 603,333 (1991) individuals (Aldrich and Paul 2002). A large number of these birds breed in the regional study area. On a regional scale, the hydric meadow habitat in the project study area comprises only 0.052 to 0.88 percent of the potential breeding habitat available to Wilson's phalaropes within the regional study area (Table 4.13-6).

Alternative A would result in 45.0 ha (111.2 ac) of foraging habitat loss; Alternative B in 76.5 ha (189.0 ac); Alternative C in 61.3 ha (151.6 ac); and Alternative E in 50.9 ha (125.8 ac). Because Wilson's phalaropes are highly gregarious and social throughout the year, they often concentrate in large numbers while foraging. These foraging habitat losses would likely result in shifts of foraging areas for local populations of birds using the project study area, which would contribute to the marked cumulative reduction of suitable foraging habitat. However, on a regional level, the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of Wilson phalarope foraging habitats in the regional study area (Table 4.13-6).

Burrowing Owl

Burrowing owls have been observed in the project study area (Table 4.13-1), where suitable habitats include dry mudflat/pickleweed, pasture, cropland, salt desert scrub, urban fields, and freeway right-of-way. They nest in crevices and burrows, especially those excavated by red fox and badgers. They breed and forage primarily in pasture, salt desert scrub, and cropland (along edges) habitats as well as on dikes

and islands in water impoundments. All the build alternatives would result in the direct loss of breeding and foraging habitats for this species. Alternative A would result in 195.3 ha (482.5 ac) of habitat loss; Alternative B in 261.9 ha (647.1 ac); Alternative C in 188.7 ha (466.2 ac); and Alternative E in 185.5 ha (458.3 ac). Radiotelemetry studies of burrowing owl movement patterns in central Saskatchewan showed that home range size varied from 0.14 to 4.81 km^2 (14 to 48.1 ha [34.6 to 118.9 ac]). Assuming similar spatial requirements for burrowing owls in the regional study area, Alternative A would remove habitat sufficient to support 3.6 to 13.9 pairs, Alternative B would remove habitat for 5.4 to 18.7 pairs, Alternative C would remove habitat for 3.9 to 13.5 pairs, and Alternative E would remove habitat for 3.8–13.2 pairs. The population size of burrowing owls in the regional study area is unknown, but the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of suitable habitats in the regional study area (Table 4.13-6). Such losses would contribute to a cumulative reduction of suitable foraging habitat for this species in the area.

This species is generally declining in many areas throughout the western U.S. (Haug et al. 1993). Vehicle collision is a major source of mortality. If the proposed action were to traverse existing burrowing owl habitat, road mortality would likely increase. Moreover, highway alignments can provide travel corridors for a variety of native and nonnative predators, including introduced foxes, which can have severe local effects on burrowing owl populations.

Loggerhead Shrike

Loggerhead shrikes (*Lanius ludovicianus*) are uncommon year-round residents in the GSLE and have not been observed in the project study area (Table 4.13-1). Suitable natural habitats in the project study area include riparian corridors, pasture, and salt desert scrub. All the build alternatives would result in the direct loss of breeding and foraging habitats that could potentially be used by this species. Alternative A would result in 139.5 ha (344.7 ac) of habitat loss; Alternative B in 164.1 ha (405.4 ac); Alternative C in 143.0 ha (353.4 ac); and Alternative E in 134.7 ha (332.8 ac). Reported territory sizes of loggerhead shrikes vary from 4.6 to 25 ha (10.4 to 62 ac) (Yosef 1996). Assuming comparable territory sizes in the regional study area, Alternative A would remove habitat sufficient to support 1 to 28 territories; Alternative B would remove habitat for 6.6 to 35.7 territories, Alternative C would remove habitat for 5.7 to 31 territories, and Alternative E would remove habitat for 5.4 to 29.3 territories. The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6) and would not affect the long-term viability of this species in the GSLE. However, such impacts would contribute to the marked ongoing cumulative reduction of suitable foraging habitat for this species.

Virginia's Warbler

Virginia's warblers (*Vermivora virginiae*) have not been observed in the project study area (Table 4.13 1). They are found during migration in riparian and some scrub (with large, tall shrubs) habitats that have high densities of insects. Potential habitat in the project study area includes riparian corridors, salt desert scrub, and urban shrub (developed). Virginia's warblers have low potential to occur in the project study area because of the limited extent of riparian habitat and the low stature of the shrubs in the salt desert scrub habitat (Table 4.13-1). All the build alternatives would result in direct losses of less than 2.3 ha (5.6 ac) of suitable habitat; these losses are unlikely to have any adverse effects on this species.

Brewer's Sparrow

Brewer's sparrows are rare summer visitants in the project study area (Table 4.13-1). They breed in shrub steppe habitats and are found during migration in riparian and scrub habitats. Suitable habitats within the project study area include riparian, hydric meadow, mudflat/pickleweed, pasture, cropland, salt desert scrub, and urban shrub (developed). All the build alternatives would result in the direct loss of breeding

and foraging habitats that could potentially be used by this species. Alternative A would result in 229.0 ha (565.9 ac) of habitat loss; Alternative B in 313.3 ha (774.3 ac); Alternative C in 243.3 ha (601.3 ac); and Alternative E in 224.2 ha (553.9 ac). Breeding season densities of Brewer's Sparrows can be highly variable between years, ranging from 50 to 350 individuals/km^2 (0.5 to 3.5 individuals/ha [0.2 to 1.4 individuals/ac]) (Weins and Rottenberry 1985 in Rottenberry et al. 1999) in southeast Oregon. In southeast Idaho, densities ranged from 116 to 192 individuals/km^2 (1.16 to 1.92/ha [0.47 to 0.78/ac]) (Oetersin and Best 1897 in Rottenberry et al. 1999); and in central Oregon, densities ranged from 111 to 277 individuals/km^2 (1.11 to 2.77/ha [0.45 to 1.12/ac]) (Rottenberry et al. 1999). Assuming an approximate density of 2.47 individuals/ha [1 individual/ac] for populations in the project study area, the habitat losses listed above could theoretically result in loss of habitat sufficient to support 554 to 774 brewer's sparrows. However, the existing habitat in the project study area is not sufficient to support such a density of birds. Moreover, because this species has been documented only as a rare summer visitant, these estimates are clearly extreme. Accordingly, the proposed action would likely have only a small effect on this species.

Additionally, the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-7). The proposed action would therefore not affect the long-term viability of this species in the GSLE. It would, however, contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Utah Division of Wildlife Resources Wildlife Species of Concern

American White Pelican

American white pelicans (*Pelecanus erythrorhynchus*) are rare summer visitants to the project study area (Table 4.13-1). All the build alternatives would result in the direct loss of small areas of potential foraging habitat (i.e., open water) for this species. Alternative A would result in 3.7 ha (9.1 ac) of habitat loss; Alternative B in 7.4 ha (18.2 ac); Alternative C in 0.6 ha (1.4 ac); and Alternative E in 3.9 ha (9.6 ac). The direct impacts of the Legacy Parkway project would be minimal on this species, affecting less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). However, these changes would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Short-Eared Owl

Short-eared owls are uncommon breeders in the project study area (Table 4.13-1). In the project study area, they are likely to be found in sedge cattail, hydric meadow, mudflat/pickleweed, pasture, cropland, and salt desert scrub habitats. All the build alternatives would result in the direct loss of breeding and foraging habitats that could potentially be used by this species. Alternative A would result in 236.6 ha (584.6 ac) of habitat loss; Alternative B in 331.0 ha (817.9 ac); Alternative C in 249.4 ha (616.4 ac), and Alternative E in 232.5 ha (574.4 ac). This species exhibits considerable variation in the size of breeding territories (Holt and Leasure 1993); territories range from 20 to 121 ha/pair (49 to 299 ac/pair) in North American populations (Holt and Leasure 1993). If short-eared owls in the GSLE exhibit the same range, the proposed action would potentially result in loss of habitat sufficient to support 3 to 16 breeding pairs of short-eared owls. Sighting records in the project area suggest that the number of owls that would be affected by the proposed action would fall near the lower end of this range. The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6). The proposed action is not likely to affect the long-term viability of this species within the GSLE, but it would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

Bobolink

Bobolinks have occasionally been observed in agricultural fields at the northern end of the project study area near the FBWMA (Table 4.13-1). All the build alternatives could result in the direct loss of some breeding and foraging habitats for this species, but site-specific habitat use information for this species is not available for the project study area. Preconstruction surveys in this area would therefore be necessary to determine whether any build alternative could disturb active bobolink nests (Federal Highway Administration et al. 2000).

Preble's Shrew

Because habitats similar to those supporting Preble's shrews (*Sorex preblei*) are present, the species may occur in hydric meadow habitat in the project study area. All the build alternatives would affect such habitat. Alternative A would result in 29.7 ha (73.3 ac) of habitat loss; Alternative B in 41.7 ha (103.0 ac); Alternative C in 39.7 ha (98.1 ac); and Alternative E in 30.6 ha (75.6 ac). Because no information is currently available on the density of this species in different habitats, it was impossible to estimate the number of shrews that could potentially be affected by the proposed action. However, the direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of habitats potentially suitable for Preble's shrew in the regional study area (Table 4.13-6).

Spotted Bat

Like many species of arid-land bats, spotted bats (*Euderma maculatum*) take their insect prey on the wing. For this reason, these aerial foragers are not tied to any specific habitats in the project study area, and direct habitat losses probably would not have any adverse effects on this species. Spotted bats could benefit from the artificial lighting that is proposed under all the build alternatives because the lighting would attract and concentrate aerial insects, potentially reducing the energetic costs of foraging for some individuals.

Townsend's Big-Eared Bat

While no studies have been conducted, it is likely that Townsend's big-eared bats (*Plecotus townsendii*) frequents suitable foraging habitat around the lake, including the project study area. Like many species of arid-land bats, Townsend's big-eared bats take their insect prey on the wing. For this reason, these aerial foragers are not tied to any specific habitats in the project study area, and direct habitat losses would probably not have any adverse effects on this species. Townsend's big-eared bats could benefit from the artificial lighting that is proposed under all the build alternatives because the lighting would attract and concentrate aerial insects, potentially reducing the energetic costs of foraging for some individuals.

Kit Fox

Great Salt Lake is located on the northeastern edge of the known distribution of kit fox (*Vulpes macrotis*) (Zevellof and Collett 1988). Kit foxes are found throughout Utah in desert and semiarid regions with flat shrub or shrub-grass communities with little ground cover. Where these foxes occur in the Great Basin, shadscale, greasewood, and sagebrush communities are common. Major prey items include desert rodents, jackrabbits, cottontail rabbits, groundnesting birds, reptiles, and insects.

Due to limited suitable habitat along the Wasatch Mountains in the vicinity of the project study area, kit foxes are considered extremely rare and have a low probability of occurring there. If they do occur in the project study area, they are most likely to frequent salt desert scrub habitats. All the build alternatives could result in the direct loss of suitable habitat that could potentially be used by this species. Alternative A would result in 52.9 ha (130.8 ac) of habitat loss; Alternative B in 32.2 ha (79.6 ac); Alternative C in 61.7 ha (152.5 ac); and Alternative E in 51.5 ha (127.2 ac). The direct impacts of the Legacy Parkway

project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area (Table 4.13-6), but the Legacy Parkway project would contribute to the local and regional cumulative reduction of suitable foraging habitat for this species.

4.13.3.13 Cumulative Impacts

Historic land use changes within the GSLE have significantly reduced available wildlife habitat for migratory birds and other species, both around Great Salt Lake and within the project study area, as described in the bullet items below.

- An estimated 58 percent of historic wetland/wildlife habitat in the GSLE (159,439ha [393,980 ac] of 274,633 ha [678,630 ac]) has been lost to past activities, primarily due to agriculture and urban development.

- In the Ogden and Jordan River hydrologic units combined, where the proposed action is located, approximately 66 percent of historic wetland/wildlife habitat (57,374.13 ha [141,774 ac] of 86,664 ha [214,150 ac]) has been lost.

Reasonably foreseeable future habitat loss, including that attributable to the proposed build alternatives, would result in a marked reduction in the amount of remaining natural habitat in the project study area. The combined effects of the proposed Legacy Parkway and projected land development would reduce availability of wildlife habitat within the project study area. At higher lake elevations, the combined effects of lake level, future proposed build-out independent of the project, and the proposed Legacy Parkway would leave little habitat available for wildlife within the project study area. Table 4.12-7 illustrates the effects that changes in the level of Great Salt Lake have on the availability of wetland functions and habitat in the Legacy Nature Preserve.

Adverse direct and indirect effects on wildlife habitat resulting from the proposed action when combined with historic wildlife habitat impacts and other future development impacts not related to the proposed action would contribute to declines in the local numbers of wildlife species, including migratory birds. In addition, cumulative traffic noise from Legacy Parkway and other roads developed in conjunction with future construction projects could potentially affect the behavior and reproductive capacity of various migratory bird species within the project study area and vicinity. As noted in Section 4.1.2.1, *Current Land Use and Development Trends in the Study Area*, Davis County will continue to be converted to residential, industrial, and commercial uses at a rate of approximately 283 ha (700 ac) a year. For purposes of projecting cumulative impacts on wildlife, it is assumed that all wildlife habitat in the project study area east of the proposed Legacy Parkway alignments would be lost to development but most of the wildlife habitat west of the alignments would be retained, either in the Legacy Nature Preserve or in other public and private (such as gun club) uses. Although any proposed build alternative would contribute to cumulative effects on wildlife habitat loss, the area of wildlife habitat affected by direct habitat loss is small—approximately 0.1 percent of the total amount of wildlife habitat available throughout the regional study area. A detailed discussion of these effects by hydrologic unit is presented in Section 3.11.4, *Cumulative Effects Analysis Summary*, of the wildlife technical memorandum. Highway noise effects would affect a larger area, approximately 1.3 percent of existing wildlife habitat in the regional study area. Loss or degradation of these areas and biological functions (reproductive capacity of birds affected by noise) would add to the cumulative historic and foreseeable future habitat loss and associated impacts on wildlife in the GSLE. These impacts alone, however, would not likely affect the long-term viability of any wildlife species in the GSLE. In addition, creation and maintenance of the Legacy Nature Preserve, as proposed under Alternative E, would result in the preservation of 849 ha (2,098 ac) of important wildlife habitat in perpetuity in an area that would otherwise likely be lost to development. The reasonably

foreseeable effect of this action would be to mitigate some of the population declines that would likely occur without it.

4.13.3.14 Mitigation Measures

This section provides a description of mitigation measures to compensate for wildlife impacts that would result from implementation of the proposed action. The Final EIS originally proposed compensatory mitigation for impacts associated with Alternative D (Final EIS Preferred Alternative) in the form of a Legacy Nature Preserve (Preserve) encompassing approximately 506 ha (1,251 ac) of land. This Preserve, which was later expanded as described below, would mitigate project impacts through restoration and preservation of wildlife habitat within the proposed Preserve area. As described in the Final EIS and Section 4.12.3.4, *Mitigation Measures*, of this document, the total mitigation area of the Preserve proposed by UDOT and approved by the Corps and FHWA for Alternative D (Final EIS Preferred Alternative) was 849 ha (2,098 ac). This includes 315 ha (778 ac) of wetland/riparian habitat (i.e., sedge cattail, mudflat/pickleweed, open water, riparian, and hydric meadow habitats); 532 ha (1,315 ac) of upland habitat (i.e., croplands, pasture, and scrub habitats); and 2 ha (5 ac) of developed land. The size and configuration of the Legacy Nature Preserve would be the same under Alternative E (Supplemental EIS Preferred Alternative). The location and size of the Preserve associated with Alternatives A, B, or C would be determined through consultation with the regulatory agencies if one of those alternatives were selected for construction, as described in Section 4.12.3.4, *Mitigation Measures*, of this document.

The total amount of land designated for the Preserve mitigation (see Section 4.12, *Wetlands*) was determined in three stages. In the first stage, 506 ha (1,251 ac) were identified as suitable mitigation during the preparation of the Draft EIS. It was based on the amount of land needed to mitigate the loss of wetland function based on the analysis using the wetland functional assessment models, as well as on an evaluation of wildlife habitat needs. During the preparation of the Final EIS, an additional 126 ha (317 ac) were added at the request of USFWS to mitigate impacts on wildlife that were not captured by the wetland functional assessment models and Draft EIS analysis. In the final stage, during the preparation of the Record of Decision (ROD) by the Corps, another 217 ha (530 ac) were added to the mitigation package to address concerns expressed by EPA regarding a potential for unquantified indirect impacts on wetlands and wildlife resulting from the selected build alternative. The extra 126 ha (317 ac) and 217 ha (530 ac) were acquired specifically because they adjoin Great Salt Lake and would serve as a buffer to the lake and the FBWMA.

Wildlife Benefits of Legacy Nature Preserve

The following describes the wildlife benefits that would be derived from the Legacy Nature Preserve. Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation*, provides a detailed analysis of the effectiveness of the proposed mitigation to replace wetlands and wildlife functions that would be lost or reduced by implementation of the proposed action.

Habitat Preservation

The primary mitigation for impacts on wildlife would be to restore and protect in perpetuity 849 ha (2,098 ac) of wildlife habitats in the project study area. These lands are an integral part of the wetland and associated upland habitat complexes along the eastern shore of Great Salt Lake that provide foraging and staging habitat for millions of migratory waterfowl and shorebirds each year. These lands also provide nesting habitat for many species. These habitats have been affected by past development and are at risk from future development. Most of the land within the project study area has been degraded ecologically

by agricultural, urban and industrial development, and other land use changes. These areas face continued threats from future urban growth and development in and to the west of the study area. The Final EIS disclosed that open space in Davis County was being developed at the rate of approximately 280 ha (700 ac) per year, and at that rate, most of the study area, including land now within the Legacy Nature Preserve, would be developed by 2020. This rate of development has not changed since the Final EIS (Sommerkorn pers. comm. [a]). Preservation of these lands would offset the historic and projected future cumulative loss of wetlands in the GSLE.

Habitat Restoration and Enhancement

In addition to preservation, the mitigation plan, as approved in the ROD, states that the Preserve would be managed to enhance its wildlife values. Restoration and enhancement measures would restore some of the wetland and wildlife habitat functions lost due to past land use changes. Incompatible land uses that have degraded the wildlife habitats include extensive use of all-terrain vehicles (ATVs), especially in the northern properties; over grazing; cultivated cropping; uncontrolled access by domestic pets, including feral cats and dogs; dumping of trash; and filling of wetlands. Also, in many areas the natural hydrology had been altered by farming and water development practices. Old channels and sloughs of the Jordan River were cut off from the main stem when levees prevented the river from overflowing into its historic floodplain.

Habitat restoration and enhancement measures proposed in the mitigation plan include removing roads, reseeding upland areas, leaving berms in certain areas in the southern portion of the Preserve, plugging tile drains, removing interior fences, removing utilities, and restoring hydrology to previously destroyed wetlands. Other activities to be implemented that would enhance habitat quality in the Preserve include controlling human disturbance, such as removing grazing; developing and implementing a noxious and/or invasive plant control plan; and managing water flows. A complete discussion of wetland restoration and enhancement appears in Section 4.12, *Wetlands*. In addition, a description of how these habitat restoration and enhancement efforts directly address specific impacts on wildlife is presented in Section 3.4, *Mitigation Goals and Objectives*, of Appendix F.

UDOT is committed to restoring and enhancing wetland/riparian and upland habitats in the mitigation area to ensure that they provide high wildlife value. Management for wildlife that use the Preserve would focus on enhancing and maintaining the mitigation property wetlands and uplands to maximize their use by the diverse array of migratory species currently inhabiting the regional and project study areas.

Mitigation for Habitat Loss

As described in Section 4.13.3, *Environmental Consequences*, construction of any proposed build alternative would result in direct loss of wildlife habitat in the project right-of-way. The extent and character of these losses would be a function of the location of the alignment within the matrix of habitats in the project study area. Under Alternative E, the Legacy Nature Preserve would compensate for direct impacts of the project by preserving and restoring more than four times as much wetland habitat and more than twice as much upland habitat than would be affected by the alternative)[7]. The Legacy Nature Preserve would encompass 315 ha (778 ac) of wetland/riparian habitat and 532 ha (1,315 ac) of upland habitat, which would offset the direct loss of 52 ha (129 ac) of wetland/riparian habitat and 186 ha (458 ac) of upland habitat.

[7] As noted above, the size and configuration of the Legacy Nature Preserve associated with Alternatives A, B, and C would be determined through consultation with the state and federal regulatory agencies if one of those alternatives were selected for construction.

As described above, in the absence of these mitigation lands, most of this area could be developed in the future and would result in a regional loss of potential high-quality wildlife habitat. Therefore, placing these lands in a preserve also prevents other foreseeable future cumulative impacts from occurring and preserves a large portion of the wildlife habitats identified as critical protection areas in the Davis County Wetlands Conservation Plan (Figure 4.13-12).

Effects of Lake Level Change on Availability of Wildlife Habitats in Legacy Nature Preserve

Figures 4A and 4B in Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation*, illustrate that the Preserve is also subject to natural cyclic inundation from changes in lake level. As illustrated in those figures, the types and quantity of wildlife habitat available in the Preserve is conditional on the prevailing level of the lake. As the lake level rises, terrestrial habitat converted to open saline water is no longer available to wildlife that formerly used it (e.g., 37 percent of the Preserve would be inundated at lake levels up to 4,212 ft). Species using the mitigation area would be forced to use more limited habitats closer to the highway and would potentially be increasingly subject to highway mortality and reduced habitat quality. At higher lake levels when the lake inundates most of the Preserve, those species would be displaced to other areas outside the Preserve, either within the GSLE basin or elsewhere. As lake levels recede, habitats would change.

The dynamic inundation-regrowth nature of the wildlife habitats in the proposed Preserve does not match that of the more constant ecological conditions of the upland habitats that would be lost under the build alternatives. However, the Preserve would provide large areas of quality habitat for long periods between inundation events that would be used by many species of wildlife. During high lake level periods, regional precipitation conditions that contributed to the rise in lake level are also likely to result in the "greening" of formerly dry areas around the GSLE basin and other areas along traditional wildlife migratory corridors. These areas would provide alternate refuge and stopover areas for many migrating species that would potentially use the Preserve.

It is not known how the regional dynamics of habitat availability would affect species displaced from the Preserve by high water. However, the mitigation area has significant value in preserving key habitats for these species during low lake level periods and in preserving an important part of the natural GSLE cycle.

Mitigation for Habitat Fragmentation

As described in Section 4.13.3, *Environmental Consequences*, construction of any build alternative of the Legacy Parkway project would transect the matrix of wildlife habitats in the project study area. This would result in fragmentation of existing wetland/riparian and upland habitats into smaller patches that could reduce the local carrying capacity for some species. Other possible effects of habitat fragmentation include reduced connectivity between habitat patches; increased "edge" effects; and possible dispersal barriers for some species.

The Preserve would compensate for many of these fragmentation effects by restoring and enhancing much of the existing degraded and fragmented habitat within the proposed Preserve area. The Legacy Nature Preserve would be managed to maintain large and contiguous wildlife habitat areas with low levels of human disturbance. Most wildlife species currently found there should benefit from an increased carrying capacity resulting from habitat enhancement and reversed fragmentation restoration efforts that would create a more contiguous habitat area

Mitigation for Noise Impacts on Wildlife

Based on best available information on biological impacts of highway noise on wildlife, it is likely that noise-sensitive species adjacent to the proposed build rights-of-way would either move away from the disturbance area or remain and adapt to the extent they are able, with some reductions in local population densities and species diversity. More noise-tolerant species could replace noise-sensitive species in some areas. However, the overall impact of noise on wildlife resulting from the proposed action is not expected to jeopardize the long-term viability of any species that currently use the project study area. The Preserve would mitigate adverse biological effects of highway noise through habitat enhancement that would increase the productivity of wildlife species affected by the proposed action. By improving habitat conditions (food availability, shelter from disturbance and predation), the carrying capacity of many of these species would likely increase, thereby offsetting in part the predicted population declines of these species adjacent to the proposed highway.

As additional mitigation for unquantifiable impacts on bird populations from project noise, UDOT has committed to fund a study to determine the effects of highway noise on bird populations in the project area and comparable habitats. Because there are currently no accepted methods for assessing impacts and mitigation requirements for wildlife impacts resulting from highway noise, the lead agencies have determined that a study to develop such a methodology would be appropriate mitigation for this project. The study, which is being collaboratively designed by the federal lead agencies, UDOT, USFWS, and UDWR, will include the monitoring of bird populations and noise before, during, and after construction of the highway. The results of the monitoring will be used to develop a tool for the analysis of noise impacts on wildlife for future projects. A statement of commitment outlining the specifics of the noise study, and signed by the federal lead agencies, UDOT, and the resource agencies, is included in Appendix H, *Statement of Commitment*. The Preserve would also create a distance and noise buffer of undeveloped habitat for some habitat areas west of the proposed highway alignment, including sensitive wildlife areas such as parts of the FBWMA and wetlands west of the project that are managed by local duck clubs. The Preserve would also exclude development and its associated noise in the proposed mitigation area.

Effects of Highway Noise on Quality of Habitat in the Legacy Nature Preserve

Because the Preserve is in close proximity to the proposed action, highway noise would affect wildlife within the Preserve. Under existing conditions, as estimated by the traffic noise model (Figure 4.13-14), the Preserve area is subject to noise levels mostly below 50 dB, with smaller areas closest to I-15 experiencing noise in the 50–55 dB range (Figures 4.13-14 and 4.13-15). With implementation of the Legacy Parkway project, large areas of the Preserve would potentially be subject to higher noise levels (up to >60 dB) (Figures 4.13-14 and 4.13-16). Figure 4.13-17 shows the net area (i.e., change) of each habitat that would be affected by highway noise compared to existing conditions. This figure shows increases of areas in higher noise level contours (50–>60 dB), as well as a decrease in the extent of areas currently within the 45–50 dB contour.

This noise disturbance would affect wildlife species in the same manner as described in Section 4.13.3.10. Noise-sensitive species would either move away from the disturbance or stay and adapt to the extent they are able, with potential reductions in survival rates and/or reproductive success. These impacts could affect the proposed habitat enhancement benefits for parts of the Preserve, as described above, particularly parts of the Preserve adjacent to the highway. The proposed monitoring program would provide quantitative information on the nature of these noise impacts in the Preserve. Implementation of specific adaptive management actions identified by the initial monitoring program described above can be equally applied to mitigate the compounding effects of noise impacts within the Preserve. The wildlife technical memorandum describes these effects in greater detail.

Other Mitigation Measures to Protect Wildlife Habitat

Under all build alternatives, the following measures to minimize wetland and wildlife habitat impacts would be implemented during project construction and would be incorporated into the final project design.

- Culverts would be placed under the highway within the Corps floodplain boundary to maintain hydrologic connections between the east and west sides of the parkway during high lake levels.
- Surface water conveyance and groundwater conveyance structures would be installed wherever existing hydrologic connections or wetlands are present. The roadway design has been modified to lower the embankment height in non-floodplain areas to further minimize the minor effect of soil compaction on the subsurface water table.
- Best management practices (BMPs) would be employed to limit the amount of eroded sediment and other materials that leave the right-of-way.
- Vegetated filter strips would be constructed to remove pollutants from highway runoff.
- .Native vegetation would be used, as much as possible, for artificial landscaping.

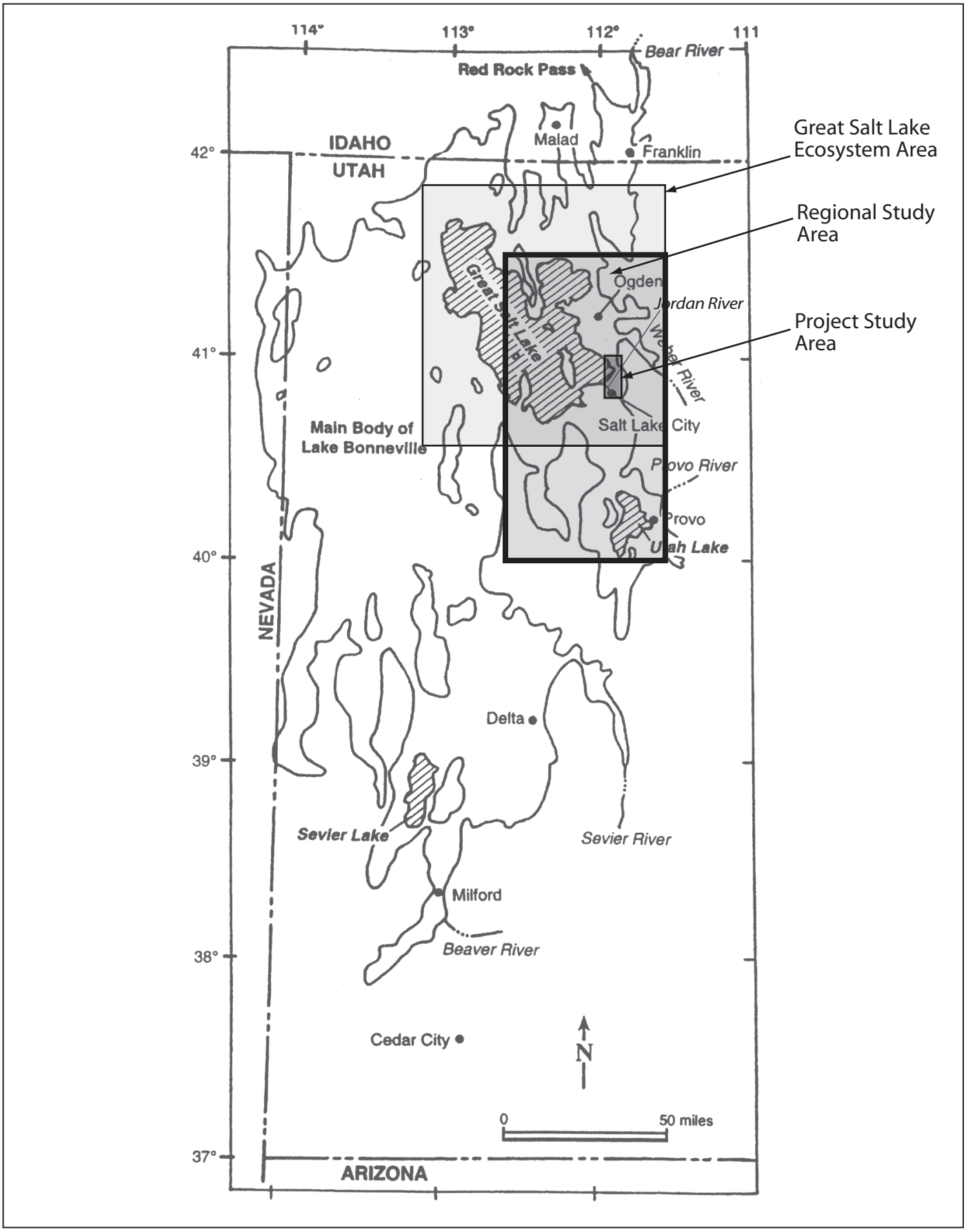

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Figure 4.13-1
Location of Great Salt Lake in Lake Bonneville Basin

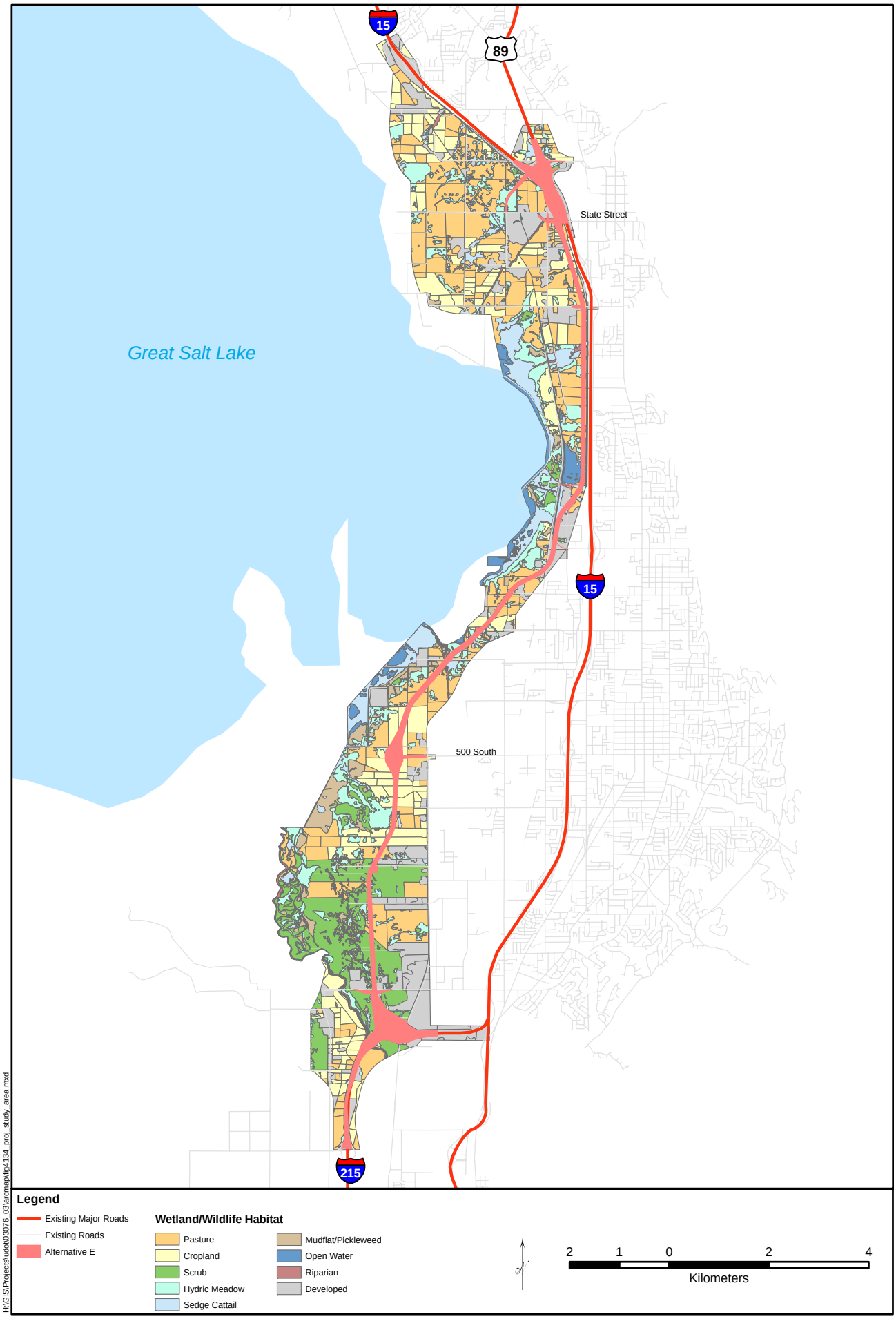
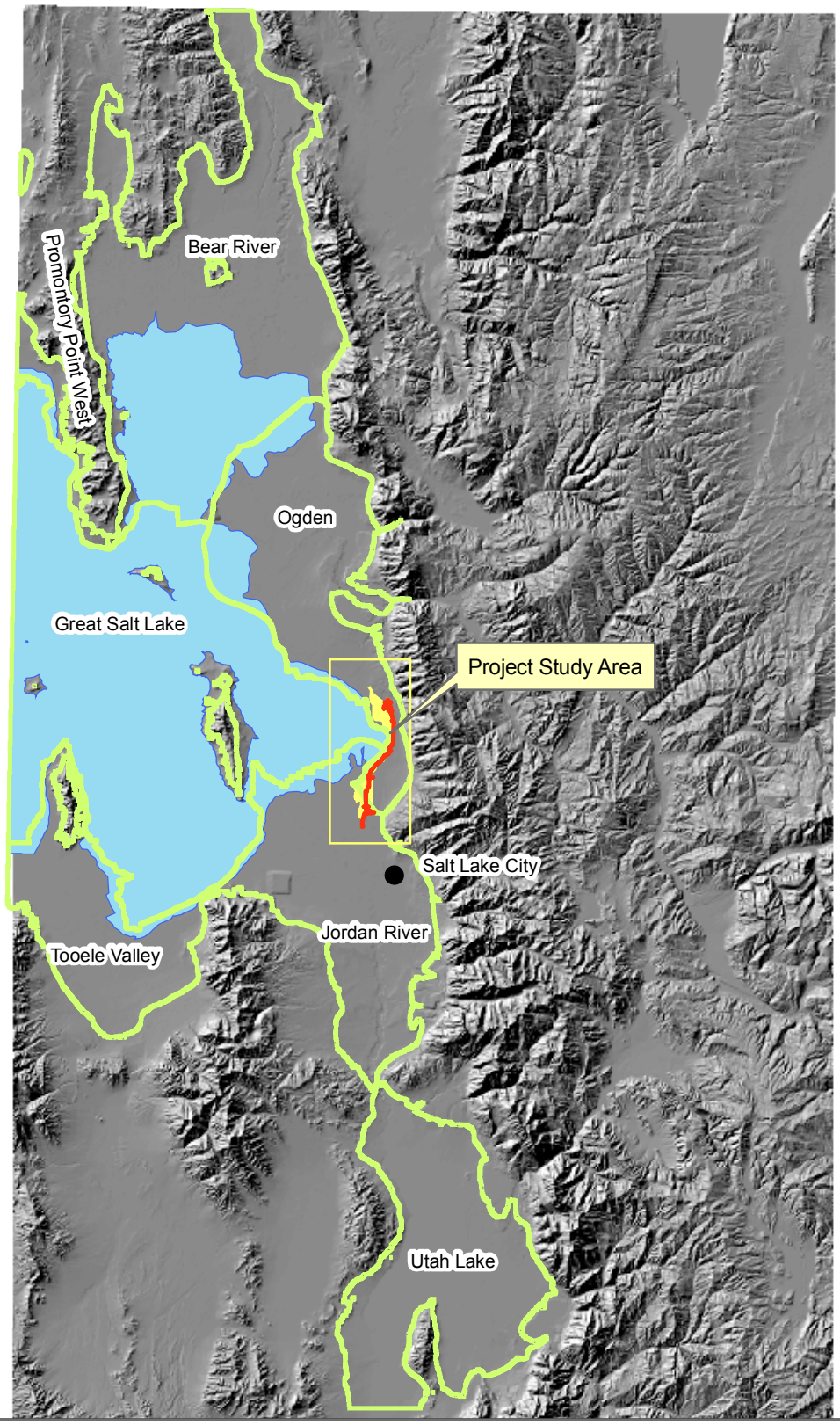


Figure 4.13-2
Project Study Area



Legend

- Alternative A (for reference)
- Project Study Area
- Regional Study Area
- Great Salt Lake

20 10 0 20 40
Kilometers

Data Source: USGS 30 Meter DEM, USGS Modified HUC, UDOT Proposed Project

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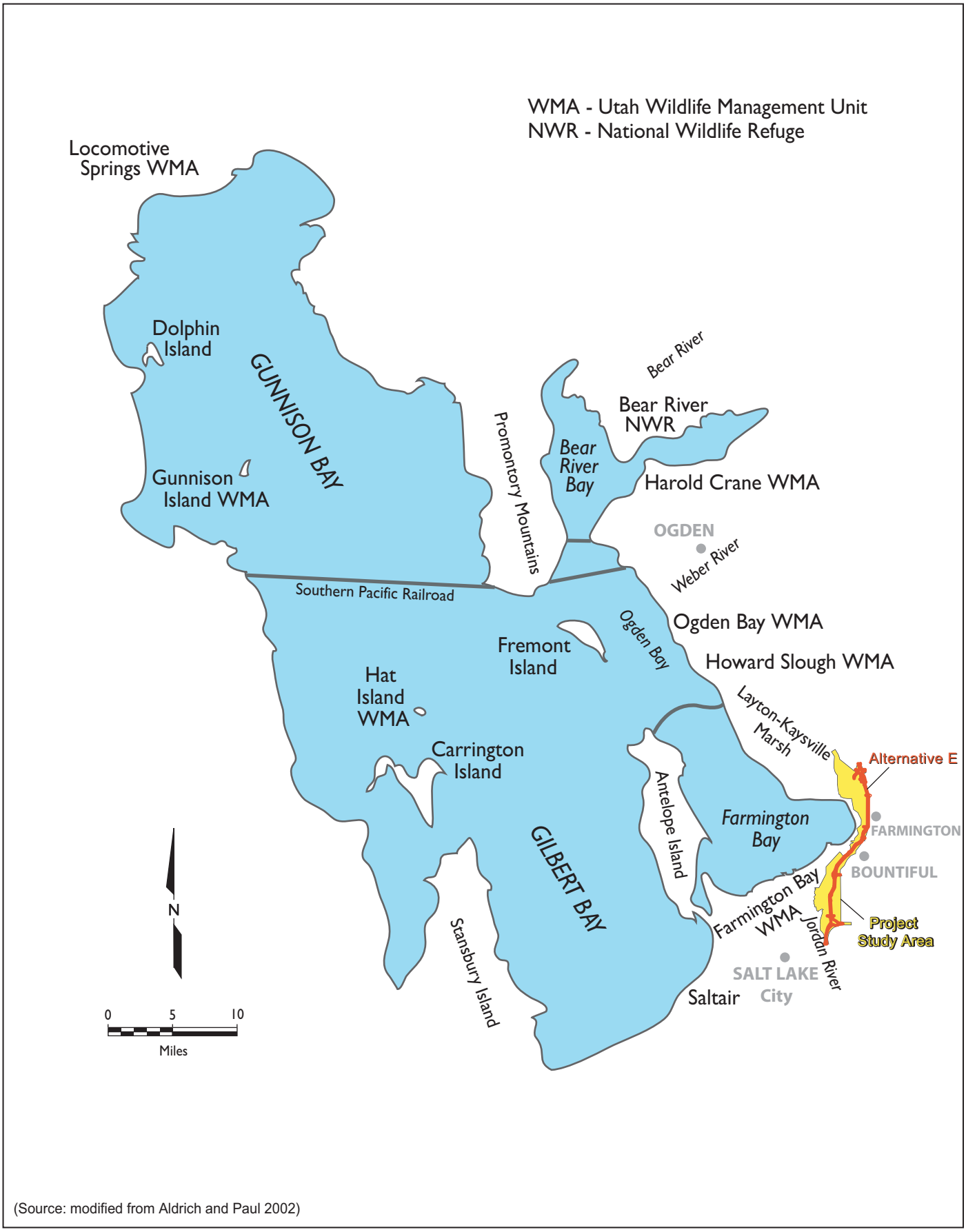
Figure 4.13-3
Regional Study Area



(Source: modified from Aldrich and Paul 2002)

03076.03 SEIS

Jones & Stokes

Figure 4.13-4
Great Salt Lake Ecosystem Area

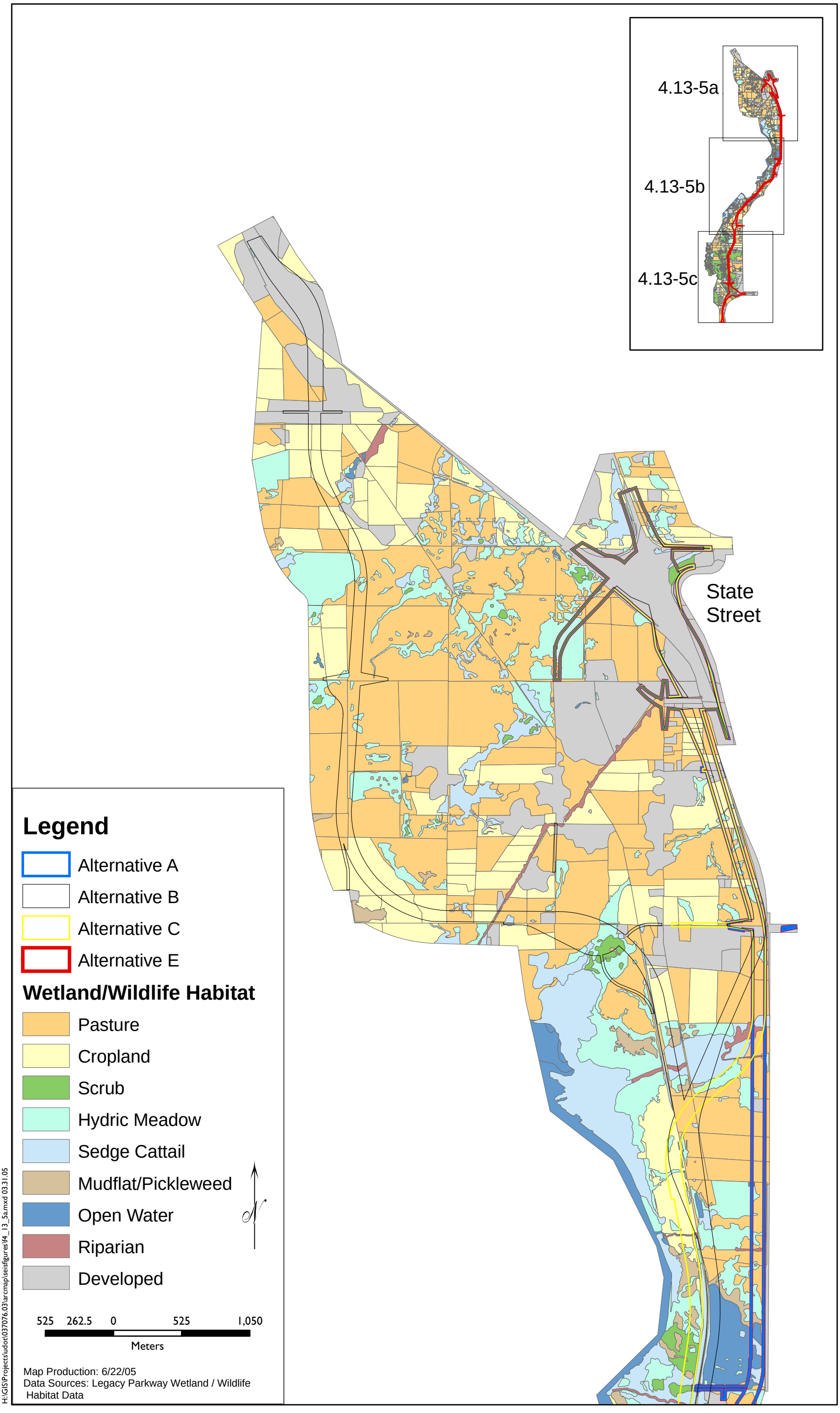


Figure 4.13-5a
Wildlife Habitats and Build Alternatives in the Project Study Area

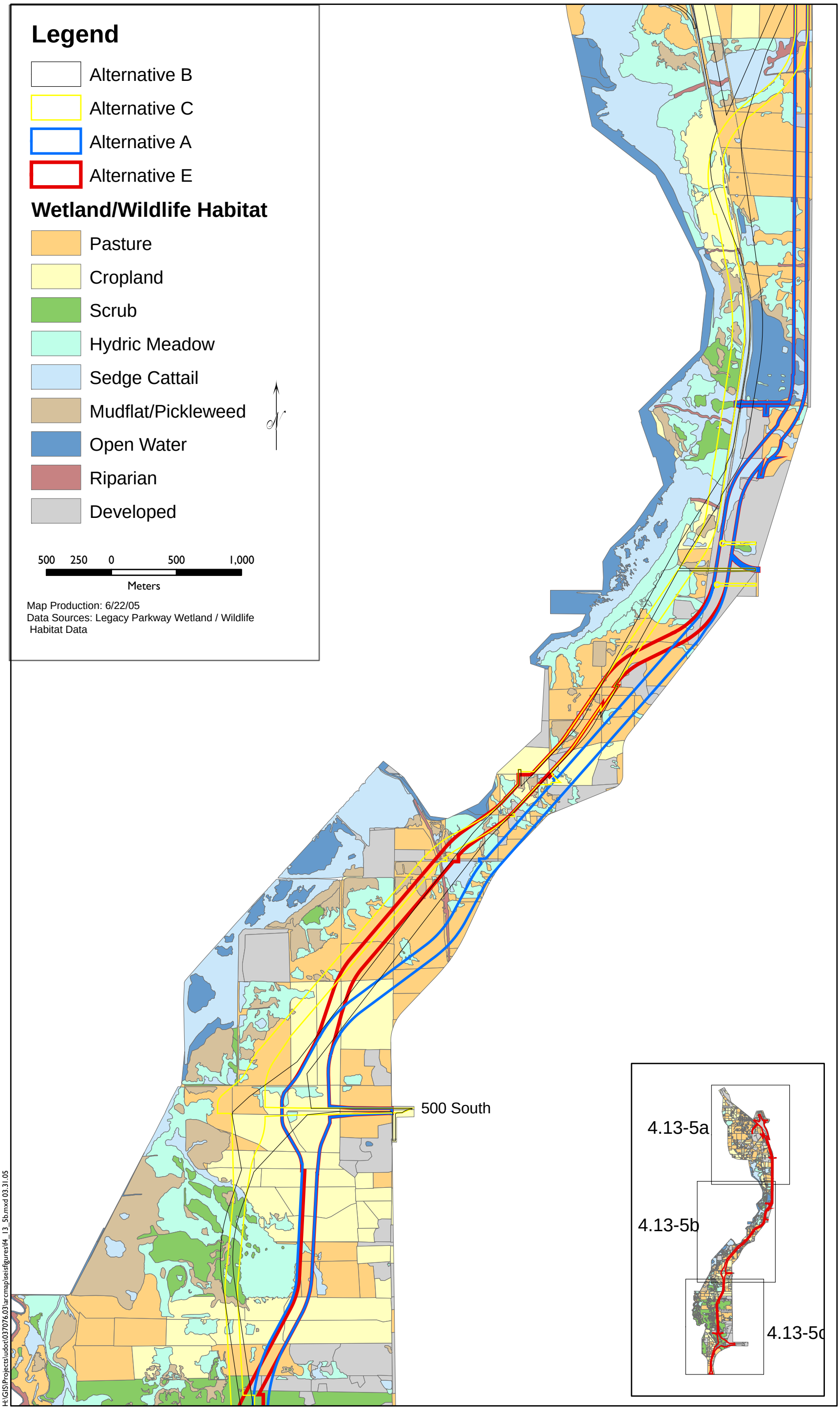


Figure 4.13-5b
Wildlife Habitats and Build Alternatives in the Project Study Area

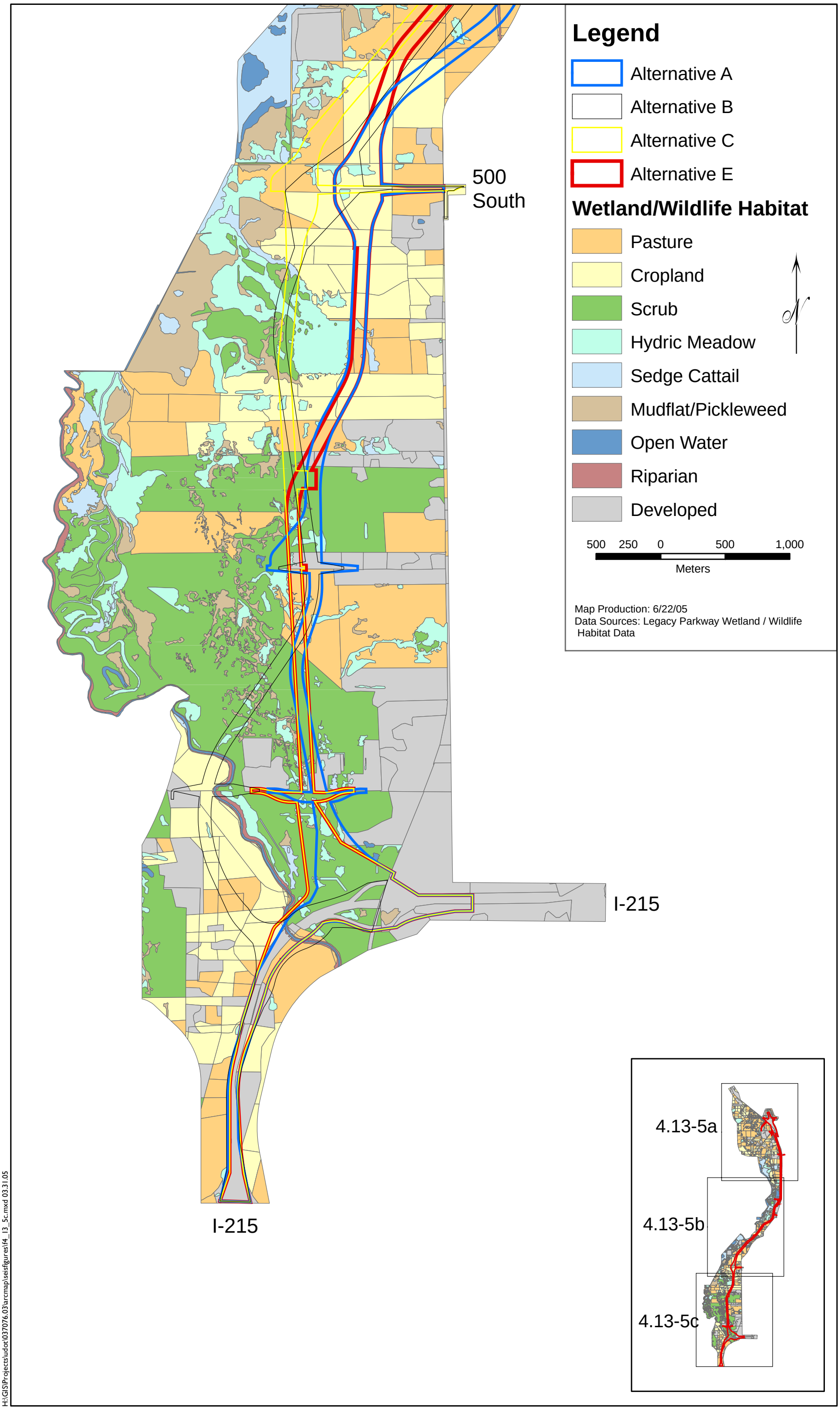
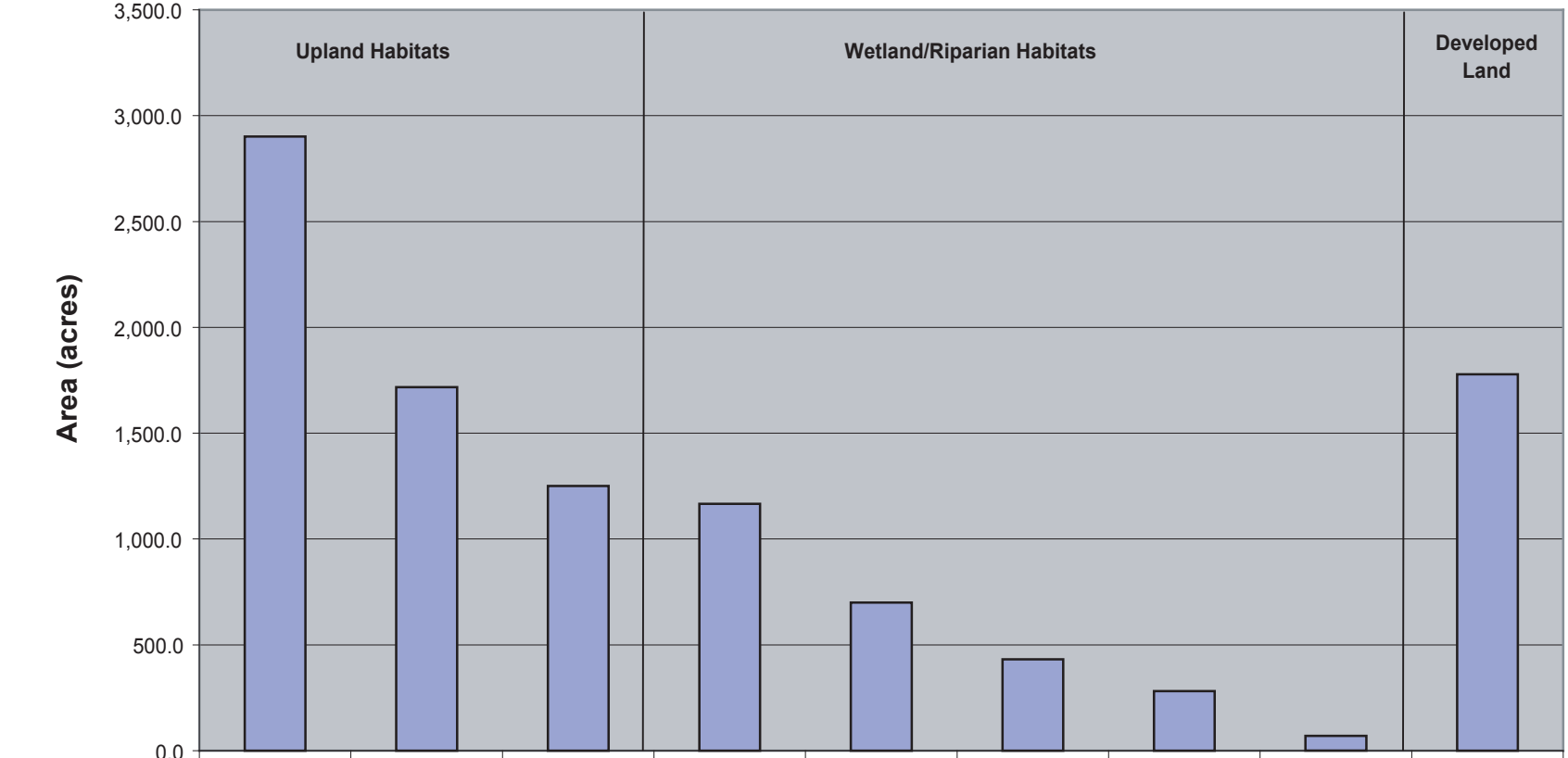


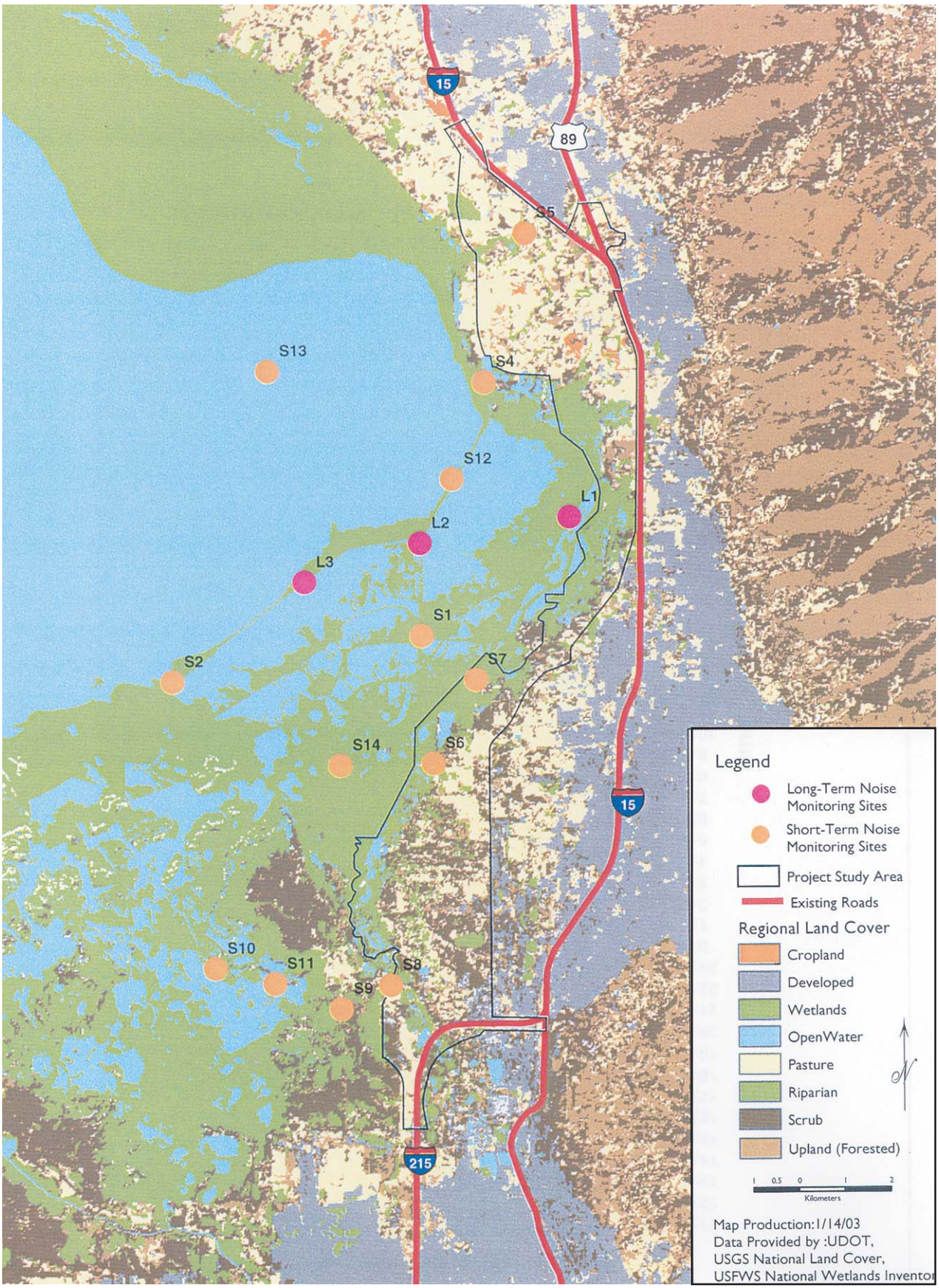
Figure 4.13-5c
Wildlife Habitats and Build Alternatives in the Project Study Area



	Pasture	Cropland	Desert Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Open Water	Riparian	Developed
Habitat Area (acres)	2,908.7	1,725.1	1,260.7	1,161.4	709.5	439.8	284.8	70.9	1,783.3

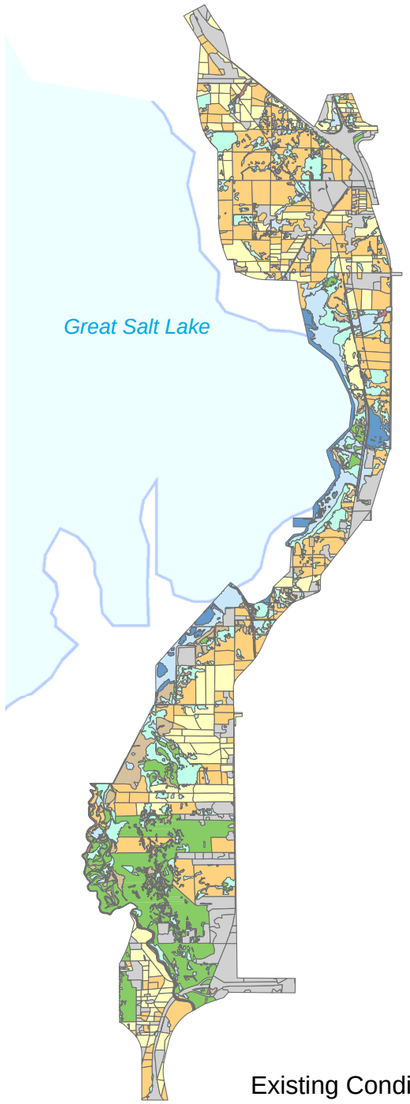
03076.03 002 SEIS (revised 7-05)

Figure 4.13-6
Total Existing Wildlife Habitat in the Project Study Area

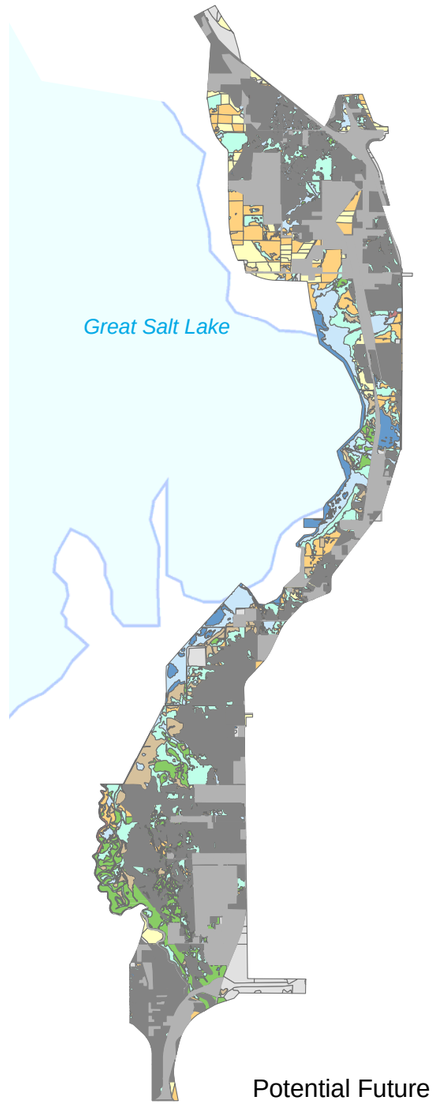


03076.03 (7-05)

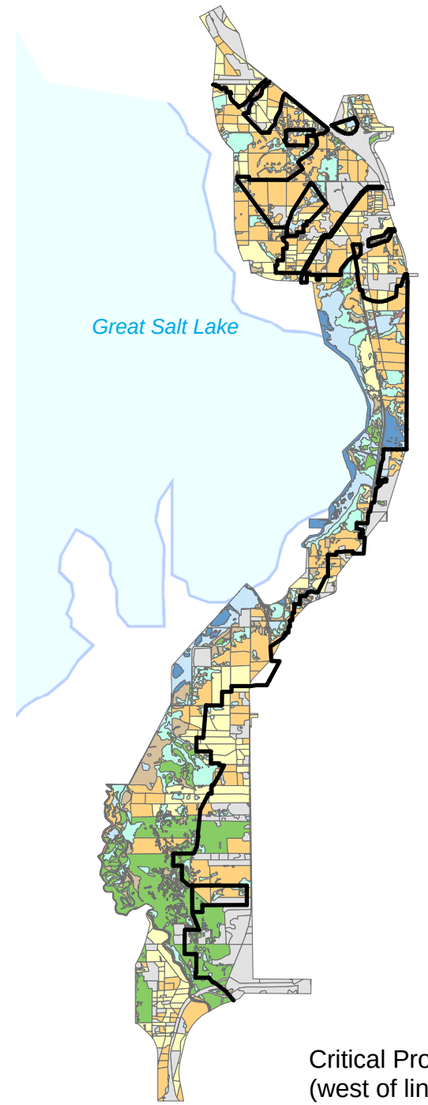
Figure 4.13-7
Noise Monitoring Locations in the Project Study Area



Existing Conditions



Potential Future Development



Critical Protection Areas*
(west of line)

Legend

Critical Protection Areas (west of line)*

Potential Future Developement

- Developed
- Developable

Wetland/Wildlife Habitat

- Pasture
- Cropland
- Scrub
- Hydric Meadow
- Sedge Cattail
- Mudflat/Pickleweed
- Open Water
- Riparian
- Developed

2.5 1.25 0 2.5 5
Kilometers

Map Production: 6/22/05
Data Sources: UDOT Project Alternatives and Wetland/Wildlife Habitat Data, Potential Future Development modified from the Final EIS
*Davis County Critical Protection Area from the Wetlands Conservation Plan -- A Plan for Protection of the Great Salt Lake Wetlands Ecosystem in Davis County (December 1996).

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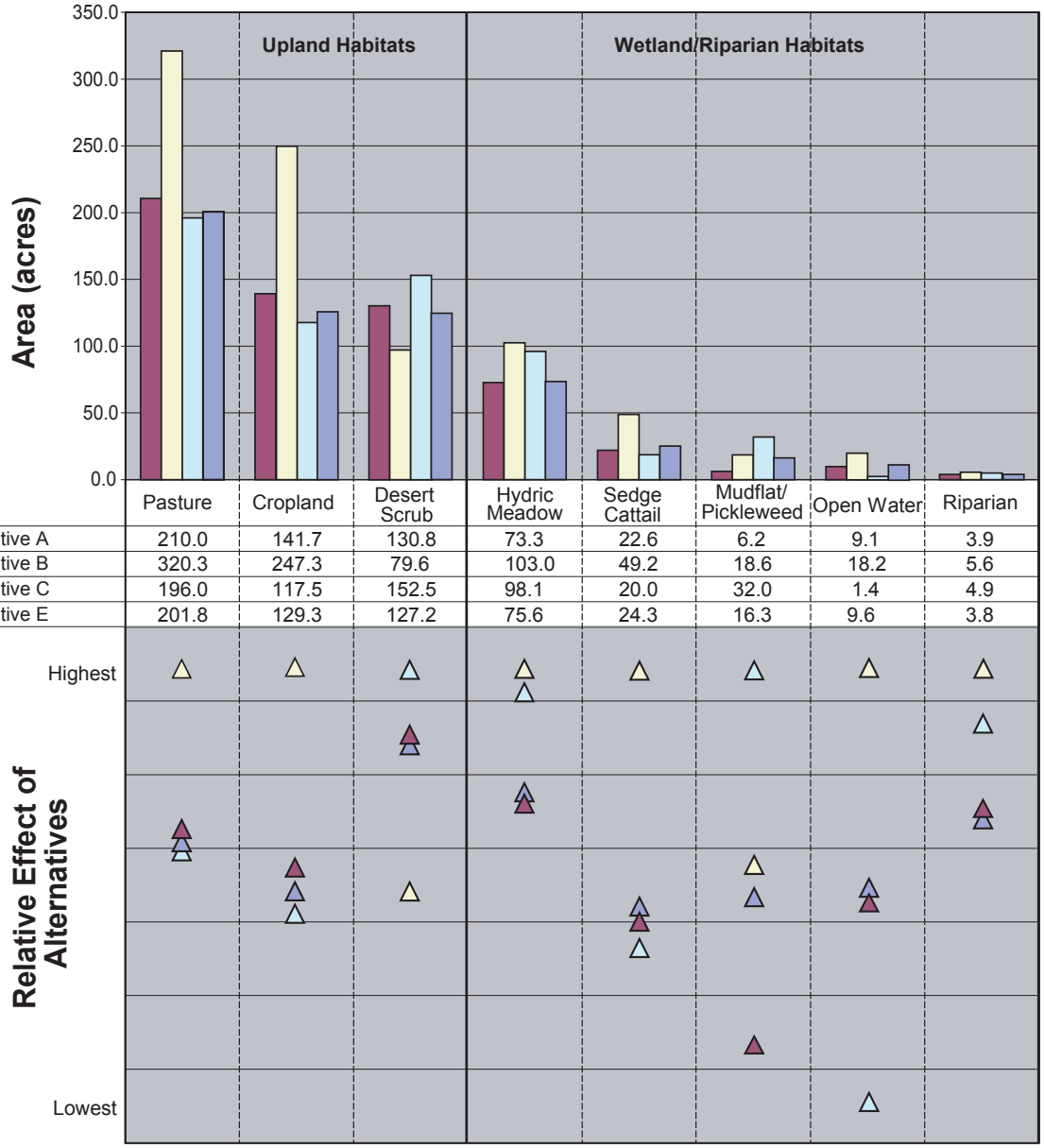
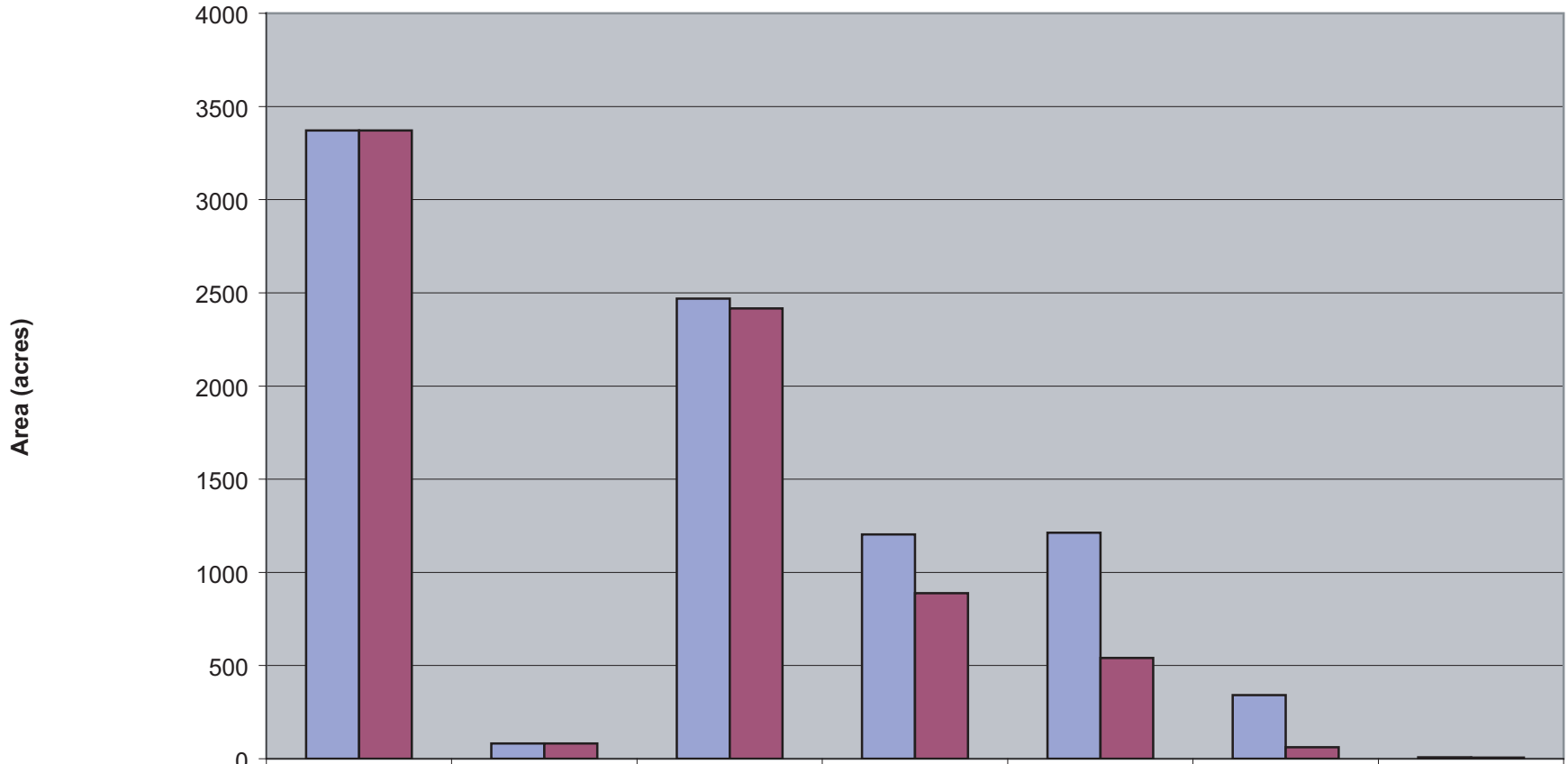
Figure 4.13-8
Potential Future Development in the Project Study Area



	Pasture	Cropland	Desert Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Open Water	Riparian
Alternative A	210.0	141.7	130.8	73.3	22.6	6.2	9.1	3.9
Alternative B	320.3	247.3	79.6	103.0	49.2	18.6	18.2	5.6
Alternative C	196.0	117.5	152.5	98.1	20.0	32.0	1.4	4.9
Alternative E	201.8	129.3	127.2	75.6	24.3	16.3	9.6	3.8

03076.02 SEIS (revised 7-05)

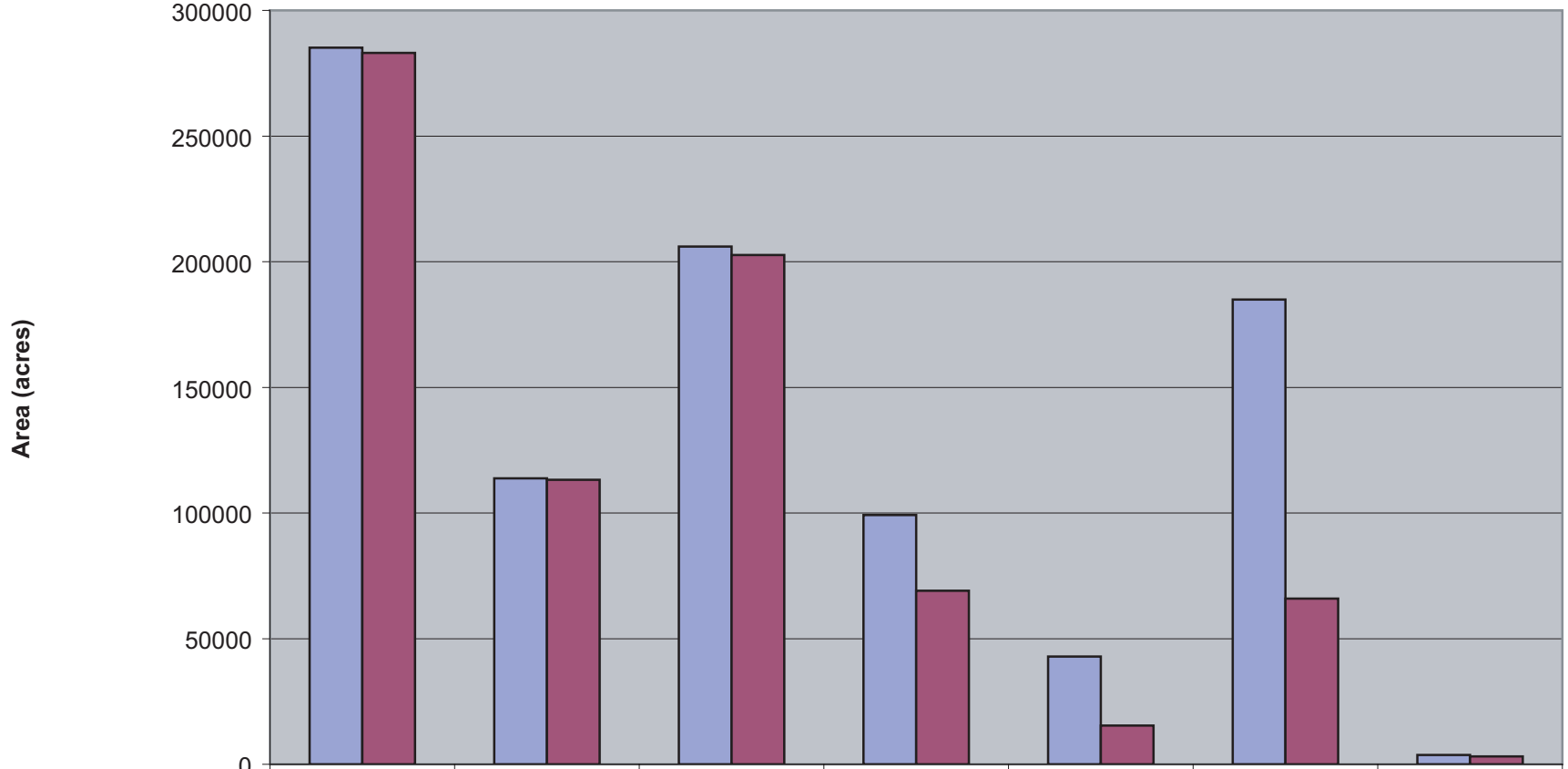
Figure 4.13-9
Direct Habitat Loss in the Project Study Area
By Habitat Type



	Pasture	Cropland	Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Riparian
Total Habitat at Low Water (acres)	3,372	83	2,469	1,203	1,212	341	8
Total Habitat at High Water (acres)	3,371	81	2,416	888	541	62	6

03076.03 SEIS (7-05)

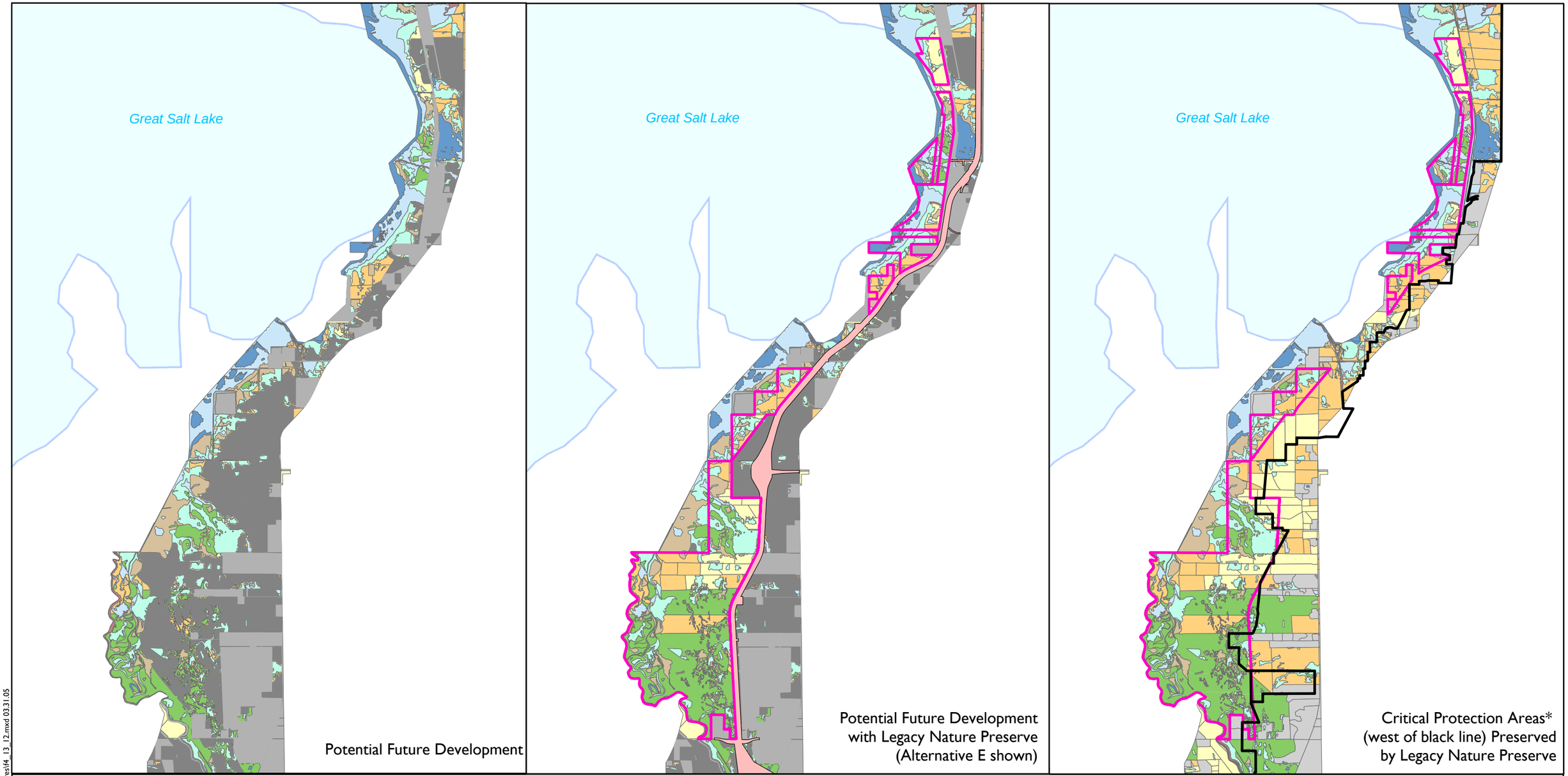
Figure 4.13-10
Wildlife Habitat Availability in the Project Study Area at Low and High Lake Levels



	Pasture	Cropland	Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Riparian
Total Habitat at Low Water (acres)	285,165	113,742	206,017	99,139	42,817	184,915	3,728
Total Habitat at High Water (acres)	283,104	113,195	202,614	69,005	15,431	65,938	3,139

03076.03 SEIS (7-05)

Figure 4.13-11
Wildlife Habitat Availability in the Regional Study Area at Low and High Lake Levels



Legend

- Legacy Nature Preserve Boundary
- Critical Protection Areas (west of line)*

Potential Future Development

- Developable Uplands
- Developed
- Alternative E*

Wetland/Wildlife Habitat

- Pasture
- Cropland
- Scrub
- Hydric Meadow
- Sedge Cattail
- Mudflat/Pickleweed
- Open Water
- Riparian
- Developed

N

1 0.5 0 1 2
Kilometers

Map Production: 6/22/05
Data Sources: UDOT Project Alternatives and Wetland/Wildlife Habitat Data, Potential Future Development modified from the Final EIS
*Davis County Critical Protection Area from the Wetlands Conservation Plan -- A Plan for Protection of the Great Salt Lake Wetlands Ecosystem in Davis County (December 1996).

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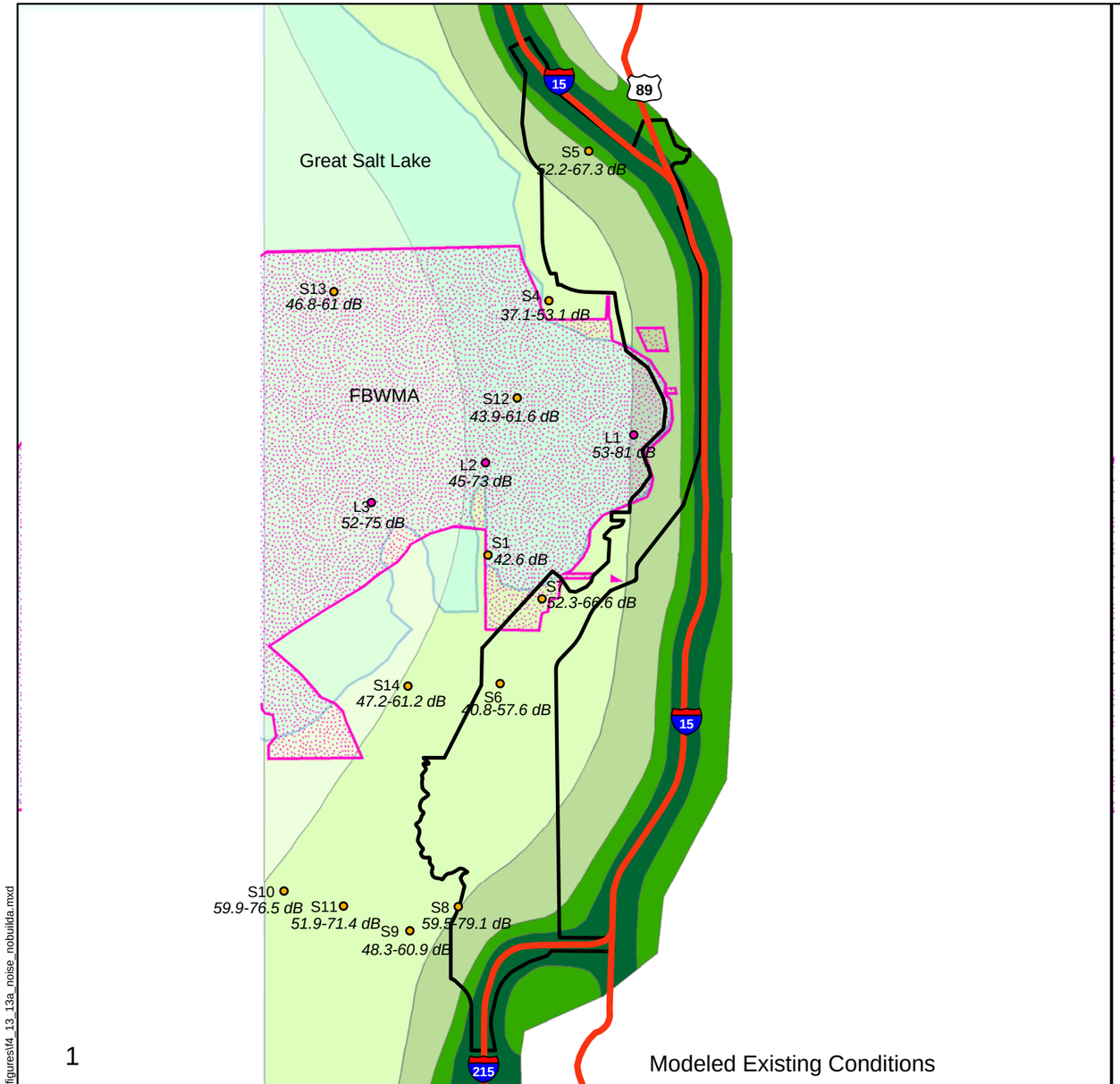
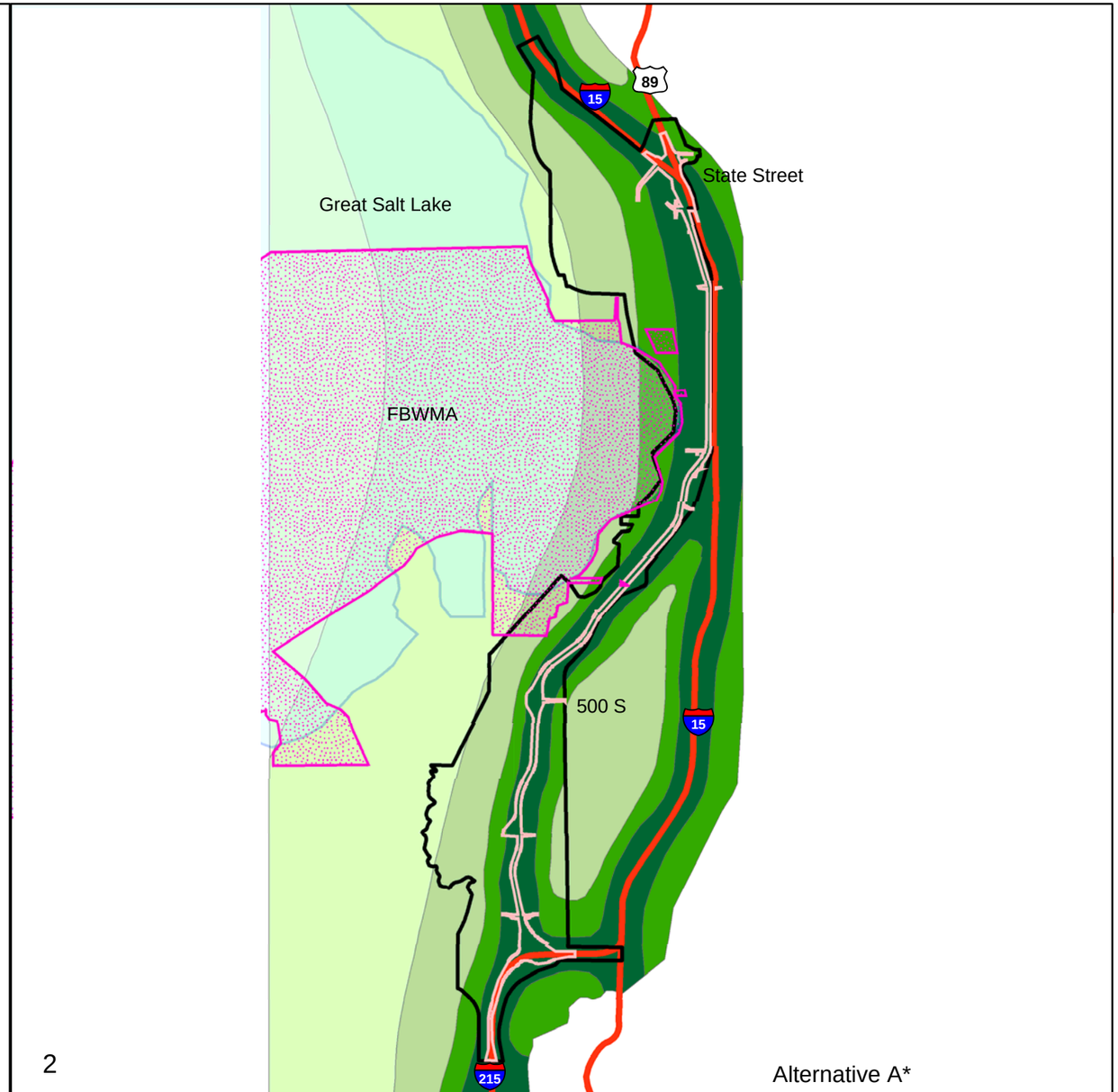
Figure 4.13-12
Potential Future Development in the Project Study Area and Legacy Nature Preserve





Legend

- Local Study Area Boundary
- Proposed Right of Way
- Major Existing Roads
- Great Salt Lake
- Farmington Bay Wildlife Management Area (FBWMA)

TNM Modeled Noise Levels (Decibels dBA)[1]

- <45
- > = 45 < 50
- > = 50 < 55
- > = 55 < 60
- > = 60

Monitoring Type

- Short-term Noise Measurements (Leq-Lmax): Table 4.13-3
- Long-term Noise Measurements (Leq-Lmax); Table 4.13-4

2.5 1.25 0 2.5 5

Kilometers

Map Production: 6/22/05

Data Sources: UDOT Project Study Area Boundary, Project Alternatives and Exsiting Roads. Contours generated from field data

*Supplemental EIS 312-ft ROWs used for the alternatives

[1]The noise level contours generated by the traffic noise model have not yet been verified beyond 305m (1000 ft). The locations of contours beyond this distance are projected estimates only and could vary significantly depending on existing background noise, atmospheric conditions, and substrate type.

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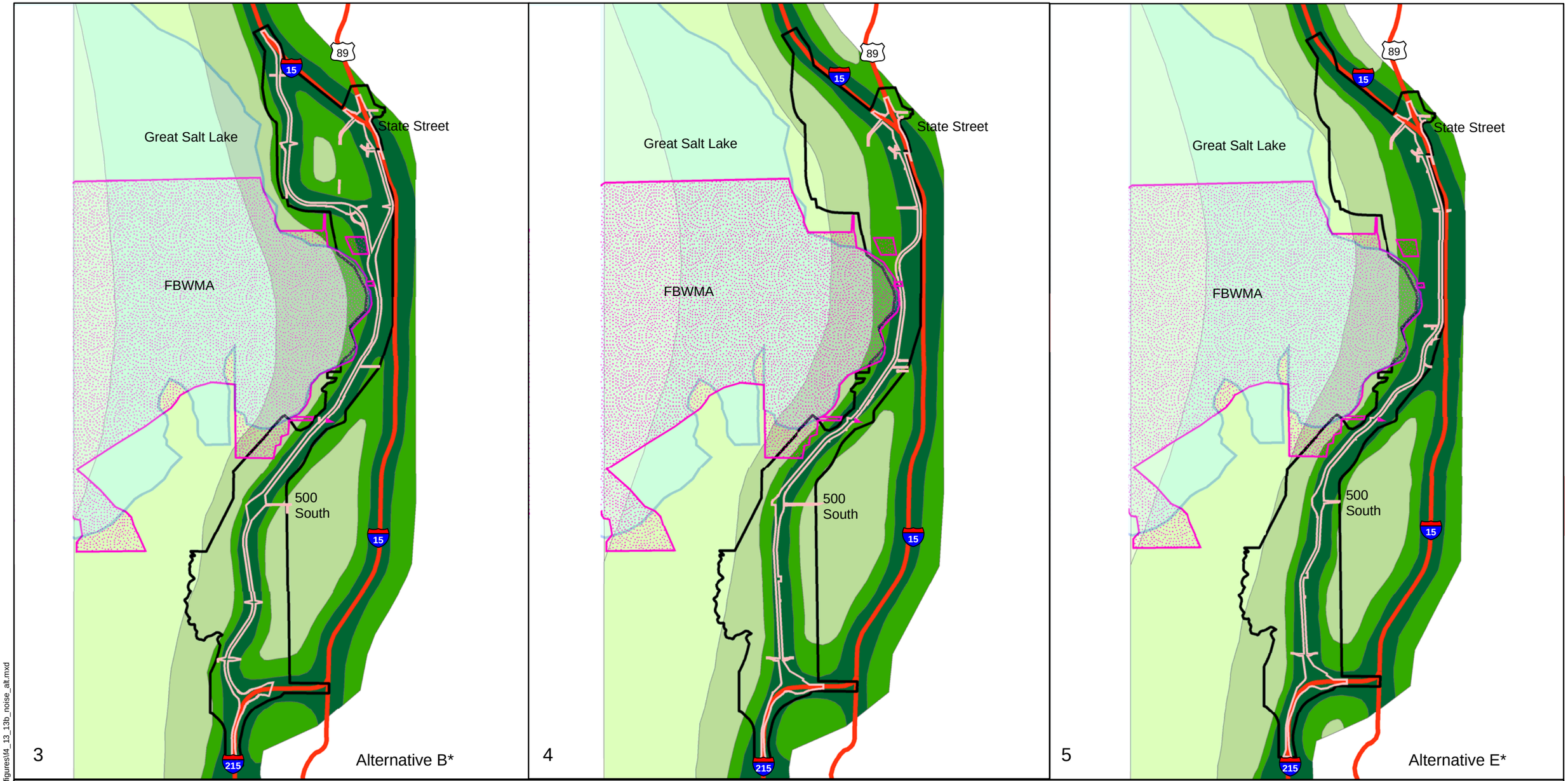
Figure 4.13-13a

Highway Noise Levels for the Legacy Parkway Build Alternatives



Legend

- Local Study Area Boundary
- Proposed Right of Way
- Major Existing Roads
- Great Salt Lake
- Farmington Bay Wildlife Management Area (FBWMA)

TNM Modelled Noise Levels (Decibels)[1]

- <45
- > = 45 < 50
- > = 50 < 55
- > = 55 < 60
- > = 60

2.5 1.25 0 2.5 5
Kilometers

Map Production: 6/22/05
Data Sources: UDOT Project Study Area Boundary, Project Alternatives and Exsiting Roads. Contours generated from field data
*Supplemental EIS 312 foot ROWs used for the alternatives
[1] The noise level contours generated by the traffic noise model have not yet been verified beyond 305m (1000 ft). The locations of contours beyond this distance are projected estimates only and could vary significantly depending on existing background noise, atmospheric conditions, and substrate type.

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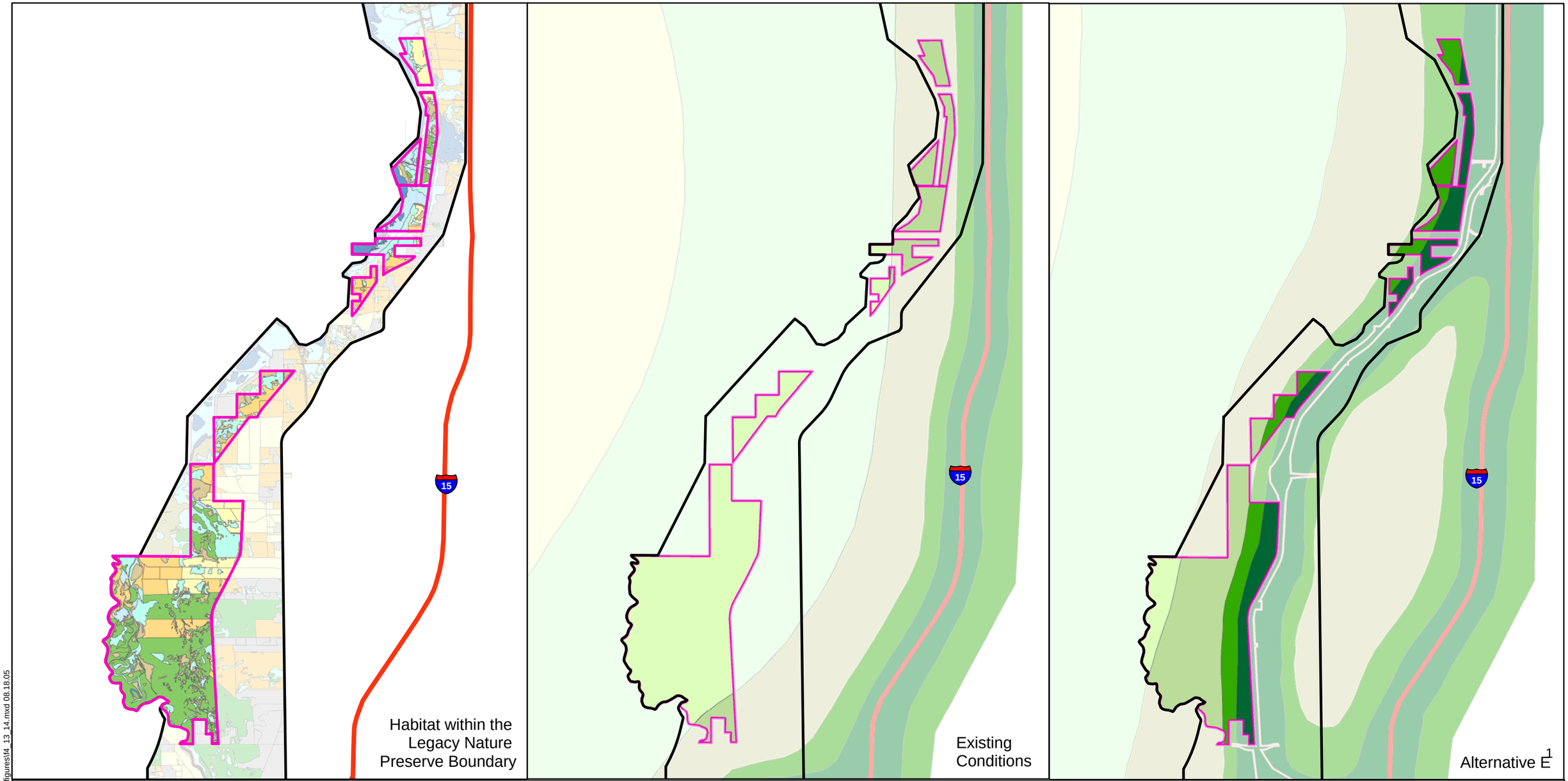
Figure 4.13-13b
Highway Noise Levels for the Legacy Parkway Build Alternatives



Legend

- Legacy Nature Preserve Boundary
- Project Study Area Boundary
- Alternative E[1]
- Major Existing Roads

Modeled Noise Levels (Decibels)[2]

- <45
- >=45 < 50
- >=50 < 55
- >=55 < 60
- >=60

Wetland/Wildlife Habitats

- Pasture
- Cropland
- Scrub
- Hydric Meadow
- Sedge Cattail
- Mudflat/Pickleweed
- Open Water
- Riparian
- Developed

Areas outside the Legacy Nature Preserve boundary have been muted for display and are shown to provide contex.

1 0.5 0 1 2
Kilometers

Map Production: 6/22/05
Data Sources: UDOT Project Study Area Boundary, Project Alternatives and Existing Roads. Contours generated from field data.
[1]Supplemental EIS 312-foot ROW.
[2]The noise level contours generated by the traffic noise model have not yet been verified beyond 305 m (1,000 ft). The locations of contours beyond this distance are projected estimates only and could vary significantly depending on existing background noise, atmospheric conditions, and substrate type.

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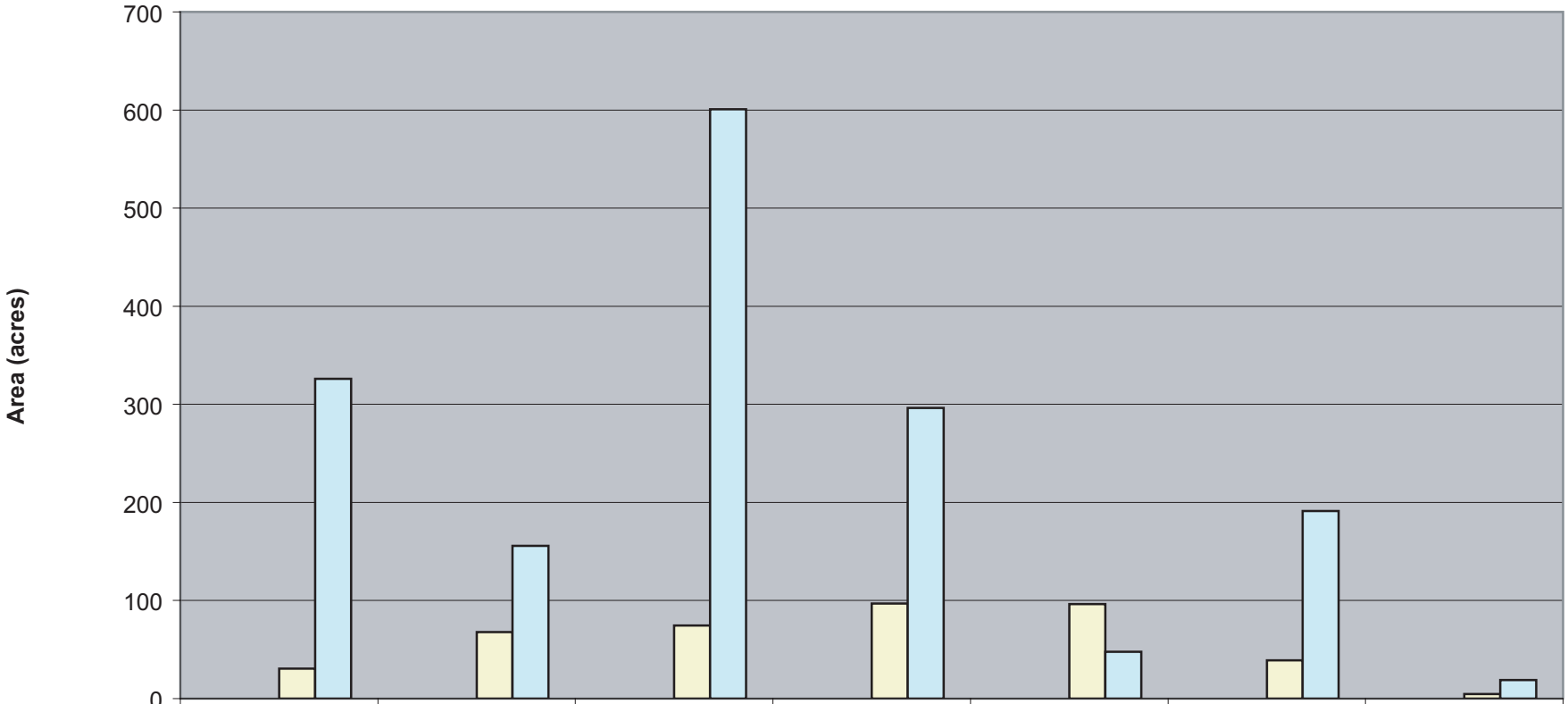
Figure 4.13-14
Highway Noise Levels in the Proposed Legacy Nature Preserve



	Pasture	Cropland	Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Riparian
>=60	0	0	0	0	0	0	0
>=55 < 60	0	0	0	0	0	0	0
>=50 < 55	30.7	67.7	74.5	96.9	96.3	39.1	4.7
>=45 < 50	326.1	155.8	600.8	296.4	47.8	191.4	19.0

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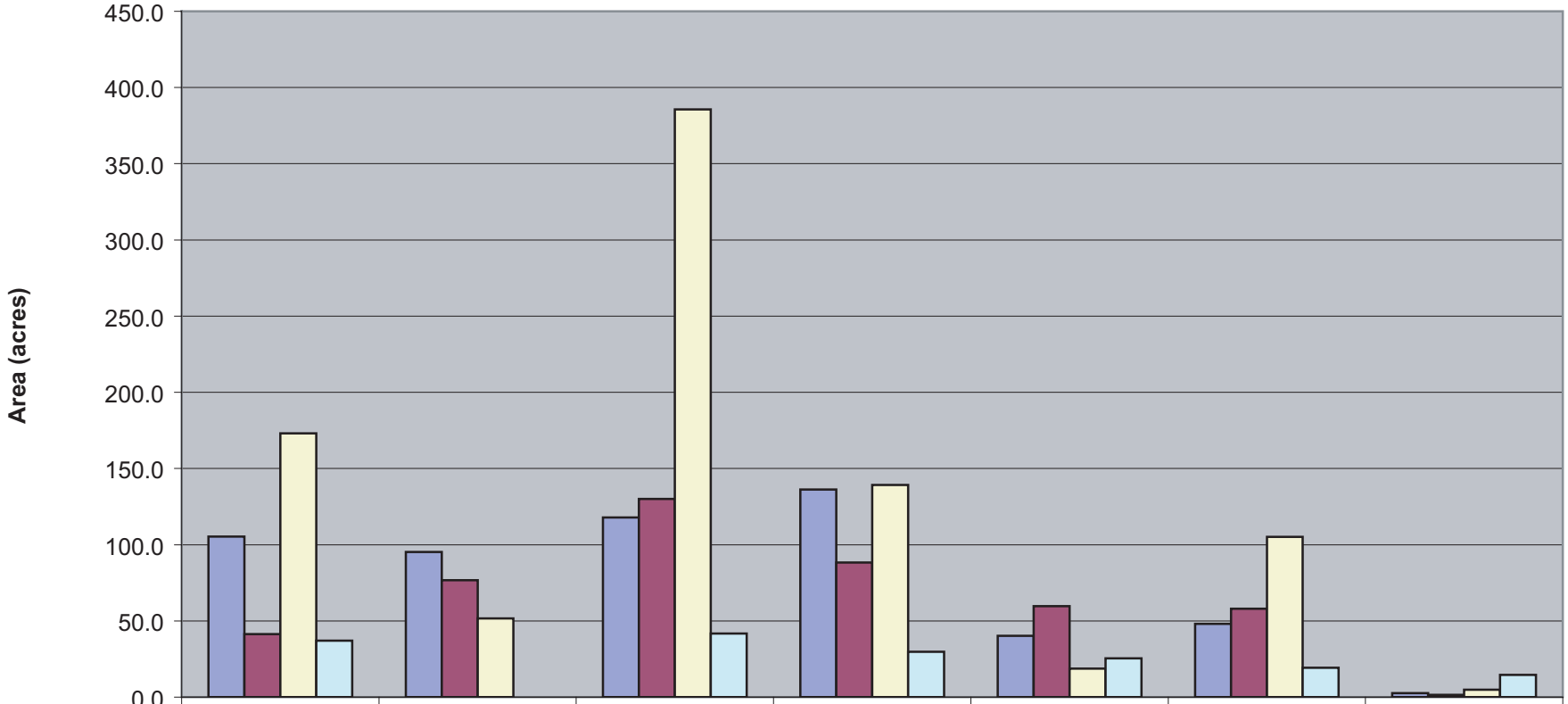
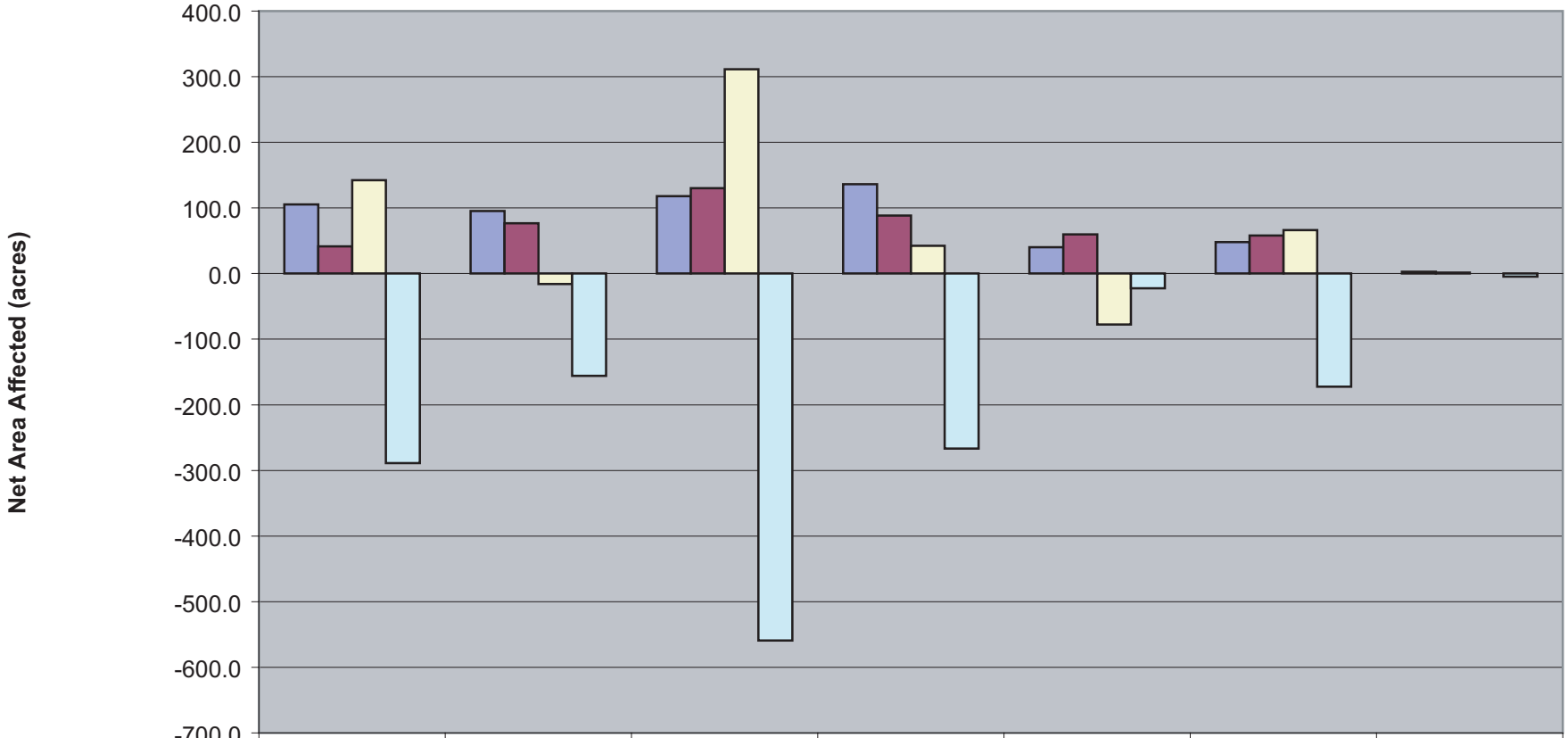
Figure 4.13-15
Areal Extent of the Proposed Parkway Nature Preserve Affected by Noise (Existing Conditions)



	Pasture	Cropland	Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Riparian
>=60	105.3	95.2	117.8	136.1	40.2	48.1	2.7
>=55<60	41.3	76.8	130.1	88.3	59.7	57.9	1.5
>=50 < 55	173.1	51.6	385.6	139.2	18.8	105.2	4.9
>=45 < 50	37.0		41.7	29.7	25.4	19.2	14.5

03076.03 (7-05)

Figure 4.13-16
Areal Extent of the Proposed Legacy Nature Preserve That Would Be Affected by Noise (Alternative E)



	Pasture	Cropland	Scrub	Hydric Meadow	Sedge Cattail	Mudflat/ Pickleweed	Riparian
>=60 w/road	105.3	95.2	117.8	136.1	40.2	48.1	2.7
>=55<60 w/road	41.3	76.8	130.1	88.3	59.7	57.9	1.5
>=50 < 55 w/road	142.4	-16.1	311.1	42.3	-77.5	66.1	0.3
>=45 < 50 w/road	-289.0	-155.8	-559.0	-266.7	-22.4	-172.2	-4.5

03076.03 (7-05)

Figure 4.13-17
Net Area Affected by Noise Compared to Existing Conditions

Section 4.14
Floodplains

This section discusses floodplains in the study area. In addition, the section provides information about the Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRM) for Davis and Salt Lake Counties that have been updated since the publication of the Final EIS.

4.14.1 Approach and Methodology

4.14.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with floodplains in the study area, Sections 3.14 and 4.14 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for floodplains is described in Section 4.0.1, *Study Area*, of this document.

Utah State Floodplain Manager, Judy Watanabe, was consulted on September 18, 2003, to determine whether Davis County floodplain maps had been changed or revised since publication of the Final EIS (Watanabe pers. comm.). Nancy Barr of the State Floodplain Office was consulted on November 5, 2003, to determine whether Salt Lake County floodplain maps had been changed or revised since publication of the Final EIS (Barr pers. comm.). Scott Stoddard of the Corps was also contacted to determine whether the Corps floodplain study had been changed or revised since publication of the Final EIS (Stoddard pers. comm.).

4.14.1.2 Changes since Draft Supplemental EIS

Several changes have been made to the calculations of impacts on floodplains since the Draft Supplemental EIS was published in December 2004. As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. Impact information presented in Table 4.14-1 has been updated to reflect those modifications.

4.14.2 Affected Environment

This affected environment section presents a summary of updated information on the affected environment relative to floodplains. As indicated in the Final EIS, 15 communities in Davis County and 13 communities in Salt Lake County participate in the National Flood Insurance Program (NFIP), which is administered by FEMA. As stated in the Final EIS, the communities that participate in the NFIP are required to administer a permit review program that minimizes flood damages based in part on FEMA-

generated FIRM maps. The updated regulatory setting and updated status of the FIRM maps that pertain to the study area are presented below.

4.14.2.1 Regulatory Setting

Executive Order 11988, Floodplain Management, and Title 23 CFR Section 650, Subpart A, "Location and Hydraulic Design of Encroachments on Floodplains," provide guidance to federal agencies on constructing projects within the boundaries of designated floodplains.

Executive Order 11988, Floodplain Management

Executive Order 11988 requires that all federal agencies take action to reduce the risk of flood loss, restore and preserve the natural and beneficial values served by floodplains, and minimize the impact of floods on human safety, health, and welfare. Federal agencies' actions must reflect consideration of alternatives to avoid adverse impacts in floodplains, and must modify the proposed action to minimize such impacts where such impacts are unavoidable.

Title 23 Code of Federal Regulations Section 650, Subpart A, "Location and Hydraulic Design of Encroachments on Floodplains"

Title 23 CFR 650, Subpart A, prescribes FHWA's policies and procedures for locating and designing highway encroachments in floodplains. Specifically, FHWA must avoid longitudinal and/or significant encroachments into floodplains, where practicable, and must minimize adverse affects on floodplains resulting from its actions. 23 CFR 650.105(q) defines a "significant encroachment" as a highway encroachment and any direct support of floodplain development that would involve one or more of the following construction- or flood-related impacts.

- A significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route.
- A significant risk attributable to the encroachment.
- A significant adverse impact on natural and beneficial floodplain values.

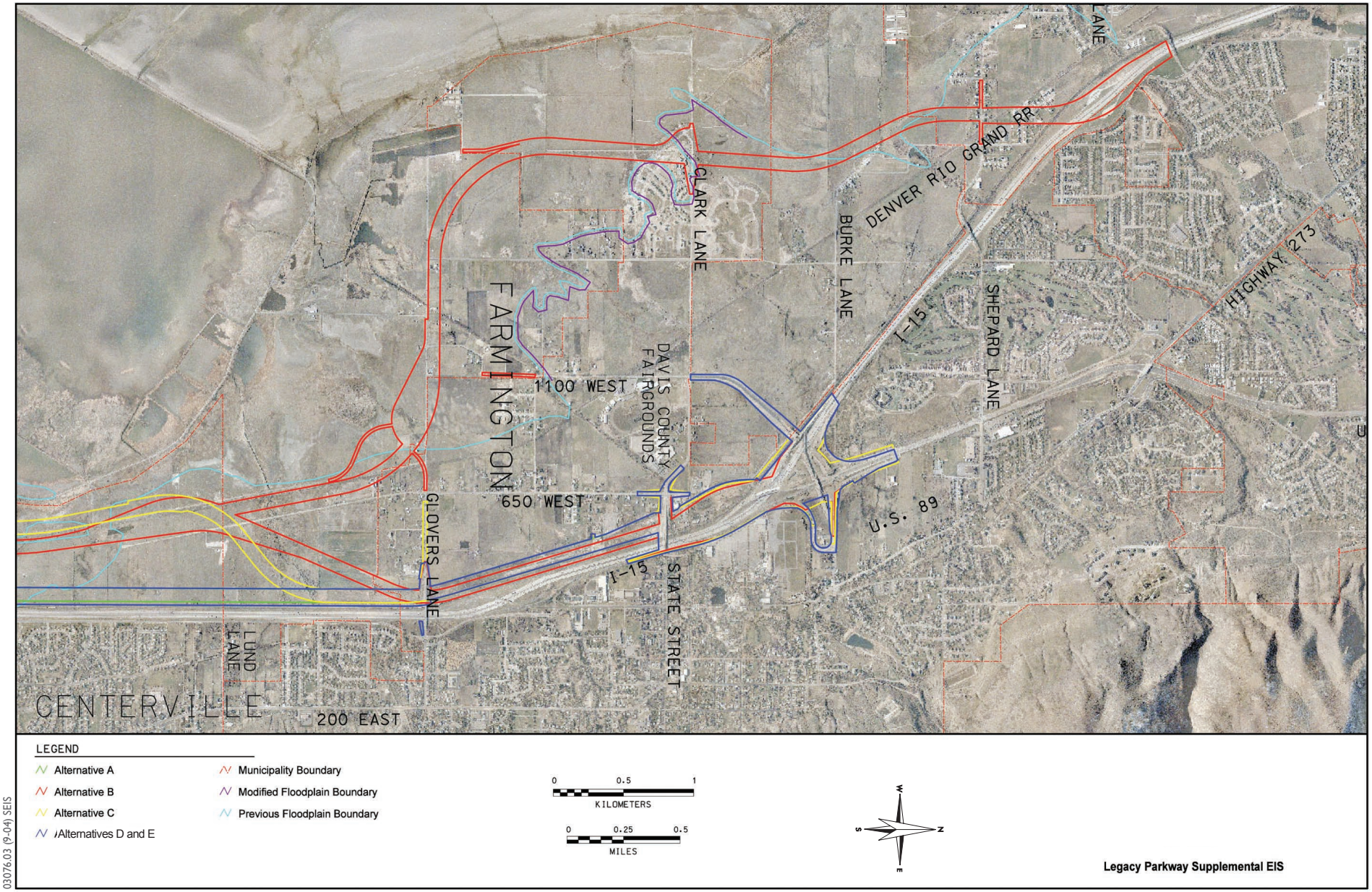
A proposed action that includes a significant encroachment cannot be approved unless FHWA finds that the proposed significant encroachment is the only practicable alternative.

4.14.2.2 FEMA Studies and Maps

The floodplain map for Farmington Creek and Great Salt Lake was revised in 2001 to reflect updated hydrologic and topographical information (Federal Emergency Management Agency 2001). This revision resulted in an eastward expansion of the Great Salt Lake FEMA floodplain boundary of 152 m to 305 m (500 ft to 1,000 ft) between approximately 1500 West and 100 North in the City of Farmington (Figure 4.14-1). This is the only change to the FIRM maps that was reported for floodplains in the study area.

4.14.2.3 Vertical Datum Differential

There has been no change to the vertical datum differential since publication of the Final EIS.



03076.03 (9-04) SEIS

Figure 4.14-1
Revised Floodplain Area

4.14.2.4 Corps Floodplain Study

The Corps floodplain study has not been revised since 1998, and the Corps floodplain boundary has not changed since publication of the Final EIS (Stoddard pers. comm.). Therefore, there is no additional discussion of the Corps floodplain study in this document. However, since the FEMA floodplain boundary has been updated since publication of the Final EIS (see Section 4.14.2.2), the relationship between the Corps Great Salt Lake floodplain boundary (defined in the Corps floodplain study) and the updated FEMA floodplain boundary has changed.

4.14.2.4 Wetland Hydrology

As stated in the Final EIS, the wetlands found in the study area are not extremely important for flood control and/or water storage functions around river and stream systems. Their elevations are not high enough to perform those functions, and they are not geomorphically positioned in the watershed to capture and retain peak floodwaters of rivers and stream. Wetlands adjacent to Great Salt Lake provide more of a flood control function by capturing and storing a small portion of the lake's floodwater, helping prevent it from intruding into adjacent cities and towns. The wetlands in the Jordan River floodplain and areas surrounding Farmington Bay near Centerville also provide flood control functions (Federal Highway Administration et al. 2000). This information has not changed since publication of the Final EIS. For more information on wetlands see Section 4.12.

4.14.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, portions of all the proposed build alternatives would encroach into the FEMA 100-year floodplain of Great Salt Lake and several streams in the study area. The environmental consequences and mitigation measures associated with encroachment into these floodplains are similar to those described in the Final EIS. Since publication of the Final EIS, however, UDOT has reduced the proposed right-of-way of the proposed build alternatives from 100 m to 95 m (328 ft to 312 ft) (see Chapter 3, *Alternatives*, of this Supplemental EIS). This reduction in right-of-way width would reduce the area that would be within the 100-year floodplain for each proposed build alternative (Table 4.14-1). The environmental consequences associated with encroachment of the proposed action into the 100-year floodplain and the proposed mitigation measures are summarized below.

4.14.3.1 Floodplain Management

Section 4.14.1 of the Final EIS states that all the proposed build alternatives would run alongside or near both the FEMA and Corps 100-year floodplain boundaries throughout the study area, except that the Alternative B alignment would fall approximately 1 km (0.6 mi) inside the FEMA floodplain boundary in the Farmington area, and alongside the Great Salt Lake floodplain boundary in the southern portion of the study area. The expansion of the FEMA floodplain boundary in the Farmington Area, discussed above in Section 4.14.2.2, would increase the distance Alternative B within the floodplain of Great Salt Lake by approximately 152 m to 305 m (500 ft to 1000 ft). Figure 4.14-1 shows the location of the revised FEMA floodplain boundaries relative to the proposed Alternative B alignment.

All the proposed build alternatives would still be designed to allow passage of 100-year flood flows at stream crossings and a 100-year floodwater elevation in Great Salt Lake, as described in the Final EIS.

Floodplain equalization culverts would be installed to allow water from high lake levels to pass through the parkway to areas east of the proposed highway (Figure 4.14-2). Pumping water from Great Salt Lake to maintain flood levels below a set elevation and to protect the proposed highway alignment would not be required and is not included as a component of the proposed action.

4.14.3.2 Floodplain Impacts

The revision to the FEMA floodplain boundary does not change any of the overall impact conclusions presented in Section 4.14.2 of the Final EIS. The acreage of affected floodplain (both FEMA and Corps floodplains) associated with the proposed build alternatives is listed in Table 4.14-1. The table accounts for the reduced right-of-way.

Table 4.14-1 Impacts on Great Salt Lake Floodplain North of Center Street

Floodplain Area Associated with Build Alternatives	Area Affected by Alternative, Hectares (Acres)				
	Alternative A[1]	Alternative B[1]	Alternative C[1]	Alternative D[2]	Alternative E[1]
FEMA Floodplain Filled	12 (29)	82 (202)	15 (38)	17 (43)	17 (43)
Corps Floodplain Filled	56 (138)	150 (371)	131 (323)	86 (213)	81 (200)
FEMA Floodplain East of the Proposed Alignment	25 (62)	81 (201)	92 (227)	22 (56)	24 (59)
Corps Floodplain East of the Proposed Alignment	24 (60)	228 (562)	246 (607)	72 (179)	73 (181)

Notes:

[1] Area represents acreage of floodplain filled based on a 95-m (312-ft) right-of-way width. For Alternatives A, B, and C, this represents a reduction in the right-of-way presented in the Final EIS.

[2] Area represents acreage of floodplain filled based on a 100-m (328-ft) right-of-way. This right-of-way is consistent with that presented in the Final EIS.

No-Build Alternative

Existing Conditions (2004)

As stated in the Final EIS, no project-related impacts on floodplains would occur under the existing conditions No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. It is possible that these future projects would encroach into the FEMA and Corps floodplains, although the nature and timing of these projects are not known at this time. Floodplain

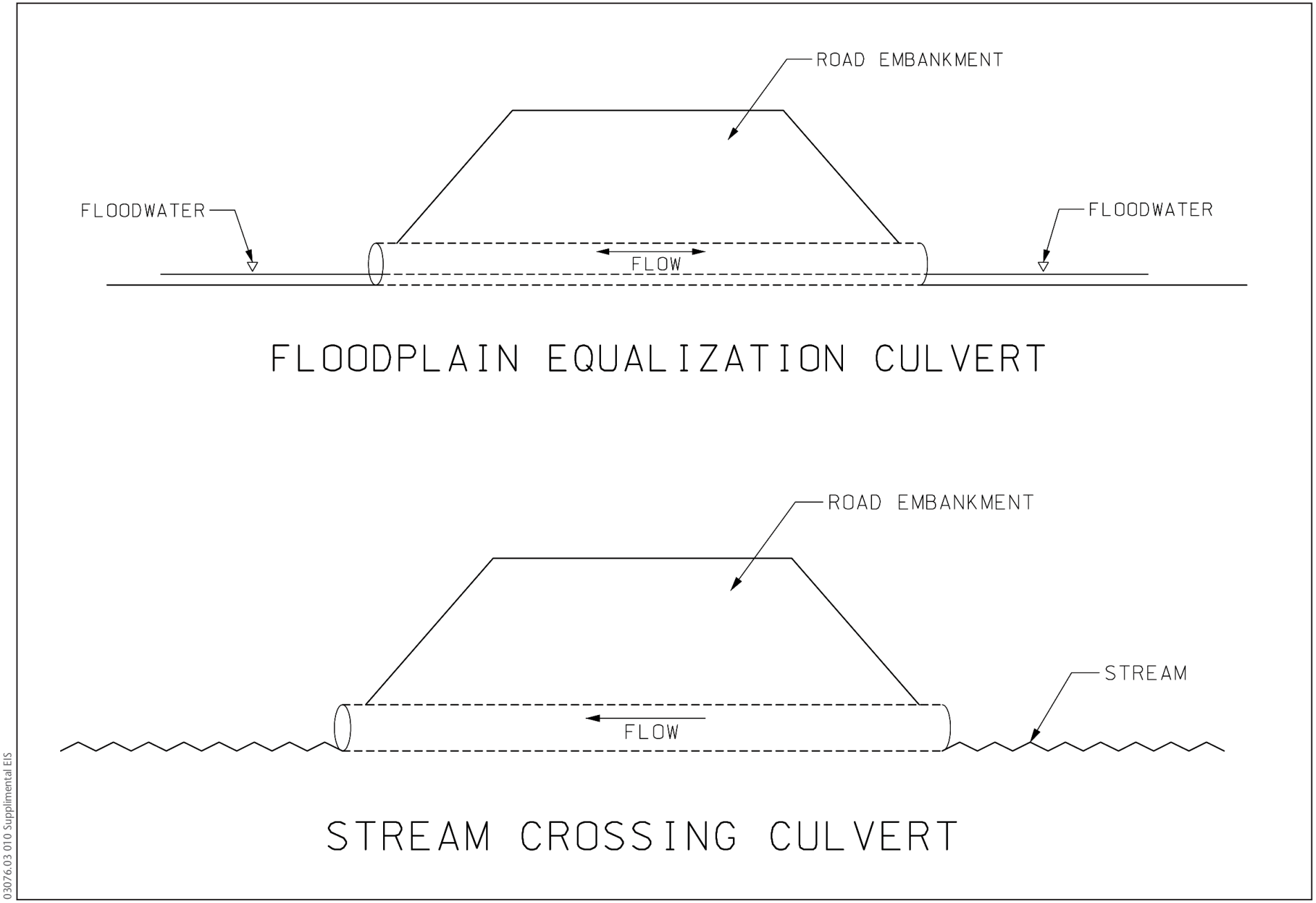


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Figure 4.14-2
Floodplain Equalization and Stream Crossing Culverts

development permits, which would be issued by the governing local jurisdiction, would have to be obtained before construction within a floodplain could occur.

Build Alternatives

As described in Section 4.14.2 of the Final EIS, each build alternative would result in some longitudinal encroachment into the Corps and FEMA 100-year floodplain of Great Salt Lake, as well as transverse encroachments of the floodplains of several streams in the study area. These encroachments would be associated with construction of the proposed interchange with I-215 in the southern portion of the study area and construction of the proposed action alignments north of Center Street. Impacts on the Great Salt Lake floodplain that would occur as a result of the encroachment into the floodplain north of Center Street are quantified in Table 4.14-1. Impacts associated with construction of the interchange with I-215 are not represented in Table 4.14-1 because they would be the same under all build alternatives.

The acreages presented in Table 4.14-1 are based on a 95-m (312-ft) right-of-way width, except for the acreage presented for Alternative D, which is based on a 100-m (328-ft) right-of-way. Expansion of the floodplain boundary did not substantively change the acreage calculations presented in the Final EIS.

The location and design of all the proposed build alternatives avoids and minimizes, to the extent practicable, longitudinal encroachments into floodplains in the study area. None of the build alternatives would result in a significant encroachment into floodplains in the study area. Floodplain equalization culverts and stream crossing culverts would be included in the design to ensure that, during a flood period, evacuation and emergency vehicle routes would be maintained and that the natural floodplain values of the study area would not be lost. As a result, implementation of any proposed build alternative would meet the requirements of both Executive Order 11998 and 23 CFR 650, Subpart A.

4.14.3.3 Hydrologic Function of Wetlands

The hydrologic function of wetlands in the study area, or their ability to provide surface water storage, was evaluated in the Final EIS and reassessed in this Supplemental EIS using a hydrogeomorphic (HGM) model. All the build alternatives would directly and indirectly affect the hydrologic function of wetlands, as described in Section 4.12, *Wetlands*, of this document. The expansion of the floodplain boundary would not change this impact conclusion for any build alternative.

4.14.3.4 Mitigation Measures

As indicated in the Final EIS, to mitigate impacts on floodplains in the study area resulting from construction of any build alternative, floodplain equalization culverts would be installed to allow floodwaters to flow freely between the eastern and western sides of the proposed highway within the Corps floodplain boundary (Parker pers. comm.). Stream-crossing culverts would be designed to allow passage of floodwaters from the FEMA 100-year flood, and riprap would be provided at the ends of such culverts to minimize erosion. Providing equalization culverts to maintain hydrologic connection would minimize the impact on the hydrological function of wetlands on the east side of the alternatives. Both the floodplain equalization and stream crossing culverts are depicted in Figure 4.14-2.

Section 4.15

Threatened and Endangered Species

This section discusses threatened and endangered wildlife species in the study area, including those that are listed or proposed for listing under the federal Endangered Species Act (ESA), and those that are listed on the Utah sensitive species list. This section has been updated to reflect changes that have occurred in the listing status of species since publication of the Final EIS, including the listing of four additional species that could occur in the study area as state species of special concern: northern goshawk, bobolink, Preble's shrew, and kit fox.

4.15.1 Approach and Methodology

4.15.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with special-status wildlife species in the study area, Sections 3.15 and 4.15 of the Final EIS were reviewed to determine what changes that had taken place since publication of the Final EIS. The study area for threatened and endangered species is described in Section 4.0.1, *Study Area*, of this document.

Coordination letters were sent to the U.S. Fish and Wildlife Service (USFWS) and the Utah Department of Natural Resources (UDNR) Division of Wildlife Resources requesting updated information on special-status species that could occur in the study area (Perkins pers. comm.). A letter was received from USFWS in December 2003 that provided an updated list of federally listed species that could occur in Davis and Salt Lake Counties (Maddox pers. comm.) (Appendix A). A copy of the revised Utah sensitive species list, which was updated in December 2003, was obtained from UDNR Division of Wildlife Resources (UDNR, Division of Wildlife Resources 2003a), as was a copy of the Salt Lake and Davis Counties species lists, which were updated in February 2004 (UDNR, Division of Wildlife Resources 2004). These updated federal and state species lists were compared to the information presented in the Final EIS and used, in conjunction with an evaluation of species habitat requirements, to update the list of species that could potentially occur in the study area and the effects the proposed action could have on those species.

The information presented in this section is also consistent with the analysis conducted for the wildlife technical memorandum (Jones & Stokes 2005) and Section 4.13, *Wildlife*, of this document.

4.15.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of impacts on threatened and endangered species since the Draft Supplemental EIS was published in December 2004. Those changes were made for the following reasons.

- A correction was made to the number of state species of special concern listed on the state list for Salt Lake and Davis Counties, because a species was not described in the Final EIS. See Sections 4.15.2, *Affected Environment* and 4.15.2.4, *State Species of Special Concern.*

- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. In addition, updates were made to the developed lands dataset from 1997 and the wildlife habitat map. These updates and recalculations affected the calculations of acreage of habitat lost. See 4.15.3.2, *Threatened and Endangered Wildlife.*

- The analysis of grasshopper sparrow was removed from Sections 4.15.2.4, *State Species of Special Concern*, and 4.15.3, *Environmental Consequences and Mitigation Measures*, because it was determined that the species was unlikely to occur in the project study area.

4.15.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to special-status wildlife species. Since publication of the Final EIS, one species proposed for listing on the federal endangered species list has been removed (Appendix A) and one has been added. In addition, since publication of the Final EIS, six species listed on the Utah sensitive species list for Salt Lake and Davis Counties have been removed (UDNR, Division of Wildlife Resources 2003a) and 16 have been added (UDNR, Division of Wildlife Resources 2004).

Table 4.15-1, which updates Table 3-33 in the Final EIS, lists the special-status species that occur or could potentially occur in the study area and indicates which species have been added to or removed from the federal endangered species list or added to the state sensitive species list since publication of the Final EIS. Table 4.15-1 lists the 14 special-status species (10 described in the Final EIS and four additional Species) evaluated in this document. As described in Section 4.15.2.1, Utah no longer designates state threatened or endangered species.

Table 4.15-1 Special-Status Species That Occur or Could Occur in Study Area

Species		Status*	
Common Name	Scientific Name	Federal	State
Plants			
Ute ladies' tresses	*Spiranthes diluvialis*	T	–
Mammals			
Preble's shrew	*Sorex preblei*	–	SPC
Spotted bat	*Euderma maculatum*	–	SPC
Pale Townsend's big-eared bat	*Plecotus townsendi pallescens*	–	SPC
Kit fox	*Vulpes macrotis*	–	SPC
Birds			
American white pelican	*Pelicanus erthrothynchos*	–	SPC
Northern goshawk	*Accipiter gentiles*	–	CAS
Ferruginous hawk	*Buteo regalis*	–	SPC

Species		Status*	
Common Name	Scientific Name	Federal	State
Bald eagle	*Haliaeetus leucocephalus*	T	–
Long-billed curlew	*Numenius americanus*	–	SPC
Yellow-billed cuckoo	*Coccyzus americanus*	P	SPC
Short-eared owl	*Asio flammeus*	–	SPC
Burrowing owl	*Athene cunicularia*	–	SPC
Bobolink	*Dolichonyx oryzivorus*	–	SPC

Notes:

* T = Threatened under the ESA; E = Endangered under the ESA; P = Proposed for listing under the ESA; SPC = Utah State Species of Special Concern; CAS = Utah State Conservation Agreement Species.

Shaded cells indicate special-status species whose status has changed since publication of the Final EIS. Species removed from the Utah sensitive species list since publication of the Final EIS are not noted in this table.

Source: U.S. Fish and Wildlife Service 2003; UDNR, Division of Wildlife Resources 2003a; UDNR, Division of Wildlife Resources 2004.

4.15.2.1 Definitions

As described in the Final EIS, the threatened and endangered species addressed in this section include all plant and animal species that are proposed for listing (P) and species currently listed as threatened (T), endangered (E), or candidate (C) by USFWS. Also discussed are State of Utah species of special concern (SPC) and conservation agreement species (CAS), which are listed on the Utah sensitive species list. The definitions described in the Final EIS have not changed, except that the state no longer designates species as threatened or endangered. As a result, all state special-status species are only assigned the SPC or CAS designation, as appropriate. There have been no other changes to this section since publication of the Final EIS.

4.15.2.2 Federally Listed Species

Two species listed as threatened under the ESA were described in the Final EIS: bald eagle (*Haliaeetus leucocephalus*) and Ute ladies' tresses (*Spiranthes diluvialis*). There have been no changes to the federal status of either species or its potential to occur in the study area since publication of the Final EIS.

As noted in the Final EIS, peregrine falcon (*Falco peregrinus*), which was included in the list of federally endangered species in the biological opinion for the proposed action (U.S. Fish and Wildlife Service 1999a) (Appendix A), was delisted in August 1999 and is no longer considered in this section because it is no longer considered a special-status species (U.S. Fish and Wildlife Service 1999b).

Since publication of the Final EIS, the yellow-billed cuckoo was added to the federal list of species proposed for listing as threatened under the ESA. This species is still included on the Utah sensitive species list for Salt Lake and Davis Counties (UDNR, Division of Wildlife Resources 2004), as described in the Final EIS. The Final EIS concluded that migrant yellow-billed cuckoos might be affected by this project because they are rare migrants in the regional study area, but no yellow-billed cuckoos were detected during bird surveys conducted between 1999 and 2003 within the area of the proposed Legacy Nature Preserve (Utah Department of Transportation 2004). Recent documentation of a yellow-billed

cuckoo in a peregrine falcon nest in Salt Lake City, however, suggests that this species still migrates through the study area.

Mountain plover (*Charadrius montanus*), which was also described as a species proposed for listing as threatened under the ESA in the Final EIS, is no longer proposed for listing. Table 4.15-1 above provides an updated list of all federally listed species that occur or could potentially occur in the study area.

4.15.2.3 State-Listed Species

Bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*) and yellow-billed cuckoo (*Coccyzus americanus*) were included in the Final EIS as state threatened species. The State of Utah no longer designates state threatened and endangered species, but ferruginous hawk and yellow-billed cuckoo remain on the Utah sensitive species list as species of special concern (UDNR, Division of Wildlife Resources 2003a).

4.15.2.4 State Species of Special Concern

Six species included in the Final EIS as state species of special concern are no longer listed on the Utah sensitive species list: black tern (*Chlidonias niger*), Caspian tern (*Sterna caspia*), common yellowthroat (*Geothlypis trichas*), osprey (*Pandion haliaetus*), Swainson's hawk (*Buteo swainsoni*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (UDNR, Division of Wildlife Resources 2003a).

However, 16 state species of special concern not described in the Final EIS are now listed on the state list for Salt Lake and Davis Counties (UDNR, Division of Wildlife Resources 2004). Four of these species—northern goshawk (*Accipiter gentilis*), bobolink (*Dolichonyx oryzivorus*), Preble's shrew (*Sorex preble*), and kit fox (*Vulpes macrotis*)—could occur in the study area, as described below following the table.

Additionally, information on four species discussed in the Final EIS—least chub, boreal toad, spotted frog, and mountain plover—and 12 of the newly added species of special concern suggest that they do not occur in the study area. These species are not, therefore, likely to be affected by the proposed action. Table 4.15-2 lists the 16 species excluded from further analysis, their distributions and the reasons they were excluded from further analysis.

Table 4.15-2 State Species of Special Concern Excluded from Further Analysis

Species		
Common Name	Scientific Name	Distribution and Habitat Requirements
Invertebrates		
Lyrate mountainsnail	*Oreohelix haydeni*	Favors habitats with limestone talus. Known distribution outside study area.
Western pearlshell	*Margaritifera falcate*	Not likely to occur in the study area because of habitat requirements. Known distribution outside study area.
Fish		
Least chub	*Lotichthys phlegethontis*	Known distribution outside study area.
June sucker	*Chasmistes liorus*	Known distribution outside study area.
Bluehead sucker	*Catastromus discobalus*	Known distribution outside study area.

Species		
Common Name	Scientific Name	Distribution and Habitat Requirements
Bonneville cutthroat trout	*Oncorhynchus clarki utah*	Known distribution outside study area.
Amphibians and Reptiles		
Boreal toad	*Bufo boreas*	Known distribution outside study area.
Spotted frog	*Rana pretiosa*	Known distribution outside study area.
Smooth greensnake	*Opheodrys vernalis*	Known distribution outside study area.
Birds		
Sharp-tailed grouse	*Typanuchus phasianellus*	Known distribution outside study area.
Greater sage grouse	*Centrocercus urophasianus*	Known distribution outside study area.
Mountain Plover	*Charadrius montanus*	Only 2 historic records in vicinity of project study area; not likely to occur there.
Black swift	*Cypseloides niger*	Known distribution outside study area. Occurs in mountainous regions. Nesting elevations are from 1,829 m (6,000 ft) to 3,505 m (11,500 ft).
Lewis's woodpecker	*Malanerpes lewis*	Occurs over a wide range of forested habitats. Rare and unpredictable occurrence in study area.
Three-toed woodpecker	*Picoides tridactylus*	Occurs in coniferous forests, generally above 2,438 m (8,000 ft). Known distribution outside study area.
Grasshopper sparrow	*Ammodrammus savannarum*	Only one historic record (1942), known existing distribution outside of study area.

Northern Goshawk

Northern goshawks are rare migrants in the Great Salt Lake ecosystem; they are more abundant in the higher forested reaches of the watersheds of Great Salt Lake and elsewhere in Utah (Ryser 1985). Goshawks reside in the Great Basin during winter, and there is some altitudinal migration from mountain forests down into the foothills and valleys, as well as immigration of individuals into the Great Basin from the north (Ryser 1985). Goshawks have been observed foraging in open sagebrush areas in Nevada, where they prey on ground squirrels (Hughes 1999). Also, wintering goshawks use cottonwood riparian areas in the Rocky Mountains and Intermountain Region (Squires and Ruggiero 1995), as well as adjacent open areas (Hughes 1999). Northern goshawks have not been observed in the project study area but rare individuals could potentially occur there in winter.

Bobolink

Isolated breeding populations of bobolinks occur in northern Utah near Centerville, Logan, Brigham City, Kamas, Heber, Morgan, Mountain Green, West Layton, and Provo. Bobolinks nest and forage in hydric meadows, wet grasslands, and irrigated areas (primarily pasture and hay fields) (Martin and Gavin 1995). Although historically common in northern Utah, bobolinks are now rare in the area, and they often exhibit unpredictable fluctuations in population numbers. During the breeding season, their diet includes weed and grain seeds, a variety of larval and adult insects, spiders, and harvestmen. The young are exclusively fed invertebrates. During migration and winter periods, grain seeds are the staple diet, supplemented

occasionally with insects. Bobolinks are rare visitors in the Great Salt Lake Ecosystem (GSLE); they have not been observed in the project study area. Because of the relatively small amount of suitable habitat and the uncertain status of the species in the project study area, the potential impacts of the build alternatives would be small or nonexistent.

Preble's Shrew

Very little is known about the distribution of Preble's shrew in Utah. Its range, as it is currently understood, includes much of Montana, central Idaho, eastern Oregon, and surrounding areas in semiarid to arid habitats. Records of its occurrence in Timpie Springs along the southern shore of Great Salt Lake indicate its presence in this region. The known habitat of this species includes marshy areas such as creeks and bogs bordered by willows and other brushy plants. Preble's shrews have been recently found in a montane sagebrush community in northern California, suggesting that the species may also use drier habitats (Zeveloff and Collett 1988). Because similar habitats are found in the project study area, the species may occur there; however, its status in the study area is unknown. Because of the relatively small amount of suitable habitat and the uncertain status of the species in the project study area, the potential impacts of the build alternatives would be small or nonexistent.

Kit Fox

Great Salt Lake is located on the northeastern edge of the known distribution of kit fox (Zevellof and Collett 1988). Kit foxes are found throughout Utah in desert and semiarid regions with flat shrub or shrub-grass communities with little groundcover. Where these foxes occur in the Great Basin, shadscale, greasewood, and sagebrush communities are common. Major prey items include desert rodents, jackrabbits, cottontail rabbits, ground-nesting birds, reptiles, and insects. Kit foxes are rare summer transients in the GSLE, but they have not been observed in the project study area. Since this area is outside their known range, the potential impacts of the build alternatives would be small or nonexistent.

4.15.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, the proposed action could affect both federally listed species and state species of special concern. Since publication of the Final EIS, five additional species that could occur in the study area have been added to the state list for Davis and Salt Lake Counties, and six species of special concern were removed from the state list. The following section provides an update of the environmental consequences and mitigation measures specific to the special-status species in the study area.

The estimates of potential direct impacts on the special-status species described below are drawn from the wildlife technical memorandum (Jones & Stokes 2005), which quantifies by habitat type the potential direct impacts of each build alternative. For each species of concern, the text below describes the range of the amount of suitable habitat (from most lost to least lost) that could be directly affected by the build alternatives. The wildlife technical memorandum and Section 4.13, *Wildlife*, of this document describe more fully the relationship between habitat lost to a build alternative and remaining similar habitat available for wildlife.

4.15.3.1 Threatened and Endangered Vegetation

As described in the Final EIS, although Ute ladies' tresses was originally documented as occurring in the region, it was not found in the study area and would therefore not be affected by the proposed action. There has been no change to this section since publication of the Final EIS.

4.15.3.2 Threatened and Endangered Wildlife

The Final EIS presented impacts on threatened and endangered wildlife species in two categories: avian (bird) and non-avian. Environmental consequences and mitigation measures for avian and non-avian species that occur or could potentially occur in the study area are updated below.

Non-avian Species—Federally Listed

As described in the Final EIS, no federally listed non-avian species occur or could occur in the study area.

Non-avian Species—State Species of Special Concern

Since publication of the Final EIS, the Brazilian free-tailed bat was removed from the state list. In addition, two additional non-avian species that could occur in the study area—kit fox and Preble's shrew—have been listed as state species of special concern. Potential impacts on those species are described below.

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions (2004) No-Build Alternative, there would be no project-related impacts on any non-avian species listed as state species of special concern.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, residential, commercial, and industrial development will continue in the study area. These future projects could affect non-avian species in the study area listed as state species of special concern. See the wildlife technical memorandum for a detailed discussion of foreseeable future conditions in the study area.

Build Alternatives

Preble's Shrew

Because hydric meadow habitats similar to those that support Preble's shrews are present, the species may occur in the study area. All the proposed build alternatives would result in some loss of such habitat. As described in the wildlife technical memorandum (Jones & Stokes 2005), this loss could range from 30.6 ha (75.6 ac) under Alternative E to 41.7 ha (103.0 ac) under Alternative B. Because no information is currently available on the density of this species in different habitats, it is not possible to estimate the number of shrews that could potentially be affected by the proposed action. However, the direct impacts

of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of habitats potentially suitable for Preble's shrew in the regional study area.[1]

Kit Fox

Because there is limited suitable habitat along the Wasatch Mountains in the vicinity of the study area, kit foxes are considered extremely rare and have a low probability of occurring there. If they do occur in the study area, they are most likely to frequent salt desert scrub habitats. All the proposed build alternatives could result in the direct loss of suitable habitat that could potentially be used by this species. As described in the wildlife technical memorandum, this loss could range from 32.2 ha (79.6 ac) under Alternative B to 61.7 ha (152.5 ac) under Alternative C. The direct impacts of the Legacy Parkway project would affect less than 0.1 percent of the overall extent of these habitats in the regional study area.

Mitigation Measures

Establishment of the Legacy Nature Preserve, as described in the Wildlife section in Section 4.13.3.14, *Mitigation Measures,* would mitigate the loss of habitat of Preble's shrew and kit fox.

Bird Species—Federally Listed

As described in Section 4.15.2.1 above, the yellow-billed cuckoo was proposed for listing as threatened under the federal ESA after the Final EIS was published. However, because the cuckoo was considered a state species of special concern in the Final EIS, impacts on the species were disclosed in that document, and those impacts have not changed.

Similarly, impacts on bald eagle have not changed since publication of the Final EIS. To summarize the potential project-related impacts on bald eagles, the highway construction phase would be the most disturbing. Based on the USFWS biological opinion, the Final EIS concluded that this disturbance could lead to abandonment of an occupied nest site and several winter roost sites, either temporarily or permanently (U.S. Fish and Wildlife Service 1999a). However, with implementation of reasonable and prudent measures to minimize take of bald eagles during the construction phase, there was no empirical evidence to suggest that Legacy Parkway construction activities would have any negative influence on bald eagles. During the operations phase of the proposed action, it is possible that bald eagles could be struck by vehicles when the eagles are foraging for carrion along the highway. In addition, all the build alternatives would decrease available hunting areas for bald eagles and the availability of the prey base; however, the Legacy Nature Preserve would provide high quality foraging habitat in a protected state, which would lessen the effects of these impacts on breeding and wintering bald eagles.

Bird Species—State Species of Special Concern

Six state bird species of special concern have been removed from the Utah sensitive species list since publication of the Final EIS and are therefore no longer addressed in this document. Two additional avian species that could occur in the study area—bobolink and northern goshawk—have been listed as state species of special concern. Potential impacts on these species are described below.

There have been no other changes to the impacts or mitigation measures described for threatened and endangered species since publication of the Final EIS.

[1] See Section 4.13, *Wildlife*, for a definition of the geographic extent of the regional study area.

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions (2004) No-Build Alternative, there would be no project-related impacts on bobolink or northern goshawk.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, residential, commercial, and industrial development will continue in the study area. These future projects could impact bobolink and northern goshawk in the study area.

Build Alternatives

Bobolink

Bobolinks have occasionally been observed in agricultural fields at the northern end of the study area near the FBWMA. However, no one has ever documented the area of use beyond its general location or how many individuals use the area. All the proposed build alternatives could result in the direct loss of some suitable breeding and foraging habitats for this species, but site-specific habitat use information for this species is not available for the project study area. Preconstruction surveys in this area would therefore be necessary to determine whether any build alternative could disturb active bobolink nests (Federal Highway Administration et al. 2000).

Northern Goshawk

Northern goshawks have not been observed in the study area. However, some studies on the seasonal movement and habitat use patterns suggest that goshawks could potentially use the study area during the winter. Moreover, the study area supports prey species that could sustain wintering individuals that move through the Great Salt Lake Ecosystem. The few wintering individuals that may occur in this region probably range over a large area that supports a variety of grassland and shrubland habitats. Direct habitat loss under any proposed build alternative would not be likely to affect this species.

Mitigation Measures

As described in the Final EIS, the reasonable and prudent mitigation measures outlined in the biological opinion for the proposed action would be implemented to minimize take of bald eagles. Table 4.15-3 lists these measures and their terms and conditions. The peregrine falcon has been removed from the endangered species list (64 Federal Register 46541–46558). Therefore, terms and conditions of the biological opinion are no longer considered nondiscretionary under authority of the ESA with respect to the peregrine falcons; however, USFWS still recommends their implementation (U.S. Fish and Wildlife Service 1999b). The Legacy Nature Preserve would also mitigate the loss of habitat for wildlife species that use the study area. In addition, site-specific preconstruction surveys would be completed for Preble's shrew and bobolink to determine whether any proposed build alternative could disturb local populations or active nests of the species.

See Section 4.13, *Wildlife*, for a more complete description of the mitigation proposed for impacts on wildlife species.

Table 4.15-3 Reasonable and Prudent Mitigation Measures and Terms and Conditions of Biological Opinion

Mitigation Measure Number	Description of Measure	Terms and Conditions
RPM 1	Measures shall be implemented to prevent construction activities from impacting nesting or wintering bald eagles.	No construction activity will occur from the courtship through incubation/brood rearing periods (approximately January 1 through May 21) within one mile of the bald eagle nest.
		During the nestling through post fledging dependency period (approximately May 21 through August 31), the one-mile buffer may be relaxed to one-half mile for some activities. Coordination with and concurrence from USFWS must occur prior to any activities occurring under this term/condition.
		FHWA shall require continuous monitoring of the bald eagle nest by a qualified wildlife biologist for activities occurring within one mile of the bald eagle nest.
		If, during monitoring, the bald eagles appear disturbed in any manner, construction activities shall immediately cease, and FHWA shall immediately follow the reporting requirement issued in the biological opinion.
		No construction activities will occur from November 1 through March 31 within one-half mile of the bald eagle winter roosting sites.
RPM 2	Measures shall be implemented to prevent construction activities from impacting nesting peregrine falcons.	No construction activities will occur from the courtship through incubation/brooding periods (approximately February 1 through June 21) within one mile of the peregrine falcon aerie.
		During the nestling through post-fledging dependency period (June 21 through August 31), the one-mile buffer may be relaxed to one-half mile for some activities. Coordination with and concurrence from the USFWS must occur prior to any activities occurring under this term/condition.
		FHWA shall require continuous monitoring of the peregrine falcon aerie by a qualified wildlife biologist for any activities occurring within one mile of the peregrine falcon aerie.
		If, during monitoring, the peregrine falcons appear disturbed in any manner, construction activities shall immediately cease, and FHWA shall immediately follow the reporting requirements issues in this biological opinion.
RPM 3	Measures shall be implemented to control human use of the area so as to prevent take, particularly harm and harassment, to nesting bald eagles and peregrine falcons and/or their young as well as to wintering bald eagles.	Project employees will be informed of the presence of the bald eagle and peregrine falcon and the need to minimize disturbance during nesting and wintering periods.

Mitigation Measure Number	Description of Measure	Terms and Conditions
		No recreational trail facilities which encourage extended human use of the area will be constructed within one mile of the nest and roost sites.
		Right-of-way fence will be constructed and maintained along the length of the highway to deter human use of the proposed Legacy Nature Preserve.
RPM 4	Measures shall be implemented to prevent highway maintenance activities from impacting nesting bald eagles and peregrine falcons over the life of the project.	No maintenance activities that result in noise or activity levels above that of normal highway operation conditions shall be conducted within one mile of the peregrine falcon aeries and one mile of the bald eagle nest site during the breeding season.
		No maintenance activities that result in noise or activity levels above that of normal highway operation conditions shall be conducted from November 1 through March 31 within one-half mile of the bald eagle winter roost sites.

Source: Final Formal Biological Opinion for Project Number SP-0067, Legacy Parkway, Salt Lake and Davis Counties, Utah (U.S. Fish and Wildlife Service 1999a).

Section 4.16

Historic and Archaeological Resources

This section provides an update on cultural and paleontological resources located in the area of potential effect (APE), an analysis of potential impacts on newly identified historic properties, and a discussion of how the Memorandum of Agreement (MOA) (see Appendix A) will address these potential impacts.

4.16.1 Approach and Methodology

4.16.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with historic structures and archaeological sites in the study area, Sections 3.16 and 4.16 of the Final EIS were reviewed to determine the changes that had taken place since publication of the Final EIS. The study area for cultural and paleontological resources is represented by the APE, which, in general, encompasses the Legacy Nature Preserve and a 1,000-m (3,280-ft) area on either side of the build alternative alignments. The APE for the Supplemental EIS is similar to the survey area described in the Final EIS, and is smaller than the study are defined in Section 4.0.1, *Study Area*. Slight modifications to this general definition of the APE are represented in the following documents.

- Class III Cultural Resource Inventory of 255 acres for the Legacy Nature Preserve (Wright et. al. 2001).
- Legacy Parkway Pipeline Relocation Project Final Class III Cultural Resources Inventory Letter Report (SWCA Environmental Consultants 2002).
- Site 42Dv94: A Human Remains Discovery in the Jordan River Wetlands, Davis County, Utah (SWCA Environmental Consultants 2003a).
- Site 42Dv98: IMACS Site Form (SWCA Environmental Consultants 2003b).
- Legacy Nature Preserve Water System Project Monitoring Report 2003 (SWCA Environmental Consultants 2003c).
- Draft: Industrial Debris and the Bottle Louse: Data Recovery at the Lagoon Drive Discovery Site (42Dv93) on the Legacy Parkway project, Farmington, Davis County, Utah (SWCA Environmental Consultants 2004a).

- Final Documentation of the Woodman Townsite, the Antelope Island Improvement Company Boat Landing, the Lake Shore Bathing Resort, and Associated Features for the Legacy Parkway Pipeline Project in Davis County, Utah (SWCA Environmental Consultants 2004b).

The following supplemental investigations and activities were completed to update information relative to historic structures and prehistoric and historic archaeological sites in the APE.

- During the Section 404 process after publication of the Final EIS, additional literature reviews and field investigations were conducted for the parcels associated with the Legacy Nature Preserve. These additional archaeological sites were identified, evaluated, and otherwise documented in the six reports listed above.

- Data recovery excavations were conducted in 2000 at one of the prehistoric sites in the APE (42Dv2). Documentation of the field investigation and the results are pending. Additional field investigations were conducted at 42Dv2 during construction monitoring to determine whether site boundaries extended beyond previously known areas.

- The historic structure inventory in the Final EIS was updated to account for structures in the APE whose eligibility for listing on the National Register of Historic Places (NRHP) had changed since publication of the Final EIS.

- Structures in the Clark Lane Historic District (CLHD) were evaluated as components of that district, as listed on the NRHP, rather than as an assemblage of individually eligible (or not eligible) structures, which was how they were evaluated in the Final EIS.

- In consultation with the Utah State Historic Preservation Office (SHPO), it was determined that the UPRR and D&RG corridors are eligible for listing on the NRHP.

- The Utah Geological Survey was contacted to confirm the presence of previously documented paleontological resources and to determine whether new paleontological resources had been discovered since publication of the Final EIS (Wright et al. 2001).

4.16.1.2 Changes since Draft Supplemental EIS

Changes have been made to the historic and archaeological resources section since the Draft Supplemental EIS was published in December 2004. These changes were made for the following reasons.

- The MOA has been finalized (September 2005). See Section 4.16.1.2, *Memorandum of Agreement*.

- Additional fieldwork, coordination with UDOT, and consultation with SHPO occurred. The Overstreet et al. 2004 draft report was finalized, and is now referenced herein as HDR 2005b.

- A correction has been made to the number of in-period structures identified in the historic structure inventory. See Section 4.16.2.2, *Historic Structures.*

- It has been determined that the demolition of the structure at 662 W. Clark Lane could be avoided under Alternatives E by building a retaining wall. Although demolition of the historic structure would be avoided, it would still be considered an adverse effect because the status of the property would change because UDOT would acquire the property.

4.16.1.3 National Register of Historic Places – Criteria for Eligibility

Criteria for evaluating the significance of resources for listing on the NRHP are outlined in 36 CFR 800.10, "National Register Criteria," and in handbooks that describe the NRHP evaluation process. Four criteria are used to evaluate the significance of properties—Criterion A through Criterion D. Under all the criteria, the quality of significance is considered present in sites that possess integrity of location, design, setting, materials, workmanship, feeling, and association. However, quality of significance also serves to differentiate the criteria, as shown below.

- **Criterion A**: The quality of significance is present in sites that are associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B**: The quality of significance is present in sites that are associated with the lives of persons significant in our past.
- **Criterion C**: The quality of significance is present in sites that embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D**: The quality of significance is present in sites that have yielded, or may be likely to yield, information important in prehistory or history.

All historic and archaeological resources identified in this document were evaluated using these criteria for eligibility for listing on the NRHP.

4.16.1.4 Memorandum of Agreement

On June 21, 2000, as part of the Final EIS process, an MOA was signed by the Advisory Council on Historic Preservation (ACHP), SHPO, FHWA, UDOT, and the Utah Division of Indian Affairs, with tribal concurrence from the Northwest Band of Shoshone of the Shoshone Nation, Idaho and Utah. Other tribes were invited to concur but declined to sign as concurring parties. These tribes included the Shoshone Bannock Tribes of Idaho, the Ute Indian Tribe of the Uintah-Ouray, Utah, the Confederated Tribes of the Goshute (Ibapah), and the Skull Valley Band of Gosiute, Utah. The MOA governs the treatment and disposition of resources in the APE that are under the jurisdiction of Section 106 of the National Historic Preservation Act (NHPA).

A revised MOA was drafted in November 2004 to address comments received from the public regarding potential construction-related vibration impacts on structures within the CLHD; to address discovery, data recovery, minimization of impacts, and preservation of historic and archaeological resources eligible for listing on the NRHP that were discovered after publication of the Final EIS; and to provide additional requirements for coordinating with interested tribes. Since publication of the Draft Supplemental EIS, the revised MOA has been finalized (September 2005). Copies of the September 2005 MOA and the June 2000 MOA are included in Appendix A.

4.16.2 Affected Environment

The following subsections provide a summary of updated information on the affected environment, relative to prehistoric and historic archaeological sites, historic structures, historic railroad corridors, and paleontological resources.

4.16.2.1 Prehistoric and Historic Archaeological Sites

The Final EIS identified the then-known prehistoric and historic sites, including 27 sites that were recorded for the first time during field surveys conducted for the Final EIS in 1998 (Baseline Data, Inc. 1998). The following sites were discovered or their status changed as a result of the additional investigations and activities described above in 4.16.1.1. Table 4.16-1 below, which updates Table 3-34b in the Final EIS, lists the prehistoric and historic and archaeological sites identified in the APE during field visits.

Site 42Dv2 (Prehistoric Camp)

42Dv2 is a large, prehistoric site that was identified in the Final EIS. In 2000, in accordance with the stipulations of the June 2000 MOA (see Section 4.16.1.2, *Memorandum of Agreement*), data recovery excavations were conducted at 42Dv2, during which both cultural materials and human remains were recovered. Excavations at 42Dv2 were halted when it was determined that construction of the proposed action would not affect the site further (i.e., the site was not located within the physical construction footprint of the build alternative). The documentation of the investigation is pending.

Supplemental field investigations at 42Dv2 were conducted during initial construction and monitoring activities associated with construction of Alternative D (Final EIS Preferred Alternative), in accordance with the June 2000 MOA, to determine whether the previously determined boundaries of the site extended west into the right-of-way of Alternative D. Cultural materials and features were identified west of the previously determined boundaries of the site, indicating that the boundaries of 42Dv2 extend into the right-of-way at this location, but not within the construction footprint. The site boundaries were expanded to the west to include those elements identified during construction monitoring before construction activities were halted (see September 2005 MOA, Appendix A).

Site 42Dv3 (Prehistoric Site)

The expansion of the Legacy Nature Preserve since publication of the Final EIS prompted a new literature search and field investigation (Wright et al. 2001). One additional prehistoric site was identified in the APE as a result of the literature search, 42Dv3. This site had been previously recorded, but locating it again in the field was not possible because of insufficient location data in the original site form (Wright et al. 2001). As a result, 42Dv3 is not further considered in this supplemental evaluation.

Sites 42Dv68 and 42Dv69 (Historic Storage Facilities)

These historic archaeological sites, located at 350 North Redwood Road, were removed for construction of the Foxboro development, a residential construction project unrelated to the Legacy Parkway project. As a result, they are no longer considered in this supplemental evaluation.

Site 42Dv88 (Prehistoric Lithic and Ceramic Scatter)

This prehistoric lithic and ceramic scatter was identified in the Legacy Nature Preserve during supplemental studies (Wright et al. 2001).

Site 42Dv89 (Historic Berms)

This archaeological site comprising two historic earthen and rock slag berms was first investigated in 2001 (Wright et al. 2001). The site was recorded again with expanded boundaries in 2004 (SWCA Environmental Consultants 2004b).

Site 42Dv90 (Historic Archaeological Debris)

This archaeological site comprising a subsurface deposit of historic debris and surface architectural debris was identified in the Legacy Nature Preserve during investigations completed in that area in 2002 for pipeline relocations associated with construction of Alternative D (Final EIS Preferred Alternative) (SWCA Environmental Consultants 2002).

Site 42Dv91 and 42Dv92 (Historic Ditches)

Archaeological sites 42Dv91 and 42Dv92, two earthen water diversion ditches, were identified in the Legacy Nature Preserve during investigations completed in that area in 2002 for pipeline relocations associated with construction of Alternative D (SWCA Environmental Consultants 2002).

Site 42Dv93 (Historic Trash Scatter)

This site comprising historic trash scatter was discovered during construction monitoring activities associated with the proposed action. The site, consisting of a historic trash debris deposit containing glass, ceramics, and metal, is the probable remains of an early twentieth-century dairy operation. Because it was discovered during construction, data recovery and excavation data recovery mitigation was conducted in 2002 (SWCA Environmental Consultants 2004a).

Site 42Dv94 (Prehistoric Site)

This site was discovered in 2002 during monitoring activities associated with the proposed action. The site contained human remains, which were discovered eroding from the margins of the City Drain Canal in North Salt Lake, Utah. The human remains have been fully excavated; however, additional remains may be present in the area (SWCA Environmental Consultants 2003a).

Site 42Dv97 (Historic Privy)

A historic privy (42Dv97) was identified after publication of the Final EIS, subsequent to the acquisition of a residential property at 1395 W. Parrish Lane in Centerville. In consultation with SHPO, FHWA and UDOT determined that it would be necessary to evaluate site eligibility if construction activities resumed at the site.

Site 42Dv98 (Prehistoric/Historic Lithic and Ceramic Scatter)

This is a multi-component site consisting of a prehistoric lithic and ceramic scatter and a historic trash scatter. The site was identified after publication of the Final EIS during investigations of the Legacy Nature Preserve (SWCA Environmental Consultants 2003b).

Site 42Dv102 (Historic Surface Scatter and Historic Artifacts)

Historic archaeological site 42Dv102 was identified after publication of the Final EIS during field investigations in the Legacy Nature Preserve associated with proposed installation of a water pipeline associated with construction of Alternative D (SWCA Environmental Consultants 2003c). The site consists of a historic artifact scatter, containing primarily glass and ceramics.

Site 42Dv103 (Historic Surface Scatter and Historic Artifacts)

Site 42Dv103 was identified after publication of the Final EIS during field investigations in the Legacy Nature Preserve associated with proposed installation of a water pipeline associated with construction of Alternative D (SWCA Environmental Consultants 2003c). It consists of a surface scatter of historic artifacts.

Site 42Dv112 (Historic Townsite)

42Dv112, referred to as the Woodman Townsite, was identified during additional archaeological investigation in the Legacy Nature Preserve after a visual review of large-scale aerial photographs indicated a street-grid pattern associated with the nineteenth-century townsite (SWCA Environmental Consultants 2004b).

Site 42Dv113 (Historic Berm)

This site is a historic boat landing consisting of an earthen and slag berm. It was identified after publication of the Final EIS during an archaeological investigation in the Legacy Nature Preserve, which also resulted in the discovery of 42Dv112 (SWCA Environmental Consultants 2003b).

Table 4.16-1 Update of Historic and Prehistoric Archaeological Sites Identified in the APE during Field Surveys*

Site Number	Site Type	Description	NRHP Eligible	Criterion
Davis County				
42Dv2	Prehistoric	Camp—Human remains	Yes	D
42Dv22	Prehistoric	Burial	No	
42Dv67	Historic	Homestead	Yes	C, D
42Dv68	Historic	Storage facility	No	
42Dv69	Historic	Storage facility	No	
42Dv70	Prehistoric	Lithic and ceramic scatter	Yes	D
42Dv71	Historic	Well	No	

Site Number	Site Type	Description	NRHP Eligible	Criterion
42Dv72	Prehistoric	Lithic and ceramic scatter	Yes	D
42Dv73	Historic	Trash scatter	No	
42Dv74	Prehistoric/historic	Artifact scatter/foundation	Yes	
42Dv75	Historic	Water conveyance	No	
42Dv76	Prehistoric	Lithic and ceramic scatter	Yes	D
42Dv77	Prehistoric	Lithic scatter	Yes	D
42Dv80	Prehistoric	Artifact scatter	Yes	D
42Dv88	Prehistoric	Lithic and ceramic scatter	Yes	D
42Dv89	Historic	Railroad berms, wooden posts	No	
42Dv90	Historic	Archaeological deposit and architectural debris	Yes	D
42Dv91	Historic	Canal remnant	No	
42Dv92	Historic	Canal remnant	No	
42Dv93	Historic	Debris from light-industrial dairy	No	D
42Dv94	Prehistoric	Human remains	Yes	D
42Dv97	Historic	Privy	Undetermined	Likely D
42Dv98	Prehistoric/historic	Lithic and ceramic scatter	Yes	D
42Dv102	Historic	Surface scatter of historic artifacts	No	
42Dv103	Historic	Surface scatter of historic artifacts	No	
42Dv112	Historic	Townsite	No	
42DV113	Historic	Earthen/slag berm, railroad spur	No	
Salt Lake County				
42Sl 154/182	Prehistoric/Historic	Lithic scatter/glass scatter	Yes	D
42Sl155	Prehistoric	Lithic scatter	No	
42Sl197	Prehistoric	Artifact scatter	No	
42SL 241	Historic	Trash scatter	No	
42SL 242	Prehistoric/historic	Artifact/trash scatter	Yes	D
42SL 243	Historic	Trash scatter	No	
42SL 244	Prehistoric	Lithic scatter	No	
42SL 245	Prehistoric/historic	Artifact/trash scatter	No	
42SL 246	Prehistoric	Artifact scatter	Yes	D
42SL 247	Historic	Trash scatter	No	
42SL 248	Prehistoric	Lithic scatter	Yes	D
42SL 249	Prehistoric	Lithic/groundstone scatter	No	
42SL 250	Historic	Trash scatter	No	
42SL 251	Historic	Concrete foundation	No	
42SL 252	Prehistoric	Artifact scatter	No	

Site Number	Site Type	Description	NRHP Eligible	Criterion
42SL 253	Historic	Trash scatter	No	
42SL 254	Historic	Trash scatter	No	
42SL 255	Historic	Trash, depressions	Yes	D

Note:
* Shaded cells indicate sites found or updated during additional surveys since 1998.
Source: Wright et al. 2001; Christensen 2004

4.16.2.2 Historic Structures

The historic structure inventory completed in 1998 for the Final EIS identified 26 in-period structures (i.e., at least 45 years old) within the APE (Federal Highway Administration et al. 2000). Of the 26 structures, 18 were considered eligible for listing on the NRHP. A new historic structure inventory of the APE was conducted in 2003–2004 to update the previous inventory (HDR Engineering 2005b). Overstreet et al. 2004 was later finalized by HDR Engineering in 2005, after completion of additional fieldwork and consultation with SHPO. This inventory identified 33 in-period structures, not all of which are eligible for listing on the NRHP, and one NRHP historic district, the CLHD. (The historic district is discussed in Section 4.16.2.3.) Table 4.16-2 provides an updated list of these structures and consolidates information from the Final EIS and the field surveys completed by Wright et al. (2001) and HDR Engineering (2005b).

During the 2005 field survey, 23 structures were identified as individually eligible for listing on the NRHP. Their location is illustrated on Figures 4.16-1a and 4.16-1b. Potential impacts on these 23 structures and on the CLHD are discussed below in Section 4.16.3. For clarification, it should be noted that the in-period historic structures that were listed individually in the Final EIS but are now considered part of the CLHD are listed separately in Table 4.16-3. Tables 4.16-2 and 4.16-3 together represent an update of Table 3-35 in the Final EIS.

Table 4.16-2 In-Period Historic Structures in the APE, outside the Clark Lane Historic District[1]

Property Address	NRHP Eligibility		Building Type	Date Constructed	Date(s) Recorded	Comments[2]
	1998	2005				
White House, 10 North 650 West, Farmington	Eligible		Temple Form	1910	1998	Structure documented according to June 2000 MOA and then demolished.
641 W. Glovers Lane, Farmington	Eligible	Not Surveyed	Bungalow	1940	1998	Final EIS noted structure was eligible for listing on the NRHP, but Baseline Data (1998) noted not eligible. HDR 2005b could not locate.
326 Burke Lane, Farmington	Not Surveyed	Not Eligible	Hall Parlor House	1920	2004, 2005	

Property Address	NRHP Eligibility		Building Type	Date Constructed	Date(s) Recorded	Comments[2]
	1998	2005				
About 1300 W. Glovers Lane, Farmington	Not Surveyed	Eligible	Animal Facility	1950	2004, 2005	
453 W. Glovers Lane, Farmington	Not Surveyed	Not Eligible	WWII-era Cottage	1955	2005	
About 637 South 650 West, Farmington	Eligible	Eligible	Cross Wing	1910	1998, 2004, 2005	HDR 2005b recorded again as an animal facility.
788 South 650 West, Farmington	Eligible	Not Surveyed	Bungalow	1945	1998	HDR 2005b could not locate.
About 2120 South 650 West, Farmington	Not Surveyed	Eligible	Animal Facility	1930	2004, 2005	
1515 North 1100 West, West Bountiful	Not Surveyed	Eligible	Foursquare House	1920	2004, 2005	
About 2125 North 1100 West, West Bountiful	Not surveyed	Eligible	Animal Facility	1940	2004, 2005	
662 W. Clark Lane, Farmington	Not Surveyed	Eligible	Animal Facility	1950	2004, 2005	
541 West 250 South, Farmington	Not Eligible	Not Surveyed	Residential	1945	1998	HDR 2005b could not locate.
1020 North 2000 West, Kaysville	Eligible	Not Surveyed	Residential	1910	1998	Final EIS noted structure was eligible for listing on the NRHP, but Baseline Data (1998) noted not eligible. HDR 2005b could not locate.
1395 W. Parrish Lane, Centerville	Not Eligible	Not Surveyed	Bungalow	1930	1998	HDR 2005b could not locate.

Property Address	NRHP Eligibility		Building Type	Date Constructed	Date(s) Recorded	Comments[2]
	1998	2005				
680 S. Redwood Rd., Woods Cross	Eligible	Nor Surveyed	Bungalow	1930	1998	Final EIS noted structure was eligible for listing on the NRHP, but Baseline Data (1998) noted not eligible. HDR 2005b could not locate.
772 S. Redwood Rd., Woods Cross	Not Surveyed	Not Eligible	Bungalow	1930	2004, 2005	
808 S. Redwood Rd., Woods Cross	Not Surveyed	Not Eligible	Bungalow	1930	2004, 2005	
About 836 S. Redwood Rd., Woods Cross	Not Surveyed	Eligible	WWII-era Cottage	1950	2004, 2005	
864 South 1800 West, Woods Cross	Eligible	Not Eligible	Bungalow	1930	1998, 2004, 2005	HDR 2005b recorded again as 864 S. Redwood Rd. and as not eligible for listing on the NRHP.
918 S. Redwood Rd., Woods Cross	Not Surveyed	Eligible	Cross Wing	1920	2004, 2005	
900 South 1800 West, Woods Cross	Not Eligible	Eligible	Cross Wing	1910	1998, 2004, 2005	HDR 2005b recorded as about 946 S. Redwood Rd., a WWII-era cottage, date 1950.
946 South 1800 West, Woods Cross	Eligible	Eligible	Residential	1920	1998, 2004, 2005	HDR 2005b recorded again as about 974 S. Redwood Rd
1430 South 1800 West, Woods Cross	Not Eligible	Not Eligible	Cross Wing	1915	1998, 2004, 2005	HDR 2005b recorded again as 1430 S. Redwood Rd.
About 1452 S. Redwood Rd., Woods Cross	Not Surveyed	Eligible	WWII-era Cottage	1950	2004, 2005	
1650 South 1800 West, Woods Cross	Eligible	Eligible	Cross Wing	1915	1998, 2004, 2005	HDR 2005b recorded again as 1650 S. Redwood Rd.
1890 S. Redwood Rd., Woods Cross	Not Eligible	Not Surveyed	Residential	1950	1998	HDR 2005b could not locate.

Property Address	NRHP Eligibility		Building Type	Date Constructed	Date(s) Recorded	Comments[2]
	1998	2005				
2016 South 1800 West, Woods Cross	Not Eligible	Eligible	Cross Wing	1920	1998, 2004, 2005	HDR 2005b recorded again as 2018/2020 S. Redwood Rd.
About 2408 S. Redwood Rd., Woods Cross	Not Surveyed	Eligible	WWII-era Cottage	1950	2004, 2005	
1095 N. Redwood Rd., North Salt Lake	Not Surveyed	Eligible	WWII-era Cottage	1950	2004, 2005	
About 900 N. Redwood Rd., North Salt Lake	Not Surveyed	Eligible	Foursquare House	1905	2004, 2005	
350 (1) N. Redwood Rd., North Salt Lake	Not Surveyed	Eligible	Military Storage	1940	2004, 2005	Structure part of complex recorded as archaeological site 42Dv68 in 1997; recently subject of mitigation; removed for housing development.
350 (2) N. Redwood Rd., North Salt Lake	Not Surveyed	Eligible	Military Storage	1940	2004, 2005	Structure part of complex recorded as archaeological site 42Dv68 in 1997; recently subject of mitigation; removed for housing development.
350 (3) N. Redwood Rd., North Salt Lake	Not Surveyed	Eligible	Military Storage	1940	2004, 2005	Structure part of complex recorded as archaeological site 42Dv68 in 1997; recently subject of mitigation; removed for housing development.
2770 North 2200 West, North Salt Lake	Not Surveyed	Eligible	Foursquare House	1920	2004, 2005	
2704 North 2200 West, North Salt Lake	Not Surveyed	Not Eligible	WWII-era Cottage	1950	2004, 2005	
2662 North 2200 West, North Salt Lake	Not Surveyed	Eligible	Bungalow	1930	2004, 2005	
2650 North 2200 West, North Salt Lake	Not Surveyed	Eligible	WWII-era Cottage	1950	2004, 2005	

Property Address	NRHP Eligibility		Building Type	Date Constructed	Date(s) Recorded	Comments[2]
	1998	2005				
2664 North Rose Park Lane, North Salt Lake	Not Surveyed	Eligible	Foursquare House	1910	2004, 2005	
2790 North 2200 West, Salt Lake City	Eligible	Not Eligible	Temple Form	1935	1998, 2004, 2005	HDR 2005b recorded as a WWII-era cottage, date 1950.
3067 North 2200 West, Salt Lake City	Eligible	Not Surveyed	Residential	1930	1998	HDR 2005b could not locate.
3071 North 2200 West, Salt Lake City	Eligible	Not Surveyed	Residential	1930	1998	HDR 2005b could not locate.
3200 North 2200 West, North Salt Lake	Not Surveyed	Eligible	Ranch House	1955	2004, 2005	
About 3290 North 2200 West, North Salt Lake	Not Surveyed	Eligible	Ranch House	1950	2004, 2005	
Structure in Section 36, west of Farmington	Not Surveyed	Not Eligible (2001 survey)	Hall Parlor house	Early 20th Century	2001	Wright et al. (2001) identified structure as a hall parlor house converted to agricultural use as a barn. Noted as not eligible for listing on the NRHP in 2001.
Clark Lane Historic District	Individual structures surveyed, see Section 4.16.2.3	Listed on NRHP	Historic District	1856–1940	2004, 2005	See Section 4.16.2.3, *Clark Lane Historic District*, and Table 4.16-3.

Note:

[1] Shaded cells represent in-period structures individually eligible for listing on the NRHP based on the 2005 survey.

[2] HDR Engineering 2005b could not locate several of the structures identified during the 1998 survey. This disparity could be attributable to demolition of these structures since publication of the Final EIS and/or a change in the house number identifying the structure. The current inventory (HDR Engineering 2005b) is the most accurate representation of standing structures in the APE.

1800 W. in Woods Cross = Redwood Road in Woods Cross

Source: HDR Engineering 2005b, Wright et al. 2001, and Baseline Data 1998.

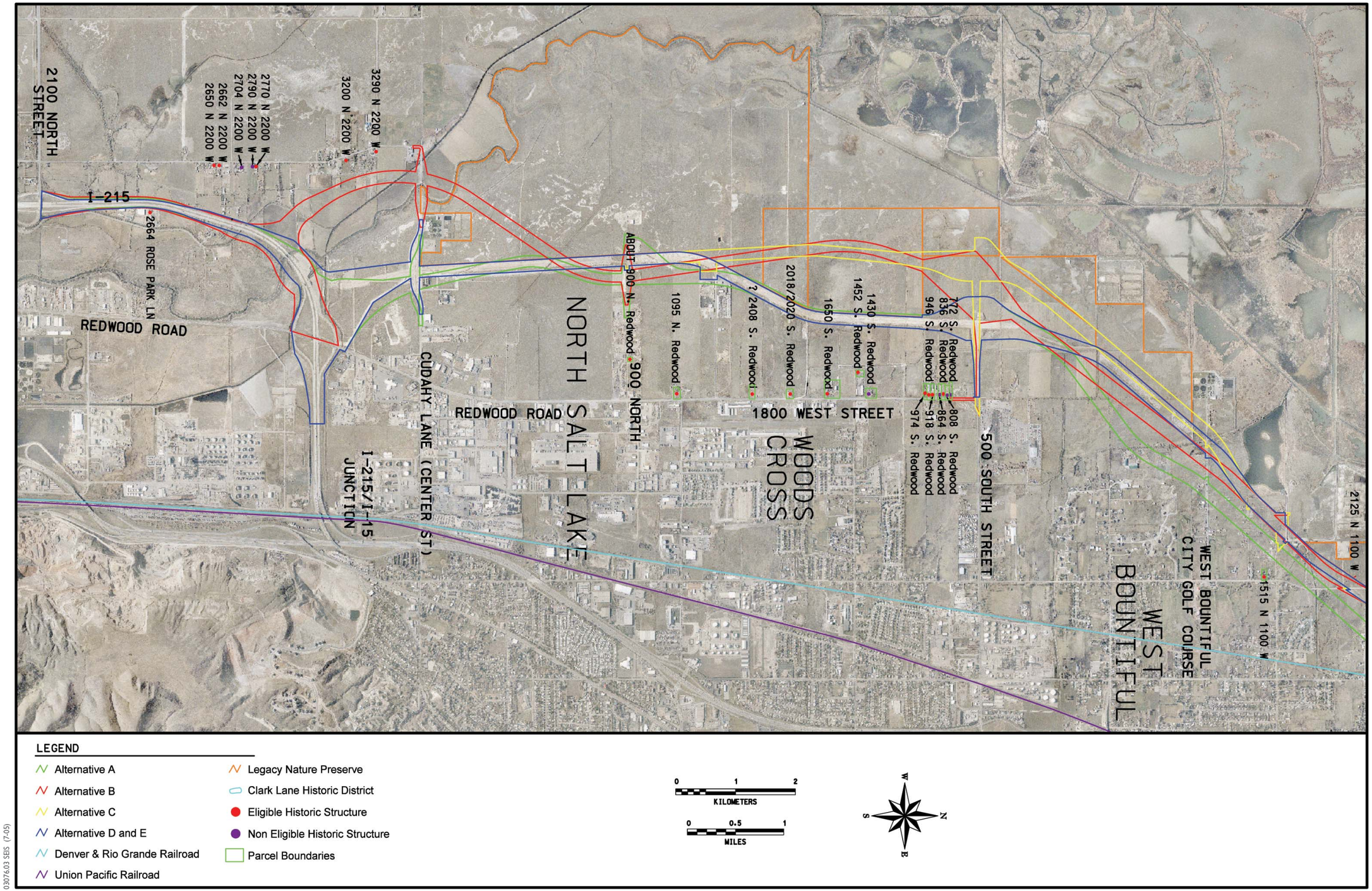

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Figure 4.16-1a
Historic Structures in the APE

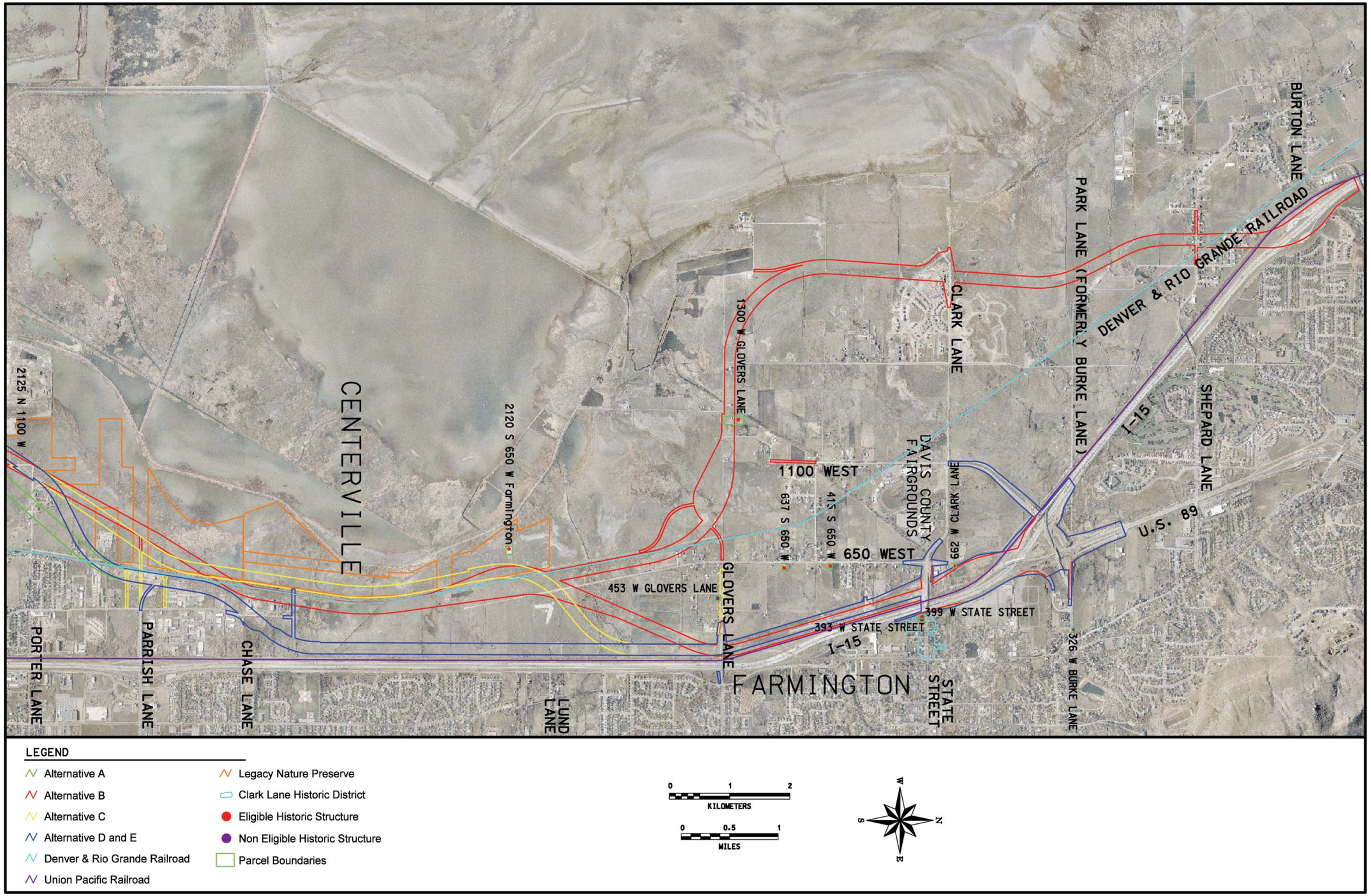


Figure 4.16-1b
Historic Structures in the APE

4.16.2.3 Clark Lane Historic District

Historical Significance of District and Structures

The CLHD was nominated for listing on the NRHP as a district in 1994. The district encompasses both sides of State Street in the City of Farmington and extends from the State Street overpass over I-15 (400 West) east to 200 West. The northern and southern boundaries of the CLHD are defined by the lot margins of the structures on the northern and southern sides of State Street, in accordance with National Park Service guidelines (National Park Service 1997).

When the CLHD was nominated, it consisted of 26 structures, 13 of which contributed to its historical significance (Balle 1994). The CLHD was associated with agriculture throughout the early part of its period of significance (1856–1940), but most of its agricultural outbuildings have been removed. The existing homes represent a wide variety of architectural styles from the period of significance. Particularly important to the integrity of the CLHD is the row of trees along each side of State Street (Balle 1994).

The Final EIS evaluated individual structures within the boundaries of the CLHD but did not evaluate the district as a single entity. Some of the individual structures evaluated in the Final EIS contribute to the integrity of the CLHD, others do not. Table 4.16-3 lists the structures in the CLHD that were discussed in the Final EIS. Their 2005 status as contributing or non-contributing members to the historical significance of the CLHD is also provided in the table. Two of the structures within the CLHD—399 W. State Street and 393 W. State Street, Farmington—are within the APE for the proposed action, as indicated in the table. Table 4.16-3 does not represent a complete list of structures within the CLHD; rather, the table lists only those that were originally evaluated in the Final EIS.

Clark Lane Historic District and Vibration

In 2001, the public was notified that State Street was being considered as a haul route for construction traffic associated with the proposed action. Following this notification, several members of the public expressed concern that historic structures in the CLHD could be damaged by earthborne vibration caused by construction activities. Potential vibration impacts on structures are discussed below in Section 4.16.3.3 and addressed in detail in Section 4.20, *Construction Impacts*.

Table 4.16-3 Clark Lane Historic District In-Period Historic Structures Identified in Final EIS*

Property Address	Section 106 Status (NRHP)		Building Type	Date Constructed	Date(s) Recorded	Comments
	1998	2005				
340 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Victorian Gothic	1890	1998	
368 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Bungalow	1910	1998	
382 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Bungalow	1920	1998	
393 W. State St., Farmington	Not Eligible	Does not contribute to CLHD	Cross-Wing House	1910	2003	
399 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Period Cottage	1920	1998, 2003	Contributes to CLHD, but also individually eligible for listing on NRHP
367 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Bungalow	1920	1998	
361 W. State St., Farmington	Not Eligible	Does not contribute to CLHD	Bungalow	1940	1998	
335 W. State St., Farmington	Individually Eligible	Contributes to CLHD	Cross Wing	1905	1998	
307 W. State St., Farmington	Not Eligible	Contributes to CLHD	Cross Wing	1900	1998	Shown as 301 W. State St. in Baseline Data, Inc. (1998) but corrected for Final EIS to 307 W. State St.

Note:

* Shaded cells represent structures in the CLHD that are within the APE of the proposed action.

Source: HDR Engineering 2005b.

4.16.2.4 Historic Railroad Corridors

Two historic railroad corridors, the D&RG and UPRR corridors, were not included in the Final EIS. SHPO concurred with the inventory at the time the Final EIS was published. SHPO, FHWA, and other consulting parties have since determined that they are eligible for listing in the NRHP under Criterion A. The D&RG and UPRR corridors are therefore considered potential historic resources in this document.

4.16.2.5 Paleontological Resources

As described in the Final EIS, paleontological resources found in the APE consist of invertebrate fossils of low significance. No additional paleontological or prehistoric resources have been found in the APE since publication of the Final EIS.

4.16.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, implementation of any build alternative would affect historic and archaeological resources in the APE. The nature and extent of these impacts, however, have changed since publication of the Final EIS because of the updated historic structure inventory, updated evaluation of the CLHD, and additional field investigations conducted in the APE, including in the Legacy Nature Preserve. Updated impact information relative to historic and archaeological resources in the APE is provided below.

4.16.3.1 Prehistoric and Historic Archaeological Sites

No-Build Alternative

Existing Conditions

There would be no project-related impacts on historic or prehistoric sites under the No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, private development will continue to occur at the rate of approximately 283 ha (700 ac) per year, although the type and timing of this development is indeterminate. It is possible that these future projects would affect prehistoric and historic archaeological sites in the APE, although the nature and timing of these projects are not known at this time.

Build Alternatives

As described in the Final EIS, eight historic and prehistoric sites eligible for listing on the NRHP were identified in the APE. Since publication of the Final EIS, four additional sites eligible for listing on the NRHP have been identified in the APE, with one additional site still undetermined. Of the total 12 sites located in the APE that are eligible for listing on the NRHP, five could be adversely affected by one or more build alternative. One additional site, if determined to be eligible for listing on the NRHP, would be adversely affected by one or more build alternative. Adverse impacts associated with ground disturbance and construction activities, such as cutting, grading, and filling, would affect the physical integrity of these six sites, which are described below. Updated and supplemental information on the nature of the impacts on all 13 sites is summarized in Table 4.16-4 below. Table 4.16-4 updates Table 4-35 in the Final EIS.

Site 42Dv2 (Prehistoric Camp)

The Final EIS stated that construction of any build alternative would adversely affect 42Dv2. In accordance with the measures prescribed to mitigate this impact in the Final EIS and in the June 2000 MOA, portions of 42Dv2 were excavated. Excavation at the site was halted in 2002 after it was determined that construction of Alternative D (Final EIS Preferred Alternative) would not affect the site because the site was not located within the construction footprint. The site boundaries were expanded during construction monitoring efforts, per discovery monitoring stipulations in the MOA, before construction was halted. The expanded site boundaries are within the right-of-way but not within the construction footprint of any of the build alternatives.

As indicated in Table 4.16-4, implementation of Alternatives A, C, D, or E would result in an adverse impact on 42Dv2 because, even though the site is not located within the construction footprint of the alternatives, the site would be incorporated into the right-of-way. Mitigation measures to minimize impacts on 42Dv2 are described below.

Site 42Dv70 (Prehistoric Lithic Scatter)

Although the Final EIS disclosed that 42Dv70 would be adversely affected by all the build alternatives, it was determined during the design-build process that construction of Alternative D would not affect the site (Lizotte pers. comm.[a]). Similarly, as indicated in Table 4.16-4, of all the build alternatives described in the Supplemental EIS, only construction of Alternative B would adversely affect 42Dv70. Mitigation measures to minimize impacts on 42Dv70 are described below.

Site 42Dv77 (Prehistoric Lithic Scatter)

The Final EIS disclosed that construction of Alternative B would result in an adverse impact on 42Dv77. Those impacts would still occur as stated in the Final EIS if Alternative B were selected.

Site 42Dv90 (Historic Archaeological Deposit and Debris)

As described in 4.16.2.1, 42Dv90 was identified in 2002 during pipeline relocation associated with construction of Alternative D (Final EIS Preferred Alternative). As indicated in Table 4.16-4, construction of Alternative B only would result in an adverse impact on this site.

Site 42Dv94 (Prehistoric Site – Human Remains)

As described in 4.16.2.1, 42Dv94 contained human remains, which were discovered eroding from the margins of the City Drain Canal in North Salt Lake. Although the identified human remains were completely excavated, there is potential for additional remains to be present in the area.

As indicated in Table 4.16-4, implementation of Alternatives A, C, or E would result in an adverse impact on 42Dv94 because, under those alternatives, the site would be incorporated into the right-of-way. Mitigation measures to minimize impacts on 42Dv94 are described below.

Site 42Dv97 (Historic Privy)

As described in 4.16.2.1, 42Dv97 consists of a historic privy located in Centerville that was discovered during property acquisition associated with construction of Alternative D. The eligibility of this site for listing on the NRHP has not been determined, but if the site exhibits integrity and sufficient archaeological data potential, it would likely be eligible under Criterion D. If it is determined that 42Dv97

is eligible for listing on the NRHP, Alternatives A and E would adversely affect the site. Because the eligibility status and therefore any potential impact on the site are currently unknown, the impact is listed as "unknown" in Table 4.16-4.

Table 4.16-4 Impacts on NRHP-Eligible Historic and Prehistoric Archaeological Sites[1]

Site Number	Site Type	Impact (by Alternative)					
		No-Build	A	B	C	D	E
42Dv2	*Prehistoric camp*	*None*	*Adverse*	*None*	*Adverse*	*Adverse*	*Adverse*
42Dv67	Historic homestead	None	None	None	None	None	None
42Dv70	*Prehistoric lithic scatter*	*None*	*None*	*Adverse*	*None*	*None*	*None*
42Dv72[2]	Prehistoric camp	None	None	None	None	None	None
42Dv74	Prehistoric camp/ historic foundation	None	None	None	None	None	None
42Dv76	Prehistoric lithic scatter	None	None	None	None	None	None
42Dv77	Prehistoric lithic scatter	None	None	Adverse	None	None	None
42Dv80[2]	Prehistoric artifact scatter	None	None	None	None	None	None
42Dv88[2]	Prehistoric lithic and ceramic scatter	None	None	None	None	None	None
42Dv90	Historic	None	None	Adverse	None	None	None
42Dv94	Prehistoric	None	Adverse	None	Adverse	Adverse	Adverse
42Dv97[3]	Historic	None	Unknown	None	None	Unknown	Unknown
42Dv98[2]	Prehistoric/historic	None	None	None	None	None	None

Note:

1 Shaded cells indicate historic and prehistoric sites identified since publication of the Final EIS. Italicized cells indicate historic and prehistoric sites whose impact conclusion has changed since publication of the Final EIS.

2 These sites are located in the area of the Legacy Nature Preserve.

3 Eligibility status of 42Dv97 is currently unknown. If this site is eligible for listing on the NRHP, it would be adversely affected by construction of Alternatives A and E.

Source: Federal Highway Administration et al. 2000, HDR Engineering 2004b.

In summary, Alternatives A and E would adversely affect two NRHP-eligible sites, and one potentially eligible archaeological site. Alternative B would adversely affect three NRHP-eligible sites, and Alternative C would adversely affect two NRHP-eligible sites.

Mitigation Measures

Mitigation would be required for any NRHP-eligible archaeological site physically affected by construction of any build alternative. Typical mitigation measures for NRHP-eligible archaeological sites

include archival investigations, development of a data recovery plan, and consultation between FHWA, UDOT, SHPO, the tribes, and other consulting parties.

To date, consultation with SHPO has resulted in the following specific mitigation measures.

- As described above, implementation of Alternatives A, C, D, or E would result in an adverse impact on 42Dv2 and 42Dv94. If any of those build alternatives are selected for implementation, in accordance with the September 2005 MOA, the site limits will be delineated and protected from construction activities through the use of construction fencing.

- To minimize impacts to 42Dv70, a professional archaeologist will monitor excavation and earthmoving activities associated with highway construction in the vicinity of the site. Although 42Dv70 would only be adversely affected under Alternative B, this mitigation measure will be implemented regardless of which build alternative is chosen, in accordance with the September 2005 MOA.. If the monitoring archaeologist determined during the design-bid-build process that the site boundaries extend into the construction footprint of any build alternative, data recovery would be initiated in accordance with the September 2005 MOA.

The existing Legacy Nature Preserve management plan, as described in the Final EIS, provides for short-term protection of historic and archaeological resources within the preserve. No impacts on historic and archaeological resources within the preserve are anticipated from implementation of the build alternatives. The Legacy Nature Preserve mitigation plan will include a management plan to ensure the future health of these resources. In addition, should any build alternative be implemented, a long-term management plan for archaeological sites within the preserve would be developed by FHWA, UDOT, and SHPO in conjunction with the organization that would manage the preserve. Mitigation of adverse effects on archaeological resources would be conducted according to the September 2005 MOA (see Appendix A).

4.16.3.2 Historic Structures

As described above in Section 4.16.2.2, 23 in-period structures individually eligible for listing on the NRHP (excluding structures located in the CLHD) are located within the APE. The following provides an update of impacts on those historic structures. Figures 4.16-1a and 4.16-1b illustrate the location of these structures.

No-Build Alternative

Existing Conditions

There would be no project-related impacts on historic structures under the No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. In addition, private development will continue to occur at the rate of approximately 283 ha (700 ac) per year, although the type and timing of this development is indeterminate. It is possible that these future projects would affect historic structures in the APE, although the nature and timing of these projects are not known at this time.

Build Alternatives

The Final EIS stated that one NRHP-eligible historic structure—the White House at 10 North 650 West in Farmington—could be affected by the build alternatives. Since publication of the Final EIS and in accordance with the June 2000 MOA, that building was documented to Utah State intensive-level survey (ILS) standards and removed (i.e., demolished).

Two additional historic structures, 1300 W. Glovers Lane and 662 W. Clark Lane, located in the APE and eligible for listing on the NRHP, would be adversely affected by implementation of one or more of the build alternatives. Since publication of the Draft Supplemental EIS, it has been determined that the demolition of the structure at 662 W. Clark Lane could be avoided under Alternatives A, C, and E by building a retaining wall. Although demolition of the historic structure would be avoided, it would still be considered an adverse effect because the status of the property would change because UDOT would acquire the property. As a result, three NRHP-eligible structures would be affected by one or more build alternative. Table 4.16-5 summarizes impact information by alternative for each historic structure in the APE.

Table 4.16-5 Impacts on NRHP-Eligible Historic Structures

	Impact (by Alternative)					
Property Address	No-Build	A	B	C	D	E
10 North 650 West, Farmington[1]	None	Adverse	Adverse	Adverse	Adverse	Adverse
About 1300 W. Glovers Lane, Farmington	None	None	Adverse	None	None	None
About 415 South 650 West, Farmington	None	None	None	None	None	None
About 637 South 650 West, Farmington	None	None	None	None	None	None
About 2120 South 650 West, Farmington[2]	None	None	None	None	None	None
1515 North 1100 West, West Bountiful	None	None	None	None	None	None
About 2125 North 1100 West, West Bountiful[2]	None	None	None	None	None	None
662 W. Clark Lane, Farmington	None	Adverse	None	Adverse	Adverse	Adverse
About 836 S. Redwood Rd., Woods Cross	None	None	None	None	None	None
918 S. Redwood Road, Woods Cross	None	None	None	None	None	None
946 South 1800 West, Woods Cross	None	None	None	None	None	None
974 S. Redwood Road, Woods Cross	None	None	None	None	None	None
About 1452 S. Redwood Rd., Woods Cross	None	None	None	None	None	None
1650 South 1800 West, Woods Cross	None	None	None	None	None	None
2018/2020 S. Redwood Road, Woods Cross	None	None	None	None	None	None
About 2408 S. Redwood Rd., Woods Cross	None	None	None	None	None	None

	Impact (by Alternative)					
Property Address	No-Build	A	B	C	D	E
1095 N. Redwood Rd., North Salt Lake	None	None	None	None	None	None
About 900 N. Redwood Road, North Salt Lake	None	None	None	None	None	None
2770 North 2200 West, North Salt Lake	None	None	None	None	None	None
2662 North 2200 West, North Salt Lake	None	None	None	None	None	None
2650 North 2200 West, North Salt Lake	None	None	None	None	None	None
2664 N. Rose Park Lane, North Salt Lake	None	None	None	None	None	None
3200 N 2200 W, North Salt Lake	None	None	None	None	None	None
About 3290 North 2200 West, North Salt Lake	None	None	None	None	None	None
Clark Lane Historic District	None	None	None	None	None	None

Note:

[1] Property at 10 North 650 West, Farmington (White House), is no longer extant; however, since this property was affected in conjunction with construction of Alternative D (Final EIS Preferred Alternative), it is disclosed as an adverse impact in the Supplemental EIS. This property would also have been affected with implementation of any other build alternative.

[2] These structures are located in the Legacy Nature Preserve. There would be no impacts on these sites.

Source: Federal Highway Administration et al. 2000, HDR Engineering 2004b.

In summary, all the build alternatives would adversely affect two of the three NRHP-eligible historic structures located in the APE.

Mitigation Measures

The White House at 10 North 650 West in Farmington, which the Final EIS identified as subject to adverse impacts associated with construction of Alternative D, has been demolished since publication of the Final EIS. Mitigation for this adverse impact was completed as described in the Final EIS (i.e., the building was documented to Utah State ILS standards before it was removed). Mitigation for adverse affects on the historic structure at 1300 W. Glovers Lane and 662 W. Clark Lane, both in Farmington, would be conducted according to the September 2005 MOA (Appendix A). These measures would include preparation of an ILS form, photographic documentation of the structures, preparation of illustrated floor plans, archival research, and a submittal to the Utah Division of History, Preservation Section. In addition to the ILS documentation, a retaining wall will be built for 662 W. Clark Lane under Alternatives A, C, and E.

4.16.3.3 Clark Lane Historic District

As described above in Section 4.16.2.3, part of the CLHD is in the APE; three individual structures that contribute to the CLHD—393 W. State Street, 398 W. State Street, and 399 W. State Street—are located in the APE. Of these structures, only 399 W. State Street is eligible for individual listing on the NRHP.

Potential impacts on these structures are presented in context of the CLHD as a whole, because any impact on a contributing element of the CLHD could affect the CLHD as a whole.

No-Build Alternative

Existing Conditions

There would be no project-related impacts on the CLHD under the No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives are implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. It is possible that these future projects would impact the CLHD, although the nature and timing of these projects are not known at this time.

Build Alternatives

Construction of any build alternative could affect the CLHD. Although none of the structures in the CLHD would be removed under any build alternative, construction of any build alternative would slightly alter the footprint of the parcels at 393 W. State Street, 398 W. State Street, and 399 W. State Street. Vibration from construction activities could also affect the structures (see Section 4.20, *Construction Impacts*).

Specifically, a total of 121 square meters (sq m) (1,302 square feet [sq ft]) of the existing parcels at 399 W. State Street and 398 W. State Street would be modified through re-grading and fill placement to provide new, permanent driveway access to both parcels. The footprints of the parcels at 399 W. State Street and 393 W. State Street would be increased by a total of 99 sq m (1,066 sq ft) due to realignment of the existing curbs and gutters, as well as a tapering of the road cross section from east to west. These modifications are shown in Figure 5-10, and described in more detail in Chapter 5 of this document.

Mitigation Measures

The modifications described above are addressed in the September 2005 MOA (Appendix A). The 2005 MOA includes mitigation measures to ensure that project-related impacts are minimized and that the CLHD and its contributory elements are returned to their original pre-construction condition. The September 2005 MOA also includes measures to minimize potential harm from construction-related vibration, as described in Section 4.20, *Construction Impacts*. With implementation of the mitigation measures in the September 2005 MOA, none of the build alternatives would adversely affect the three parcels within the APE or the CLHD as a whole.

4.16.3.4 Historic Railroad Corridors

No Build Alternative

Existing Conditions

There would be no project-related impacts on historic railroad corridors under the No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. It is possible that these future projects would impact the historic railroad corridors in the APE, although the nature and timing of these projects are not known at this time.

Build Alternatives

The historic D&RG Railroad corridor, which is eligible for listing on the NRHP under Criterion A, would be affected by implementation of all the build alternatives. Alternative B would cross the D&RG (at grade) three times near Parrish Lane, Shepard Lane, and Glovers Lane. Alternatives A and E would cross the D&RG (at-grade) twice, once just south of Parrish Lane in Centerville and once just north of Chase Lane in Centerville. Alternative C would cross the D&RG (at-grade) twice, at approximately Parrish Lane and Lund Lane. These crossings are illustrated in Figures 5-10 and 5-11. FHWA and UDOT have determined, in consultation with SHPO, that these impacts would have no adverse effect on the D&RG Railroad corridor.

The UPRR railroad corridor, which is also eligible for listing on the NRHP, would not be affected by any build alternative. The build alternatives would bridge the UPRR right-of-way at all intersections within the corridor.

Mitigation Measures

None of the build alternatives adversely affects the NRHP-eligible railroad corridors identified in the APE. No mitigation measures are proposed.

4.16.3.5 Paleontological Resources

No-Build Alternative

Existing Conditions

There would be no project-related impacts on paleontological resources under the No-Build Alternative.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. In addition, private development will continue to occur at the rate of approximately 283 ha (700 ac) per year, although the type and timing of this development is indeterminate. It is possible that these future projects would affect paleontological resources in the APE, although the nature and timing of these projects are not known at this time.

Build Alternatives

As described in Section 4.16.2.5, paleontological resources found in the APE consist of invertebrate fossils of low significance. The build alternatives would not result in an impact on any of these resources.

Mitigation Measures

None of the build alternatives adversely affects paleontological resources identified in the APE. No mitigation measures are proposed.

Section 4.17

Hazardous Waste Sites

This section discusses potential hazardous waste sites within the study area and the potential for the sites to be affected by the proposed build alternatives. It provides updated information on potential hazardous waste sites disclosed in the June 2000 Final EIS, as well as information on hazardous waste sites identified since publication of the Final EIS. In addition, this section presents information on impacts associated with aerially deposited lead.

4.17.1 Approach and Methodology

4.17.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with potential hazardous waste sites in the study area, Sections 3.17 and 4.17 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for potential hazardous waste sites is described in Section 4.0.1, *Study Area*, of this document.

Environmental databases were searched for properties or sites within the study area that have known contamination and sites that are regulated according to the requirements of state or federal laws (Environmental Data Resources 2003). The following is a list of environmental databases that were searched, many of which were also consulted during preparation of the Final EIS.

- Superfund Sites, Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS).
- National Priorities List (NPL), priority CERCLIS sites.
- Emergency Response Notification System (ERNS).
- Facility Index System (FINDS), a comprehensive database containing a description of other databases with more information.
- FIFRA/TSCA Tracking System (FTTS), a database created to register companies that handle toxic chemicals under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Toxic Substance Control Act (TSCA).
- Solid Waste Landfills database (SWLF).

- Resource Conservation and Recovery Information System (RCRIS), Large-Quantity Generators (RCRIS-LQG), Small-Quantity Generators (RCRIS-SQG), and Treatment, Storage, or Disposal Facilities (RCRIS-TSDF).
- Open or closed mines (MINES).
- Aboveground storage tanks (AST).
- Underground storage tanks (UST).
- Leaking underground storage tanks (LUST), both open (under investigation) and closed (no additional actions are required or ever took place).
- Toxic Chemicals Release Inventory System (TCRIS or more commonly TRI).

To obtain additional information on sites identified through these database searches, the ArcIMS 3.0 interactive map viewer (UDEQ Division of Environmental Response and Remediation 2003) was reviewed. ArcIMS 3.0 is a web-based tool, maintained by the UDEQ Division of Environmental Response and Remediation (DERR), which provides consolidated location and status information on many of the sites listed in the databases above.

In addition, since publication of the Final EIS, soil samples were taken at two properties identified as sites of concern in the Final EIS: refinery effluent ditch from fuel tank farm (unique identification [ID] AP-3) and construction contractor yard (Hogan and Associates) (unique ID AP-10). These limited field investigations were conducted to further evaluate the potential to encounter soil or groundwater contamination at these sites (HDR Engineering 2000). Additional soil samples were also collected from undisturbed areas within existing UDOT right-of-way at the proposed northern and southern interchange locations. These samples were collected to assess the risk associated with encountering high concentrations of aerially deposited lead at proposed Legacy tie in locations. These areas were chosen because they were located adjacent to existing highway systems where tire wear and the past use of leaded gasoline made the possibility of encountering aerially deposited lead more likely.

Furthermore, David West, Right-of-Way Manager for UDOT, was contacted to determine whether any potential hazardous waste sites within the proposed Alternative D right-of-way had been acquired since publication of the Final EIS.

Impacts on potential hazardous waste sites were also reassessed to determine whether the narrower typical cross section proposed in the Supplemental EIS for each of the build alternatives (i.e., 95 m [312 ft] versus 100 m [328 ft], as described in Chapter 3, *Alternatives*, of this document) would change the impacts on hazardous waste sites disclosed in the Final EIS.

4.17.1.2 Changes since Draft Supplemental EIS

For various reasons—including minor alignment modifications, updates of information, and corrections of inadvertent miscalculations—changes have been made to the calculations of impacts for some resources since the Draft Supplemental EIS was published in December 2004. For this hazardous waste section, however, no changes have occurred since the publication of the Draft Supplemental EIS that required updating the disclosure of impacts related to hazardous waste sites.

4.17.2 Affected Environment

This section presents a summary of updated information on the affected environment relative to potential hazardous waste sites. Additional hazardous waste sites identified during the database searches described above are listed below. Several potential hazardous wastes sites identified in the Final EIS have been acquired since publication of the Final EIS. The location and status of these properties are also described in this section.

4.17.2.1 Potential Hazardous Waste Sites

As described in Section 3.17.1 of the Final EIS, 63 potentially hazardous waste sites are located in or near the study area. These sites are listed in Table 3-37 and shown in Figures 3-25a through 3-25f in the Final EIS.

Since publication of the June 2000 Final EIS and during preparation of this Supplemental EIS, remediation began at one of the sites identified in Section 3.17.1 of the Final EIS, the Portland Cement Site 5 (UDEQ 3). This site is located adjacent to the right-of-way of the build alternatives. It was an active Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) site and repository for cement kiln dust containing arsenic, lead, and other metals. Potential was identified for contaminated groundwater from this site to migrate into or be present within the rights-of-way of the build alternatives and for dust to be windblown or carried by stormwater runoff into the rights-of-way of the build alternatives. At the time the Final EIS was published, it was determined that no remediation was required for this site under any of the build alternatives. Remediation at the Portland Cement Site 5 (UDEQ 3) is occurring independently of the Legacy Parkway project, and the project would not require additional remediation.

Three additional potential hazardous waste sites were identified during the database search described above. These were the only additional sites identified for evaluation in the Supplemental EIS. The additional sites are described below and shown in Figure 4.17-1.

BFI/Stericycle (S104968070)

This site was identified in the SWLF, RCRIS (RCRIS-LQG), and TRI databases. Its LQG unique ID number is S104968070. The address of this site is 90 North 1100 West, North Salt Lake, which is the same address as BFI Waste Systems, a private waste-hauling company. This site contains a medical waste incinerator and may also support a small waste storage area, although no waste storage or treatment is permitted onsite. This site may also be listed because of the waste collection vehicles that are typically stored at such facilities. No notices of violation were identified in the EPA Facility Registry System (FRS).

Quality Plating (1001225950)

This site was identified in the RCRIS database as an RCRIS-SQG, unique identification number 1001225950. It is located at 2425 South, 2087 West, North Salt Lake, east of the alternative alignments. No notices of violation were identified in the EPA FRS.

Davis County Jail (U000557897)

This site was identified in the LUST database, unique identification number U000557897. It is located south of State Street near the proposed northern terminus. Two UST's, one containing diesel fuel and the other gasoline, were removed from the site in September 1996. During removal of the tanks, diesel fuel was discovered, requiring remediation of the site and identification in the LUST database. The site was remediated and the incidents filed in the LUST database were closed (i.e., require no further action) in 1997. No other notices of violation were identified in the EPA FRS.

Table 4.17-1 lists the name, unique ID number, and site type for these three potential hazardous waste sites, as well as the environmental databases that they were identified in.

Table 4.17-1 Potential Hazardous Waste Sites Identified since Publication of the Final EIS

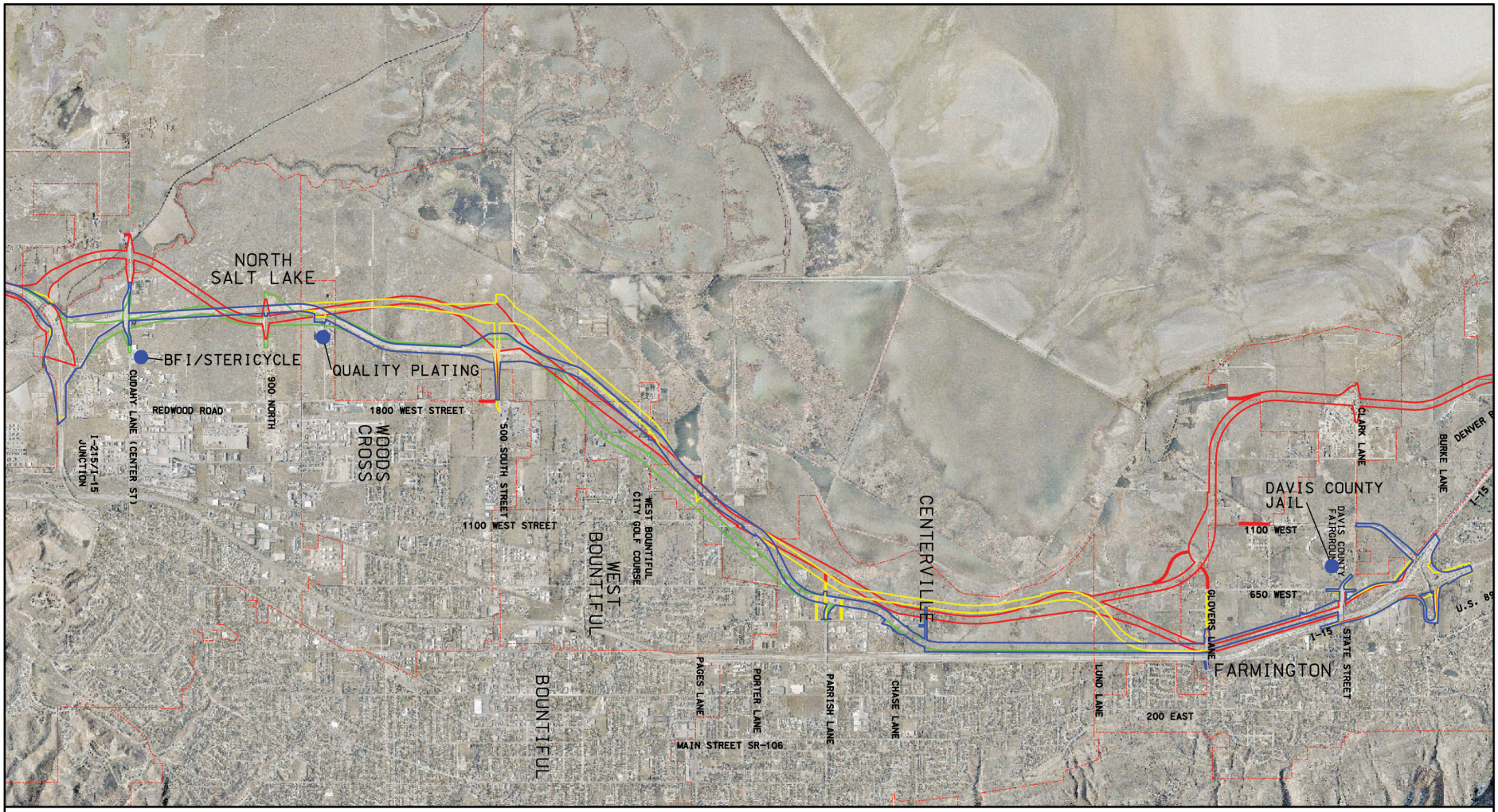
Site Name	Unique ID Number	Site Type	Source of Information
BFI/Stericycle	S104968070	RCRIS-LQG	SWLF, RCRIS, TRI
Quality Plating	1001225950	RCRIS-SQG	RCRIS
Davis County Jail	U000557897	LUST	State LUST/UST List

Note:
Additional potential hazardous waste sites that occur in the study area are listed in Table 3-37 in the Final EIS.

Table 4-36d in the Final EIS lists all potential hazardous waste sites within the right-of-way of Alternative D (Final EIS Preferred Alternative), as well as those that occur approximately 200 m (656 ft) (i.e., a reasonable distance) of the Alternative D right-of-way. The information in this table has not changed since publication of the Final EIS, except that the three new potential hazardous waste sites listed above are all located within 200 m (656 ft) of the Alternative D/E right-of-way. In addition, several of the sites located within the Alternative D right-of-way have been acquired since publication of the Final EIS (West pers. comm.[c]). Table 4.17-2 below lists the current status of all the sites that occur within the right-of-way of Alternatives D and E, and states whether they have been acquired by UDOT. For comparative purposes, Table 4.17-3 lists the potential hazardous waste sites described in Table 4.17-2 and indicates whether they would occur within the right-of way of any other build alternative.

Table 4.17-2 Status of Hazardous Waste Sites in Alternatives D and E Right-of-Way

Site Name	Unique ID Number	Status
Bay Area Refuse Disposal Site (Bountiful City Landfill)	39982	Property has been acquired, but no construction activities have occurred at this location. Potential impacts associated with this site have not changed since publication of the Final EIS
UST (UST 4001371)*	2189010	No change in status since publication of the Final EIS.
Firing Range	AP-1	No change in status since publication of the Final EIS.
Effluent Ditch from Fuel Tank Farm	AP-3	Soil samples collected at site. See 4.17.2.2 for additional information.
Auto Repair Shop	AP-8	Property has been acquired. Onsite structures demolished and site cleared since publication of the Final EIS.



LEGEND

- Alternative A
- Alternative B
- Alternative C
- Alternatives D and E
- Municipality Boundary
- Potentially Hazardous Waste Site

0 1 2 KILOMETERS

0 0.5 1 MILES

Legacy Parkway Supplemental EIS

03076.03 (7-05) SEIS

Figure 4.17-1
Additional Hazardous Waste Sites
Evaluated Since Publication of the Final EIS

Site Name	Unique ID Number	Status
Construction Contractor Yard (Hogan & Associates)	AP-10	Soil samples collected at site. See 4.17.2.2 for additional information.
Paving Contractor Yard	AP-11	Property has been acquired. Site remediation completed in 1998, as described in Section 4.17.3 of the Final EIS.
North West Oil Drain	AP-12	No change in status since publication of the Final EIS.
Petroleum Pipelines (Amoco, Chevron, and Pioneer)	NA	No change in status since publication of the Final EIS.

Note:

* Unable to locate UST site using the Final EIS Unique ID number. Review of DERR interactive map showed UST 4001371 in the same location as UST 2189010 shown in Figure 4-19a in the Final EIS.

Table 4.17-3 Hazardous Waste Sites in Alternatives D and E Right-of-Way That Would Also Be Affected by Other Build Alternatives

		Build Alternatives[1, 2]			
Site Name	Unique ID Number	A	B	C	D and E
Bay Area Refuse Disposal Site (Bountiful City Landfill)	39982		X	X	X
UST (UST 4001371)	2189010	X	X	X	X
Firing Range	AP-1	X		X	X
Effluent Ditch from Fuel Tank Farm	AP-3	X	X	X	X
Auto Repair Shop	AP-8	X			X
Construction Contractor Yard (Hogan & Associates)	AP-10	X			X
Paving Contractor Yard	AP-11	X	X	X	X
North West Oil Drain	AP-12	X	X	X	X
Petroleum Pipelines (Amoco, Chevron, and Pioneer)	NA	X	X	X	X

Notes:

1 An "X" in a column indicates that the site would be in the right-of-way of the indicated build alternative.

2 Only hazardous waste sites that occur within the Alternatives D and E right-of-way (see Table 4.17-2) are listed in this table. This information is presented for comparative purposes to illustrate whether other build alternatives would also affect these sites. There are hazardous waste sites that are not listed in this table that would be affected by Alternatives A, B, and C. The status of such sites has not changed since publication of the Final EIS; see Section 4.17.4 of the Final EIS for a detailed discussion of those sites.

4.17.2.2 Results of Field Investigations

Since publication of the Final EIS, limited field investigations have been conducted to further evaluate the potential to encounter soil or groundwater contamination at two hazardous waste sites in the study area:

effluent ditch from fuel tank farm (AP-3) and construction contractor yard (Hogan and Associates) (AP-10) (HDR Engineering 2000). Because these two sites were located in the Alternative D right-of-way, they were targeted to assess the risk of encountering contamination. The results of those field investigations are summarized below.

Effluent Ditch from Fuel Tank Farm (AP-3)

Four soils samples were collected at AP-3. Diesel-range petroleum hydrocarbons were detected in all four samples, and gasoline-range petroleum hydrocarbons were detected in three of the four samples, although none of the detected contaminants was above allowable standards. Oil and grease contamination was also detected in one of the samples (HDR Engineering 2000).

Construction Contractor Yard (Hogan and Associates) (AP-10)

Two areas with stained soil were located during field reconnaissance at AP-10. The first covered a 19-sq m (200-sq ft) area near a drum storage area on the site, and the second covered a 9-sq m (100-sq ft) area near an AST on the site (HDR Engineering 2000). Soil samples collected showed petroleum contamination to a depth of approximately 0.6 m (2 ft) at both locations. Contamination levels were not above allowable standards.

4.17.2.3 Aerially Deposited Lead

The historic use of leaded gasoline and tire wear can lead to a potential increase in concentrations of aerially deposited lead in unpaved areas adjacent to roads and highway. Aerially deposited lead (usually found within the top 0.6 m [2 ft] of soil) and lead in general can cause a range of health effects, including behavioral problems, learning disabilities, seizures, and even death. Children 6 years old and under are at particular risk from lead exposure because their bodies are growing quickly (U.S. Environmental Protection Agency 2003a).

There is a potential for construction workers to encounter aerially deposited lead in unpaved areas in the study area that are adjacent to existing roads, in particular in areas near proposed interchange locations. To estimate the potential impacts on construction workers from aerially deposited lead in these areas, UDOT collected and analyzed soil samples from undisturbed areas near the proposed southern and northern termini of the project (Sadik-McDonald pers. comm.). These areas were chosen because they were located adjacent to existing highway systems where tire wear and the past use of leaded gasoline made the possibility of encountering aerially deposited lead more likely. The results of analysis of these samples showed between 28 and 77 milligrams of lead per kilogram of soil (mg/kg). These levels are below both the average background lead concentrations in the Salt Lake Valley (123 mg/kg) and EPA's typical level of concern for lead (400 mg/kg). This potential impact is disclosed below in Section 4.17.3.4.

4.17.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, all the proposed build alternatives could affect potentially hazardous waste sites in the study area. The screening process used to determine which of the hazardous waste sites were of the greatest concern relative to construction of each of the build alternatives has been updated since publication of the Final EIS, as described below. The updated screening process and the potential impacts

associated with the identified hazardous waste sites are described below. In addition, impacts on construction workers from aerially deposited lead in the study area are discussed below.

The reduction of the right-of-way width from 100 m (328 ft) to 95 m (312 ft) did not change the impact conclusions associated with potential hazardous waste sites.

4.17.3.1 Site Screening

As described in the Final EIS, potential hazardous waste sites were screened to identify the sites in or near the proposed alignment that were more likely to contain contaminated soil or groundwater. Specifically, the screening process entailed the following two steps.

- Identifying the type of site or event and its current status (described in Section 4.17.2 above).
- Comparing the site's location to the proposed alignments (by proximity and location, with respect to the hydraulic gradient of the water table).

The potential hazardous waste sites were divided into three categories depending on their probability of environmental degradation: high, medium, and low. Only sites that were within 1.6 km (1 mi) of a proposed alternative right-of-way, a distance used for purposes of database search and initial site screening, were considered during this initial evaluation.

The process used in the Supplemental EIS for dividing the potential hazardous waste sites into the three categories was similar to that used in the Final EIS (described in Section 3.17.3 of the Final EIS). However, several additional site types not identified in the Final EIS were added for evaluation in the Supplemental EIS. Updated information relative to these categories is provided below.

Each of the site types (described below and listed in Table 4.17-1 above and Table 3-37 in the Final EIS) was compared to these three categories to yield a preliminary indication of the probability of environmental degradation. These sites were then evaluated to determine whether they were within or adjacent to (i.e., within 200 m [656 ft] of) the right-of-way of a build alternative. Based on their proximity to a right-of-way, the inferred groundwater flow direction, and their probability of environmental degradation, the sites were categorized as sites of "greater" or "secondary" concern. A complete description of this site screening process is provided in Sections 3.17.3 and 4.17.2 of the Final EIS.

High Probability of Environmental Degradation

The Final EIS identified CERCLA and NPL sites as sites that typically have a high probability of existing soil or groundwater contamination. For purposes of this supplemental analysis, open LUST sites (i.e., those that are currently under investigation) were also considered sites with a high probability of environmental degradation. Open LUST sites are included in this category because of the unknown nature of the site.

Medium Probability of Environmental Degradation

The Final EIS identified active USTs and active or closed SWLFs as sites that typically have a medium probability of environmental degradation. For purposes of this supplemental analysis, closed LUST sites (i.e., LUST sites where a compliance matter has been closed/resolved), RCRIS-TSDF sites, and MINES sites are also considered sites that have a medium probability of environmental degradation.

Closed LUST sites are included in this category because, depending on the circumstances of the LUST closure, they can have residual contamination that could pose a threat to human health or the environment if disturbed. RCRIS-TSDF sites, which treat, store, or dispose of hazardous wastes, are sites for which no releases have been reported; therefore, they were considered medium risk. Sites with historic mining operations are considered medium risk because they have a moderate chance of contamination.

Low Probability of Environmental Degradation

The Final EIS identified RCRIS-SQG, RCRIS-LQG, ERNS and HMIRS hazardous material spill sites, removed and closed UST's, and Clean Air Act (CAA) Title 3 sites (regulated air emissions) as sites that typically have a low probability of environmental degradation. For purposes of this supplemental analysis, registered AST and FTTS sites are also considered sites that have a low probability of environmental degradation.

Registered AST sites are considered to have a low probability of environmental degradation because visual evidence of a leak at an AST is easier to detect than a leak at an UST. As a result, contamination can be more quickly contained and managed to prevent potential migration into the groundwater table or to an offsite location. A large quantity release at an FTTS site would result in the site showing up in either the RCRIS or CERCLIS database.

4.17.3.2 Impacts from Potential Hazardous Waste Sites

As described in the Final EIS, each build alternative could affect potential hazardous waste sites within or adjacent to the proposed build alternative rights-of-way. Contaminated soil and/or groundwater associated with potential hazardous waste sites could affect worker health and safety during construction and could result in construction delays. Work in and around contaminated areas could also result in spreading of the contamination. As described in the Final EIS, the greatest potential to encounter contaminated groundwater exists where excavations are required (i.e., bridges or culvert crossings) or where piles are needed (i.e., bridges).

As described in Section 4.17.2.1 above, three new hazardous waste sites have been identified since publication of the Final EIS. The potential for these sites to be affected by the build alternatives is discussed below. There is no change to the impact conclusions relative to potential hazardous waste sites disclosed in the Final EIS, except that several hazardous waste sites identified in the Final EIS have been acquired and remediated since publication of the Final EIS (as described in Section 4.17.2.1 above) and the Portland Cement Site 5 (UDEQ 3) is currently undergoing remediation.

No-Build Alternative

Existing Conditions (2004)

Under the existing conditions No-Build Alternative, neither the hazardous waste sites described in the Final EIS nor the newly identified sites described in this chapter would be affected because no construction would occur.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, private development will continue to occur at the rate of approximately 283 ha (700 ac) per year, although the type and timing of this development is indeterminate. It is possible that

these future projects would impact potential hazardous waste sites in the study area, although the nature and timing of these projects are not known at this time. As noted earlier, future development will have as much impact as future transportation projects, if not more.

Build Alternatives

Section 4.17.4 and Tables 4-36a through 4-36d of the Final EIS discuss the potential hazardous waste sites that would be affected by construction of the build alternatives. The proposed narrower right-of-way associated with the build alternatives in this Supplemental EIS would not affect any of the impact conclusions disclosed in the Final EIS. Field investigations at the effluent ditch for the fuel tank farm (AP-3) and the construction contractor Yard (Hogan & Associates) (AP-10) confirmed the presence of contaminants (see Section 4.17.2.1 above) and the Final EIS conclusion that remediation activities would likely be required at these sites prior to construction of any proposed build alternative.

As stated in Section 4.17.2.1 above, the Portland Cement Site 5 (UDEQ 3) is currently undergoing remediation to remove the piles of kiln dust and contaminated soils. This will reduce the potential for contaminated groundwater, windblown dust, or stormwater runoff from the site to affect the construction of the build alternatives. In addition, the remediation will significantly reduce the potential for windblown dust from this site to expose motorists to contamination in the future. Some potential for contaminated groundwater will remain despite the remediation efforts.

Section 4.17.2 above describes three additional hazardous waste sites identified in the study area since publication of the Final EIS. If hazardous materials are present at the BFI/Stericycle (S104968070), shallow groundwater could be contaminated. Although the BFI/Stericycle (S104968070) site is located 50 m (164 ft) to 100 m (328 ft) east and north of the right-of-way for the proposed Center Street overpass (i.e., outside the proposed right-of-way of all build alternatives), the hydraulic gradient at the site could cause contamination, if present, to migrate into the right-of-way associated with Alternatives A, C, D, and E. The mitigation measures described in the Final EIS and summarized below would minimize adverse impacts associated with potential contamination.

The Quality Plating (1001225950) and the Davis County Jail (U000557897) sites do not have the proximity or the necessary location with respect to the hydraulic gradient of the water table to pose a significant contamination threat to construction of any build alternative. Quality Plating is located approximately 200 m (656 ft) east of the rights-of-way associated with Alternatives A, D, and E, and over 200 m (656 ft) east of the rights-of-way of Alternatives B and C. In addition, this site is an RCRIS-SQG site and poses a low probability of environmental degradation (see Section 4.17.3.1 above). The Davis County Jail is located more than 200 m (656 ft) west of the rights-of-way associated with Alternatives A, C, D, and E. Because the groundwater at the jail site is assumed to move west, this site would not be affected by construction of any proposed build alternative. It is also unlikely that the Davis County Jail site would be affected by construction of Alternative B because the proposed Alternative B alignment is located approximately 2 km (1.2 mi) west of the jail site, a relatively large distance.

4.17.3.3 Mitigation Measures for Impacts from Potential Hazardous Waste Sites

The mitigation measures described in Section 4.17.5 of the Final EIS are still applicable. Sites with known chemical hazards that occur within or adjacent to the right-of-way of a proposed build alternative would be remediated by UDOT based on guidance received from EPA and/or UDEQ. Similarly, if contamination by unknown chemicals is encountered, construction work would be halted until the nature of the hazard and appropriate response measures could be determined.

4.17.3.4 Impacts from Aerially Deposited Lead

As described in Section 4.17.2.3 above, there is a potential for construction workers to encounter aerially deposited lead in unpaved areas in the study area that are adjacent to a road right-of-way, and, in particular, near the proposed interchange locations with I-15. The following provides a discussion of this construction-related impact.

No-Build Alternative

Existing Conditions (2004)

No construction would occur under the existing conditions No-Build Alternative, so there would be no potential for construction workers to be exposed to aerially deposited lead.

Future Conditions (2020)

If none of the build alternatives is implemented, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. In addition, private development will continue to occur at the rate of approximately 283 ha (700 ac) per year, although the type and timing of this development is indeterminate. It is possible that these future projects would impact areas with higher concentrations of aerially deposited lead, although the nature, timing, and location of these projects are not known at this time.

Build Alternatives

Each build alternative includes construction of several interchanges where the proposed action encounters existing roads and highways. As described above in Section 4.17.2.3, soil samples collected near the proposed southern and northern termini of the project showed levels of aerially deposited lead below both the average background lead concentration for the Salt Lake Valley and EPA's typical level of concern for lead. Therefore, based on the limited sample results, there is a low possibility of encountering aerially deposited lead at concentrations that would result in adverse health effects. However, construction workers will be instructed to take precautions to limit the amount of dust inhaled. In addition, dust control measures will be employed to minimize the release of lead dust into the atmosphere.

Section 4.18
Visual Resources

This section discusses visual resources within the study area. Although the visual conditions in the study area have not changed since publication of the June 2000 Final EIS, planned development in the area has continued, which could affect views of the proposed highway from offsite. In addition, the proposed embankment height associated with the build alternatives has changed, which may reduce visual impacts associated with the proposed action.

4.18.1 Approach and Methodology

4.18.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with visual resources in the study area, Sections 3.18 and 4.18 of the Final EIS were reviewed to determine whether any changes had taken place since publication of the Final EIS. The northern and southern study area limits for this section are the same as those described in Section 4.0.1, *Study Area*; however, the western and eastern study area boundaries have been extended to accommodate the larger viewshed in the proximity of the proposed action. As a result, the study area for this section is bound on the east by the Wasatch Mountains and on the west by Antelope Island and Great Salt Lake.

HDR Engineering conducted a reconnaissance-level field survey of the study area on September 26, 2003. Project orthophotographs from the Final EIS were also compared to recent orthophotographs of the study area to determine whether there had been any changes in visual conditions.

To analyze visual resources, the Final EIS relied on the Bureau of Land Management (BLM) Visual Resources Contrast Rating System. The rating system was used to inventory and evaluate the visual resources in the study area based on the following two viewer groups.

- Offsite viewers who would be looking at the proposed Legacy Parkway.
- Onsite viewers (i.e., users of the proposed Legacy Parkway) who would be looking from the parkway at the surrounding area.

The Final EIS also divided viewers within the visual study area into the following three principal subgroups.

- Travelers along existing arterial streets, highways, and freeways, such as Redwood Road and I-15, that traverse the project area.

- Residents of neighborhoods, including those in the Davis County foothills area and new Foxboro development.
- People engaging in recreation at existing sites, including the Bountiful City Pond and the FBWMA.

In addition, 14 key observation points (KOPs) were analyzed in the Final EIS to assess the visual impacts of the proposed action; 10 KOPs were views of Legacy Parkway from offsite and four KOPs were views of offsite from the proposed highway. Section 3.18.2 of the Final EIS describes these KOPs in detail; Figure 4.18-1 herein, which updates Figure 3-26 in the Final EIS, shows the location of these KOPs.

4.18.1.2 Changes since Draft Supplemental EIS

For various reasons—including minor alignment modifications, updates of information, and corrections of inadvertent miscalculations—changes have been made to the calculations of impacts for some resources since the Draft Supplemental EIS was published in December 2004. For this visual resources section, no changes have occurred since the publication of the Draft Supplemental EIS that required changing the calculation of impacts on visual resources. However, several new housing developments have been planned, and the visual affects analysis has been revised to consider visual impacts on these developments.

4.18.2 Affected Environment

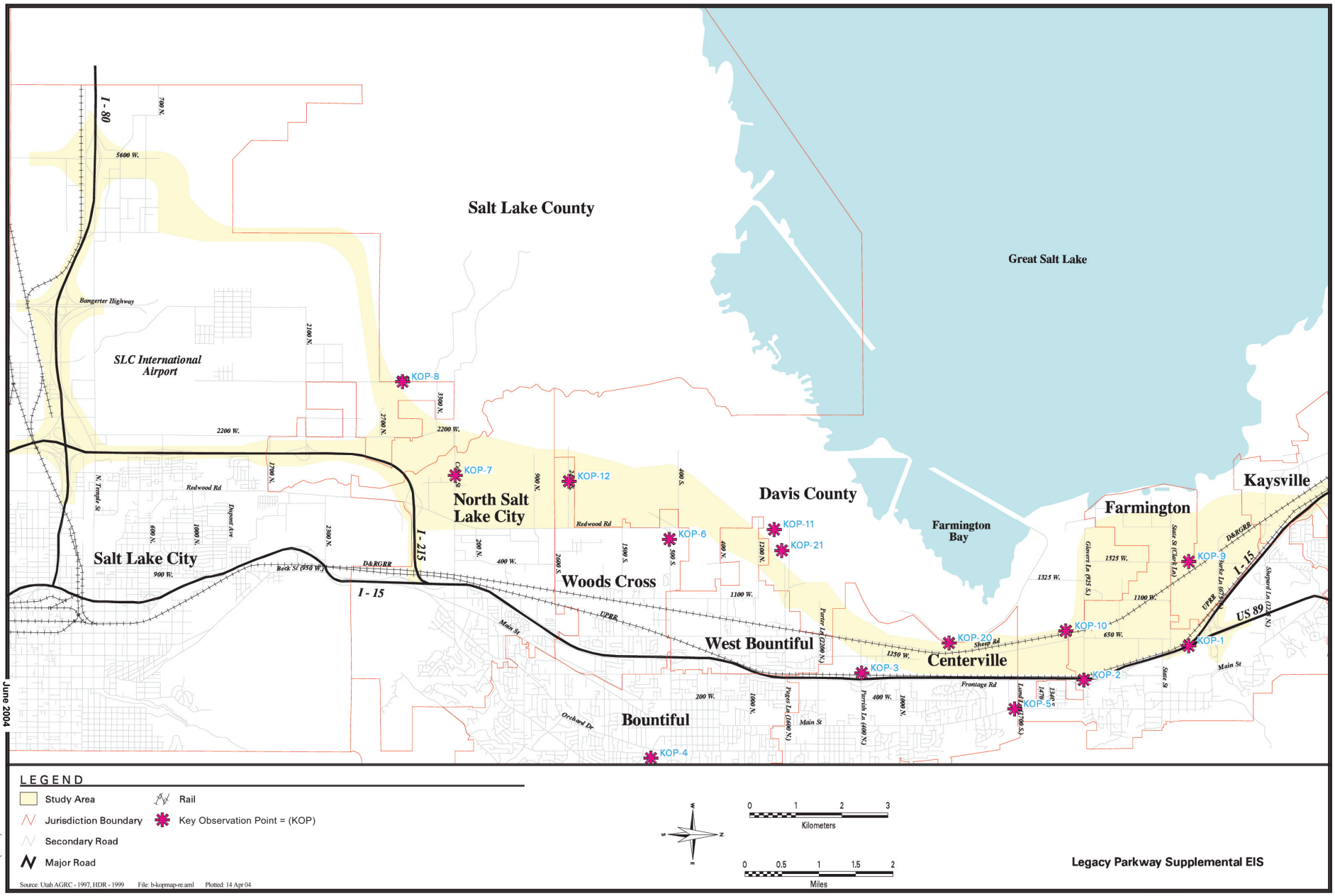
This affected environment section presents a summary of updated information on the affected environment relative to visual resources. No new data was found to indicate that the existing visual conditions or identified viewer groups in the study area had changed since publication of the Final EIS. Continued residential, commercial, and industrial development in the study area has occurred, which could affect views of the proposed highway from offsite. However, this continued development has not substantively changed the status of the affected environment associated with visual resources.

4.18.2.1 Development in Study Area since Publication of Final EIS

Residential, industrial, and commercial development has continued since publication of the Final EIS, including partial construction of the following two new housing developments in the study area.

- Foxboro housing development in North Salt Lake.
- Farmington Ranches housing development in Farmington.

The Foxboro housing development is being constructed in North Salt Lake west of Redwood Road between Center Street and 900 North on a 110-ha (272-ac) site. The development was platted in 2003, is currently under development, and will include a mixed-use development with homes, parks, a planned elementary school, a church, and commercial zoning along Redwood Road. It will include a total of 1,250 homes, 240 of which are low- to moderate-income housing units, including 12 Housing and Urban Development (HUD)–supported transitional housing units. Multiple homes and up to five multi-family buildings of three stories in height are already built or near completion.



Source: Utah AGRC - 1997, HDR - 1999 File: b-kopmap-re.aml Plotted: 14 Apr 04

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Figure 4.18-1
Key Observation Point Locations

Farmington Ranches is a development of single-family residential housing currently under construction west of the Davis County fairgrounds at 1525 West Clark Lane. It is a 288-ha (711-ac) housing development with a total of 540 single-family lots and an elementary school. The development is scheduled to be complete by 2005.

Since publication of the Draft Supplemental EIS, construction has begun on several additional housing developments in the project study area.

- Valentine Estates and Mountain View Estates in Woods Cross.
- Birnam Woods and Olsen Farms in West Bountiful.
- Miller Meadows in Farmington.

Valentine Estates, located at 2100 S. Redwood Road in Woods Cross, includes plans for 93 single-family homes and 182 multi-family units. Mountain View Estates, located at 1500 S. Redwood Road in Woods Cross, includes plans for approximately 175 single-family homes.

Birnam Woods, located at 2200 N. 800 W. in West Bountiful, includes plans for 110 single-family homes. Olsen Farms, located at 1600 N. 1000 W. in West Bountiful, also includes plans for 11 single-family homes.

Miller Meadows, located north of Glovers Lane near 650 West and 700 South in Farmington, includes plans for 107 single-family homes.

The discussion of these seven housing developments updates the information presented in the Final EIS on views of the proposed highway from the study area, as well as views of the surrounding area from the proposed highway.

14.8.2.2 Visual Resources in Study Area Viewed from Offsite

As described in the Final EIS, four main offsite locations comprising 10 KOPs were used to assess views of Legacy Parkway: the Redwood Road area (KOPs 6, 7, and 8), the Davis County foothills area (KOPs 4 and 5), the I-15 area (KOPs 1, 2, and 3), and areas near the FBWMA (KOPs 20 and 21) (Figure 4.18-1). Section 3.18.2 of the Final EIS provides a complete description of the foreground, middle ground, and background views typical for these KOPs. Most viewer groups that would view the proposed highway would be located in the residential developments to the east of the proposed alignments.

Construction of the residential developments listed above would increase the potential number of offsite viewers that would have views of the proposed highway. Specifically, the residents of the Foxboro, Valentine Estates, Mountain View Estates, Birnam Woods, and Olsen Farms developments would have views of the proposed highway similar to that described for the Redwood Road area (KOP 6). The view that the residents of the Farmington Ranches and Miller Meadows housing developments would have of the proposed highway would be most similar to that described for the area on and near the FBWMA (KOP 20).

Typical activities of the viewers in the Redwood Road areas when viewing the proposed highway would include driving or spending time inside their homes or outside in their yards. Typical activities of the viewers in the area near FBWMA would include bird watching, hiking, fishing, and hunting.

4.18.2.3 Offsite Visual Resources Viewed from Study Area

As described in the Final EIS, four KOPs were used to represent visual resources looking from the study area to offsite locations: West Farmington (KOP 9), Farmington Bay (KOP 10), West Bountiful (KOP 11), and Redwood Road (KOP 12). These views generally represent an urban viewshed, consisting of a highly varied mix of industrial, commercial, and residential elements, including large warehouses, older small units, and other types of buildings and complexes. Construction of the residential developments listed above would further emphasize the mix of urban visual elements in the study area.

4.18.3 Environmental Consequences and Mitigation Measures

The Final EIS described two types of impacts associated with visual resources in the study area: those tied to temporary construction activities and those associated with the operation of the proposed build alternatives. Since publication of the Final EIS, the nature and intensity of these impacts have not changed significantly; however, slight changes to the proposed highway design and continued development in the study area would reduce the operation-related visual impacts of the proposed highway when viewed from certain offsite locations. The environmental consequences associated with impacts on visual resources in the study area and the proposed mitigation measures to minimize these effects are summarized below.

4.18.3.1 Construction-Related Visual Impacts

Construction-related visual impacts are described in Section 4.20, *Construction Impacts*, of this document.

4.18.3.2 Operation-Related Visual Impacts

As described in the Final EIS, operation-related visual impacts were assessed from two perspectives: that of a viewer looking at the study area from an offsite location and that of a viewer looking at an offsite location from the study area (i.e., views from the proposed highway). The Visual Resources Contrast Rating System mentioned in Section 4.18.1 above was used in the Final EIS to determine the impacts a proposed build alternative would have on the existing viewshed, i.e., the extent to which a build alternative would contrast with the existing viewshed. This system uses a numerical scale of 1 to 4, with 4 representing the greatest contrast (impact). Section 4.18 of the Final EIS provides a detailed explanation of how this rating system was applied to evaluate project-related impacts on visual resources.

The nature and intensity of the operation-related visual impacts have not changed significantly since publication of the Final EIS, except that residents of the new housing developments constructed since publication of the Final EIS would now have views of the proposed highway from their communities. However, a reduction in the proposed embankment height associated with all the proposed build alternatives and the continued construction of these new housing developments would reduce the operation-related visual impacts of the proposed highway from certain offsite locations. The following describes the impacts associated with the alternatives from the two different viewer perspectives.

Visual Resources in Study Area Viewed from Offsite

No-Build Alternative

Existing Conditions (2004)

There would be no operation-related visual impacts under the existing conditions No-Build Alternative because none of the proposed build alternatives would be constructed.

Future Conditions (2020)

If none of the build alternatives is implemented, future residential, commercial, and industrial infrastructure will continue to be constructed in the study area. In addition, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met be the proposed action. These projects would affect the visual quality of the study area when viewed from an offsite location. Because the nature and timing of these projects are not known at this time, however, these impacts are difficult to assess.

Build Alternatives

Visual resource impacts from the perspective of a viewer looking at the study area from an offsite location were described in the Final EIS based on the four offsite areas (10 KOPs) described above in Section 4.18.2.2. Since publication of the Final EIS, an additional adverse operations-related visual impact has been identified because all the residents in the seven new housing developments being constructed in the study area would have a direct view of the proposed highway.

In addition, since publication of the Final EIS, the embankment height associated with all the proposed build alternatives has been reduced from 2.7 m (9 ft) to 1.8 m (6 ft), except in floodplain areas, to reduce the amount of required fill material. This reduced embankment height would create a lower profile roadway that would be less visible from offsite. This reduction in the height of the embankment would reduce the visual impact of all the proposed build alternatives on the surrounding area; however, the permanent visual presence of pavement, fill slopes, grade separations, lighting, roadway hardware, and drainage structures would still result in an adverse operation-related visual impact, as described in the Final EIS.

The new housing developments would also reduce the visual impact of the proposed highway when viewed from the Davis County foothills area (KOPs 4 and 5) (Figure 4.18-1). As described in the Final EIS, both I-15 and several large industrial areas would block views of the proposed highway from the Davis County foothills area; the construction of these new developments would further block views of the highway for viewers in the higher elevation offsite residential areas in the foothills. Therefore, the impact conclusions disclosed in the Final EIS have not changed.

Visual Impact Ratings

Table 4-39a in the Final EIS presents the results of the contrast rating for each of the proposed build alternatives at the 10 offsite KOP locations. These visual impact ratings have not changed since publication of the Final EIS. Although reducing the embankment height generally creates a lower-profile roadway, it would not substantially alter the visual impact ratings presented in those tables because the embankments are not entirely eliminated. The continued development of land in the study area for residential, commercial, and industrial uses, along with viewer activity, was already accounted for in the visual impact ratings presented in the Final EIS.

Offsite Visual Resource Viewed from Study Area

No-Build Alternative

Existing Conditions (2004)

There would be no operation-related visual impacts under the existing conditions No-Build Alternative because none of the proposed build alternatives would be constructed.

Future Conditions (2020)

If none of the build alternatives is implemented, future residential, commercial, and industrial infrastructure will continue to be constructed in the study area. In addition, future transportation improvement projects may be undertaken by local jurisdictions in the study area to address capacity needs not being met by the proposed action. These projects would affect the views from the study area to offsite locations. Because the nature and timing of these projects are not known at this time, however, these impacts are difficult to assess.

Build Alternatives

Visual resource impacts, from the perspective of a viewer in the study area (i.e., using the proposed highway or adjacent trail) looking at an offsite location, were described in the Final EIS based on the four KOPs, as described above in Section 4.18.2.3. As stated in the Final EIS, the greatest visual impact on viewers in the study area looking offsite would be the highway itself. The permanent visual background presence of pavement, fill slopes, grade separations, lighting, roadway hardware, and drainage structures would have the greatest long-term operation-related visual impact associated with the project, particularly for the motorists driving on the proposed highway and for those in its immediate proximity. The inclusion of the proposed Legacy Nature Preserve into the build alternatives would provide improved views west of the highway due to restoration activities, including the removal of debris and revegetation of certain areas.

Visual Impact Ratings

Table 4-39b in the Final EIS presents the results of the contrast rating for each proposed build alternative at the four KOP onsite locations. These visual impact ratings have not changed since publication of the Final EIS.

4.18.3.3 Mitigation Measures

As described in the Final EIS, landscaping, a berm/buffer area, and a trail system have been integrated into the design of all the proposed build alternatives to minimize operation-related visual impacts. Section 4.18.3 of the Final EIS describes different approaches that would be applied to different areas to minimize visual impacts.

Section 4.19
Energy

This section discusses current and projected future energy consumption associated with traffic in the study area. Daily energy consumption figures (2001) have been updated based on output from the 2004 WFRC travel demand model (version 3.2). The updated travel demand model was also used to estimate daily energy consumption in 2020 in order to evaluate the potential energy-related environmental impacts of traffic associated with the proposed action.

4.19.1 Approach and Methodology

4.19.1.1 Changes since June 2000 Final EIS

To update the affected environment and environmental consequences information associated with energy in the study area, Sections 3.19 and 4.19 of the Final EIS were reviewed to determine what changes had taken place since publication of the Final EIS. The study area for energy is the North Corridor, which includes all of Salt Lake and Davis Counties. In addition, this section presents energy information for a four-county area, which includes Weber, Davis, Salt Lake, and Utah Counties. The energy impacts were evaluated assuming that the 2020 build scenario would include Legacy Parkway, I-15 reconstruction to 10 lanes, and Maximum Future Transit; to that extent, the transportation system varies from the projected 2020 transportation system in the WFRC long range plan. These differences have been explained more fully in Chapters 1 and 2 of this SEIS

The analysis presented in the Final EIS was based on the 1997 version of the WFRC travel demand model. This model was updated in 2004, and the updated model (version 3.2) has been used to reevaluate the assessment of energy impacts presented in this document.

4.19.1.2 Changes since Draft Supplemental EIS

Changes have been made to the calculations of impacts on energy resources for traffic-related energy consumption since the Draft Supplemental EIS was published in December 2004 because more thorough traffic modeling was conducted that used a single, consistent, and complete version of the WFRC travel model version 3.2 for all scenarios reported. Impact information presented in Table 4.19-1 has been updated to reflect those modifications.

Table 4.19-1 Existing (2001) and Future (2020) Daily Traffic-Related Energy Consumption[3]

	Existing Conditions (2001)			No-Build Alternative (Future Conditions [2020])			Build Alternatives (2020)		
Area	VMT	Energy Consumption (million Btu)	Fuel Consumption (gallons)	VMT	Energy Consumption (million Btu)[1]	Fuel Consumption (gallons)	VMT	Energy Consumption (million Btu)[1]	Fuel Consumption (gallons)
North Corridor	2,550,729	15,942	127,536	3,761,613	17,743	141,948	3,778,607	17,824	142,589
Four-County[2]	39,618,291	247,614	1,980,915	62,277,511	293,762	2,350,095	62,322,666	293,975	2,351,799

Notes:

[1] The slight increase in energy consumption between the 2020 future no-build conditions and 2020 build alternatives in the four-county area is consistent with the increase in energy consumption in the North Corridor between these two conditions. The increase in energy usage would be minimized by providing a more direct route and reducing congestion, thus increasing mobility.

[2] VMT totals for the four-county area include centroid connectors. Centroid connectors represent groups of local streets. The model represents such minor facilities in an aggregate, abstract manner, and mileage accumulated on centroids is an approximation of minor street mileage. VMT totals that include centroid mileage account for all travel, not only on the major highway and arterial networks, but also on the local and collector streets. This mileage, therefore, includes travel between the arterial network and the sites at which the traffic is generated, such as groups of homes or commercial establishments. VMT totals that exclude centroid travel exclude mileage accumulated on the first and last mile, approximately, of each trip.

[3] Energy calculations in the Final Supplemental EIS differ from the Draft Supplemental EIS because a more thorough traffic model was conducted that used a single, consistent, and complete version of WFRC travel model version 3.2 for all scenarios reported.

VMT = vehicle miles traveled; Btu = British thermal unit; 1 gallon gasoline = 125,000 Btu (Oregon State Department of Energy 2003).

Passenger vehicles are assumed to achieve gasoline fuel efficiency of 20 miles per gallon (mpg) in 2001 (U.S. Department of Transportation 2002), and 26.5 mpg in 2020 (U.S. Department of Energy 2003a).

Source: Wasatch Front Regional Council travel demand model (version 3.2), as modified and run by Fehr & Peers.

4.19.2 Affected Environment

As described in the Final EIS, traffic is projected to continue to increase along existing highways and roadways in the study area. Current (2001) vehicle-miles traveled (VMT) in the study area were determined using the 2004 travel demand model (version 3.2), as was VMT for the four-county area described above. The existing traffic demand information and related energy consumption are presented above in Table 4.19-1, which updates Table 3-38 in the Final EIS.

4.19.3 Environmental Consequences and Mitigation Measures

As described in the Final EIS, vehicles using any proposed build alternative would consume energy. If Legacy Parkway is not constructed, however, vehicles using existing facilities will also consume energy. To determine how much future energy consumption could be attributed to vehicles using Legacy Parkway, the 2004 WFRC travel demand model (version 3.2) was used to generate two sets of future (2020) daily energy consumption figures for the study area (i.e., North Corridor) and for the four-county area: one without Legacy Parkway (future no-build conditions), and one with Legacy Parkway.

Construction activities associated with Legacy Parkway would also result in energy consumption; construction impacts are discussed in Section 4.20, *Construction Impacts*. The following provides a summary of potential energy impacts.

4.19.3.1 Direct Impacts

Direct energy impacts are associated with energy that would be consumed by vehicles using the transportation facilities in the study area, including Legacy Parkway if it is constructed. As described in the Final EIS, fuel consumption varies with traffic characteristics. The primary traffic characteristics are traffic flow (average vehicle speed), driver behavior, the geometric configuration of the highway, the vehicle mix, and climate and weather. Of all the traffic-related factors, average vehicle speed accounts for most of the variability in fuel consumption and is a good predictor of fuel economy for most urban travel. Fuel efficiency under steady-flow “cruising” driving conditions peaks at 72 kilometers per hour (kph) (45 miles per hour [mph]) to 97 kph (60 mph), and then rapidly declines as speeds increase. At lower speeds, fuel efficiency is reduced by engine friction, tires, use of powered accessories (e.g., air conditioning), and repeated braking and acceleration (Davis and Diegel 2003).

The VMT in the study area and in the four-county area under the existing (2001) conditions, future no-build conditions (2020), and build alternatives in 2020 were determined using the 2004 WFRC travel demand model (version 3.2) and are presented in Table 4.19-1 above. The build alternatives were not evaluated individually because energy consumption would not vary significantly among them. The energy impacts are summarized below.

No-Build Alternative

Existing Conditions (2001)

No project-related energy impacts would occur under the existing conditions (2001) No-Build Alternative.

Future Conditions (2020)

Under the future conditions (2020) No-Build Alternative, VMT in the study area (i.e., North Corridor) in 2020 is projected to increase approximately 47 percent over 2001 levels, and related energy consumption is projected to increase by approximately 11 percent over the next 20 years (Table 4.19-1). The VMT in the four-county area in 2020 is projected to increase 57 percent over 2001 levels, and related energy consumption by about 19 percent. The fuel efficiency of vehicles is expected to improve by about 33 percent during the same period (e.g., new light-duty vehicle efficiency is projected to reach 26.5 mpg by 2020) (U.S. Department of Energy 2003b). This projected increase in fuel efficiency is included in the energy calculations shown in Table 4.19-1.

As illustrated in Table 4.19-1 under the No-Build Alternative future conditions, vehicles traveling through the study area in 2020 would use slightly less energy and fuel than under the build alternatives. Similarly, vehicles traveling through the four-county area would use slightly less energy and fuel under the future conditions No-Build Alternative than under the build alternatives. The build alternatives would provide increased capacity, which would result in increased VMT and energy consumption. However, this increase in energy usage would be minimized because the build alternatives would provide a more direct route and reduce congestion.

Build Alternatives

The build alternatives would result in increased energy consumption in the study area due to traffic use of the Legacy Parkway facilities. Under the build alternatives, VMT in the study area in 2020 is projected to increase approximately 48 percent over 2001 levels, and related energy consumption is projected to increase by approximately 11 percent over the next 20 years (Table 4.19-1). Under the build alternatives, the VMT in the four-county area in 2020 is projected to increase 57 percent over 2001 levels, and related energy consumption by about 19 percent.

The increases in VMT and energy consumption in both the study area and the four-county area are very similar to those that would be experienced in 2020 if none of the build alternatives were constructed. The difference in daily energy consumption between the future no-build scenario and the proposed build alternatives is a savings of 81 million Btu (0.005 percent), and the difference in daily fuel consumption is a savings of 641 gallons (0.005 percent) (Table 4.19-1). This slightly higher energy usage under the build alternatives would result from the added traffic capacity provided by the build alternatives. However, the difference in energy usage is relatively small because the added traffic capacity of the build alternatives would decrease the energy consumption of individual vehicles by increasing average vehicle speeds and smoothing traffic flows. Although the future no-build scenario results in lower VMT, congestion and stop-and-go traffic would increase the energy usage per VMT in the study area.

Energy consumption in the four-county area would slightly increase under the build alternatives compared to the future conditions No-Build Alternative, as described above and illustrated in Table 4.19-1.

Section 4.20

Construction Impacts

4.20.1 Approach and Methodology

4.20.1.1 Changes since June 2000 Final EIS

This section supplements the construction impacts analysis presented in the Final EIS. This analysis of construction impacts was based on the following review and consultation.

- Review of Section 4.20 of the previous Final EIS.
- Review of the resource-specific technical analyses developed for this Supplemental EIS.
- Consultation with UDOT regarding construction activities that have taken place to date and project design changes.
- Review of actual impacts that occurred during the initial construction activities.

UDOT began construction on Legacy Parkway in summer 2001. The project under construction was the Preferred Alternative from the Final EIS (Alternative D). UDOT implemented a design-build delivery system to construct the project until construction was halted in November 2001 because of an injunction from the U.S. Court of Appeals for the Tenth Circuit. The design-build contract has since been terminated. A new design-bid-build contract would be initiated if the lead agencies approve any of the build alternatives.

Detailed analysis of highway construction impacts is sometimes difficult to provide under the design-build delivery system because the exact locations of material borrow and disposal sites, haul roads, detour routes, and other details of the construction process are often not known when the EIS is prepared. That was the case when the previous Final EIS was prepared. However, because construction was started on a portion of the Legacy Parkway project (before being halted by the court), the details of some of these impacts can be estimated by drawing from the actual experiences of project construction.

The existing conditions, including construction activities to date and changes that have been made to the design of the project as well as impacts of previous construction and reasonably foreseeable future construction impacts, are discussed below.

4.20.1.2 Changes since Draft Supplemental EIS

As stated in Section 4.0, *Introduction*, and as described in Section 3.4.2, *Modified Build Alternatives A, B, C, and D/E*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative) since preparation of the Draft Supplemental EIS. These changes would result in a further slight reduction in many of the construction-related impacts. Additionally, construction best management practices (BMPs) have been added to the construction mitigation to ensure that no runoff leaves the right-of-way.

4.20.2 Affected Environment

This section presents a summary of the construction activities to date and changes made to the design of the project.

4.20.2.1 Construction Activities to Date

The following construction activities have been completed to date.

- **Southern Interchange**. The contractor cleared and grubbed (removed vegetation from) about 4.9 ha (12 ac) at the I-215 interchange location at the southern terminus of the proposed action. The contractor also placed fill at varying heights (up to 6 m [20 ft]) in this area (Campagna pers. comm.).

- **Mainline**. The contractor cleared, grubbed, and performed grading and filling (about 0.6 m to 0.9 m [2 ft to 3 ft] in height) on a segment about 6 km (3.7 mi) long at the southern terminus of the project near I-215 (Campagna pers. comm.). The contractor also cleared and grubbed a segment about 1 km (0.7 mi) long just north of 500 South.

- **Northern Interchange**. The entire interchange at I-15 at the northern terminus of the project has been cleared and grubbed. Construction continues on the extension of Park Lane (formerly Burke Lane) and all ramps from Park Lane to I-15 and US-89 as part of the *Farmington City Master Transportation Plan* (City of Farmington 1998) and the Sheppard Lane project. Construction of drainage facilities in this area also continues as part of implementing the master plan and the Sheppard Lane project. The Park Lane (formerly Burke Lane) and drainage facility construction is planned for completion in the spring of 2005. Some bridge construction (piers and abutments) was initiated for the Legacy Parkway mainline over I-15, but it was not completed.

4.20.2.2 Design Changes

The type of construction impacts described in Section 4.20 of the previous Final EIS have not changed since publication of the Final EIS. However, the construction delivery system has changed slightly from design-build to design-bid-build. *Design-bid-build* is the traditional project delivery approach that segregates design and construction responsibilities by awarding them to an independent private engineer and a separate private contractor. By doing so, design-bid-build separates the delivery process into three linear phases: 1) design; 2) bid; and 3) build, or construction. The *design-build* project delivery method combines these services into a single contract. Under the design-build process, a single, fixed-fee contract

is executed for both architectural/engineering and construction services. This change is not likely to affect construction-related impacts.

In addition, three design changes have been made since publication of the June 2000 Final EIS that would slightly reduce the magnitude of construction impacts.

- **Narrower Right-of-Way**. Since publication of the Final EIS, UDOT revised its minimum design standard for median width from 20 m (66 ft) to 15 m (50 ft). As discussed in Section 2.1, *Narrower Right-of-Way*, the width of the Legacy Parkway right-of-way has been reduced from 100 m (328 ft) to 95 m (312 ft). This will reduce the footprint of the construction area and the area of disturbed earth.

- **Reduced Embankment Height**. During the design-build process, UDOT and the contractor reduced the embankment height for the mainline in all areas except floodplain areas from 3 m (9 ft), as presented in the Final EIS, to 2 m (6 ft). This is a reduction in fill height of about 1 m (3 ft) over a large portion of the highway (only between 5 and 11 percent of the overall alignment lies with the Corps floodplain for any build alternative [see Section 4.14, *Floodplains*]). The reduced embankment height will reduce the amount of earthwork and fill required for construction.

- **Lengthened Bridges**. To provide support towards the goal of integration of mass transit with the design and construction of Legacy Parkway, the bridge structures were lengthened to accommodate the physical integration of the commuter rail project at Park Lane (formerly Burke Lane), State Street, Glovers Lane, I-15 southbound to Legacy Parkway southbound ramp, Legacy Parkway northbound to I-15 northbound ramp, US-89 southbound to Legacy Parkway southbound ramp, and Legacy Parkway northbound to US-89 northbound ramp.

In addition and as described in Section 3.4, the alignments of Alternatives A and E have been modified slightly since publication of the Draft Supplemental EIS to further avoid impacts. These modifications would result in a further slight reduction in many of the construction-related impacts.

4.20.3 Environmental Consequences and Mitigation Measures

Section 4.20.1 of the June 2000 Final EIS described construction-related impacts under the No-Build and build alternatives. This section provides updated and/or new construction-related impacts relative to implementation of the build alternatives. Construction-related impacts and their associated mitigation measures that were disclosed in the Final EIS but have not changed since publication of that document are not described herein.

4.20.3.1 No-Build Alternative

Existing Conditions (2004) and Future Conditions (2020)

No changes have taken place since publication of the Final EIS that warrant updating this section. The information regarding the No-Build Alternative in the Final EIS is still accurate.

4.20.3.2 Build Alternatives

As described in Section 4.20 of the Final EIS, construction of any proposed build alternative would result in temporary construction-related impacts from ground disturbance and operation of equipment. Possible impacts would include air quality, noise, water quality, wetlands, wildlife, cultural resources, visual resources, business operations, utility service, railroad operations, and traffic flow. These impacts, as disclosed in Section 4.20 and the resource-specific sections of the previous Final EIS, would still occur. However, as noted above, they would be reduced by the reduced right-of-way width, reduced embankment height, and reduced amount of earthwork needed to construct the project. The narrower right-of-way would slightly decrease predicted impacts on air quality from fugitive dust; on water quality from erosion and suspended sediments; on wetlands from construction activities; and on archaeological, paleontological, and historical resources that might be present underground. The reduced embankment height would decrease the amount of earthwork and fill required for the project, thus reducing the amount of sand and gravel that would be hauled from sand and gravel pits to the project.

Because the impacts identified in the Final EIS would still occur but to a lesser degree, they are not detailed here. However, because previous construction activities provided information on sand- and gravel-related impacts that was not available at the time the Final EIS was prepared, those impacts are disclosed below.

Impacts from Sand and Gravel Sources and Truck Hauling

Sand and gravel sources for highway construction projects can include existing commercial sand and gravel pits (also referred to as material borrow sources) or new sources developed for a specific project. It is unlikely that a new sand and gravel pit would be developed for constructing Legacy Parkway because commercial pits already exist near the project alignment. The design-builder that was under contract for the initial construction of the project in 2001 used material from two nearby pits; eight sand and gravel pits near the study area could potentially provide the fill material necessary to construct any proposed build alternative.

The Final EIS did not include a discussion of impacts related to the procurement of sand and gravel for the proposed action because UDOT does not specify materials sources for private construction contractors bidding on UDOT projects, and as a result, the location of the source(s) was not known at that time. A discussion of typical impacts to be expected from the procurement of sand and gravel and information gained from actual construction activities to date is presented below.

UDOT does not specify particular sand and gravel sources for its contractors because that would eliminate competition from non-specified sources and would be inconsistent with the State of Utah's procurement guidelines designed to control costs of publicly funded projects. Therefore, private contractors bidding on UDOT projects determine the source of the sand and gravel and how the material will be transported. Typically contractors use dump trucks to haul the material from a commercial sand and gravel pit to various staging areas along the project route.

The environmental effects produced by the sand and gravel sources are addressed during the permitting process for a particular site. Local governments regulate localized impacts from operation of a mine, such as noise, dust, congestion, traffic, zoning, and erosion runoff. The Utah Department of Environmental Quality also regulates dust and water quality impacts from mines.

Typical impacts from sand and gravel pit operations include air quality and water quality impacts caused by fugitive dust, erosion, and suspended sediments; noise; and increased truck traffic on local routes. For existing active commercial sand and gravel pits, these impacts are already present and mitigation measures are in place. Providing material for construction of the Legacy Parkway project could increase the quantity of material mined at a particular sand and gravel pit for a limited period. Increasing the quantity of material mined at a particular pit would not necessarily magnify impacts on air quality or water quality because air and water quality impacts depend on the surface area of earth that is disturbed, and mining activities would most likely extend vertically instead of laterally. Noise and truck traffic associated with the sand and gravel pit could increase temporarily.

The design-builder that was under contract for the initial construction of the project in 2001 used material from the Staker Parson pit on Beck Street in North Salt Lake and the Craythorne pit near Hill Air Force Base in Syracuse. Table 4.20-1 shows existing commercial sand and gravel pits near the project area.

Table 4.20-1 Commercial Sand and Gravel Pits near Proposed Legacy Parkway Alignments

Sand and Gravel Pit	Location
Allroc	2500 N. Beck Street, North Salt Lake
Construction Products Company	1075 N. Warm Springs Road, North Salt Lake
Craythorne	601 West 1700 South, Syracuse
Geneva Rock	5400 South 6000 West, West Valley City
Geneva Rock	2635 E. South Weber Drive, South Weber
Lakeview Rock Products	2300 N. Beck Street, North Salt Lake
Staker Parson	1810 N. Beck Street, North Salt Lake
Staker Parson	7425 South 2700 East, South Weber

Most of the earthwork required for Legacy Parkway would be for fill. Table 4.20-2 shows earthwork quantities estimated in the Final EIS and in the Supplemental EIS. The earthwork quantities in the Supplemental EIS are lower than those in the Final EIS because the right-of-way and embankments of the modified project have been reduced. The cost estimates and earthwork quantities that were provided in Appendix N of the Final EIS have been updated in Appendix G, *Updated Cost Estimates*, of the Supplemental EIS.

Some fill has already been placed on the Alternative D (Final EIS Preferred Alternative) alignment, which overlaps in part with the alignments of Alternatives A, B, and C in the area where the fill was placed. The quantities shown in Table 4.20-2 have not been reduced to account for the fill that has already been placed.

Truck trips were calculated from the total earthwork amount (rounded to the nearest 1,000 cubic meters), including cut and fill.

The contractor hired for the design-build work conducted in 2001 estimated that about 8 million cubic meters (10.5 million cubic yards) of fill would be required for construction of Alternative D (Final EIS Preferred Alternative), which is less than the 10 million cubic meters (13 million cubic yards) estimated in the Final EIS. The earthwork estimates from the Supplemental EIS and Final EIS are shown in Table 4.20-2 for comparison purposes.

Table 4.20-2 Required Earthwork and Construction-Related Energy Consumption by Alternative

Alternative	Estimated Amount of Earthwork, cubic m (cubic yd) [1]	Approximate Number of Truck Trips [2]	Vehicles Miles Traveled	Fuel Consumption (Gallons)	Energy Consumption (million Btu)
No-Build Alternative	None	0	0.0	0.0	0.0
Alternative A	10,000,000 (13,000,000)	720,000	10,080,000	1,344,000	168,000
Alternative B	13,000,000 (17,000,000)	940,000	13,160,000	1,754,667	219,333
Alternative C	10,000,000 (13,000,000)	720,000	10,080,000	1,344,000	168,000
Alternative D (Final EIS Preferred Alternative)	8,000,000 (10,500,000)	580,000	8,120,000	1,082,667	135,333
Alternative E	8,000,000 (10,500,000)	580,000	8,120,000	1,082,667	135,333

Notes:

Btu = British thermal unit

One gallon gasoline = 125,000 Btu (Oregon State Department of Energy 2003).

[1] The estimated amount of earthwork necessary for constructing Alternatives A, B, and C was derived from Appendix N of the Final EIS. These figures are overstated because they do not account for a reduction in the proposed embankment height (see 4.20.2.2, *Design Changes*). The amount of earthwork necessary for constructing Alternatives D and E was derived from final design calculation and the Legacy Parkway partial termination contract.

[2] The approximate number of truck trips is based on a truck capacity of 13.7 cubic meters (18 cubic yards).

Source: U.S. Energy Information Administration 2004.

Constructing the Legacy Parkway project would temporarily increase construction truck traffic on haul routes. Trucks would travel from sand and gravel pits to the project site and from cut areas on the project site to other fill or disposal locations. To reduce the impact on local roads, after the previous Final EIS was published UDOT specified that the contractor only use state roads as haul routes. UDOT is still committed to this mitigation measure. Haul routes would vary depending on where construction were occurring along the project alignment.

Energy Impacts

Constructing any build alternative would involve operating heavy machinery with a resulting impact on energy usage. To evaluate construction-related energy impacts, the approximate number of truck trips associated with each build alternative was estimated and is illustrated in Table 4.20-2. The figures associated with vehicle-miles traveled in Table 4.20-2 were based on an average truck trip length of 22.5 km (14 mi) which, in turn, was based on assumptions regarding which sand and gravel pit(s) in the study area would be used and the location along the alignment to and from which the trucks travel. The average fuel efficiency of the type of trucks typically used for earthwork was estimated at 7.5 mpg.

Impacts on Clark Lane Historic District

As described in Section 4.16, *Historic and Archaeological Resources*, the Clark Lane Historic District (CLHD) is located on State Street between 200 West and 400 West in Farmington.[1] Residents of the CLHD raised concerns about construction impacts after a public notification (July 2001) identified a construction haul route along State Street through the CLHD. Representatives from the CLHD summarized their concerns to UDOT in a letter dated April 17, 2003 (Appendix A). The letter conveyed concerns about impacts from vibrations from pile driving, impacts on the historic streetscape, and impacts from truck vibrations. Below is a discussion of how each concern was addressed.

Vibrations from Pile Driving

The letter from the CLHD residents stated that groundborne vibrations from pile driving during the reconstruction of the State Street overpass could damage historic structures. In 2001, UDOT conducted vibration monitoring and determined that vibration levels associated with reconstruction of the overpass would not be high enough to affect any structures within the CLHD (Lizotte pers. comm.[b]). The Utah State Historic Preservation Office (SHPO) challenged that determination on the grounds that the proposed vibration limits were potentially inappropriate because of the elderly nature of the CLHD structures and the intensity of the proposed pile driving activities (Murphy pers. comm.[a]).

To address these concerns, UDOT reevaluated vibration levels in the CLHD in 2003. Three structures within the CLHD (i.e., 399 W. State Street, 398 W. State Street, and 393 W. State Street) are within 61 m (200 ft) of the proposed pile driving location for the State Street overpass, which, depending on the degree of force used to drive the piles (typical or high impact) and the soil conditions, could exceed the threshold and cause damage to those homes (e.g., 3.1 mm/sec [0.12 in/sec]). On April 14, 2004, FHWA and UDOT held a meeting with residents of the CLHD to discuss and take recommendations on minimizing these potential impacts on the district. Based in part on input received during that meeting, SHPO, FHWA, and UDOT revised their Memorandum of Agreement (MOA) to reflect measures to minimize vibration impacts on the CLHD resulting from pile driving activities. The complete text of the September 2005 MOA is included for reference in Appendix A.[2] These mitigation measures are summarized in Section 4.20.3.3, *Mitigation Measures*, below.

Historic Streetscape

The letter from the CLHD residents stated that adverse effects on historic streetscape and properties, including removal of street trees and changes in grade, street width, and elevation, could occur during reconstruction of the State Street overpass. Since publication of the Final EIS, the design of the overpass has been revised to eliminate the need to acquire property from any contributing element of the CLHD (see 4.16, *Historic and Archeological Resources*, for a description of the structures that contribute to the integrity of the CLHD). However, temporary easements would be needed to realign existing curbs and gutters and taper the road cross-sections from east to west in front of the properties at 399 W. State Street, 398 W. State Street, and 393 W. State Street.

A total of 121 sq m (1307 sq ft) of land would be modified by regrading and fill activities at 399 W. State Street and 398 W. State Street to provide new, permanent driveway access to those parcels (Figure 5-10).

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[1] Figure 5-3 illustrates the boundaries of the Clark Lane Historic District.

[2] The MOA governs the treatment and disposition of resources in the study area that are under the jurisdiction of Section 106 of the National Historic Preservation Act (NHPA).

The footprints of the parcels at 399 W. State Street and 393 W. State Street would be increased by a total of 99 sq m (1,068 sq ft) to accommodate the realignment of curbs and gutter and the proposed road tapering, and the footprint of the parcel at 398 W. State Street would be reduced by 47 sq m (508 sq ft). Mitigation measures to offset these impacts and to ensure that the CLHD and its contributory elements are returned to their original preconstruction condition are stipulated in the September 2005 MOA (Appendix A) and summarized in Section 4.20.3.3 below.

The MOA also states that the mature trees in front of 399 W. State Street and 393 W. State Street would not be affected by the proposed build alternatives.

Vibrations from Trucks

The potential vibration effects of truck traffic on the CLHD are no longer a consideration because State Street is no longer being considered as a proposed haul route for construction traffic (Appendix A).

Construction-Related Visual Impacts

As described in the Final EIS, construction-related visual impacts would be essentially the same under all proposed build alternatives. During construction, the work zone would be cleared of vegetation and the exposed bare ground would likely contrast visually with the surrounding agricultural, recreational, and residential areas that viewers of the area are accustomed to seeing. Visual quality from sensitive viewer locations (e.g., residents of new homes in the Foxboro development that have been completed prior to construction activities) would be temporarily reduced during construction operations. Until construction is completed and the right-of-way is revegetated, the construction area would visually stand out.

The construction-related visual impacts, while likely greater in intensity than the operation-related visual impacts, would be temporary. As a result, visual impacts related to the operation of the proposed build alternatives, as described in Section 4.18.3.2, would have a greater long-term visual impact on viewers in the study area than would visual impacts related to the actual construction of those alternatives.

It should be noted that construction was initiated on the southern end of the Alternative D alignment prior to the court injunction. The construction-related visual impacts that occurred onsite were no greater than or different from those described in the Final EIS. However, because all construction-related work was stopped by the court injunction, the mitigation measures described in Section 4.18.3 of the Final EIS, which have not changed since its publication, were not carried out in those areas. In addition, in the vicinity of the northern terminus, UDOT has continued construction on projects outlined in the Farmington master plan (i.e., projects whose configuration is not dependant on the selection of any given build alternative) (City of Farmington 1998). As stated above, the construction-related visual impacts onsite are no greater than or different from those described in the Final EIS.

Construction-Related Noise Impacts

For all the proposed build alternatives, construction operations would consist of similar activities resulting in comparable construction-related noise impacts. Table 4.20-3 illustrates the noise levels produced by various types of construction equipment. Properly maintained equipment produces noise levels near the middle of the indicated ranges. The type of construction equipment used for this project typically generates noise levels of 80 to 90 dBA at a distance of 15 m (50 ft) while the equipment is operating (U.S. Environmental Protection Agency 1971; Toth 1979; Gharabegian et al. 1985).

Table 4.20-3 Typical Construction Equipment Noise Levels

Type of Equipment	Noise Level (dBA) at Specified Distance				
	15 m (50 ft)	20 m (500 ft)	26 m (1,000 ft)	30 m (1,500 ft)	610 m (2,000 ft)
Bulldozer	80	60	54	50	48
Front loader	72–84	52–64	46–58	42 –54	40–52
Jack hammer or rock drill	81–98	61–78	55–72	51–68	49–66
Crane with headache ball	75–87	55–67	49–61	45–57	43–55
Backhoe	72–93	52–73	46–67	42–63	40–61
Scraper and grader	80–93	60–73	54–67	50–63	48–61
Electrical generator	71–82	51–62	45–56	41–52	39–50
Concrete pump	81–83	61–63	55–57	51–53	49 - 51
Concrete vibrator	76	56	50	46	44
Concrete and dump trucks	83–90	63–70	57–64	53–60	51–58
Air compressor	74–87	54–67	48–61	44–57	42–53
Pile drivers (peaks)	95–106	75–86	69–80	65–76	63–74
Pneumatic tools	81–98	61–78	55–72	51–68	49–66
Roller (compactor)	73–75	53–55	47–49	43–45	41–43
Saws	73–82	53–62	47–56	43–52	41 - 50

Source: U.S. Environmental Protection Agency 1971.

Construction equipment operations can vary from intermittent to fairly continuous with multiple pieces of equipment operating concurrently. Assuming that a bulldozer (87 dBA), backhoe (90 dBA), grader (90 dBA), and front-end loader (82 dBA) are operating concurrently in the same area, peak construction-period noise would generally be about 94 dBA at 15 m (50 ft) from the construction site.

Locations within about 580 m (1,900 ft) of a construction site would experience occasional episodes of noise levels greater than 60 dBA. Areas within about 229 m (750 ft) of a construction site would experience episodes of noise levels greater than 70 dBA. Such episodes of high noise levels would not be continuous throughout the day and would generally be restricted to daytime hours.

Most construction activities associated with the proposed action would occur during daylight hours, which would minimize noise impacts. Incidents of noise conflicts could occur when construction directly adjacent to residential, park, or recreation areas is necessary.

4.20.3.3 Mitigation Measures

Section 4.20 of the June 2000 Final EIS included certain mitigation measures for construction activities, and there has been no change to these mitigation measures. Some additional construction-related mitigation measures were included in resource-specific sections of the Final EIS and of this Supplemental EIS as appropriate, and are not repeated in this section.

The following new construction-related mitigation measures have been proposed as part of this Supplemental EIS.

- **BMPs**. The following construction best management practices (BMPs) will be implemented during construction.
  - Silt fence.
  - Berms.
  - Check dams.

    The silt fence will be placed to keep all runoff from leaving the right-of-way. Inside the silt fence, the contractor will be required to place earthen berms along both sides of the right-of-way. Vegetation will be required between the silt fence and earthen berms. Check dams will then be placed at each drainage crossing. These BMPs will ensure that no runoff leaves the right-of-way.
- **Mitigation for Noise Impacts.** To reduce temporary noise from construction, contractors will comply with all state and local regulations relating to construction noise. In addition, the following measures will be incorporated into contract specifications to help reduce the effects of construction noise.
  - Restrict construction to daytime hours within 305 m (1,000 ft) of residences. No construction will be performed within 305 m (1,000 ft) of an occupied dwelling unit on Sundays or legal holidays or between 10:00 p.m. and 6:00 a.m. on other days. Any variance from this condition will require approval by the UDOT construction manager.
  - All equipment will have sound-control devices at least as effective as the original factory-installed devices. No equipment will have unmuffled exhaust.
  - The noise from any rock-crushing or screening operations performed within 914 m (3,000 ft) of any occupied dwelling unit will be mitigated either by placing material stockpiles between the operation and the affected dwelling or by other means approved by the UDOT construction manager.
  - As directed by the UDOT construction manager, the contractor will implement appropriate additional noise mitigation measures, possibly including changing the location of stationary construction equipment, shutting off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, or installing acoustic barriers around stationary construction noise sources.

- **Mitigation for Truck Traffic on Haul Routes**. UDOT will specify that the contractor use only state roads as haul routes. Haul routes will vary depending on where construction is taking place along the roadway.

- **Mitigation for Construction-Related Air Quality Impacts**. Construction-related air quality impacts were discussed in Section 4.20 of the previous Final EIS, but no mitigation measures were prescribed. Fugitive dust, which is dust generated by construction equipment such as haul trucks and earth-moving vehicles, will be mitigated according to a dust control plan to be developed by the contractor according to Utah Division of Air Quality standards. This plan will include measures for minimizing fugitive dust, such as applying dust suppressants and water sprays, minimizing the extent of disturbed surface areas, and restricting activities during periods of high wind.

- **Mitigation for Potential Vibration Impacts on the Clark Lane Historic District from Pile Driving Activities**. As described in Section 4.20.2 above, mitigation measures for potential impacts on the CLHD associated with pile driving activities at the State Street overpass were incorporated into the September 2005 MOA (Appendix A). In summary, the MOA stipulates maximum energy ratings for pile driving hammers, prescribes vibration monitoring requirements for the home at 399 W. State Street, provides specific guidance on measures to take if vibration levels exceed 0.12 in/sec, and includes a requirement for pre- and post-construction surveys of structures in the CLHD and notification of homeowners in the district prior to pile driving activities.

- **Mitigation for Potential Historic Streetscape Impacts in the Clark Lane Historic District**. As described in Section 4.20.3.2, none of the build alternatives would affect mature trees in front of 393 W. State Street and 398 W. State Street in the CLHD. To ensure that the CLHD and its contributory elements are returned to their original preconstruction condition, the September 2005 MOA stipulates that the design of the State Street overpass include provisions for minimizing grade changes, redesigning and incorporating sidewalks within the CLHD into the sidewalks for the new bridge structure, and maintaining existing landscape and streetscape features.

Section 4.21
Cumulative Impacts

This section updates the cumulative impacts analysis presented in the Final EIS. The updated analysis is based on a revised list of past, present, and reasonably foreseeable projects that are or would be located in the Legacy Parkway study area, and that could impact the same resources that would be affected by the proposed action.

4.21.1 Approach and Methodology

4.21.1.1 Changes since June 2000 Final EIS

As described in the Final EIS, the Council on Environmental Quality (CEQ) provides the following definition of a *cumulative effect* (40 CFR 1508.7).

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-federal) or person undertakes such other actions.

CEQ guidance recommends that a cumulative impact analysis focus on effects that can be evaluated meaningfully. This recommendation, along with guidance from EPA in the publication *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (U.S. Environmental Protection Agency 1999), and guidance from CEQ in the publications *Considering Cumulative Effects under the National Environmental Policy Act* (Council on Environmental Quality 1997), was used to complete the cumulative impacts analysis for the Supplemental EIS, taking into consideration an updated list of past, present, and reasonably foreseeable projects.

The updated information presented in this section, including both the list of considered projects and the resource specific cumulative impact analysis, is based on the updated information presented in Chapter 4, *Supplemental Environmental Analysis*, of the Supplemental EIS. As such, the study area for each cumulative impact evaluation varies by resource area. The general study area boundary for the proposed action is defined in Section 4.0.1, *Study Area*, of this document; modifications to this boundary, if they were made, are described in the specific resource area sections in Chapter 4 and listed in Section 4.0.1.

4.21.1.2 Changes since Draft Supplemental EIS

Since the Draft Supplemental EIS was published in December 2004, changes have been made in this section. Those changes were made for the following reasons.

- Updated guidance material from CEQ was reviewed in preparation for updating this section, *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (Council on Environmental Quality 2005).

- The information presented in Chapter 4, *Supplemental Environmental Analysis*, has been updated. This section has been updated where appropriate to reflect those changes.

- As stated in Section 4.0, *Introduction*, additional minor modifications have been made to the alignments of Alternatives A and E (Final EIS Preferred Alternative), and incorrect calculations and a typographical error have been revised since preparation of the Draft Supplemental EIS. Impact information presented in this section has been updated to reflect those modifications and revisions. See Section 4.21.3.2, *Farmland.*

- Out-of-date information has been updated based on recent input since publication of the Draft Supplemental EIS. The impact assessment has been revised as follows to reflect this update.

  - Construction has occurred in new housing developments, and new subdivisions have been platted. See Section 4.21.2 *Past, Present, and Reasonably Foreseeable Future Actions.*

  - The 1997 developed lands dataset has been updated (Keller pers. comm. 2005), affecting the acreage of potential impacts of future development and the extent of wildlife impacts.

- Modifications to the watershed boundaries associated with the regional study area for wildlife (see Section 4.13.1.2, *Regional Study Area*) resulted in changes to the assessment of regional wildlife habitat availability.

4.21.2 Past, Present, and Reasonably Foreseeable Future Actions

This section provides an updated list of past, present, and reasonably foreseeable projects considered in the cumulative impacts analysis. The following highway projects were funded in the WFRC long range plan and are included in the cumulative impacts analysis.

- I-15 reconstruction from 600 South in Salt Lake City to 200 North in Kaysville (future).

- I-15 reconstruction from 31st Street to 2700 North in Ogden (future).

- The proposed Layton interchange on I-15 about 8 km (5 mi) north of Legacy Parkway (future).

- US-89 reconstruction (present).

- Mountain View Corridor on the west side of Salt Lake valley (future—EIS is currently in progress).

- Redwood Road improvements (future).

- Commuter rail (future—EIS finalized in March 2005).

In addition, past, present, and proposed future land development throughout the study area has resulted in open land being converted to agricultural and urban uses. Past development includes conversion of open land to agricultural and urban uses in both Salt Lake and Davis Counties. Current developments include the new Foxboro residential development in North Salt Lake, Farmington Ranches located west of the Davis County Fairgrounds, Valentine Estates and Mountain View Estates in Woods Cross, and Birnam Woods and Olsen Farms in West Bountiful. Based on the number of Davis County building permits issued since 1999, about 283 ha (700 ac) acres of land are being developed per year in Davis County (Sommerkorn pers. comm.[b]). A similar rate of land development is expected in the future.

4.21.3 Evaluation of Cumulative Impacts

Most of the potential cumulative impacts described in the following sections would be associated with growth that will occur in the region and the change in land use from open to developed land. This planned growth and change in land use does not depend on implementation of the proposed Legacy Parkway, although the types of land use and timing would be somewhat different if the project were implemented, mainly around the two proposed Legacy Parkway interchanges. The growth and change in land use could cause cumulative impacts on land use, farmland, pedestrian and bicycle facilities, air quality, noise, wetlands, wildlife, habitat for threatened and endangered species, historical and archaeological resources, and visual resources as the area is developed.

Changes in the discussions provided in this section from that provided in the June 2000 Final EIS are attributable either to the addition to the cumulative impacts analysis of projects that are now reasonably foreseeable or to changes in the methodology used to determine direct and indirect impacts for specific resource topic areas, as described in the previous sections of Chapter 4. If the information presented relative to cumulative effects in the Final EIS has not changed, a statement to that effect is presented in the discussion below.

4.21.3.1 Land Use

As described in Section 4.1.2, the study area for land use extends to the north to account for potential growth inducement impacts in northern Davis and Weber Counties. Section 4.1.3 of this document concluded that the Shared Solution could contribute to the conversion of land to development uses by changing the land use around the two proposed Legacy Parkway interchanges to commercial use, but that it would not in and of itself induce growth north of the study area.

The combined projects in the Shared Solution, which include the proposed Legacy Parkway, I-15 north reconstruction (widening), and commuter rail, could induce growth and development in northern Davis County and in Weber County.[1] Section 4.1.4 of the previous Final EIS disclosed that, although Legacy Parkway would greatly improve north-south mobility in the North Corridor, the major portion of this improvement in mobility would be attributable to the combined expansion of I-15 and the construction of Legacy Parkway. The cumulative effect of commuter rail was not assessed in the Final EIS because commuter rail was not a reasonably foreseeable project and was not a component of the Shared Solution or the WFRC long-range plan at the time of publication of the Final EIS, even though the Final EIS included a transit component. The addition of commuter rail to the long range plan reinforces the conclusion in the Final EIS that the accessibility provided to these areas by Legacy Parkway, I-15, and

[1] The Shared Solution concept identifies a multi-modal solution to transportation deficiencies both in and around the study area. The concept did not include commuter rail at the time the Final EIS was published. A complete description of the Shared Solution and its evolution since publication of the Final EIS is contained in Chapter 1.

commuter rail could promote accelerated development of residential growth in Davis and Weber Counties, provided other key characteristics of the area are favorable for such growth (e.g., neighborhood conditions [schools, crime], price and economics, air quality, noise, etc.). Transit-oriented development (TOD) associated with the commuter rail portion of the Shared Solution may occur near the rail stations in a manner consistent with planned development near the proposed Mildale and Sandy stations in Salt Lake City. However, it should be noted that TOD would be attributable to the Shared Solution rather than to Legacy Parkway in and of itself.

With the exception of the project right-of-way and Legacy Nature Preserve, local jurisdictions interviewed for both the Final EIS and the Supplemental EIS stated that the level of development in the study area is expected to be the same, regardless of the mobility improvements made and even though the improvements offered under the Shared Solution could affect the short-term location and timing of development in the study area and areas to the north.

4.21.3.2 Farmland

During the 1990s, Utah's loss of farmland was about 8,000 ha (20,000 ac) per year (Utah Department of Agriculture and Food 2000). The amount of farmland in Utah has continued to decline in the study area as agricultural areas within city boundaries have been converted to urban uses. Approximately 283 ha (700 ac) of land are being developed per year in Davis County, much of which is farmland (Sommerkorn pers. comm.[b]). Further, the Utah Division of Water Resources' Water-Related Land Use Data Inventory Map dated 2003 shows about 1,073 ha (2,652 ac) of farmland in the study area, while the Final EIS showed 1,582 ha (3,917 ac) in the study area in 2000.[2]

These historic cumulative impacts on farmland are attributable to development and will probably continue to occur given the current conversion rate of land to urban uses in the study area. Since Legacy Parkway would affect between 97 and 208 ha (240 and 513 ac) of farmland, depending on the build alternative, it would contribute to the cumulative loss of farmland. However, it is likely that most of this farmland loss would be due to planned and ongoing development and would occur regardless of whether Legacy Parkway is implemented.

4.21.3.3 Social

As described in the Final EIS, none of the social impacts associated with the past, present, and reasonably foreseeable projects would occur in the same area or on the same groups as those affected by the proposed action, except that many groups (e.g., minority and low income populations) would more generally benefit by improvements in mobility. This discussion has not changed since publication of the Final EIS.

4.21.3.4 Relocations

Section 4.3 of this document describes the relocations that would be required if any build alternative is constructed. As stated in the Final EIS, other projects considered in this section, including the I-15 reconstruction projects, would also require some relocation of residences and businesses. Residential units affected by highway projects qualify for relocation assistance, and businesses and farms affected qualify

[2] See Section 4.2, *Farmland*, of the Supplemental EIS. Some farmland acreage differences between the Supplemental EIS and Final EIS are attributable to changes in the way farmland was categorized in each document.

for business or farm displacement assistance. This assistance may not be available if similar displacements occur as a result of other types of development.

This discussion has not changed since publication of the Final EIS.

4.21.3.5 Economics

As described in the Final EIS, the economic impacts associated with construction of Legacy Parkway and other projects considered in this section would be temporary and would generally occur at different times. They would represent only a small portion of the overall economics in the study area (see Section 4.5.2), and therefore would only result in a minor cumulative impact. This discussion has not changed since publication of the Final EIS.

4.21.3.6 Joint Development

As described in the Final EIS, the main joint development opportunity made possible by Legacy Parkway would be associated with the multi-use trail that would run adjacent to the proposed highway. Ongoing development in the corridor, including the Foxboro development and Farmington Ranches, could provide additional opportunities for recreational development in conjunction with the Legacy Parkway Trail. The proposed action would not contribute to any other cumulative impacts on joint development.

4.21.3.7 Pedestrian and Bicycle Considerations

As described in the Final EIS, the main pedestrian and bicyclist activities made possible by the Legacy Parkway project would be those provided by the multi-use trail. This trail would benefit the pedestrian and bicycle trail systems spanning Davis and Salt Lake Counties (see Figure 4.6-1). The trail is reflected in the general plans of several cities in the study area, and it has been integrated into the proposed trail systems for several proposed and existing residential developments near the proposed highway (see Section 4.7).

Construction of commuter rail would also improve pedestrian access in the study area by generally improving the walkable transportation options in the study area. Although improvements to I-15 would not specifically contribute to pedestrian and bicycle opportunities in the study area, the combined effect of commuter rail and the proposed action would result in a beneficial cumulative impact on pedestrian and bicycle opportunities in the study area.

4.21.3.8 Air Quality

As described in the Final EIS, air quality would improve slightly over future No-Build conditions with implementation of the Legacy Parkway project and other projects considered in this section because the projects are designed to reduce congestion and travel times, facilitating compliance with air quality standards. The predominant air quality factors influencing air quality in the study area have historically been and will likely continue to be the stationary and mobile source emissions associated with the continued development, almost all of which would occur with or without implementation of the Legacy Parkway project. It should also be noted that conformity with state air quality goals requires a regional and cumulative analysis, which is discussed in Section 4.8, *Air Quality*.

4.21.3.9 Noise

Construction of any proposed build alternative would increase noise levels in the noise study area (i.e., within 457 m [1,500 ft] of the proposed build alternatives) from noise levels typical of a rural area to those associated with the new highway (Table 4.21-1). Existing noise levels in the study area, which represent the baseline for the cumulative impact analysis, range from about 39 dBA (undeveloped areas) to 67 dBA (next to I-215). Potential cumulative impacts from noise would be associated with the travel-related noise from the highway projects described in this section, including the proposed action, as well as from ongoing and planned residential, commercial, and industrial development in and adjacent to the study area.

Table 4.21-1 Typical Noise Levels in Rural and Urban Areas in the U.S.

Area	Typical Range of dBA	Average Census Tract Population Density (people/square mile)
Wilderness and rural	16–35	Zero to little population
Quiet suburban residential	48–52	630
Normal suburban residential	53–57	2,000
Urban residential	58–62	6,300
Noisy urban residential	63–67	20,000
Very noisy urban residential/downtown city	68–75	63,000

Source: Cooper Engineering 1985; Canter 1996

It is likely that the study area will be developed by 2020 to include more residential, commercial, and industrial land uses, regardless of whether the Legacy Parkway project is implemented (see Section 4.1, *Land Use*, of this document). In addition, as roadways and municipal support systems are developed to support these changes in land uses, it is likely that noise levels would continue to increase, changing from those of a suburban residential area to those of an urban residential area. As stated above, these cumulative noise impacts would likely occur with or without the proposed action.

It should be noted that the northern portion of Legacy Parkway would parallel I-15 just south of the US-89/I-15 interchange. Projected traffic on Legacy Parkway in combination with traffic on US-89 and I-15, as well as operation of commuter rail, would result in a cumulative noise impact on the surrounding area. Operation of the highways alone would result in noise levels approximating an urban residential/downtown city environment. Noise levels would increase when a commuter rail train is using a track in the area but would decrease to between 68 dBA and 75 dBA after the train passes.

4.21.3.10 Water Quality

As described in the Final EIS, the primary effect on water quality from the Legacy Parkway project would be from pollutants and sediments contained in stormwater runoff from impervious surfaces and construction sites. Since development, including construction of additional impervious surfaces, would likely occur in the study area with or without the proposed action, Legacy Parkway would have a relatively minor cumulative impact on water quality, taking into consideration potential build out conditions without the project. In addition, the Legacy Parkway project, as well as the other highway

projects assessed in this section, would use extensive best management practices during construction to minimize pollutant and sediment concentrations in stormwater runoff.

Deicing practices associated with Legacy Parkway, as well as other roadway improvements considered in this section, could affect the salinity of runoff in the study area. Since much of the soil and water in the study area is already highly saline because it is within the floodplain of Great Salt Lake, it is unlikely that temporary acute increases in salinity associated with deicing practices would have a long-term impact on water resources in the study area. Both the Legacy Nature Preserve and the vegetated filter strips associated with the highway would minimize the cumulative impact of this practice.

This discussion has not changed since publication of the Final EIS.

4.21.3.11 Wetlands

As described in Sections 4.12, *Wetlands*, and 4.13, *Wildlife*, of this document, the loss of wetland habitat in the study area has been an ongoing process that began with settlement and development of agriculture in the nineteenth century and continues under current conditions. For the wetlands analysis, the Supplemental EIS assumed that future development could affect all remaining uplands in the wetlands study area, resulting in adverse indirect impacts on remaining wetlands. The wildlife analysis, using a slightly different characterization of habitats (see Section 4.12.2.2, *Wetland Cover Types*), concluded that there was a historic loss of approximately 58 percent of the wetland/riparian habitat in the modified project area (Jones & Stokes 2005).

Loss of wetlands continues; wetland fill authorized in Salt Lake and Davis Counties between 1992 and 2003 averaged over 12 ha (30 ac) per year. Future loss of wetlands and wetland functions appears likely, with or without implementation of any of the proposed build alternatives, given the historic trend and future development pressure within the study area. Under the future conditions No-Build Alternative, even if no wetland fill were to occur, wetland functions in the study area would decrease over 20 percent due to planned development of adjacent upland habitat.

The Legacy Parkway project would contribute to the cumulative loss of wetlands and wetland functions in the study area. The impact is substantial both because of the timing of the impact (after many wetlands have already been filled or lost wetland functions) and the magnitude of the impact, compared with those of other current projects.

4.21.3.12 Wildlife

See Section 4.13, *Wildlife*, for a discussion of cumulative impacts on wildlife and wildlife habitat.

4.21.3.13 Floodplains

As described in Section 4.14, floodplain impacts were assessed for both the 100-year floodplain associated with Great Salt Lake and the 100-year floodplains of the streams that the proposed highway would cross within the study area. Cumulative impacts on stream floodplains from past, present, and reasonably foreseeable projects are limited because project proponents are generally required to maintain the existing flood characteristics (i.e., flood elevation and boundary) of rivers and streams affected by a project.

For the Great Salt Lake floodplain, most of the proposed build alignments would traverse the eastern edge of the floodplain, as delineated by the Corps and FEMA (see Section 4.14). Where the Great Salt Lake floodplain lies on the eastern side of Legacy Parkway, the highway design would allow flood waters to pass to the west side of the highway through equalization culverts to minimize impacts on the floodplain elevation or boundary. Similarly, the I-15 reconstruction projects would require a slight encroachment on the Great Salt Lake floodplain north of Chase Lane in Centerville, and future development could encroach on the floodplain, although the nature and location of such encroachment are not known at this time.

4.21.3.14 Threatened and Endangered Species

As described in the Final EIS, Legacy Parkway, combined with other highway projects and development in the study area, could have a cumulative effect on threatened, endangered, and state species of special concern in the study area. An updated list of federal threatened and endangered species and state species of special concern that could occur in the study area was provided by USFWS and the Utah Division of Fish and Wildlife, and is summarized in Section 4.15, *Threatened and Endangered Species*, of this document.

The bald eagle (*Haliaeetus leucocephalus*) is the only federally listed species that could be affected by the proposed action. The commuter rail final EIS (Federal Transit Administration and Utah Transit Authority 2005) and the I-15 North Corridor draft EIS (Federal Highway Administration and Utah Department of Transportation 1998) both state that impacts on federally listed species, including the bald eagle, and state species of special concern are not expected. Legacy Parkway, as well as some private developments proposed in the study area, could contribute to cumulative impacts on threatened and endangered species through loss of habitat and an increase in human disturbances.

4.21.3.15 Historic and Archaeological Resources

Past regional transportation projects, future regional transportation projects (including Legacy Parkway), and current and planned development, have affected and will continue to affect historic and archaeological resources in the study area that have various degrees of integrity and significance (see Section 4.16.2). The Final EIS recognized the cumulative effects on cultural resources of the reconstruction of I-15 and future development, along with the impacts of Legacy Parkway. The other reasonably foreseeable actions will contribute to additional cumulative effects on historic and archaeological resources.

4.21.3.16 Hazardous Waste Sites

As stated in the Final EIS, the proposed action would not contribute to cumulative effects on hazardous waste sites because any environmental effects would be mitigated. There has been no change in this discussion since publication of the Final EIS.

4.21.3.17 Visual Resources

As described in the Final EIS, the majority of the cumulative visual impacts in the study area have been caused by land development and the infrastructure associated with it, including streets, highways, railroads, and power lines. The existing visual character of the study area is already disturbed by the presence of pavement, cut-and-fill slopes, grade separations, lighting, roadway hardware, and drainages

structures associated with I-15, I-215, and US-89, as well as other local roadways in the vicinity (see Section 4.18, *Visual Resources*). Several new developments in the study area, including the Foxboro development and Farmington Ranches, have been completed since publication of the Final EIS, further changing the visual environment and making it more urban.

The proposed Legacy Parkway would result in an additional amount of currently undeveloped land being converted to roadway use. This conversion and any indirect development associated with the new roadway would contribute to the historic, cumulative visual impact associated with changing the visual nature of the study area from rural to urban uses.

Section 4.22

Short-Term Uses Versus Long-Term Productivity

The short-term use of the environment versus preserving its long-term productivity relates to converting the natural productivity of the land to some developed use. The natural productivity of the land is considered a renewable use of the land; developed use generally has a relatively short economic lifespan and is regarded as a short-term use.

As described in the June 2000 Final EIS, all the proposed build alternatives would have an impact on farmland, wetlands, and other wildlife habitats in the study area. No changes to the consistency of the proposed action's short-term uses of the environment with local land use and transportation plans or maintenance and enhancement of long-term productivity, as defined by local governments, have occurred since publication of the Final EIS. However, since publication of the Final EIS, construction activities associated with Alternative D (Final EIS Preferred Alternative) and development unrelated to the proposed action have affected farmland and wetland and upland habitats in the project study area. See Sections 4.2, 4.12, 4.13, and 4.20 of the Supplemental EIS for a complete description of farmland impacts, impacts on wetland and wildlife habitats, and construction-related impacts that have occurred since publication of the Final EIS.

Section 4.23

Irreversible and Irretrievable Commitment of Resources

Implementation of the proposed action since publication of the June 2000 Final EIS (i.e., project construction prior to the court injunction) involved the commitment of a range of natural, physical, human, and fiscal resources. Land affected in the construction of Legacy Parkway was committed to use as a highway; however, it could be converted to another use should a greater need arise. As a result of the initial project construction, fossil fuels, labor, highway construction materials, and funding were irretrievably committed to the project. See Section 4.20, *Construction Impacts*, of the Supplemental EIS for a complete description of construction impacts that have occurred since publication of the Final EIS.

As stated in the Final EIS, the commitment of the resources is based on the premise that residents in the immediate area, the region, and the State of Utah would benefit by the improved transportation system, which would outweigh the commitment of these resources. If an alternative on another alignment is selected or if the No-Build Alternative is selected, wetland and other natural habitat resources that were removed by grading and other construction activities would be returned to a natural state. In addition, property acquired for the proposed action would be disposed of.

Section 4.24
Mitigation Summary

4.24.1 Approach and Methodology

This section updates the summary of mitigation measures provided in Section 4.24, *Mitigation Summary*, of the Final EIS. Table 4.24-1 below provides a summary of the mitigation measures presented in Table 4-40 in the Final EIS, as well a summary of updated and supplemental mitigation measures identified since publication of the Final EIS. Mitigation measures in this document that differ from those presented in the Final EIS were modified as a result of one or more of the following items.

- Agreements made in the Final EIS Records of Decision (RODs) issued in October 2000.
- The Clean Water Act Section 404 permit, which was issued by the Corps in January 2001 for implementation of Alternative D (Final EIS Preferred Alternative).
- Wetland mitigation commitments outlined in *Legacy Nature Preserve Addendum to the Wetland Mitigation Plan*, prepared in April 2001.
- Narrowing of the proposed right-of-way from 100 m (328 ft) in the Final EIS to 95m (312 ft) in the Supplemental EIS for Alternatives A, B, C, and E.
- Other design modifications described in Chapters 3 and 4.
- Updated information presented in Appendix E, *Analysis of the Adequacy of Wetlands and Wildlife Mitigation Technical Report*, which was prepared in July 2005.

Although the right-of-way and project impacts associated with the proposed build alternatives evaluated in the Supplemental EIS would be less than those associated with build alternatives evaluated in the Final EIS, proposed mitigation for project impacts, and specifically the extent of the Legacy Nature Preserve for Alternative E, has not been reduced. In light of more detailed qualitative evaluation of impacts on natural resources, particularly wildlife, done for the Supplemental EIS, UDOT has proposed to leave the size of the Legacy Nature Preserve unchanged to assure that direct and indirect impacts that may not be subject to precise quantification are mitigated. See Section 4.13, *Wildlife*, for a complete discussion of the progression of the development of the Legacy Nature Preserve.

Table 4.24-1 presents a summary of the mitigation described in this Supplemental EIS for each resource topic. Table 4.24-1 updates Table 4-40 in the Final EIS.

Table 4.24-1 Mitigation Summary

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Land Use		
Cities and Counties	(None)	No change.
Consistency with Plans and Policies	(None)	No change.
Growth within and beyond the North Corridor	(None)	No change.
Farmland		
All Farmland	*All Build Alternatives.* Owners of farmland directly within the Legacy Parkway right-of-way would be compensated according to requirements of the URAA and other state and federal guidelines. In the case of indirect impacts, the Utah Department of Transportation (UDOT) would determine whether (based on the comparative costs) access is restored or the remainder of the farmland is purchased.	No change. These mitigation measures do not replace any farmland taken by the project.
Social		
Socially Disadvantaged Groups and Environmental Justice Populations	*Alternative A and the PA.* Business displacement assistance would be provided to Commercial Coatings pursuant, to the eligibility and other requirements of the Uniform Relocation Assistance Act (URAA).	No change.
Neighborhood and Community Cohesion	(None)	No change.
Travel Patterns and Accessibility	(None)	No change.
Public Facilities	*All Build Alternatives.* The impacts on public facilities would be mitigated by providing compensation for the real property taken or damaged or by functionally replacing the publicly owned real property with another facility that would provide an equivalent use.	No change.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Public Services and Utilities	The relocation of utilities would cause possible impacts on wetlands, farmlands, and native vegetation. Generally, these impacts would be temporary in nature. Disturbed areas from pipeline relocations would be backfilled and restored to their natural state.	Mitigation measures for impacts on wetlands are described in Section 4.12, *Wetlands*, and in Section 4.2, *Farmlands*, for farmlands.
Recreation Resources	*All Build Alternatives.* Access to the southern entrance of the Farmington Bay Waterfowl Management Area (FBWMA) and to the Bountiful City Pond would be maintained by a frontage road and a non-motorized overpass at Page's Lane. Mitigation for impacts of all build alternatives, except Alternative A on the Bountiful City Pond, would be mitigated by replacing the lands lost and by reshaping the shoreline to provide an equivalent area for users of the pond.	*All Build Alternatives.* The non-motorized vehicle overpass at Page's Lane has been eliminated. As a result, motorized vehicles would access the FBWMA by taking the 500 South exit off Legacy Parkway and the corresponding frontage road. Similarly, motorized vehicles would access Bountiful City Pond by taking the 500 South exit and the frontage road along the west side of Legacy Parkway. Non-motorized access would be provided to both the FBWMA and the Bountiful City Pond by the frontage roads that run along the west side of the proposed alignments. Access to the frontage roads would be provided at 500 South.
	Alternatives B and C. The impact on FBWMA's eastern entrance and parking lot would be mitigated by providing a frontage road along the western side of Legacy Parkway from Sheep Road to the eastern entrance. The parking lot and other land would be replaced with land of at least equal value and usefulness.	No change.
Relocations		
Residential	*All Build Alternatives.* Relocation assistance would be provided to the affected households, pursuant to the eligibility and other requirements of the URAA.	No change.
Business	*All Build Alternatives.* Business relocation and re-establishment assistance would be provided to the affected businesses, pursuant to the eligibility and other requirements of the URAA.	No change.
Farm and Horse Paddocks	*All Build Alternatives.* Assistance would be provided to the affected farmstead and horse paddock operations, pursuant to the eligibility and other requirements of the URAA.	No change.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Economic		
Regional Economic Impacts	(None)	No change.
Local Economic and Community Impacts	(None)	No change.
Joint Development	The 100-m (328-ft) highway right-of-way proposed for this project includes room for the trail. Impacts on wetlands, farmlands, and wildlife from the trail would be included in the mitigation for the overall project.	No change other than change in right-of-way width to 95 m (312 ft).
Pedestrian and Bicyclist Considerations	(None)	No change.
Air Quality	(None)	Non-tailpipe PM10 emissions would be minimized through street sweeping, minimal use of sand for snow and ice control (see Section 4.10, *Water Quality*), and other general maintenance measures performed by UDOT. See Section 4.20, *Construction Impacts*, for a discussion of mitigation for construction-related air quality impacts.
Noise	The extent of the noise impacts would be determined during the design phase, and UDOT's current noise abatement policy would be applied. Preliminary analysis shows construction of noise barriers would be feasible in the following areas: *Noise Abatement for Alternative A* Noise barriers would be feasible west of 1100 West and 800 West in Davis County and West Bountiful City. *Noise Abatement for Alternative B* Noise barriers would be feasible in south Kaysville for 25 residences along Sheppard Lane near the northern project terminus. *Noise Abatement for Alternative C*	It should be noted that the potential locations for noise barriers evaluated in this document are different than those evaluated in the Final EIS. The differences are attributable to updated noise monitoring data; use of a different traffic noise model (TNM instead of the STAMINA model used for the Final EIS), which takes into consideration terrain features not available with the STAMINA model; more sophisticated noise transmission algorithms; and the shielding effects of intervening rows of residences. *Noise Abatement for Alternative A* None. *Noise Abatement for Alternative B* The Alternative B alignment would pass within 152 m (500 ft) of residences near the southern terminus of the project, east of

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
	Noise barriers would be feasible between 1200 north and 2200 north in West Bountiful. *Noise Abatement for the Preferred Alternative* Noise barriers would be feasible between 1200 north and 2350 north in West Bountiful.	2200 West (near ML-2). At this location and under this alternative, a noise barrier 377 m (1,237 ft) long and 5 m (16.4 ft) high would provide an acoustic benefit to five residences. The cost per dwelling of $13,527 would be less than the abatement limit ($22,600) per affected residence. Therefore, a noise barrier at this location would be reasonable and feasible according to UDOT's Noise Abatement Policy. *Noise Abatement for Alternative C* The Alternative C alignment would pass within 152 m (500 ft) of the residences near ML-7 at 1200 North. At this location and under this alternative, a noise barrier 225 m (738 ft) long and 5 m (16.4 ft) high would provide an acoustic benefit to four residences. The cost per dwelling of $10,091 would be less than the abatement limit ($22,600 per affected residence). Therefore, a noise barrier at this location would be reasonable and feasible according to UDOT's Noise Abatement Policy. *Noise Abatement for Alternative D* None. *Noise Abatement for Alternative E* None.
Water Quality		
Surface Water and Groundwater from Parkway Operations	*All Build Alternatives.* Through coordination with the U.S. Army Corps of Engineers (Corps), the Utah Department of Environmental Quality (UDEQ), and the Utah Department of Transportation (UDOT), mitigation requirements were selected that would provide acceptable water quality protection, once Legacy Parkway is operational. The following mitigation would be provided:	*Minimization of Salting.* UDOT would minimize salting on the roadway to the extent practicable. *Retention Pond.* UDOT would construct a retention pond near Center Street to retain sufficient runoff from a 100-year-storm flows to prevent discharge to the Jordan River. *All Build Alternatives.* No change.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
	Minimization of Concentrated Discharges. Legacy Parkway would be constructed without curbs so that stormwater runoff would sheetflow off the highway. Stormwater would be concentrated only where necessary (that is, to collect drainage on overpasses). This concentrated stormwater would not be discharged directly into wetlands or into streams with quantitative water quality standards. Instead, concentrated discharges would be routed over vegetated buffer strips (grassy median) or dissipated back to sheetflow.	No change.
	Vegetated Filter Strips. Roadway design would include vegetated filter strips (grassy median) to improve the quality of water runoff from the highway, as recommended by the Corps and UDEQ. All cleared areas within the right-of-way except the paved surface would be vegetated. The vegetation would filter suspended particles, metals, oils, and greases from the runoff.	*Vegetated Filter Strips.* The narrower right-of-way would reduce the width of the vegetated filter strips from 20 m (66 ft) to 15 m (50 ft). This reduction in the width of the vegetated filter strips would not affect the ability of the vegetated filter strips to treat water quality to the standards required in the CWA Section 401 water quality certification
	Equalization Culverts. Runoff on the upstream side of the road would gradually flow to the toe of the roadway slope and/or the berm, then cross under the road through small equalization culverts. The culverts would be positioned to maintain sheetflow conditions across the study area to the extent practical and, at a minimum, would limit culverted discharges to less than 0.14 cu m (5 cu ft) per second. For costing purposes, it is assumed that there would be a culvert every 150 m (492 ft).	*Surface Water Conveyance.* The equalization culverts referred to in the Final EIS that were intended to allow free movement of water in either direction, maintain sheetflow conditions to the extent practical, and minimize concentrated discharges for water quality and wetland mitigation, are now referred to as surface water conveyances. Although the Final EIS may have implied that surface water conveyances would be installed at regular intervals along the project alignment, surface water conveyances would actually be installed in areas where an existing hydrologic connection would be cut off by the proposed highway. The surface water conveyances would be designed to pass surface water through the road in the direction or directions of its existing flow. The conveyances could be manifest as many types of drainage structures, including culverts, series of small culverts, French drains, corrugated strip drains, synthetic drainage nets, and gravel layers.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		Floodplain Equalization Culverts. Based on more specific hydraulic design information, UDOT and the Corps determined that equalization culverts for the purpose of equalizing floodwaters across the road would only be needed within the Corps floodplain boundary, rather than along entire length of the proposed roadway. *Groundwater Conveyance*. Groundwater conveyance structures would be installed to mitigate the potential impact of the road embankment consolidating underlying soils and impeding groundwater flows. Groundwater conveyances would be installed in areas where fill heights exceed approximately 3 m (10 ft), and would extend from the eastern fill limit to the western fill limit.
	Scour and Erosion Protection. If warranted, scour protection to mitigate downstream erosion would be provided at all culvert outlets and stream crossings, based on a case-by-case analysis to determine outlet velocities. Velocities would be calculated for 50-year storm flows except at stream crossings, where the 100-year storm flow would be used. The following criteria would apply: For velocities greater than 1.2 m (4 ft) per second but less than 4.6 m (15 ft) per second, loose riprap would be provided, based on UDOT design guidelines (Utah Department of Transportation 2004). For velocities greater than 4.6 m (15 ft) per second, an energy dissipater would be provided.	No change.
Groundwater Rights	UDOT would either purchase the groundwater right from the owner or pay for a transfer of the right. The determination would be made on a case-by-case basis.	No change.
Permits	(None)	No change.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Wetlands		
Wetlands (Direct and Indirect)	*All Build Alternatives*. The Legacy Nature Preserve will mitigate the wetland impacts of all build alternatives. Restoration is included within the Preserve. The Legacy Nature Preserve was initially formulated for each build alternative using a mitigation ratio of 10 to 1. The Legacy Nature Preserve would be about 440 ha (1,088 ac) for Alternative A, 856 ha (2,116 ac) for Alternative B, 621 ha (1,535 ac) for Alternative C, and 506 ha (1,251 ac) for the Preferred Alternative. An additional 128 ha (317 ac) of mitigation lands proximate to the FBWMA were added to the Legacy Nature Preserve associated with Alternative D (Final EIS Preferred Alternative) at the request of USFWS. Restoration measures described in the Final EIS that have been updated are described in the Legacy Nature Preserve Addendum to the Wetland Mitigation Plan (April 2001).	The extent of the Legacy Nature Preserve has been modified since publication of the Final EIS. In addition to the 126 ha (317 ac) of mitigation lands added at the request of USFWS, four additional parcels totaling 217 ha (530 ac) were added to the Legacy Nature Preserve to address EPA's concerns regarding the adequacy of the mitigation package for Alternative D. The incorporation of these additional parcels directly into the mitigation package would result in preservation of an 849-ha (2,098-ac) area, including 315 ha (778 ac) of wetland habitat and 532 ha (1,315 ac) of upland habitat. The configuration and size of the Legacy Nature Preserve is proposed to address impacts associated with Alternative E. If the federal lead agencies authorize construction of a build alternative other than Alternative E, a mitigation package—proportionate to the amount of impacts and based on a similar analysis using the same principles as those used for the Legacy Nature Preserve identified for Alternative E—would be proposed, with input from the Corps and other regulatory agencies. As described in Section 4.12, *Wetlands*, the wetland acreage mitigation-to-impact ratio for Alternative E is 6.8 : 1; that is the Legacy Nature Preserve would provide 6.8 acres of wetland habitat for each acre of wetland habitat affected under Alternative E. Similarly, overall, there would be a net gain in wetland function in the study area, although wetland functions lost in the depressional wetland class would be compensated by mitigating at higher ratios in the lacustrine fringe wetland class. As such, although some of the mitigation provided by the Legacy Nature Preserve would be out of kind, such mitigation would be adequate to offset the loss of wetland acreage and function associated with Alternative E.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		As of July 2005, the following mitigation has been completed within the Legacy Nature Preserve. • Acquisition of 788 ha (1,948 ac) of land associated with the Legacy Nature Preserve. • Installation of 9.7 km (6 mi) of perimeter fencing and 549 m (1,800 ft) of silt fence, and removal of 3,048 m (10,000 ft) of internal fences. • Removal of over 8,000 feet of dirt roads, and restoration of these areas to original contours and reseeding. • To raise the water table to more natural levels, fill of over 18,000 linear feet of ditches with spoils contoured back to natural topography. • Removal of 905 tires, 3,614 dump truck loads of trash, five buildings, and five car frames. • Regrading of large areas that were disturbed by uncontrolled access and illegal dumping, and revegetation of disturbed areas. • Relocation of a Davis County sewer line and two QUESTAR gas lines out of the Legacy Nature Preserve. • Installation of a water control structure diverting water from the Jordan River into the floodplain and a water control structure regulating water returning to the Jordan River. • Initial development of an active water management plan for the 121 ha (300 ac) Jordan River Floodplain in the southern portion of the Legacy Nature Preserve. • Planning for establishment of artesian wells and subsequent creation of approximately 4.9 ha (12 ac) of groundwater slope wetlands.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		• Re-creation of the Old Jordan River oxbow and channel, called the Mini Jordan River, totaling 2.4 km (1.5 mi). • Creation of an island called Lord Byron's Island within the Mini Jordan River. • Construction of 390 m (1,280 ft) of meander channel. • Construction of a storm drain to handle stormwater from North Salt Lake. • Completion of comprehensive surveys of noxious weeds/invasive species and initiation of adaptive management measures to control undesirable plants.
Wildlife		
Wildlife (Direct and Indirect) Acreage	*All Build Alternatives*. The restoration measures for the Legacy Nature Preserve (see Wetland Mitigation Summary above) would also benefit wildlife. The Legacy Nature Preserve would provide wetland and upland habitat for a wide variety of species. An additional 126 ha (317 ac) of mitigation lands proximate to the FBWMA were added to the Legacy Nature Preserve associated with Alternative D (Final EIS Preferred Alternative), at the request of USFWS, to offset wildlife impacts not captured by the wetland functional assessment models.	The extent of the Legacy Nature Preserve has been modified since publication of the Final EIS. In addition to the 126 ha (317 ac) of mitigation lands added at the request of USFWS, four additional parcels totaling 217 ha (530 ac) were added to the Legacy Nature Preserve to address EPA's concerns regarding the adequacy of the mitigation package for Alternative D. The incorporation of these additional parcels directly into the mitigation package would result in preservation of an 849-ha (2,098ac) area, including 315 ha (778 ac) of wetland habitat. The configuration and size of the Legacy Nature Preserve is proposed to address impacts associated with Alternative E. If the federal lead agencies authorize construction of a build alternative other than Alternative E, a mitigation package—proportionate to the amount of impacts and based on a similar analysis using the same principles as those used for the Legacy Nature Preserve identified for Alternative E—would be proposed, with input from the Corps and other regulatory agencies.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		As additional mitigation for unquantifiable impacts on bird populations from project noise, UDOT has committed to fund a study to determine the effects of highway noise on bird populations in the project area and comparable habitats. The study, which is being collaboratively designed by the federal lead agencies, UDOT, USFWS, and UDWR, will include the monitoring of bird populations and noise before, during, and after construction of the highway. The results of the monitoring will be used to develop a tool for the analysis of noise impacts on wildlife for future projects. A statement of commitment outlining the specifics of the noise study, and signed by the federal lead agencies, UDOT, and the resource agencies, is included in Appendix H, *Statement of Commitment*, of this Final Supplemental EIS.. Based on the analysis presented in Section 4.13, *Wildlife*, the Legacy Nature Preserve would mitigate the direct loss of wildlife habitat, habitat fragmentation, and noise impacts.
Wildlife (Direct and Indirect) Streams	*All Build Alternatives*. The Jordan River would be bridged, and natural stream substrate culverts would be used along perennial streams (Farmington Creek) and other large drainages requiring culverts larger than 1.2 m (4 ft) in diameter to facilitate movement of fish and other aquatic wildlife. The culverts would be placed at an elevation that would retain natural stream substrates and have the greatest value in maintaining natural conditions.	No change.
Wildlife (Direct and Indirect) Vegetation	The right-of-way would be landscaped with natural vegetation.	No change.
Wildlife (Direct and Indirect) Equalization Culverts	Culverts would be installed to allow floodwater during the Great Salt Lake's high-water years to pass beneath the roadway and supply wildlife habitat east of the alignment rights-of-way.	In addition to mitigation measures presented in the Final EIS, vegetated filter strips and surface water conveyance structures will be incorporated into the project design to minimize impacts on water quality and hydrology. These structures are described in the discussion of water quality mitigation above.
Wildlife – Birds	*All Build Alternatives*. Raptors. Preconstruction surveys of known raptor nests would be conducted within the Legacy Parkway	No change. (See the section on threatened and endangered species below.)

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Raptors	corridor by a qualified wildlife biologist to determine which nests are active. If nests are determined active, coordination with the USFWS and UDWR would occur and appropriate actions under the Migratory Bird Treaty Act (MBTA) and USFWS Raptor Guidelines (Romin and Muck 1999) would be followed to ensure the least amount of impact on the species.	
Peregrine Falcon	Peregrine Falcon. UDOT will prevent construction activities from impacting nesting peregrine falcons by implementing the following measures.	No change. (See the section on threatened and endangered species below.)
	Construction Activities. UDOT shall require a qualified wildlife biologist to monitor the nest for any activities occurring within 1.6 km (1 mi) of the nest from the courtship through post-fledgling dependency periods (about a 126-day period from February 1 through August 31). If, during monitoring, the peregrine falcons appear disturbed in any manner, construction activities shall immediately cease and UDOT shall immediately consult with USFWS before continuing construction activities.	No change. (See the section on threatened and endangered species below.)
	Human Use. Human use of project lands shall be controlled to prevent any take (particularly harm and harassment) of nesting peregrine falcons and/or their young. *Human Use (Project Employees)*. Project employees shall be informed of the presence of the peregrine falcon and the need to minimize disturbance during nesting.	No change. (See the section on threatened and endangered species below.)
	Human Use (Recreation). No recreational trail facilities that encourage extended human use of the area (for example, picnic tables and rest areas) shall be constructed on project lands within	Additionally, no animals, including livestock and/or pets, will be allowed on mitigation properties.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
	1.6 km (1 mi) of the nest and roost sites. *Human Use (Right-of-Way Fences)*. Right-of-way fences shall be constructed and maintained along the length of the Parkway.	
Floodplains	*All Build Alternatives.* The road elevation would be sited above the 100-year flood elevation of the streams that the project crosses and the Great Salt Lake. Any damage sustained by the new roadway when the lake level is high would be corrected through road maintenance. Major drainage structures would be designed to pass the 100-year flood without overtopping the road or changing the regulatory floodway. Riprap and other measures would be provided at the ends of drainage structures to control erosion where appropriate.	No change.
	Equalization Culverts. Equalization culverts would allow floodwater to pass back and forth beneath the roadway to preserve the natural and beneficial floodplain.	No change. Equalization culverts for the purpose of equalizing floodwaters across the road would only be constructed within the Corps floodplain instead of throughout the entire roadway (Parker pers. comm.[a]). These equalization culverts are now referred to as floodplain equalization culverts.
Threatened and Endangered Species		
Wildlife – Birds	*All Build Alternatives*. The Legacy Nature Preserve would provide long-term benefits for avian species. Additional reasonable and prudent measures and their terms and conditions based on the USFWS Biological Opinion are outlined below.	No change. The reasonable and prudent mitigation measures outlined in the biological opinion to minimize take of bald eagle are listed in Table 4.15-3 of this document. Because the peregrine falcon has been delisted as an endangered species, the terms and conditions of the biological opinion, with respect to peregrine falcon, are no longer considered nondiscretionary under authority of the ESA. However, USFWS still recommends implementation of these measures.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Historic and Archaeological Resources		
Historic Structures	*All Build Alternatives.* Pursuant to 36 CFR 800.5(e), the Utah State Historic Preservation Office (SHPO) would be consulted regarding methods to minimize the effects of the project on the historic qualities of the White House. Historic Properties eligible under criterion C would be documented to Utah State Intensive Level Survey (ILS) standards prior to demolition.	The White House at 10 North 650 West in Farmington, which the Final EIS identified as subject to adverse impacts associated with construction of Alternative D, has been demolished since publication of the Final EIS. Mitigation for this adverse impact was completed as described in the Final EIS (i.e., the building was documented to Utah State ILS standards before it was removed). Mitigation of adverse affects to the historic structures as 1300 W. Glover Lane and 662 W. Clark Lane, both in Farmington, would be conducted according to the September 2005 MOA. These measures would include preparation of an ILS form, photographic documentation of the structures, preparation of illustrated floor plans, archival research, and a submittal to the Utah Division of History, Preservation Section. In addition to the ILS documentation, a retaining wall will be built for 662 W. Clark Lane under Alternatives A, C, and E. *Clark Lane Historic District (All Build Alternatives)* The September 2005 MOA includes design mitigation measures to ensure that project-related impacts are minimized and that the CLHD and its contributory elements are returned to their original pre-construction condition. The September 2005 MOA also includes measures to minimize potential harm from construction-related vibration.
Prehistoric and Archaeological Sites	*All Build Alternatives.* Archeological sites would be excavated and data recovered in accordance with an approved MOA. See Appendix O (Section 106 Memorandum of Agreement) for more details. All activities would be coordinated with the (Utah) State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). The MOA was also distributed to regional Native America Tribes for their concurrence.	*All Build Alternatives.* Mitigation would be required for any NRHP-eligible archaeological site physically affected by construction of a build alternative. Typical mitigation measures for NRHP-eligible archaeological sites include archival investigations, development of a data recovery plan, and consultation between FHWA, UDOT, SHPO, the tribes, and other consulting parties. To date, consultation with SHPO has resulted in the following specific mitigation measures.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		• Implementation of Alternatives A, C, D, or E would result in an adverse impact on 42Dv2 and 42Dv94. If any of those build alternatives are selected for implementation, in accordance with the September 2005 MOA, the site limits will be delineated and protected from construction activities through the use of construction fencing. • To minimize impacts on 42Dv70, a professional archaeologist will monitor excavation and earthmoving activities associated with highway construction in the vicinity of the site. Although 42Dv70 would only be adversely affected under Alternative B, this mitigation measure will be implemented regardless of which build alternative is chosen, in accordance with the September 2005 MOA. If the monitoring archaeologist determines during the design-bid-build process that the site boundaries extend into the construction footprint of any of the build alternatives, data recovery will be initiated in accordance with the September 2005 MOA. In addition, the Legacy Nature Preserve mitigation plan will include a management plan to ensure the future health of cultural resources within the boundaries of the Legacy Nature Preserve.
Historic Railroad Corridors	None.	SHPO concurred that the build alternatives would have no adverse effect on the NRHP-eligible D&RG Railroad corridor. None of the proposed build alternatives would adversely affect the NRHP-eligible UPRR corridor. No mitigation measures are proposed.
Hazardous Waste Sites		
	All Build Alternatives. Measures would be implemented to prevent the spread of contamination and worker exposure to contaminants during construction. In the case of known chemical hazards, the site remedy may be negotiated through the U.S. Environmental	No change. Landfill mitigation would apply to Alternatives B, C, D, and E.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
	Protection Agency (EPA) and/or UDEQ; remedial action would be conducted by a qualified hazardous waste contractor certified by the U.S. Occupational Safety and Health Administration (OSHA). If contamination by unknown chemical hazards is suspected, the Parkway construction contractor would stop work. The contractor would employ the services of a certified industrial hygienist and environmental scientists who can identify the nature of the hazard and appropriate response measures. *All Build Alternatives.* The Northwest Oil Drain site would be mitigated by avoidance through bridging. *Alternatives B, C, and Preferred Alternative.* The impacts on the Bountiful Sanitary Landfill would be mitigated by relocating the facilities and removing landfill waste material located within the right-of-way, and disposing of it at a permitted facility.	
Visual Resources		
	All Build Alternatives. Revegetation of the highway grade would help soften the visual impacts of the highway and blend it into the existing landscape. Native plants would be used where possible. The work would be completed as quickly as possible after construction to lessen the amount of time the highway grade would be more visible. Landscaping and a trail system are planned for the entire length of Legacy Parkway. Landscaping includes different approaches for different areas. Where Legacy Parkway is adjacent to I-15, grasses would be used. In areas of open farmland and light industry, there would be moderate tree and shrub planting. Windows facing east would maintain views of the mountains and windows facing west would maintain open views. In residential areas, berms and tree and shrub plantings would be used.	No change.
Energy	(None)	No change.
Construction		
	All Build Alternatives. A public information program would be implemented to alert the community of ongoing and future	*Best Management Practices.* The following construction BMPs will be implemented during construction.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
	construction activities. Information would include construction work hours and alternative travel routes. Signs would be used to notify motorists of work activities and changes in traffic patterns. Night and weekend work may shorten the duration of the construction impacts. Lights used during nighttime construction would be aimed directly at the work area and/or shielded from nearby residences. Construction activities would be limited during certain periods to protect threatened and endangered species.	• Silt fence. • Berms. • Check dams. The silt fence will be placed to keep all runoff from leaving the right-of-way. Inside the silt fence, the contractor will be required to place earthen berms along both sides of the right-of-way. Vegetation will be required between the silt fence and earthen berms. Check dams will then be placed at each drainage crossing. These BMPs will ensure that no runoff leaves the right-of-way. *All Build Alternatives.* No change.
Construction Noise	(none)	To reduce temporary noise from construction, contractors will comply with all state and local regulations relating to construction noise. In addition, the following measures will be implemented: Restrict construction to daytime hours within 305 m (1,000 ft) of residences. No construction will be performed within 305 m (1,000 ft) of an occupied dwelling unit on Sundays or legal holidays or between 10:00 p.m. and 6:00 a.m. on other days. Any variance from this condition will require approval by the UDOT construction manager. All equipment will have sound control devices at least as effective as the original factory-installed devices. No equipment will have unmuffled exhaust. The noise from any rock-crushing or screening operations performed within 914 m (3,000 ft) of any occupied dwelling unit will be mitigated either by placing material stockpiles between the operation and the affected dwelling or by other means approved by the UDOT construction manager. As directed by the UDOT construction manager, the contractor will implement appropriate additional noise mitigation

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		measures, possibly including changing the location of stationary construction equipment, shutting off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, or installing acoustic barriers around stationary construction noise sources.
Construction Haul Routes	(none)	UDOT will specify that the contractor only use state roads as haul routes. Haul routes will vary depending on where construction is taking place along the roadway.
Construction Air Quality	(none)	Fugitive dust, which is dust generated by construction equipment such as haul trucks and earth-moving vehicles, will be mitigated according to a dust control plan, to be developed by the contractor according to Utah Division of Air Quality standards. This plan will include measures for minimizing fugitive dust, such as applying dust suppressants and water sprays, minimizing the extent of disturbed surface areas, and restricting activities during periods of high wind.
Construction Vibration on Clark Lane Historic District		Maximum energy ratings for pile driving hammers, prescribes vibration monitoring requirements for the home at 399 W. State Street, provides specific guidance on measures to take if vibration levels exceed 0.3 cm/sec (0.12 in/sec), and includes a required for pre- and post-construction surveys of structures in the CLHD and notification of homeowners in the district prior to pile driving activities.
Construction Streetscape Impacts		As described in Section 4.20.3.2, none of the build alternatives would affect mature trees in front of 393 W. State Street and 398 W. State Street in the CLHD. To ensure that the CLHD and its contributory elements area returned to their original pre-construction condition, the September 2005 MOA stipulates that the design of the State Street overpass will include provisions for minimizing grade changes, redesigning and incorporating sidewalks within the CLHD into the sidewalks for the new bridge structure, and maintaining existing landscape and streetscape features. The complete text of the September 2005 MOA is included for reference in Appendix A.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Short-Term Uses vs. Long-Term Productivity	(None)	No change.
Irreversible and Irretrievable Commitment of Resources	(None)	No change.
Section 4(f) Properties		
Farmington Bay Waterfowl Management Area (FBWMA)	*Avoidance Alternatives* The direct use of the FBWMA eastern entrance would be avoided by Alternative A and the PA. It could also be avoided by shifting Alternative B entirely to the eastern side of the D&RGRR, or by elevating Alternative B or C over the parking lot and small area north of the lot. *Minimization Measures* 128 ha (317 ac) of land would be set aside to provide a buffer to the FBWMA and would be given to the UDWR to manage as part of the FBWMA. This land would be in addition to the Legacy Nature Preserve	*Avoidance Alternatives* Alternatives A and E would avoid the use of the new parcel of land that has become part of the FBWMA since publication of the June 2000 Final EIS. Alternatives B and C would avoid the new parcel by shifting the alignments to the east of the D&RG Railroad, a Section 4(f) historic resource. Shifting the alignments further to the east of the D&RG Railroad would be the same alignment as Alternatives A, E, and the Parkway Facility Adjacent to Redwood Road Alternative. *Minimization Measures* The amount of land required by Alternatives B and C has been reduced due to the change in the width of the right-of-way. Land required by Alternatives B and C from the eastern entrance and parking area of the FBWMA (as discussed in Section 5.5.1) would be replaced with land of equal value, location, and usefulness and the parking area relocated. If Alternative B or C were adopted, all planning to minimize further harm would be included. The 128 ha (317 ac) of land are currently managed, under the Section 404 permit, by UDOT as part of the Legacy Nature Preserve. Ultimate management authority over these 128 ha (317 ac) and the remainder of the Legacy Nature Preserve will be established through the Section 404 permit process.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
		Alternatives A and E avoid any direct use of the new parcel and are the alternatives that would least harm this resource. Elevating Alternative B or C over the new parcel would minimize impacts by not physically bisecting it. However, the Parrish Lane interchange for Alternatives B and C are located in this same area. Elevating the interchange over the new parcel is feasible but would not but would not be prudent because of extraordinary cost.
Bountiful City Pond	*Avoidance Alternatives* Alternative A is the only alternative that would not require direct use of this parcel. The PA would require 2.4 ha (6 ac) of the 17-ha (43-ac) parcel (14 percent). Less than 50 m (164 ft) of the shoreline of the pond would be affected. A Bountiful City Pond Avoidance Alternate would be located between the PA and Alternative A. *Minimization Measures* Alternatives B and C and the PA. The Legacy Parkway right-of-way would be the minimum possible that meets design standards. The land used would be replaced with land of at least equal value and usefulness. The affected shoreline would be reshaped to provide the same habitat and an area for users to walk around the pond.	Direct use of this resource has been eliminated for all build alternatives due to modifications made to the final design of the build alternatives and reevaluation of specific areas of the property eligible for protection under Section 4(f). Modifications were made to the final design for Alternative D (Final EIS Preferred Alternative) that included constructing retaining walls to avoid any fill in the pond and associated wetlands. These modifications have been incorporated into the final design of all build alternatives. In addition the City of Bountiful, in coordination with the Utah Division of Wildlife Resources and Sport Fish Restoration, has developed and implemented a management plan that includes developing specific areas of the property for recreation purposes and other areas for municipal purposes. Improvements have been made to the recreation facilities near the pond, and recreation use has increased. The areas of the property used for and functioning as recreation resources are eligible for protection under Section 4(f). Those areas of the property not used for recreation have been reevaluated, and such municipal uses are not eligible for protection under Section 4(f). Specifically, areas developed and managed as public recreation areas on the property would not be affected by the proposed action. The City of Bountiful has agreed to accept 4 ha (10 ac) of replacement land in exchange for less than 2.4 ha (5.9 ac) of land needed for Alternatives B, C, and E.

Impact Category	Mitigation Measures in Previous Final EIS	Current Mitigation Measures
Utah State Parks Land and Jordan River Raceway (renamed Jordan River OHV Center)	*Avoidance Alternatives* All Build Alternatives would require some of the Jordan River Raceway Land. To avoid using Raceway land, the interchange would have to be designed to stay within the current right-of-way, which could not be done without violating the desirable standards of geometric design. *Minimization Measures* All Build Alternatives would use the minimum right-of-way needed to meet roadway design standards. The land used would be replaced with land of at least equal value, location, and usefulness.	*Avoidance Alternatives* No change. *Minimization Measures* No change.
Historic Resources	*Avoidance Alternatives* All Build Alternatives would require demolition of the white house. *Minimization Measures* Recordation on an Intensive Level Survey Form would be done in accordance with the U.S. Secretary of Interior's *Standards and Guidelines* for documentation (48 FR 44728-37). Mitigation would be coordinated with the SHPO and ACHP.	*White House at 10 North 650 West, Farmington*: All build alternatives required a direct use of the White House at 10 North 650 West in Farmington, including demolition of the structure and incorporation of the property into the right-of-way. After publication of the Final EIS, the ILS form was completed in accordance with U.S. Secretary of Interior's Standards and Guidelines for documentation (48 FR 44728-37). The site documentation was submitted to SHPO on February 21, 2001. SHPO approved the site documentation on March 8, 2001. The structure was subsequently demolished.

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		Clark Lane Historic District, Farmington: None of the build alternatives would require a permanent direct use of the CLHD or structures therein because design and minimization measures have been developed and included in the September 2005 MOA to avoid a permanent direct use of the CLHD and result in a temporary occupancy instead. The temporary occupancy of the CLHD would meet all the criteria outlined in 23 CFR 771.135(p)(7). *Avoidance Alternatives* *1300 Glovers Lane, Farmington*: Alternative B would result in a direct use of this resource. The entire property lies within the right-of-way for Alternative B. There is no prudent avoidance alternative other than Alternatives A, C and E in this area. However, selection of any of these build alternatives to avoid using 1300 Glovers Lane would result in a direct use of 662 West Clark Lane in Farmington, also a Section 4(f) historic resource. *662 West Clark Lane, Farmington*: Alternatives A, C, and E would avoid demolishing the historic structure by constructing retaining walls. The direct use required by these alternatives of 0.02 ha (0.06 ac) from the historic property boundary could not be avoided because of the right-of-way required for the northern interchange with I-15 and US-89. There are no avoidance alternatives for use of this property by Alternatives A, C, and E because it is located in the area required for the northern interchange, a system-to-system connection between Legacy Parkway, I-15, and US-89. Avoiding the direct use of this property would require relocating the entire northern interchange, which is not prudent. Alternative B does not require a direct use of 662 West Clark Lane in Farmington. However, selection of Alternative B would result in a direct use of the historic structure at 1300 Glovers Lane in Farmington, also a Section 4(f) historic resource. *D&RG* Railroad: All the build alternatives require a direct use of the D&RG Railroad by crossing it at grade. An avoidance

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		alternative to the direct use of the D&RG Railroad right-of-way for Alternatives A, C, and E would be to span both crossings with a roadway bridge. The cost to implement this avoidance alternative is estimated at approximately $8,000,000. This is roughly 23 times the estimated $350,000 cost for the two at-grade crossings per alternative. SHPO has concurred there would be no adverse effect as a result of the direct use of the D&RG Railroad by crossing it at grade. An avoidance alternative for Alternative B would be to shift the alignment further west, between Parrish Lane and Glovers Lane, and span the D&RG Railroad where the proposed Legacy Parkway connects with US-89. However, shifting the Alternative B alignment further west would result in a direct use of the FBWMA (also a Section 4(f) resource) near the eastern entrance on Sheep Road and the FBWMA isolated property. SHPO has concurred that crossing at grade would not have an adverse effect on the historic resource; therefore, a direct use of FBWMA to avoid a direct use of the D&RG Railroad is not prudent. *Measures to Minimize Harm* *1300 Glovers Lane, Farmington*: Measures to minimize harm to 1300 Glovers Lane in Farmington for Alternative B would include completion of an ILS form in accordance with the U.S. Secretary of Interior's *Standards and Guidelines* for documentation (48 FR 44728-37). All actions would be coordinated with SHPO and ACHP in accordance with the September 2005 MOA. The right-of-way required for Alternative B in this area was reviewed for any potential to minimize the direct use of this structure, however the current design is the minimum right-of-way width feasible in this location.

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		662 West Clark Lane, Farmington: Construction of a retaining wall for Alternatives A, C, and E would minimize the impact on 662 West Clark Lane in Farmington and would allow the structure to remain in place, but would still require a direct use of 0.02 ha (0.06 ac) from the historic property boundary. Other minimization measures include completion of an ILS form in accordance with the U.S. Secretary of Interior's *Standards and Guidelines* for documentation (48 FR 44728-37). All actions would be coordinated with SHPO and ACHP in accordance with the September 2005 MOA. *D&RG Railroad*: SHPO concurred there would be no adverse effect on the D&RG Railroad by crossing it at grade, all possible planning to minimize harm to the resource would be included in implementation of the adopted alternative.
Archaeological Sites	*None*	*Avoidance Alternatives* *Sites 42Dv2 and 42Dv94*: Alternatives A, C, and E require a direct use of Sites 42Dv2 and 42Dv94 by incorporation of the site into the right-of-way required for southern interchange with I-215. These two sites are located between the proposed interchange and the proposed trail. Because of the existing facilities associated with I-215 and to maintain connectivity of the proposed trail with the existing trail system, the properties containing Sites 42Dv2 and 42Dv94 must be acquired for use as right-of-way. No further work would take place within the boundaries of the site. An avoidance alternative would be implementation of Alternative B because the southern interchange is in a different location. However, construction of Alternative B would affect 13 ha (33 ac) of prime farmland, require 6 ha (15 ac) of land from a century farm compared to 2 ha (5 ac) for the other build alternatives, and would affect two multigenerational farms that the other alternatives would not affect. Because of the additional impacts required by Alternative B on other resources in the area and the fact that these sites would remain untouched within the right-of-way, Alternative B is not considered a prudent avoidance alternative.

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		Minimization Measures *Sites 42Dv2 and 42Dv94*:No further use of or impacts on these sites are anticipated during this project, any possible impacts could be minimized through the completion of archaeological data recovery in those portions of the sites directly used upon discovery and as outlined in the September 2005 MOA. Archaeological data recovery would be completed in accordance with the U.S. Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716). Additional minimization measures for these sites would include delineation of the site boundaries and fencing during construction of Alternatives A, C, and E. These alternatives would require construction activity adjacent to the sites but would not require additional direct use. SHPO and consulting parties would also be given the opportunity to review construction plans.
Section 6(f) Properties		
Jordan River OHV Center	*All Build Alternatives* Replacement land of equal value, location and usefulness would be provided in accordance with Section 6(f) requirements to replace the portion of the Jordan River Raceway that would be required.	No change.

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ACHP = Advisory Council on Historic Preservation
BMPs = best management practices
Corps = U.S. Army Corps of Engineers
EPA = U.S. Environmental Protection Agency
FBWMA = Farmington Bay Waterfowl Management Area
ILS = Intensive-Level Survey
MBTA = Migratory Bird Treaty Act
MOA = Memorandum of Agreement
OSHA = Occupational Safety and Health Administration
PA = Preferred Alternative
SHPO = (Utah) State Historic Preservation Office
TSS = total suspended solids
UDEQ = Utah Department of Environmental Quality
UDOT = Utah Department of Transportation
UDWR = Utah Division of Wildlife Resources
UPDES = Utah Pollutant Discharge Elimination System
URAA = Uniform Relocation Assistance Act
USFWS = U.S. Fish and Wildlife Service