Chapter Three: Affected Environment And Environmental Consequences

This chapter describes the existing environmental, social, and economic conditions within the study area and how these conditions would be affected by the No-action Alternative and the Preferred Alternative. Existing conditions were identified based on literature and data file searches, coordination with federal, state, and local agencies, and field investigations. Additional details relating to technical research performed in the preparation of this Environmental Assessment (EA) that are not discussed in this document are included in the project records.

Each affected environmental resource will be evaluated for direct, indirect, and cumulative impacts, in addition to avoidance, minimization, and mitigation measures. Types of impacts are explained in the following definitions and illustrated in Figure 3-1:

- **Direct impacts** are caused by the Preferred Alternative and occur at the same time and place (40 CFR §1508.8). These are discussed in each resource area subsection.
- **Indirect impacts** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR §1508.8). Indirect effects are generally not quantifiable but can be reasonably predicted to occur. These impacts are discussed in each resource area subsection.
- **Cumulative impacts** are the impacts to the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR §1508.7). These impacts are discussed in Section 3.23 of this chapter.

The study area is defined in the Figures in Volume 2. For individual environmental resources the study area varies, depending upon individual resource characteristics. Unless otherwise noted, the study area for each resource is the study area defined in the Figures in Volume 2.

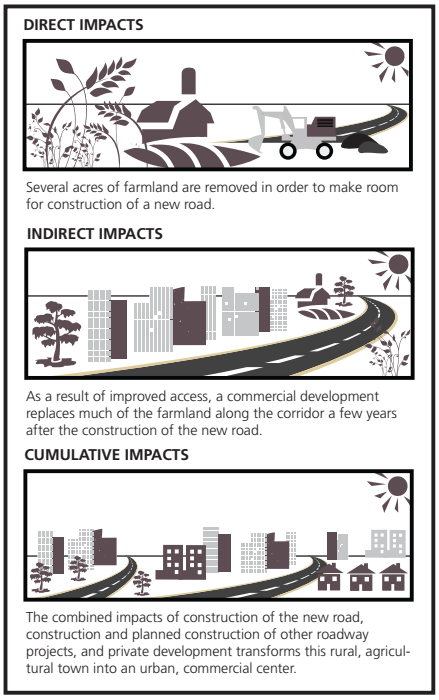


Figure 3-1 Direct, Indirect, and Cumulative Impacts

3.1 LAND USE

Zoning maps and land use master plans show current and planned land uses within municipalities. Zoning maps show how land within a municipality is currently zoned and land use master plans show proposed future land uses. These maps and plans are developed by local governments which use them to identify community goals and priorities, and to assist in decision-making procedures regarding land development.

3.1.1 AFFECTED ENVIRONMENT

General Character of Land Use in Study Area

This section discusses the general character of land use in the study area, based on visual inspection, from south to north. The following land uses currently exist in the study area:

- Undeveloped land on both sides of I-15 from the State Line to the Southern Parkway Interchange.
- Residential development on the west side of I-15 and undeveloped land on the east side of I-15 between Southern Parkway and Brigham Road.

- Commercial development on both sides of I-15, with undeveloped land just south of the Virgin River between Brigham Road and the Virgin River.
- Residential development and a golf course on the west side of I-15 and undeveloped land on the east side of I-15 between the Virgin River and Dixie Drive.
- Commercial development on both sides of I-15 between Dixie Drive and Bluff Street.
- Residential development with mixed commercial use between Bluff Street and Washington Parkway.
- Red Cliffs Desert Reserve on the west side of I-15 between Washington Parkway and SR-9.
- Undeveloped land on the east side of I-15 between Washington Parkway and Grapevine Pass.
- Residential development on the east side of I-15 between Grapevine Pass and SR-9.

Zoning and Land Use Master Plans

Current Zoning

Table 3-1 shows the current zoning in the study area (see Appendix A for the City of St. George, Washington City, and Hurricane City zoning maps).

Table 3-1 Current Zoning

I-15 Mainline Segment	Current Zoning
State Line to Port-of-Entry	Mining and grazing zoning on both sides of I-15.
Port-of-Entry to Southern Parkway	Mining and grazing zoning, then planned development zoning on both sides of I-15.
Southern Parkway to Brigham Road	Planned development zoning on both sides of I-15 at the southern end with residential zoning on the west side of I-15 and open space zoning on the east side. Planned development (commercial) at the Brigham Road Interchange.
Brigham Road to Bluff Street	Planned development zoning on both sides of I-15, then residential zoning on the east side. Next, the area around the Virgin River is zoned as open space. North of the Virgin River there is residential zoning on the west side and commercial zoning on the east side. Next, planned development (commercial) on the west side of I-15 and commercial zoning on the east side.
Bluff Street to St. George Boulevard	Commercial zoning, with some residential zoning on the west side of I-15 at the south, which transitions to mostly residential zoning, with some commercial and planned development zoning on both sides of I-15. Residential zoning with commercial zoning centered around the St. George Boulevard Interchange.
St. George Boulevard to Green Springs Drive	Commercial zoning on both sides of I-15, then residential zoning on the east side (on top of bluff) with manufacturing zoning, residential zoning, and open space zoning on the west side. Next, planned development (commercial) on west side, with residential zoning on east side. Next, residential zoning on east side and commercial zoning on the west side of I-15. Finally, planned development (commercial) and commercial zoning on the south end of the Green Springs Drive Interchange.
Green Springs Drive to Washington Parkway	Commercial zoning on both sides of I-15, then residential zoning on the east side of I-15 with commercial zoning on the west side. Further north, residential zoning that transitions to commercial zoning on the east side of I-15.
Washington Parkway to SR-9	Open space zoning on the west side of I-15 with Planned Community Development on the east side.

Land Use

Table 3-2 shows the planned land uses in the study area (see Appendix A for the City of St. George, Washington City, and Hurricane City general plans).

Table 3-2 General Plans

I-15 Mainline Segment	Planned Land Uses from General Plans
State Line to Port-of-Entry	Planned for very low density residential on the west side and employment on the east side of I-15.
Port-of-Entry to Southern Parkway	Planned for residential on the west side and employment on the east side of I-15. Next, there is residential on the west side with a planned park on the west side. On the east side, planned land uses consist of open space, planned parks, public facilities, and a visitor center.
Southern Parkway to Brigham Road	On the west side of I-15, planned land uses consist of employment and commercial. On the east side of I-15, planned land uses consist of employment and a visitor center. Next, planned for residential on the west side of I-15 and open space with some residential on the east side. Finally, planned for residential on the west side of I-15 and open space on the east side of I-15, with planned commercial centered around the Brigham Road Interchange.
Brigham Road to Bluff Street	Planned for commercial on the west side of I-15 and open space on the east side. Next, the area around the Virgin River is planned for public facilities. North of the Virgin River is planned for residential on the west side and commercial on the east side of I-15. Next, there is planned open space (floodplain) on the west side and public facilities on the east side. Finally, there is planned commercial on both sides of I-15.
Bluff Street to St. George Boulevard	Planned for commercial uses on both sides of I-15 at the Bluff Street Interchange. Next, planned for residential uses on both sides of I-15, with some planned commercial uses.
St. George Boulevard to Green Springs Drive	Planned for industrial uses on the west side of I-15 and commercial on the east side. Next, there is planned open space with residential zoning on top of the bluff. North of the bluff there is planned commercial and residential uses on both sides of I-15. Next, mostly planned for commercial uses on both sides of I-15 with some residential uses on the east.
Green Springs Drive to Washington Parkway	Mostly planned for commercial uses on both sides of I-15 with some residential uses. Next there is some open space, then mostly residential with some commercial and a planned park.
Washington Parkway to SR-9	Open space on the west side of I-15 and commercial uses on the east side, with planned residential uses at the northeast end of the study area.

3.1.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Under the No-action Alternative, I-15 would not be improved. There would be no changes to planned land uses.

Preferred Alternative

Direct Impacts

Construction of the Preferred Alternative would require relatively small amounts of right-of-way acquisition, mostly in areas where detention basins would be required and near interchanges. This would convert some land to detention basin and roadway use. Specifically, the Preferred Alternative would convert 1.3-acres of commercial property, 4-acres of open space, 0.7-acres of planned development, and 0.4-acres of residential property to detention basin and roadway use.

The Preferred Alternative is consistent with the zoning and land use plans of the City of St. George, Washington City, and Hurricane City.

Indirect Impacts

The Preferred Alternative would not change planned land uses. The General Plans for St. George, Washington, and Hurricane were developed based on the existing I-15 corridor. Widening the existing corridor and re-constructing interchanges would not change the amount or type of development.

Mitigation

No mitigation required.

3.2 FARMLAND

The Farmland Protection Policy Act (FPPA) requires federal agencies to identify and account for adverse effects of their programs and policies on the preservation of farmlands, including identifying potential alternatives to lessen the adverse impacts that may result. Under the FPPA (7 CFR 658.2a), farmland for the purpose of a prime or unique or statewide importance determination does not include land already in or committed to urban development. Under this Act, federal programs are also required to comply with state, local, and private programs aimed at preserving farmland.

In the Utah Code, Title 17 Chapter 41, the State of Utah allows for the formation of Agricultural Protection Areas (APAs). Areas designated as such are protected for the production of commercial crops, livestock, and livestock products. APAs can be established in unincorporated parts of a county or within a city or town limit.

3.2.1 AFFECTED ENVIRONMENT

The City of St. George, Washington City, and Hurricane City are considered urbanized areas according to the U.S. Census Bureau Map. There is one small portion of the study area that is within unincorporated Washington County at the southern end of the I-15 corridor. However, at this location, the study area does not extend beyond the I-15 right-of-way. Therefore, no prime, unique, or statewide important farmland has been identified in the study area. In addition, no APAs have been identified in the study area and there are no areas of cultivated farmland or areas that have been zoned or planned for agricultural uses in the study area.

3.2.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not affect prime, unique, or statewide important farmland, APA designated farmland, or cultivated farmland.

Preferred Alternative

The Preferred Alternative would not affect prime, unique, or statewide important farmland, APA designated farmland, or cultivated farmland.

Mitigation

No mitigation required.

3.3 SOCIAL ENVIRONMENT AND ENVIRONMENTAL JUSTICE POPULATIONS

A social assessment was performed in the study area (see Appendix A). The assessment analyzed social and demographic characteristics of populations in the study area in order to identify the presence of populations that may experience heightened susceptibility to disturbance caused by the Preferred Alternative. Specifically, the assessment determined whether portions of the study area contained unusually large concentrations of racial or ethnic minority populations or persons living at or below poverty levels.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by the President on February 11, 1994, directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent possible and permitted by law.

Fundamental Environmental Justice principles include:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process

- To prevent the denial of, reduction in, or substantial delay in the receipt of benefits by minority and low-income populations

Executive order 12898 and the United States Department of Transportation (USDOT) and Federal Highway Administration (FHWA) Orders on Environmental Justice address persons belonging to any of the following groups:

- **Black** - a person having origins in any of the black racial groups of Africa
- **Hispanic** - a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race
- **Asian** - a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent
- **American Indian and Alaskan Native** - a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition
- **Native Hawaiian or Other Pacific Islander** - a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
- **Low-Income** - a person whose household income (or in the case of a community or group, whose median household income) is at or below the Health and Human Services (HHS) poverty guidelines

3.3.1 AFFECTED ENVIRONMENT

Several areas adjacent to the I-15 study area include residential/neighborhood development. These areas include:

- Residential development between the Southern Parkway Interchange and the Brigham Road Interchange on the west side of I-15
- Residential development between the Virgin River and the Dixie Drive Interchange on the west side of I-15
- Residential development with mixed commercial use between the Bluff Street Interchange and the Washington Parkway Interchange
- Residential development southwest of the SR-9 Interchange

3.3.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

A decision to adopt the No-action alternative would leave existing social conditions and trends in the study area intact. The No-action Alternative would not impact minority or low income populations in the study area.

Preferred Alternative

Direct Impacts

Community Social Conditions

The Preferred Alternative would generally remain within the existing I-15 corridor right-of-way and there would be no removal of residential units, substantial encroachment into residential properties, or alteration of the general character of existing residential neighborhoods. As such, there appears to be no meaningful potential for disruptive social effects. No individuals or families would be confronted by either financial or social adjustment difficulties that can occur when relocations are necessary. In the absence of such relocation effects and with no alteration to roadway infrastructure within localized residential neighborhoods, there is no reason to anticipate changes to existing patterns of social interaction in neighborhoods located in proximity to the study corridor, or in the larger surrounding community. Levels of social integration and cohesion at the level of individual neighborhoods and in the broader local community would consequently not be altered as a result of changes to the I-15 corridor associated with the Preferred Alternative.

The addition of travel lanes through the study corridor would in some locations reduce the distance between nearby residential units and neighborhoods and I-15 traffic. As a result, some homes located in close proximity to I-15 would experience increased exposure to traffic noise following the completion of construction activities

(see Section 3.8 Noise). The potential for disturbance and increased dissatisfaction with traffic noise would be greatest in neighborhoods where housing units are already situated very close to I-15. However, the Preferred Alternative could potentially include the construction of noise walls (pending balloting efforts) which would mitigate traffic noise effects in some areas. The potential for substantial adverse impacts associated with noise-related disturbance (including possible reductions in levels of interaction and participation in outdoor areas in localized areas) would be low. Additionally, areas where noise walls are constructed may experience an improvement in such conditions relative to what is currently experienced by those who already live in close proximity to I-15.

Based on the above conclusions, the Preferred Alternative would be unlikely to cause substantial adverse impacts on community social conditions.

Environmental Justice

Impacts from the Preferred Alternative, such as increases in noise levels and construction impacts, would be comparable for all residents in the study area. No Environmental Justice population has been identified that would disproportionately bear impacts of the Preferred Alternative. The Preferred Alternative would not result in the denial of, reduction in, or substantial delay in the receipt of the benefits of any federal programs, policies, or activities to Environmental Justice populations. Based on the above considerations, the Preferred Alternative would not have disproportionately high and adverse effects on minority and low-income populations.

See Section 3.22 Construction Impacts for impacts during construction.

Indirect Impacts

No indirect impacts.

Mitigation

No mitigation will be required.

3.4 ECONOMICS

3.4.1 AFFECTED ENVIRONMENT

Washington County has recently been one of the fastest growing areas in Utah with a population of 138,115 in 2010), and ranked (based on population growth) as the second fastest growing metropolitan area in the United States between 2000 and 2009. The City of St. George contains the majority of Washington County's population with a population of 72,897, according to the 2010 Census data. The local non-agricultural economy is based largely on tourism and recreation, which helps fuel the service and trade industries. Also, due to the large influx of population that Washington County has experienced in recent years, construction has constituted a major portion of the County's economy. The largest employers in Washington County for 2009 are shown in Table 3-3.

Table 3-3 Washington County's Largest Employers (Annual Average Employment Numbers for 2009)

Company	Industry	Employment
Washington County School District	Public Education	2000-2999
Intermountain Health Care	Health Care	2000-2999
Wal-Mart	Discount Department Store	1000-1999
Dixie State College	State Institution of Higher Education	1000-1999
St. George City	Local Government	500-999
Cross Creek Manor	Residential Care Facility	500-999
SkyWest Airlines	Air Transportation	500-999
Federal Government (various)	Federal Governmental	500-999

Source: Utah Department of Workforce Services (accessed August 2011)

Washington County was hard hit by economic recession in 2008. According to the Utah Department of Workforce Services, as of June 2011, the unemployment rate for Washington County was 9.6%, which was down from 2010's annual average of 10.1%, but still substantially higher than the 4.9% annual average of 2008. Almost all sectors of Washington County's economy experienced job losses, with a large portion of those job losses occurring in the construction sector of the economy. The only sectors to post increases in 2010 were professional/business service, education/health and social services, and the government with each creating fewer than 250 jobs each in 2010 (see Table 3-4).

Table 3-4 Non-Agricultural Employment by Industry for the St. George Metropolitan Statistical Area (Washington County) 2006 through 2010

	2006	2007	2008	2009	2010p*
Labor Force	61,432	63,391	61,668	60,009	58,964
Employed	59,566	61,562	58,617	54,707	53,003
Unemployed	1,866	1,829	3,051	5,301	5,962
Unemployment Rate	3.0%	2.9%	4.9%	9.5%	10.1%
Non-farm Jobs	51,459	53,468	51,454	49,995	45,789
Percent Change from Prior Year	9.1%	3.8%	-3.8%	-8.7%	-2.6%
Mining	246	307	261	213	135
Construction	8,289	8,368	6,311	3,922	3,368
Manufacturing	3,276	3,302	3,116	2,419	2,212
Trade/Transportation/Utilities	15,971	12,178	12,089	11,360	10,894
Information	868	805	816	746	717
Financial Services	1,385	1,419	1,345	1,967	1,822
Professional/Business Services	2,756	2,980	2,849	3,503	3,577
Education/Health/Social Services	6,923	7,237	7,681	7,836	8,068
Leisure/Hospitality	6,567	6,955	6,832	6,696	6,523
Other Services	3,297	3,486	3,310	1,253	1,245
Government	6,140	6,477	6,892	7,080	7,225

**Preliminary data.*

Source: Utah Department of Workforce Services (accessed August 2011)

The impact of the 2008 recession on the construction industry is further evidenced by the drop in the number of new dwelling units that were permitted, down to 682 in 2008 from 1,954 in 2007. Recent increases have been shown in 2010, with 870 new residential building permits being issued (see Table 3-5). Revenue from sales and use taxes have also been experiencing a decrease in recent years, as shown in Table 3-6.

Table 3-5 Sales and Building Statistics for Washington County, 2006 through 2010

Economic Indicator	2006	2007	2008	2009	2010p*
Gross Taxable Sales ($000s)	$ 2,680,271	$ 2,615,120	$ 2,267,529	$ 2,344,664	NA
Permit Authorized Construction ($000)	$ 618,284	$ 530,484	$ 278,596	$ 167,748	$ 229,868
New Residential Building Permits	2,256	1,954	682	605	870
Residential Build Permits Value ($000)	$ 411,808	$ 351,160	$ 119,327	$ 99,368	$ 166,630

**Preliminary data.*

Source: Utah Tax Commission and University of Utah Bureau of Economic and Business Research (accessed August 2011)

Table 3-6 Sales Tax Revenue by Jurisdiction, 2008 to 2010

Sales Tax	FY 2008	FY2009	FY2010	% Change from 2008 to 2010
Washington County	24,228,224	21,242,586	19,389,007	-20.0%
St. George City	15,513,808	13,216,523	11,847,248	-23.6%
Washington City	3,041,415	2,801,031	2,541,665	-7.9%

Source: Utah State Tax Commission Annual Report 2010 FY

3.4.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Under the No-action Alternative, current market forces and trends would continue to influence the local economy. Increased congestion could hamper access to local businesses from the I-15 corridor; however, I-15 is a major thoroughfare through Washington County, which is not likely to change even if the proposed improvements are not implemented.

Preferred Alternative

Direct Impacts

The Preferred Alternative would not displace commercial and industrial businesses. Under the Preferred Alternative, current market forces and trends would continue to influence the local economy. The improvements to I-15 would improve traffic flow and mobility throughout the study area, which would make access to local businesses from the I-15 corridor easier for both the local and traveling commuter. Although some local businesses may lose some patronage during construction as shoppers avoid the construction area, the Preferred Alternative improvements would benefit the local economy in the long term by reducing congestion, improving safety, and making businesses more accessible.

Indirect Impacts

There would be no indirect impacts to economic conditions as a result of the Preferred Alternative.

Mitigation

No mitigation required.

3.5 RIGHT-OF-WAY AND RELOCATIONS

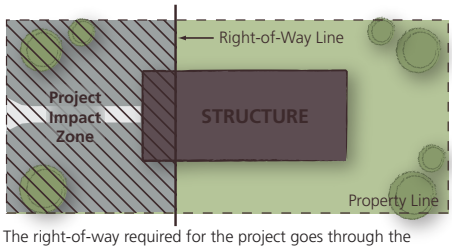
Where property acquisition is necessary, land owners are compensated under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. If an individual is required to move as a result of a Federal or federally assisted program, assistance will be provided.

The Uniform Act ensures the fair and equitable treatment of all people displaced from their homes, businesses, and farms without discrimination on any basis.

This right-of-way and relocations section will use the following definitions to analyze the impacts of relocations:

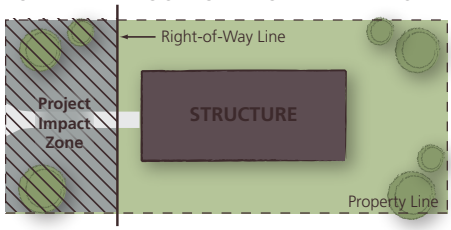
- **Relocation:** Occurs when an existing structure would be within the right-of-way of the Preferred Alternative, the entire property needs to be acquired, and the residents or business would need to relocate.
- **Potential Relocation:** A situation in which a property would be directly affected by the project and an existing structure (excluding porches and garages) would be close to the proposed right-of-way, but it is not clear whether the entire property needs to be acquired. *By the end of the right-of-way acquisition phase, UDOT will determine whether each potential relocation is a full relocation or a strip take. This determination depends on an independent valuation of the property that includes any project-related damage to buildings.*
- **Strip Take (partial acquisition):** Generally occurs when a property is located within the proposed right-of-way, but the right-of-way is further away from an existing structure. For this type of impact, only a strip of land would need to be acquired. *As with potential relocations, UDOT could refine strip takes during the right-of-way acquisition phase.*

RELOCATION: DIRECT IMPACT



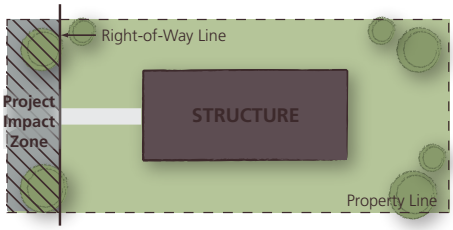
The right-of-way required for the project goes through the structure.

POTENTIAL RELOCATION: PROXIMITY IMPACT



The right-of-way required for the project impacts the property and is close to the structure.

STRIP TAKE



The right-of-way required for the project impacts the property but is further away from the structure.

3.5.1 AFFECTED ENVIRONMENT

The areas adjacent to the I-15 study area are mostly characterized by undeveloped land, residential development, and commercial development (see Section 3.1 Land Use for more detail).

3.5.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not require any additional right-of-way or the relocation of any residences or businesses.

Preferred Alternative

Direct Impacts

The Preferred Alternative would not require the relocation of any residences or businesses. Approximately 6.4-acres of property would be acquired, mostly for possible detention basins and roadway use near interchanges (see Table 3-7 and Figures in Volume 2).

Table 3-7 Right-of-Way Acquisition

Property #	Location	Current Use	Approximate Strip Take Required
1 (Sheet 06 and 07)	West side of I-15 (between I-15 and Pioneer Road) north of the Southern Parkway Interchange in St. George	Vacant	1.8-acres (detention basins)
2 (Sheet 09)	141 West Brigham Road, St. George	Gas Station (Chevron)	0.01-acres (roadway use)
3 (Sheet 09)	144 West Brigham Road, St. George	Common Area of Bloomington Courtyard Community Center	0.006-acres (roadway use)
4 (Sheet 09)	2841 South 60 East, St. George	Truck Stop/Gas Station (Flying J)	0.02-acres (roadway use)
5 (Sheet 11)	Southeast corner of Dixie Drive Interchange, St. George	Vacant	0.2-acres (cut slope)
6 (Sheet 15)	West side of I-15, north of 700 South in St. George	Vacant	0.09-acres (detention basin)
7 (Sheet 15)	850 East 600 South, St. George	Residential	0.3-acres (detention basin)
8 (Sheet 18)	848 North 1100 East, St. George	Vacant	2.1-acres (detention basin)
9 (Sheet 18)	691 North 1800 East, St. George	Vacant	0.01-acres (roadway use)
10 (Sheet 18)	1770 East Red Cliffs Drive, St. George	Restaurant (Ruby Tuesday)	0.2-acres (roadway use)
11 (Sheet 18)	592 North Mall Drive, St. George	Banks (Wells Fargo Bank)	0.04-acres (roadway use)
12 (Sheet 18)	1940 East Red Cliffs Drive, St. George	Residential	0.02-acres (roadway use)
13 (Sheet 19)	623 North 1950 East	Residential	0.003-acres (roadway use)
14 (Sheet 20A)	West side of Green Springs Drive, Washington	Vacant	0.3-acres (roadway use)
15 (Sheet 20A)	East side of Green Springs Drive, Washington	Vacant	0.02-acres (roadway use)
16 (Sheet 20)	1036 West Red Hills Parkway, Washington	Gas Station (Texaco)	0.2-acres (roadway use)
17 (Sheet 21)	990 West Buena Vista Boulevard, Washington	Gas Station (Chevron)	0.08-acres (roadway use)
18 (Sheet 21)	North side of Buena Vista Boulevard	Vacant	0.2-acres (roadway use)
19 (Sheet 21)	North side of Buena Vista Boulevard	Vacant	0.3-acres (roadway use)
20 (Sheet 29)	Red Cliffs Desert Reserve	Reserve	0.2-acres (roadway use)
21 (Sheet 29)	Southwest corner of the SR-9 Interchange, Washington	Vacant	0.5-acres (roadway use)

Any right-of-way acquisitions will be purchased by the Utah Department of Transportation (UDOT) in accordance with the Uniform Relocation Assistance Act and Real Property Acquisition Policies Act of 1970, as amended; Title VI of the Civil Rights Act of 1964 (42 USC §2000d, et seq.); and 49 Code of Federal Regulations 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.

Indirect Impacts

There would be no indirect right-of-way acquisition or relocations as a result of the Preferred Alternative.

Mitigation

No mitigation required.

3.6 PEDESTRIAN AND BICYCLIST ISSUES

Section 1202(a) of the Transportation Equity Act for the 21st Century (TEA-21) states that "bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use[s] are not permitted." This section also states that "transportation plans and projects shall provide due consideration for safety and contiguous routes for bicycles and pedestrians." Pedestrian facilities will comply with the American with Disabilities Act of 1990 (ADA).

Pedestrian and bicycle facilities are defined as Class I, Class II, or Class III (see box to right).

Facility	Description
Class I	Typically considered a "trail" and is separated from the roadway facility
Class II	Dedicated bicycle lane
Class III	Shared travel lane with vehicles

3.6.1 AFFECTED ENVIRONMENT

City of St. George

Existing Class I Facilities

According to the St. George Traffic and Transportation Master Plan there are several existing Class I trails located in the vicinity of the Virgin River stretching north/south through St. George. The existing trails in the study area are (see Figure 3-2):

- **Virgin River Trail:** The Virgin River Trail is a 10-ft wide paved trail that is roughly eight miles long and runs parallel to the Virgin River on the west. It is owned and managed by the City of St. George and can be accessed from three points: the Man O' War Trailhead, the Confluence Trailhead, and the Riverside Trailhead. The trail crosses underneath I-15 at the Virgin River (see Sheet 10 and 11 in Volume 2).
- **Webb Hill Trail:** The Webb Hill Trail is a 10-ft wide paved trail, 0.8 miles in length, and can be accessed at 2150 South, Hill Road, Bloomington Hills off Vermillion Avenue, or at the end of 60 East. The trail parallels I-15 on the east side of the roadway between its southernmost access point and its intersection with the Virgin River Trail (see Sheet 10 and 11 in Volume 2).
- **Hilton Drive Trail:** The Hilton Drive Trail is a 10-ft wide paved trail, 1.5 miles in length, that runs parallel to the west side of I-15 from Bluff Street to the Santa Clara River, where it crosses underneath I-15 and connects to the Virgin River Trail (see Sheet 11, 12, and 13 in Volume 2).
- **Southern Parkway:** There is a small portion of the trail system planned for construction in the Sunriver area that has already been constructed in connection with Southern Parkway. It is a paved, multi-use trail and it crosses I-15 over the Southern Parkway Interchange, with another section that runs north/south that will eventually connect to other trails planned for the area (see Sheet 05 and Volume 2).

Virgin River Trail

Webb Hill Trail

Hilton Drive Trail

Proposed Class I Facilities

Future plans to expand the trail system in St. George in the study area include (see Figure 3-2):

- **Sunriver Connections:** There are plans for an extensive system of paved, multi-use trails in southern St. George. The proposed trails would intersect with I-15 at the Southern Parkway Interchange and again near the Man-O'-War/Pioneer Road intersection.
- **Virgin River South Trail:** The proposed Virgin River South Trail will be an asphalt, multi-use trail approximately 2.91 miles in length. It will run parallel to the east side of the existing Virgin River Trail west of I-15 and cross under I-15 at the Virgin River to connect with the Webb Hill Trail.

- **Webb Hill Trail:** The proposed improvements to the Webb Hill Trail would include extending the trail to the south.
- **Hilton Drive - Santa Clara River Trail Connection:** The future connection between the Hilton Drive Trail and the Santa Clara River Trail will be 0.59 miles in length and have an asphalt surface. It will connect the Hilton Drive Trail intersection and the southern end of the Santa Clara River Trail at Tonaquint Park (see Sheet 11 in Volume 2). There are also plans to include a paved, multi-use connection between portions of the Hilton Drive Trail alongside I-15 near the Bluff Street/Hilton Drive intersection.
- **400 South**: There are plans for a paved, multi-use trail to cross I-15 at 400 South.
- **St. George Boulevard:** There are plans for a paved, multi-use trail to cross I-15 at the St. George Boulevard Interchange.
- **1680 East:** There are plans for a paved, multi-use trail to cross I-15 at 1680 East and connect to the existing Middleton Wash Trail.
- **Red Hills Trail:** The proposed Red Hills Trail will be a paved multi-use trail, approximately 4.5 miles in length. It will run parallel to Red Hills Parkway from approximately Twin Lakes Drive (adjacent to I-15, north of the St. George Boulevard Interchange) to Bluff Street.

Existing Class II and Class III Facilities

According to the St. George Traffic and Transportation Master Plan there are no Class II bike routes within or near the study area. There are several Class III bike routes and shared use facilities along local streets and frontage roads that either parallel or cross I-15, which are as follows (see Figure 3-2):

- **Sun River Parkway/Pioneer Road/Sugar Leo Road:** Begins on the west end of Sun River Parkway, turns north up Pioneer Road (where it parallels I-15), continues on to Sugar Leo Road, and terminates at Pioneer Road.
- **Man O' War Road:** Begins on the west end of Man O' War Road and terminates at Pioneer Road.
- **700 South:** Runs along 700 South and crosses I-15 mainline.

Proposed Class II and Class III Facilities

One of the goals expressed in the St. George Traffic and Transportation Master Plan is to "integrate pedestrian and bicycle facilities into the overall transportation system to meet recreation and commute needs." Proposed Class II and Class III facilities include (see Figure 3-2):

- **Pioneer Road:** Class II facility that would run along Pioneer Road from Sugar Leo Road to Brigham Road.
- **1160 South:** Class III facility that would parallel I-15 on 1160 South until turning north onto 400 East.
- **900 South:** Class II facility that would parallel I-15 on 900 South.
- **Mall Drive:** Class II facility that would run along Mall Drive until it terminates at I-15.

Washington City

Existing Facilities

Existing pedestrian and bicycle facilities located in or near the study area in Washington City include (see Figure 3-2):

- **Washington Parkway Trail:** Runs along the east side of Washington Parkway until it crosses I-15 just north of the Washington Parkway Interchange (see Sheet 25 in Volume 2).
- **Coral Canyon Trail:** Runs parallel to I-15 on the east side between the Washington Parkway and SR-9 Interchanges (see Sheet 27 and 28 in Volume 2).

Proposed Facilities

Future plans to expand the trail system in Washington City in the study area include (see Figure 3-2):

- **Mill Creek Trail:** The proposed Mill Creek Trail will run through Nisson Park, following Mill Creek and will cross I-15 just north of Red Hills Parkway.
- **Warm Springs Trail:** The proposed Warm Springs Trail will run parallel to the northwest side of I-15, starting at the proposed Mill Creek Trail.
- **Northern Corridor Trail:** The proposed Northern Corridor Trail will begin north of Green Spring Park and travel east until it connects with the Washington Parkway Trail at I-15.
- **Highland Park Loop Trail (expansion):** The Highland Park Loop Trail will be extended northwest to loop back near I-15.

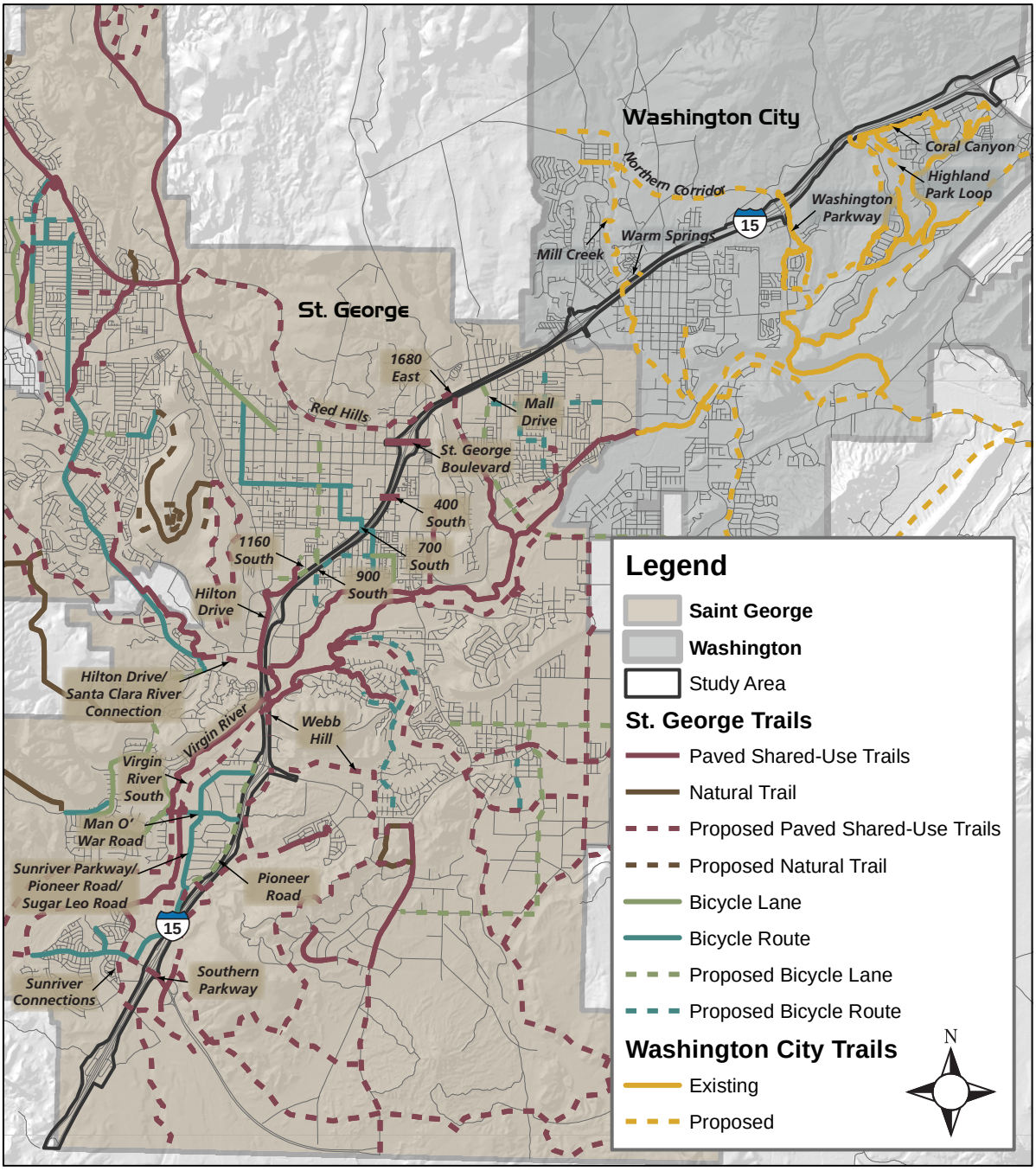


Figure 3-2 Trails within or near the Study Area

I-15
According to the UDOT Pedestrian and Bicycle Guide, bicycle use of I-15 in the study area is allowed if there are no alternative routes available. In the study area, bicyclists are allowed on I-15 from MP 0 to MP 4 and again from MP 10 to MP 16. Bicyclists are restricted on I-15 between MP 4 and MP 10. Pedestrians are not allowed to utilize the I-15 mainline, but there are pedestrian facilities that cross I-15 at the Southern Parkway, Bluff Street, Green Springs Drive, and Washington Parkway Interchanges.

Current Use of Trails and Pedestrian and Bicycle Facilities
The existing paved, shared-use trails in the study area are used for recreation as well as alternate transportation methods. Existing sidewalk and bicycle routes are currently used as an alternate transportation method for residents to access businesses and neighborhoods in the area.

3.6.2 ENVIRONMENTAL CONSEQUENCES
No-action Alternative
The No-action Alternative would not impact trails and pedestrian and bicycle facilities.

Preferred Alternative
Direct Impacts
The Preferred Alternative would include new pedestrian facilities that would cross I-15 at the Brigham Road and the St. George Boulevard Interchanges. It would maintain existing facilities as presently constituted and would not preclude the implementation of any additional planned pedestrian and bicycle facilities. Any and all trails and/or bicycle routes that cross I-15 would not be permanently impaired and the connection would be maintained. See Section 3.22 Construction Impacts for impacts during construction.

Indirect Impacts
There would be no indirect impact to Pedestrian and Bicyclist issues as a result of the Preferred Alternative.

Mitigation
No mitigation required.

3.7 AIR QUALITY
Regulatory Background
National Ambient Air Quality Standards
The Clean Air Act Amendments (CAAA) of 1990 established the National Ambient Air Quality Standards (NAAQS) for airborne pollutants. The six criteria pollutants addressed in the NAAQS are carbon monoxide (CO), particulate matter, ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), and sulfer dioxide (SO_2). Particulate matter is broken into two categories: particulate matter with a diameter of 10 micrometers or less (PM_{10}) and particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$). The current NAAQS are shown in Table 3-8.

Table 3-8 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide (CO)	9 ppm (10 mg/m^3) [3] 35 ppm (40 mg/m^3)	8-hour [1] 1-hour [1]	None	
Lead (Pb)	0.15 µg/m^3 [2] 1.5 µg/m^3	Rolling 3-Month Average Quarterly Average	Same as Primary	
Nitrogen Dioxide (NO_2)	0.053 ppm (100 mg/m^3) [3] 0.100 ppm	Annual (Arithmetic Mean) 1-hour [3]	Same as Primary None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour [4]	Same as Primary	

Pollutant	Primary		Secondary	
	Level	Averaging Time	Level	Averaging Time
Particulate Matter ($PM_{2.5}$)	15 µg/m³ 35 µg/m³	Annual [5] (Arithmetic Mean) 24-hour [6]	Same as Primary	
Ozone (O_3)	0.075 ppm (2008 std) 0.08 ppm (1997 std) 0.12 ppm	8-hour [7] 8-hour [8] 1-hour [9]	Same as Primary	
Sulfur Dioxide (SO_2)	0.03 ppm 0.14 ppm	Annual (Arithmetic Mean) 24-hour [1]	0.5 ppm (1300 µg/m³)	3-hour [1]

Source: EPA 2010

Note: Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m³), and micrograms per cubic meter of air (µg/m³). **Primary standards** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. **Secondary standards** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
[4] Not to be exceeded more than once per year on average over 3 years.
[5] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
[6] 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 35 µg/m³ (effective December 17, 2006).
[7] 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 0.075 ppm. (effective May 27, 2008)
[8] (a) 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.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
[9] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.

If the levels of the criteria air pollutants exceed the NAAQS, then the area is designated a non-attainment area and are required to develop a State Implementation Plan (SIP). The SIP sets allowable emissions levels to be met and identifies control strategies to meet the NAAQS for those specific criteria pollutants that experienced exceedances. All proposed transportation projects must conform to the SIP. The Transportation Conformity Rule (40 C.F.R. parts 51 and 93) sets forth the standards and guidelines for determining conformity of a proposed transportation project with the SIP. Air quality analysis occurs at both the regional level and at project level.

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the Environmental Protection Agency (EPA) also regulates air toxics. Most air toxics originate from human-made sources (e.g., dry cleaners) and stationary source (e.g., factories or refineries). Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. The seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) are:

- Acrolein
- Benzene
- 1.3-butadiene
- Diesel exhaust particulate matter plus diesel exhaust organic gases (diesel PM)
- Formaldehyde
- Naphthalene
- Polycyclic organic matter

3.7.1 AFFECTED ENVIRONMENT

Climate

Washington County has an arid, temperate climate that is characterized by moderately long, hot summers and mild winters. Average maximum temperatures for the summer months are between 95 and 101 °F. There are two rainfall seasons, early spring and late summer, with an average of under 9 inches of annual precipitation.

Winds in the study area are typically from the west-southwest to the south-southwest. Winds in the area are calm 86% of the time and between 13 and 18 mph (miles per hour) 11% of the time. Temperature inversions are common in Utah, especially in the fall and winter months, and can cause smoke and haze to build up in the valleys. This is a more severe problem in northwest Utah because the basins in this area are true basins without a drainage outlet for cool air, which tends to pool in the air basins. The southwest area of Utah has the lowest elevations in the state (2,500 to 3,500 feet above sea level), and the topography of this area extends into northwest Arizona. This area drains to the Colorado River to the south, which tends to limit the strength of inversions in the area.

Air Quality Attainment and Transportation Conformity Status

Washington County is not in a non-attainment or maintenance area for any of the criteria pollutants. The transportation conformity regulations apply only to federally funded road improvement projects within non-attainment or maintenance areas; therefore, the transportation conformity regulations do not apply to this project.

3.7.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Under the No-action Alternative, the proposed project would not be built. However, other regionally significant transportation projects identified in the Dixie Metropolitan Planning Organization (DMPO) 2011 – 2040 Regional Transportation Plan (RTP) and by the communities would be constructed, and these projects may contribute to regional and local air quality impacts throughout the study area.

The Air Quality Protection Strategy included in the DMPO RTP includes a number of measures to minimize transportation-related air quality impacts including encouraging efficient operation of intersections and traffic signal synchronization; maintaining roadway capacity, speed, and function; and support of public transportation. Because Washington County is not in a non-attainment area for all priority pollutants and there have been no air pollution issues in the past, air quality impacts under the No-action Alternative are not expected.

Preferred Alternative

Direct Impacts

Project Level ("Hot Spot") Analysis

Project level analysis is performed when a project is located in a non-attainment area or in an area that was previously designated as non-attainment but has been subsequently redesignated as attainment, otherwise known as a maintenance area. Project level analysis may consist of either a qualitative or quantitative analysis or both.

The Preferred Alternative is in Washington County, Utah and is therefore not in a non-attainment or maintenance area for carbon monoxide, particulate matter, or sulfer dioxide. Therefore, no hot-spot analysis is required for

these criteria pollutants. However, it is noted that under a No-action Alternative, the majority of the I-15 mainline segments and interchanges in the study area would be operating under a LOS D or worse by the year 2040. Under the Preferred Alternative, the LOS for the I-15 mainline segments and interchanges would be D or better for the I-15 mainline and for all movements on ramp intersections for interchanges on I-15 between MP 0 and MP 16.

The Preferred Alternative is also not in an ozone maintenance area; however, if the Preferred Alternative reduces traffic congestion and delay, it may improve ozone levels in the region, although project-level improvements are likely to have a minimal impact on ozone levels. The other criteria pollutants do not currently have any non-attainment or maintenance areas in Utah. Due to their regional nature and the reduction of motor vehicles as a source of these pollutants (especially lead), there is no reason to believe that the Preferred Alternative would affect concentrations of these pollutants regionally or locally.

Mobile Source Air Toxics (MSAT)

The traffic volumes on I-15 in the design year of 2040 would range from 41,000 to 123,000 vehicles per day (vpd). This is less than the 140,000 to 150,000 vpd threshold for higher potential effects, as described in the FHWA *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA*. A qualitative assessment is therefore appropriate for this study.

For the No-action Alternative and the Preferred Alternative, the amount of MSAT emitted would be proportional to the vehicle miles traveled (VMT). Other variables, such as fleet mix, are anticipated to be the same for each alternative. The VMT estimated for the Preferred Alternative is the same as the No-action Alternative, because of the unique freeway route of I-15 through Washington County. This similarity in VMT would lead to similar MSAT emissions for the Preferred Alternative along I-15. However, the emissions would be somewhat lower MSAT emission rates due to increased speeds. According to EPA's MOBILE6.2 model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions would decrease cannot be reliably projected due to the inherent deficiencies of technical models. Because the estimated VMT under each of the alternatives are the same, it is expected there would be no appreciable difference in overall MSAT emissions between the Preferred Alternative and the No-action Alternative. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050. 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 in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the Preferred Alternative would have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher than for the No-action Alternative. The localized increases in MSAT concentrations would likely be most pronounced where residential areas are close to I-15, including:

- West of the Southern Parkway Interchange in the Sunriver Development
- Residential and commercial development along both sides of I-15 between the Brigham Road Interchange and the Washington Parkway Interchange
- Residential development along the east side of I-15 between Grapevine Pass and SR-9.

However, the magnitude and the duration of these potential increases compared to the No-action Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, if I-15 is widened, the localized level of MSAT emissions for the Preferred Alternative could be higher relative to the No-action Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be significantly lower than today.

The Preferred Alternative would not result in new violations of the NAAQS, increases in the frequency or severity of existing violations of the NAAQS, or delays in attaining the NAAQS. Therefore, no harmful health effects are expected as a result of this Preferred Alternative.

Indirect Impacts
There would be no indirect impacts to air quality as a result of the Preferred Alternative.

Mitigation
No mitigation required.

3.8 NOISE
A preliminary noise analysis was completed in accordance with 23 CFR §772 and the UDOT Noise Abatement Policy, last revised January 10, 2012 (see Appendix A). The preliminary noise analysis is summarized below.

3.8.1 AFFECTED ENVIRONMENT
Traffic noise levels are measured in A-weighted decibels (dBA), which most closely approximate the way the human ear hears sounds at different frequencies (see Figure 3-3). Since traffic noise varies over time, the sound levels for this EA are expressed as "equivalent levels" or Leq, representing the average sound level over a one hour period of time. Unless noted otherwise, all sound levels in this EA are expressed in the hourly equivalent noise level.

UDOT has established Noise Abatement Criteria for several categories of land use activities (see Table 3-9). UDOT's noise criteria is based on noise levels that are considered to be an impact to nearby property owners, also known as receptors. Receptor locations are selected based on exterior areas where frequent human use occurs. Typically, noise receptor locations are chosen at areas between the right-of-way line and buildings where frequent human activity occurs, such as a patio, pool, or play area in the yard of a home.

UDOT has developed a Noise Abatement Policy for transportation projects, which conforms to FHWA noise abatement requirements outlined in 23 CFR §772. UDOT's Noise Abatement Policy, last revised January 10, 2012, states that a traffic noise impact occurs when either 1) the future worst case noise level is equal to or greater than the UDOT Noise Abatement Criteria for specified land use categories or, 2) the future worst case noise level is greater than or equal to an increase of 10 dBA over the existing noise level. Noise levels were determined using the greatest hourly traffic noise conditions likely to occur on a regular basis - at or near LOS C conditions. LOS C conditions occur when traffic is free-flowing and truck volumes and vehicle speeds are the greatest.

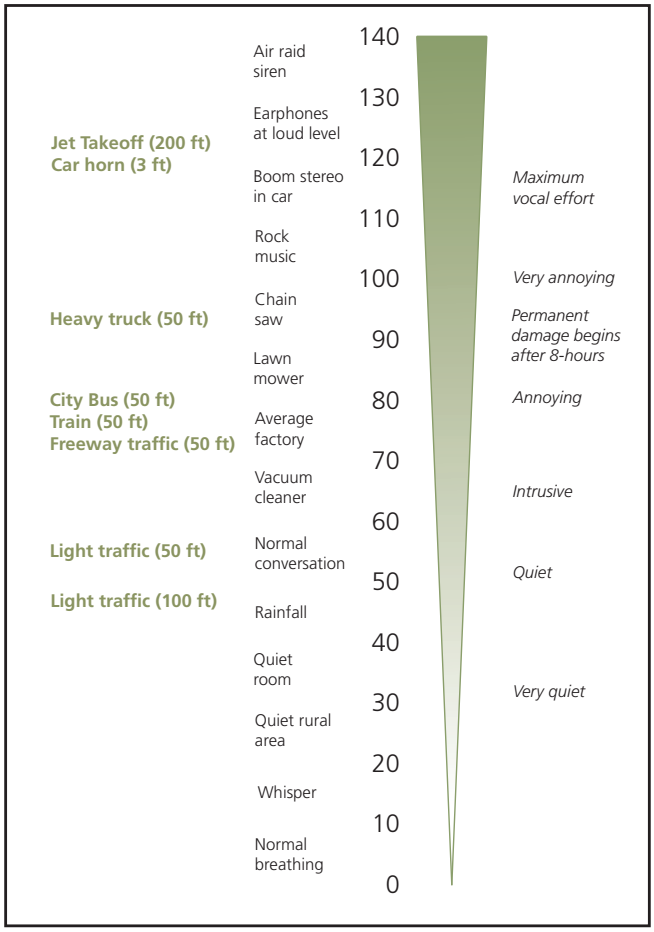


Figure 3-3 Typical Noise Levels (in dBA)

Table 3-9 Noise Abatement Criteria

Activity Category	Leq (h)	Activity Description
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Residential.
C	66 (Exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	51 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	71 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	Undeveloped lands that are not permitted.

Source: UDOT Noise Abatement Policy

Activity Categories F and G include lands that are not sensitive to traffic noise. There are no impact criteria for these land use types and an analysis of noise impacts is not required. Noise impact and abatement analyses will include lands within Land Use Activity Categories A, B, C, D, and E (see Table 3-9) only when development exists or has been permitted (formal building permit issued before the date of the final environmental decision document).

Land use along the corridor consists primarily of residential, commercial, and recreational development.

Existing Noise Levels

The primary source of noise in the study area is automobile and truck traffic from I-15 and other streets in the study area. Existing traffic noise levels for each receptor in the study area were calculated using the Traffic Noise Model (TNM) 2.5 software using existing conditions (travel lane configurations and traffic volumes). Existing noise levels were determined using the greatest hourly traffic noise conditions likely to occur on a regular basis. The greatest hourly traffic noise conditions occur between 4:00 PM and 6:00 PM (the peak traffic hour) when I-15 is operating at LOS A and B conditions, with the exception of the area of I-15 between St. George Boulevard and Green Springs Drive which operates at LOS C in the southbound direction. On-site measurements were made to verify the accuracy of the model and are shown in Table 3-10 and Figures in Volume 2.

Existing modeled noise levels range from 56 dBA to 76 dBA, with an average existing noise level of about 63 dBA.

Table 3-10 Existing Noise Levels

Site #	Location	Field Measurements Leq	TNM Output Leq	Difference
1	3603 South Santa Anita Drive (St. George)	63 dBA	65 dBA	2 dBA
2	SWWF Habitat (West Side of Virgin River Bridge) (St. George)	63 dBA	65 dBA	2 dBA
3	SWWF Habitat (East Side of Virgin River Bridge) (St. George)	64 dBA	66 dBA	2 dBA
4	Southgate Golf Course (St. George)	70 dBA	68 dBA	2 dBA
5	Trailhead near Dixie Convention Center (St. George)	68 dBA	68 dBA	0 dBA
6	Fairfield Inn on Convention Center Drive (Pool) (St. George)	66 dBA	67 dBA	1 dBA
7	The Meadows Retirement Community (950 South 400 East) (St. George)	68 dBA	65 dBA	3 dBA
8	749 East Morningside Drive (St. George)	65 dBA	65 dBA	0 dBA
9	396 North Crestline Drive (St. George)	63 dBA	65 dBA	2 dBA
10	658 North 1700 East (St. George)	70 dBA	68 dBA	2 dBA
11	2101 East Panorama Parkway (St. George)	62 dBA	65 dBA	3 dBA
12	Mobile Home Park on Middleton Drive (St. George)	73 dBA	71 dBA	2 dBA
13	Canyon Breeze RV Resort	69 dBA	67 dBA	2 dBA
14	Mobile Home Park at about 500 West (Washington)	60 dBA	63 dBA	3 dBA
15	Mill Creek Springs Townhomes (Washington)	66 dBA	65 dBA	1 dBA
16	590 North 200 East (Washington)	67 dBA	69 dBA	1 dBA
17	La Venita Condos (Washington)	61 dBA	60 dBA	1 dBA
18	Red Cliffs Desert Reserve	64 dBA	61 dBA	3 dBA
19	2659 East Spring Canyon Drive (Washington)	56 dBA	59 dBA	3 dBA

3.8.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Noise levels for the No-action Alternative would generally increase over the existing noise levels. This is because the greatest hourly traffic noise conditions likely to occur on a regular basis would be at or near LOS C conditions, rather than LOS A and B conditions. The No-action Alternative noise levels range from 57 dBA to 78 dBA, with an average noise level of about 66 dBA. See Table 3-11 for a summary of No-action Alternative noise levels.

Preferred Alternative

Direct Impacts

The Preferred Alternative would include:

- Constructing an additional general purpose lane on I-15 in both the northbound and southbound directions between Southern Parkway and SR-9
- Constructing auxiliary lanes between the Port-of-Entry and Southern Parkway, between Brigham Road and St. George Boulevard, and between Washington Parkway and SR-9
- Improving and/or re-configuring interchanges at Southern Parkway, Brigham Road, St. George Boulevard, and SR-9

These improvements would increase noise levels in the study area. Projected traffic noise levels for each receptor in the study area were calculated using TNM 2.5 software using Preferred Alternative conditions (travel lane configurations and traffic volumes). Preferred Alternatives noise levels range from 58 dBA to 81 dBA, with an average noise level of about 68 dBA. See Figures in Volume 2 for Preferred Alternative noise impacts, and Table 3-11 for a summary of Preferred Alternative noise levels.

Noise Level Comparison

Table 3-11 shows a summary of existing, No-action Alternative, and Preferred Alternative noise levels for each noise measurement site. Shaded cells indicate noise impacts, as defined by the UDOT Noise Abatement Policy.

Table 3-11 Summary of Existing and Projected Noise Levels

Site #	Location	Existing Hourly Leq	No-Action Alternative	Preferred Alternative Hourly Leq
1	3603 South Santa Anita Drive (St. George)	65 dBA	70 dBA	74 dBA
2	SWWF Habitat (West Side of Virgin River Bridge) (St. George)	65 dBA	68 dBA	70 dBA
3	SWWF Habitat (East Side of Virgin River Bridge) (St. George)	66 dBA	68 dBA	70 dBA
4	Southgate Golf Course (St. George)	68 dBA	68 dBA	68 dBA
5	Trailhead near Dixie Convention Center (St. George)	68 dBA	Location removed as part of Dixie Drive Interchange	Location removed as part of Dixie Drive Interchange
6	Fairfield Inn on Convention Center Drive (Pool) (St. George)	67 dBA	70 dBA	74 dBA
7	The Meadows Retirement Community (950 South 400 East) (St. George)	65 dBA	68 dBA	72 dBA
8	749 East Morningside Drive (St. George)	65 dBA	68 dBA	71 dBA
9	396 North Crestline Drive (St. George)	65 dBA	67 dBA	73 dBA
10	658 North 1700 East (St. George)	68 dBA	70 dBA	71 dBA
11	2101 East Panorama Parkway (St. George)	65 dBA	67 dBA	73 dBA

Site #	Location	Existing Hourly Leq	No-Action Alternative	Preferred Alternative Hourly Leq
12	Mobile Home Park on Middleton Drive (St. George)	71 dBA	73 dBA	71 dBA
13	Canyon Breeze RV Resort	67 dBA	68 dBA	69 dBA
14	Mobile Home Park at about 500 West (Washington)	63 dBA	66 dBA	70 dBA
15	Mill Creek Springs Townhomes (Washington)	65 dBA	66 dBA	68 dBA
16	590 North 200 East (Washington)	69 dBA	72 dBA	70 dBA
17	La Venita Condos (Washington)	60 dBA	63 dBA	62 dBA
18	Red Cliffs Desert Reserve	61 dBA	63 dBA	69 dBA
19	2659 East Spring Canyon Drive (Washington)	59 dBA	61 dBA	65 dBA

3.8.3 NOISE ABATEMENT ANALYSIS

According to UDOT's Noise Abatement Policy, specific conditions must be met before traffic noise abatement is implemented as part of the Preferred Alternative (noise abatement is not considered for the No-action Alternative). Noise mitigation must be considered feasible and reasonable. Some of the factors considered when determining if mitigation is feasible and reasonable include, but are not limited to, the following:

- **Engineering Considerations:** Engineering considerations such as safety, presence of cross streets, sight distance, access to adjacent properties, barrier height, topography, drainage, utilities, maintenance access and maintenance of the abatement measure must be taken into account as part of establishing feasibility.
- **Safety on Urban Non-Access Controlled Roadways:** To avoid a damaged wall from becoming a safety hazard, in the event of a failure, wall height shall be no greater than the distance from the back of curb to the face of proposed wall.
- **Noise Abatement Design Goal:** Every reasonable effort should be made to obtain substantial noise reductions. UDOT defines the minimum noise reduction (design goal) from proposed abatement measures to be 8 dBA or greater for at least 75% of front-row receptors.
- **Cost Effectiveness**: The cost used to determine reasonable mitigation for Activity Category B is $30,000 per benefited receptor. (A benefited receptor is a noise-sensitive receptor that is predicted to receive a minimum of 8 dBA of noise reduction as a result of noise abatement.) The cost used to determine reasonable mitigation for Activity Categories A, C, D, or E is $360 per linear foot.
- **Viewpoints of Property Owners and Residents**: As part of the final design phase, public balloting would take place if noise abatement measures appear to meet the criteria outlined in UDOT's Noise Abatement Policy.

Under UDOT's Noise Abatement Policy, only Type I projects are eligible for noise abatement measures. Type I projects are projects that include any of the following: the construction of a highway at a new location, the physical alteration of an existing highway that substantially alters its alignment, the addition of a through traffic lane, the addition of an auxiliary lane, or the addition or relocation of interchange lanes or ramps. The Preferred Alternative is a Type I project so noise abatement was considered. The types of noise mitigation measures considered for the Preferred Alternative included:

- Traffic management measures
- Noise barriers
- Noise insulation of Activity Category D land use facilities

Traffic Management Measures

Traffic management measures include reducing speed or signing for the restriction of compression brakes. According to the *Highway Traffic Noise Analysis and Abatement Policy and Guidance* report produced by FHWA, a reduction in speed of more than 20 mph is necessary for a noticeable decrease in noise levels. Therefore, speed reduction is not a viable abatement measure for this project because it is not consistent with the roadway classifications.

Noise Barriers

Construction of Berms and Associated Landscaping

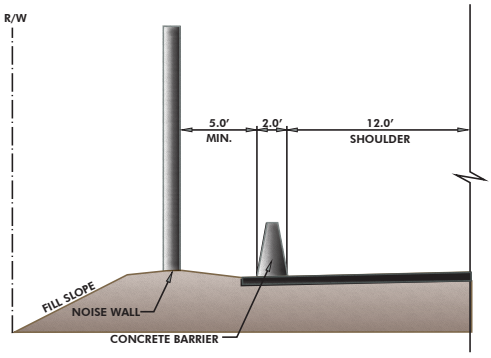
Berms would need to be between 8-ft and 19-ft high to be effective, which would require between 48-ft and 114-ft feet of additional right-of-way in order to accommodate the width for the slope required. Vegetation must be extremely dense and at least 100 feet thick (according to FHWA's June 1995 *Highway Traffic Noise Analysis and Abatement Policy and Guidance*) in order to achieve noticeable noise reduction by itself. The construction of berms and/or landscaping for noise mitigation is not reasonable because of the environmental impacts and cost associated with the large amount of extra right-of-way that would be required.

Noise Walls

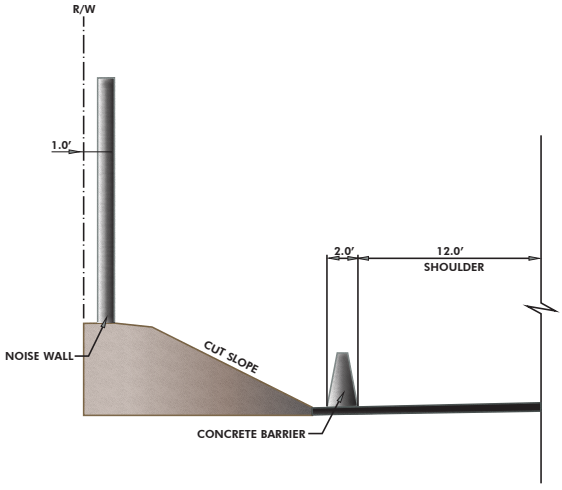
For a noise wall to be effective, it must be high enough and long enough to block the view of the noise source from the receptor's perspective. The *Highway Traffic Noise Analysis and Abatement Policy and Guidance* states that a good rule of thumb is that the noise barrier should extend four times as far in each direction as the distance from the receptor to the barrier. For instance, if the receptor is 50 feet from the proposed noise barrier, the barrier needs to extend at least 200 feet on either side of the receptor in order to shield the receptor from noise traveling past the ends of the barrier.

Generally, if a roadway is in a fill condition, the noise wall would be located adjacent to the roadway. If a roadway is in a cut condition, the noise wall would be located on the right-of-way line (see Figure 3-4).

The UDOT Noise Abatement Policy requires that noise walls achieve at least an eight dBA reduction to at least 75 percent of front-row (adjacent) receptors. The UDOT Noise Abatement Policy further states that a value of $30,000 per benefitted residence will be applied to determine if noise abatement is cost effective for residential areas. A value of $360 per linear foot of noise wall will be applied to determine if noise abatement is cost effective for recreation areas, churches, commercial properties, and other non-residential areas. Noise wall costs were estimated at $20.00 per square foot for the cost of the noise barrier and its installation. Noise walls that were analyzed for the I-15 corridor are discussed below.



TYPICAL NOISE WALL LOCATION IN FILL CONDITION



TYPICAL NOISE WALL LOCATION IN CUT CONDITION

Figure 3-4 Noise Wall Locations in Fill and Cut Conditions

Southern Parkway to Brigham Road West Wall 1

Southern Parkway to Brigham Road West Wall 1 would be about 7,299-ft long and located on the west side of I-15 from about Sugar Leo Road to Rocket Bar Road in St. George (see Sheet 07 to Sheet 09 in Volume 2 of the Environmental Assessment). As shown in Table 3-12, a 16-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Southern Parkway to Brigham Road West Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-12 Southern Parkway to Brigham Road West Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
7,299	14	26	76.5%	Yes	$2,043,720	40	$51,093	No	**No**
	15	29	85.3%	Yes	$2,189,700	71	$30,841	No	**No**
	16	29	85.3%	Yes	$2,355,680	85	$27,479	Yes	**Yes**
	17	29	85.3%	Yes	$2,481,660	95	$26,123	Yes	**Yes**
	18	29	85.3%	Yes	$2,627,640	99	$26,542	Yes	**Yes**
	19	29	85.3%	Yes	$2,773,620	100	$27,736	Yes	**Yes**
	20	29	85.3%	Yes	$2,919,600	101	$28,907	Yes	**Yes**

Brigham Road to Dixie Drive West Wall 1

Brigham Road to Dixie Drive West Wall 1 would be about 804-ft long and located on the west side of I-15 from north of the Virgin River to Dixie Drive in St. George (see Sheet 11 in Volume 2). As shown in Table 3-13, an 8-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Brigham Road to Dixie Drive West Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-13 Brigham Road to Dixie Drive West Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
804	8	13	81.3%	Yes	$128,640	13	$9,895	Yes	**Yes**
	9	13	81.3%	Yes	$144,720	13	$11,132	Yes	**Yes**
	10	13	81.3%	Yes	$160,800	13	$12,369	Yes	**Yes**
	11	13	81.3%	Yes	$176,880	13	$13,606	Yes	**Yes**
	12	13	81.3%	Yes	$192,960	13	$14,843	Yes	**Yes**
	13	13	81.3%	Yes	$209,040	13	$16,080	Yes	**Yes**
	14	13	81.3%	Yes	$225,120	13	$17,317	Yes	**Yes**
	15	13	81.3%	Yes	$241,200	13	$18,554	Yes	**Yes**
	16	13	81.3%	Yes	$257,280	13	$19,791	Yes	**Yes**
	17	16	100%	Yes	$273,360	16	$17,085	Yes	**Yes**
	18	16	100%	Yes	$289,440	16	$18,090	Yes	**Yes**
	19	16	100%	Yes	$305,520	16	$19,095	Yes	**Yes**
	20	16	100%	Yes	$321,600	19	$16,926	Yes	**Yes**

Bluff Street to St. George Boulevard West Wall 1

Bluff Street to St. George Boulevard West Wall 1 would be about 3,900-ft long and located on the west side of I-15 from about 1160 South to 700 East (see Sheet 13 to 14 in Volume 2 of the Environmental Assessment). As shown in Table 3-14, a 14-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Bluff Street to St. George Boulevard West Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-14 Bluff Street to St. George Boulevard West Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
3,900	12	30	39.5%	No	N/A	N/A	N/A	N/A	**No**
	13	31	40.8%	No	N/A	N/A	N/A	N/A	**No**
	14	57	75.0%	Yes	$1,092,000	61	$17,902	Yes	**Yes**
	15	74	97.4%	Yes	$1,170,000	89	$13,146	Yes	**Yes**
	16	74	97.4%	Yes	$1,248,000	92	$13,565	Yes	**Yes**
	17	74	97.4%	Yes	$1,326,000	105	$12,629	Yes	**Yes**
	18	74	97.4%	Yes	$1,404,000	118	$11,893	Yes	**Yes**
	19	76	100.0%	Yes	$1,482,000	128	$11,578	Yes	**Yes**
	20	74	97.4%	Yes	$1,560,000	135	$11,556	Yes	**Yes**

Bluff Street to St. George Boulevard East Wall 1

Bluff Street to St. George Boulevard East Wall 1 would be about 3,600-ft long and located on the east side of I-15 from 400 East to 770 East (see Sheet 13 to 15 in Volume 2 of the Environmental Assessment). As shown in Table 3-15, a 13-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Bluff Street to St. George Boulevard East Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-15 Bluff Street to St. George Boulevard East Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
3,600	12	34	70.8%	No	N/A	N/A	N/A	N/A	**No**
	13	39	81.3%	Yes	$936,000	65	$14,400	Yes	**Yes**
	14	40	83.3%	Yes	$1,008,000	86	$11,721	Yes	**Yes**
	15	41	85.4%	Yes	$1,080,000	102	$10,588	Yes	**Yes**
	16	41	85.4%	Yes	$1,152,000	115	$10,017	Yes	**Yes**
	17	41	85.4%	Yes	$1,224,000	119	$10,286	Yes	**Yes**
	18	42	87.5%	Yes	$1,296,000	121	$10,711	Yes	**Yes**
	19	46	95.8%	Yes	$1,368,000	127	$10,772	Yes	**Yes**
	20	46	95.8%	Yes	$1,440,000	130	$11,077	Yes	**Yes**

Bluff Street to St. George Boulevard West Wall 2

Bluff Street to St. George Boulevard West Wall 2 would be about 3,799 -ft long and located on the west side of I-15 from about 700 South to 100 South (see Sheet 15 to 16 in Volume 2 of the Environmental Assessment). As shown in Table 3-16, an 18-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Bluff Street to St. George Boulevard West Wall 2 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-16 Bluff Street to St. George Boulevard West Wall 2

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
3,799	12	63	55.8%	No	N/A	N/A	N/A	N/A	**No**
	13	74	65.5%	No	N/A	N/A	N/A	N/A	**No**
	14	84	74.3%	No	N/A	N/A	N/A	N/A	**No**
	15	84	74.3%	No	N/A	N/A	N/A	N/A	**No**
	16	84	74.3%	No	N/A	N/A	N/A	N/A	**No**
	17	84	74.3%	No	N/A	N/A	N/A	N/A	**No**
	18	98	86.7%	Yes	$1,367,640	128	$10,685	Yes	**Yes**
	19	98	86.7%	Yes	$1,443,620	128	$11,278	Yes	**Yes**
	20	98	86.7%	Yes	$1,519,600	128	$11,872	Yes	**Yes**

Bluff Street to St. George Boulevard East Wall 2

Bluff Street to St. George Boulevard East Wall 2 would be about 2,800-ft long and located on the east side of I-15 from 600 South to 200 South in St. George (see Sheet 15 to 16 in Volume 2 of the Environmental Assessment). As shown in Table 3-17, a 16-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Bluff Street to St. George Boulevard East Wall 2 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-17 Bluff Street to St. George Boulevard East Wall 2

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
2,800	12	0	0%	No	N/A	N/A	N/A	N/A	**No**
	13	3	4.5%	No	N/A	N/A	N/A	N/A	**No**
	14	21	31.8%	No	N/A	N/A	N/A	N/A	**No**
	15	21	31.8%	No	N/A	N/A	N/A	N/A	**No**
	16	53	80.3%	Yes	$896,000	53	$16,906	Yes	**Yes**
	17	57	86.4%	Yes	$952,000	59	$16,136	Yes	**Yes**
	18	57	86.4%	Yes	$1,008,000	59	$17,085	Yes	**Yes**
	19	57	86.4%	Yes	$1,064,000	59	$18,034	Yes	**Yes**
	20	57	86.4%	Yes	$1,120,000	60	$18,667	Yes	**Yes**

St. George Boulevard to Green Springs Drive West Wall 1

Several variations of the St. George Boulevard to Green Springs Drive West Wall 1 were evaluated. The wall variation in this location that came closest to meeting the feasible and reasonable criteria outlined in the UDOT Noise Abatement Policy would be about 4,159-ft long and located on the west side of I-15 from about 1700 East to 850 North in St. George. A 17-ft to 20-ft noise wall would be able to reduce noise levels by 8 dBA to 75 percent front-row receptors, but would be unable to meet the $30,000 per receptor cost criteria. Therefore, St. George Boulevard to Green Springs Drive West Wall 1 is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-18 St. George Boulevard to Green Springs Drive West Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
4,159	14	1	14.3%	No	N/A	N/A	N/A	N/A	**No**
	15	2	28.6%	No	N/A	N/A	N/A	N/A	**No**
	16	5	71.4%	No	N/A	N/A	N/A	N/A	**No**
	17	6	85.7%	Yes	$1,414,060	6	$235,677	No	**No**
	18	7	100.0%	Yes	$1,497,240	9	$187,155	No	**No**
	19	7	100.0%	Yes	$1,580,420	9	$175,602	No	**No**
	20	7	100.0%	Yes	$1,663,600	9	$184,844	No	**No**

St. George Boulevard to Green Springs Drive East Wall 1

The St. George Boulevard to Green Springs Drive East Wall 1 would be about 2,797-ft long and located on the east side of I-15 from about Mall Drive to 850 North in St. George (see Sheet 18 to 19 in Volume 2 of the Environmental Assessment). As shown in Table 3-19, a 19-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, St. George Boulevard to Green Springs Drive East Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-19 St. George Boulevard to Green Springs Drive East Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
2,797	14	11	61.6%	No	N/A	N/A	N/A	N/A	**No**
	15	13	72.2%	No	N/A	N/A	N/A	N/A	**No**
	16	16	88.9%	Yes	$895,040	27	$33,150	No	**No**
	17	17	94.4%	Yes	$950,980	31	$30,677	No	**No**
	18	17	94.4%	Yes	$1,006,920	33	$30,513	No	**No**
	19	18	100%	Yes	$1,062,860	37	$28,726	Yes	**Yes**
	20	18	100%	Yes	$1,118,800	38	$29,442	Yes	**Yes**

St. George Boulevard to Green Springs Drive West Wall 2

The St. George Boulevard to Green Springs Drive West Wall 2 would be about 1,333-ft long and located adjacent to the mobile home park at the corner of Red Hills Parkway and Green Springs Drive in St. George. A 20-ft noise wall would be unable to reduce noise levels by 8 dBA to 75 percent front-row receptors. Therefore, St. George Boulevard to Green Springs Drive West Wall 2 is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-20 St. George Boulevard to Green Springs Drive West Wall 2

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
1,333	14	0	0%	No	N/A	N/A	N/A	N/A	**No**
	15	0	0%	No	N/A	N/A	N/A	N/A	**No**
	16	0	0%	No	N/A	N/A	N/A	N/A	**No**
	17	0	0%	No	N/A	N/A	N/A	N/A	**No**
	18	0	0%	No	N/A	N/A	N/A	N/A	**No**
	19	0	0%	No	N/A	N/A	N/A	N/A	**No**
	20	0	0%	No	N/A	N/A	N/A	N/A	**No**

Green Springs Drive to Washington Parkway West Wall 1

The Green Springs Drive to Washington Parkway West Wall 1 would be about 1,152-ft long and located on the west side of I-15 just north of the Green Springs Drive Interchange in Washington. As shown in Table 3-21, a 17-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors, but would be unable to meet the $30,000 per receptor cost criteria. Therefore, Green Springs Drive to Washington Parkway West Wall 1 is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-21 Green Springs Drive to Washington Parkway West Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
1,152	14	0	0%	No	N/A	N/A	N/A	N/A	**No**
	15	0	0%	No	N/A	N/A	N/A	N/A	**No**
	16	8	50%	No	N/A	N/A	N/A	N/A	**No**
	17	16	100%	Yes	$391,680	8	$48,960	No	**No**
	18	16	100%	Yes	$414,720	8	$51,840	No	**No**
	19	16	100%	Yes	$437,760	8	$54,720	No	**No**
	20	16	100%	Yes	$460,800	8	$57,600	No	**No**

Green Springs Drive to Washington Parkway East Wall 1

The Green Springs Drive to Washington Parkway East Wall 1 would be about 5,300-ft long and located on the east side of I-15 from about 500 West to 300 East in Washington (see Sheet 21 to 23 in Volume 2 of the Environmental Assessment). As shown in Table 3-22, a 14-ft to 20-ft noise wall would reduce noise levels by 8 dBA to at least 75 percent of front-row receptors and would meet the $30,000 per benefited receptor cost criteria. Therefore, Green Springs Drive to Washington Parkway East Wall 1 is considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-22 Green Springs Drive to Washington Parkway East Wall 1

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
5,300	13	30	56.6%	No	N/A	N/A	N/A	N/A	**No**
	14	42	79.2%	Yes	$1,484,000	53	$28,000	Yes	**Yes**
	15	47	88.7%	Yes	$1,590,000	74	$21,486	Yes	**Yes**
	16	51	96.2%	Yes	$1,696,000	94	$18,043	Yes	**Yes**
	17	51	96.2%	Yes	$1,802,000	98	$18,388	Yes	**Yes**
	18	51	96.2%	Yes	$1,908,000	100	$19,080	Yes	**Yes**
	19	51	96.2%	Yes	$2,014,000	102	$19,745	Yes	**Yes**
	20	51	96.2%	Yes	$2,120,000	102	$20,784	Yes	**Yes**

Green Springs Drive to Washington Parkway West Wall 2

The Green Springs Drive to Washington Parkway West Wall 2 would be about 2,140-ft long and located on the west side of I-15 from about Main Street to Graham Manor in Washington. A 20-ft noise wall would be unable to reduce noise levels by 8 dBA to 75 percent front-row receptors. Therefore, Green Springs Drive to Washington Parkway West Wall 2 is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Table 3-23 Green Springs Drive to Washington Parkway West Wall 2

Barrier Length (feet)	Barrier Height (feet)	# of First-Row Benefited	% of First-Row Benefited	Meets Noise Abatement Goal?	Cost	# of Benefited Receptors	Cost per Benefited Receptor	Meets Cost Criteria?	Is Barrier Feasible and Reasonable?
2,140	14	0	0%	No	N/A	N/A	N/A	N/A	**No**
	15	0	0%	No	N/A	N/A	N/A	N/A	**No**
	16	0	0%	No	N/A	N/A	N/A	N/A	**No**
	17	0	0%	No	N/A	N/A	N/A	N/A	**No**
	18	1	4.3%	No	N/A	N/A	N/A	N/A	**No**
	19	10	43.5%	No	N/A	N/A	N/A	N/A	**No**
	20	10	43.5%	No	N/A	N/A	N/A	N/A	**No**

Non-Residential Noise Walls

This section discusses mitigation for those areas that are solely commercial or other non-residential uses. According to the UDOT Noise Abatement Policy, a value of $360 per linear foot of noise wall will be applied to determine if noise abatement is cost effective for recreation areas, churches, commercial properties, and other non-residential areas. Since noise wall costs were estimated at $20.00 per square foot for the cost of the noise barrier and its installation, the height of a noise wall for commercial and other non-residential areas is limited to 18-ft.

Three commercial properties along the corridor had an outdoor use that was impacted by a noise level of 71 dBA or higher. Therefore, noise walls were evaluated at each of these commercial locations. These locations included:

- **La Quinta Inn & Suites (91 East 2680 South, St. George):** An 18-ft wall at this location would be unable to reduce noise levels by 8 dBA. Therefore a noise wall at La Quinta Inn & Suites is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.
- **Fairfield Inn (1660 South Convention Center Drive, St. George):** An 18-ft wall at this location would be unable to reduce noise levels by 8 dBA. Therefore a noise wall at Fairfield Inn is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

- **Red Cliffs Inn (912 Red Cliffs Drive, Washington):** An 18-ft wall at this location would be unable to reduce noise levels by 8 dBA. Therefore a noise wall at Red Cliffs Inn is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

One recreational property (that would not already be mitigated by a residential noise wall) would have a noise impact of 66 dBA or higher. This property was the KOA Camping Facility on the west side of I-15 between St. George Boulevard and Green Springs Drive. A noise wall was evaluated for this location. An 18-ft noise wall would be unable to reduce noise levels by 8 dBA. Therefore, a noise wall at the KOA is not considered feasible and reasonable according to the UDOT Noise Abatement Policy.

Viewpoints of Property Owners and Residents

The UDOT Noise Abatement Policy requires that a public involvement process be used to make sure that the concerns of the affected community are known to UDOT and that every effort to provide noise abatement to an impacted community is taken. The UDOT Noise Abatement Policy states that as part of the final design phase of projects, UDOT needs to know if property owners and residents are in favor of noise abatement measures. This process involves sending ballots to the following groups so they can indicate their preference for or against noise abatement measures:

- All benefited receptors (property owners and residents). A benefited receptors is one that would receive a reduction of 8 dBA or more as a result of noise abatement.
- Receptors that border and are directly adjacent to the end of a proposed wall that are not, by definition, benefited by the wall.

The number of votes is established as follows:

- Owner occupied residences: The owner will have 1 vote.
- Rental homes, multi-family residences and apartments: The owner will have 1 vote per unit and the resident (non-owner) will have 1 vote for the unit.
- Day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures: The owner will have 1 vote.
- Commercial/industrial businesses: The owner will have 1 vote per unit and, if applicable, the tenant will have 1 vote for the unit.
- Mobile home parks: The mobile home owner will have 1 vote. The lot owner, if different than the home owner, will have 1 vote.

When the votes are counted, property owners' votes will receive a multiplier factor of 5 compared to residents (non-owners) factor of 1.

Noise abatement will only be recommended if 75% of votes counted favor noise abatement. The denominator used to calculate this percentage will equal the total number of votes. In addition, at least 50% of the total number of completed ballots must be returned to adequately assess if noise abatement measures are desired. If less than 50 percent of ballots are returned after balloting efforts are completed, then noise abatement measures will be deemed not reasonable.

Noise Insulation of Activity Category D Land Use Facilities

The UDOT Noise Abatement Policy states that noise insulation of Activity Category D Land Use facilities will be considered as a noise abatement measure when determined reasonable and feasible. The interior noise levels of any Activity Category D Land Uses in the study area (churches, schools, etc.) are not expected to reach the 51 dBA threshold for the consideration of noise abatement under the Preferred Alternative.

Mitigation

The following noise walls (see Figures in Volume 2) meet all the criteria outlined in UDOT's Noise Abatement Policy (revised January 10, 2012), and are therefore recommended for inclusion in the proposed project, pending balloting efforts:

- **Southern Parkway to Brigham Road West Wall 1:** West side of I-15 from about Sugar Leo Road to Rocket Bar Road in St. George
- **Brigham Road to Dixie Drive West Wall 1:** West side of I-15 from north of the Virgin River to Dixie Drive in St. George
- **Bluff Street to St. George Boulevard West Wall 1:** West side of I-15 from 1160 South to 700 East in St. George
- **Bluff Street to St. George Boulevard East Wall 1:** East side of I-15 from 400 East to 770 East in St. George
- **Bluff Street to St. George Boulevard West Wall 2:** West side of I-15 from about 700 South to 100 South in St. George
- **Bluff Street to St. George Boulevard East Wall 2:** East side of I-15 from 600 South to 200 South in St. George.
- **St. George Boulevard to Green Springs Drive East Wall 1:** East side of I-15 from about Mall Drive to 850 North in St. George
- **Green Springs Drive to Washington Parkway East Wall 1:** East side of I-15 from about 500 West to 300 East in Washington.

3.9 CULTURAL (ARCHAEOLOGICAL AND ARCHITECTURAL) RESOURCES

Historic properties include archaeological resources (both prehistoric and historic), architectural resources (buildings and structures), and traditional cultural properties. The Advisory Council on Historic Preservation (ACHP) defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP)[1]" (i.e., generally historic properties at least 50 years old). The term includes artifacts, records, and remains related to and located within such properties, and includes properties of traditional religious and cultural importance to a Native American tribe. The term "eligible for inclusion" in the National Register includes both properties formally determined as such, and all other properties that meet the National Register criteria, which are described below.

The National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations (36 CFR §800) establish the national policy and procedures regarding historic properties. Section 106 of the NHPA requires consideration of the effects of federal projects and policies on historic properties. Also, the Utah Historic Preservation Act (UCA §9-8-401 et seq.) was passed to provide protection of "all antiquities, historic and prehistoric ruins, and historic sites, buildings, and objects which, when neglected, desecrated, destroyed or diminished in aesthetic value, result in an irreplaceable loss to the people of this state."

3.9.1 AFFECTED ENVIRONMENT

The Section 106 review process requires historic properties to be identified and evaluated for eligibility and listing on the NRHP, based upon whether "the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association,[2]" and meet one or more of the criteria in Table 3-24.

[1] 16 U.S.C. Section 470(w)(5).

[2] NPS Bulletin 15

Table 3-24 NRHP Criteria for Evaluation

NRHP Criterion	Characteristics
A	Associated with events that have made a significant contribution to the broad patterns of our history.
B	Associated with the lives of persons significant in our past.
C	Embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction.
D	Yielded, or may be likely to yield, information important in prehistory or history.

Source: Code of Federal Regulations Title 36 (36 CFR 60.4)

Area of Potential Effects (APE)

The Area of Potential Effects (APE) for the proposed transportation improvements comprises approximately 977 acres and includes the entire area encompassed by the I-15 right-of-way between mileposts (MP) 0 and 16.5 and selected locations outside the right-of-way for proposed detention ponds and interchange improvements. Areas outside the I-15 right-of-way encompass roughly 50 of the 977 total acres, of which approximately 40 acres are located within the SR-9 right-of-way.

Determination of Eligibility

A Determination of Eligibility and Finding of Effect (DOEFOE), which outlines the eligibility determinations for each architectural and archaeological resource, was prepared by UDOT, on behalf of FHWA, and was submitted for concurrence by the State Historic Preservation Officer (SHPO). The DOEFOE was signed by SHPO on April 9, 2012 (see Chapter 4).

Archaeological Resources

The APE was inventoried for cultural resources in December of 2011 and January of 2012, in accordance with 36 CFR 800.4. The results of the investigation are documented in *A Cultural Resource Inventory of the I-15 Milepost 0 to 16 Highway Improvements Project, Washington County, Utah* (see Appendix A).

As a result of the investigation, six new sites and 18 previously recorded sites were documented within the APE. Table 3-25 shows the archaeological resources in the study area. A total of eleven archaeological sites within the APE were determined eligible for inclusion in the NRHP (see shaded cells in Table 3-25).

Table 3-25 Cultural Resources

Site No.	Site Type	Land Status	NRHP Eligibility
42WS5796	Euro-American Road	Private/ SITLA	Not Eligible
42WS5797	Euro-American Historic Canal	Private/ SITLA	Not Eligible
42WS5798	Euro-American Trash Scatter	BLM	Not Eligible
42WS5800	Euro-American Road	Private/ SITLA	Not Eligible
42WS5801	Euro-American Road	SITLA	Not Eligible
42WS5799	Aboriginal Rock shelter /Granary	Private	Eligible, Criterion D
42WS1220 42WS0357	Southern Paiute Open Artifact Scatter	SITLA	Eligible, Criterion D
42WS1221 42WS356 42WS1222 42WS1223 42WS2364	Virgin Anasazi Open Artifact Scatter	Private/SITLA	Eligible, Criterion D

Site No.	Site Type	Land Status	NRHP Eligibility
42WS0355 42WS1235	Aboriginal Open Lithic Scatter	SITLA	Eligible, Criterion D
42WS2346	Virgin Anasazi Open Artifact Scatter	SITLA	Eligible, Criterion D
42WS2349	Aboriginal Open Lithic Scatter and Source Area	SITLA	Not Eligible
42WS2361	Aboriginal Open Lithic Scatter	SITLA	Not Eligible
42WS4285	Euro-American Road	SITLA	Not Eligible
42WS4713	Euro-American Road	Private/BLM/SITLA	Not Eligible
42WS1840	Aboriginal Open Lithic Scatter	Private/ SITLA	Not Eligible
42WS2232 42WS157	Pueblo III Euro-American Open Habitation/ Historic Campsite	Private	Eligible, Criteria C and D
42WS4283	Southern Paiute Open Campsite	SITLA	Eligible, Criterion D
42WS4707	Basketmaker III Pueblo I Euro-American Open Habitation and Historic Campsite	Private	Eligible, Criterion D
42WS4708	Virgin Anasazi Open Campsite	Private	Not Eligible
42WS4709	Aboriginal Rock Art	Private	Eligible, Criteria C and D
42WS4710	Aboriginal Rock Shelter	Private	Eligible, Criterion D
42WS4711	Aboriginal Rock Shelters	Private	Eligible, Criterion D
42WS4712	Euro-American Road	Private	Not Eligible
42WS5794	Euro-American Canal	Private/ SITLA	Not Eligible

Architectural Resources

A windshield survey of the Area of Potential Effect (APE) was conducted on April 3, 2010 by an architectural historian. The APE was limited to the current I-15 right-of-way and any properties adjacent to I-15 that would require right-of-way acquisition, either due to roadway widening or detention basins. There were no historic properties (45 years or older) identified within the APE (see memorandum dated December 15, 2011 in Appendix A).

3.9.2 ENVIRONMENTAL CONSEQUENCES

Effects are defined as "alteration[s] to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR §800.16(i)). Impacts to historic properties are categorized as No Historic Properties Affected, No Adverse Effect, and Adverse Effect.

A finding of **No Historic Properties Affected** is made when "[e]ither there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in §800.16(i)" (See 36 CFR §800.1(d)(1)).

A finding of **No Adverse Effect** is made "[w]hen the undertaking's effects do not meet the criteria of paragraph (a)(1) of this section [see Adverse Effect definition] or the undertaking is modified or conditions are imposed... to ensure consistency with the Secretary's standards for the treatment of historic properties (36 CFR §68) to avoid adverse effects" (See 36 CFR §800.5(b)).

A finding of **Adverse Effect** is made "[w]hen an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, and association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (See 36 CFR §800.5(a)(1)).

Finding of Effect

A DOEFOE, which outlines the type of effect that would result from the implementation of the Preferred Alternative, was prepared by UDOT, on behalf of FHWA, and was submitted for concurrence by the SHPO. UDOT made an overall Adverse Effect determination with concurrence by the SHPO. The DOEFOE was signed on April 9, 2012 (see Chapter 4).

No-action Alternative

The No-action Alternative would not involve construction activities; therefore, there would be no impact to cultural resources.

Preferred Alternative

Direct Impacts

Efforts to avoid or minimize impacts to historic properties were incorporated into the Preferred Alternative. See Table 3-26 for impacts the Preferred Alternative would have to historic properties in the study area (only those properties eligible for the NRHP are included).

Table 3-26 Impacts to Archaeological Resources Eligible for the NRHP in the APE

Site No.	Site Type	Effect	Avoidance/Minimization/ Mitigation
42WS5799	Aboriginal Rock shelter / Granary	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid
42WS1220 42WS0357	Southern Paiute Open Artifact Scatter	**Adverse Effect** The site would be impacted by construction of the Preferred Alternative	Data recovery in advance of construction.
42WS1221 42WS356 42WS1222 42WS1223 42WS2364	Virgin Anasazi Open Artifact Scatter	**Adverse Effect** The site would be impacted by construction of the Preferred Alternative	Data recovery in advance of construction.
42WS0355 42WS1235	Aboriginal Open Lithic Scatter	**Adverse Effect** The site would be impacted by construction of the Preferred Alternative	Site will be staked when the highway section is under active development to determine whether it will be affected or not. If affected, data recovery will occur. Unaffected site portions will be protected from ground disturbing activities.
42WS2346	Virgin Anasazi Open Artifact Scatter	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid
42WS2232 42WS157	Pueblo III Euro-American Open Habitation/ Historic Campsite	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid

Site No.	Site Type	Effect	Avoidance/Minimization/ Mitigation
42WS4283	Southern Paiute Open Campsite	**Adverse Effect** The site would be impacted by construction of the Preferred Alternative	Site will be staked when the highway section is under active development to determine whether it will be affected or not. If affected, data recovery will occur. Unaffected site portions will be protected from ground disturbing activities.
42WS4707	Basketmaker III Pueblo I Euro-American Open Habitation and Historic Campsite	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid
42WS4709	Aboriginal Rock Art	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid
42WS4710	Aboriginal Rock Shelter	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid
42WS4711	Aboriginal Rock Shelters	**No Historic Properties Affected** The Preferred Alternative would avoid the site	Avoid

Indirect Impacts
There would be no indirect impacts to cultural resources as a result of the Preferred Alternative.

Mitigation

Construction of the preferred alternative will be completed in phases over the course of 10-20 years. In order to adequately address and resolve any adverse effects of the project's multiple phased undertakings, FHWA is inviting UDOT, the BLM, SITLA, the USACE, the Red Cliffs Desert Reserve (RCDR), the State Historic Preservation Officer, other consulting parties, and the Advisory Council on Historic Preservation to participate in developing a Programmatic Agreement (PA) in accordance with 36 CFR 800.6 and 36 CFR 800.14(4)(b) to take into account and resolve any potential adverse effects that the proposed undertaking may have on historic properties in the APE. The PA will require development of a written data recovery plan and research design for individual sites that will be submitted for review and approval by the consulting parties and the SHPO prior to implementation.

Proposed mitigation for sites 42WS1220 and 42WS1221 will include archaeological data recovery in advance of construction. Those sites with boundaries plotted adjacent to or within 15 meters of the outside margin of the APE, 42WS0355 and 42WS4283, will be staked when the highway section is under active development to determine whether they will be affected or not. If affected, these sites will go to data recovery under the written treatment plan developed per stipulations in the PA. Unaffected site portions located outside areas designated for construction use will be protected from ground disturbing activities through implementation of a special provision in the construction contract that explicitly identifies the areas needing protection and requires construction of temporary fencing.

Consultation

Tribal and agency consultation was initiated through notification letters mailed out in March of 2010 (see Chapter 4). Notified tribal parties included the Paiute Indian Tribe of Utah (PITU), the Shivwits, Kaibab, Moapa, Indian Peaks, and Cedar Bands of the Southern Paiutes, the Pueblo of Hopi, and the Ute Indian Tribe of the Uintah and Ouray Reservation. Agencies with jurisdiction over lands adjacent to the APE including the RCDR, the Bureau of Land Management (BLM), the School and Institutional Trust Lands Administration (SITLA), and the U.S. Army Corps of Engineers (USACE) were notified at this time. Certified local government representatives from the cities of Hurricane, Washington, and St. George were also notified. The letters described the scope of work, requested information on historic properties of traditional religious and/or cultural importance in the area, and served an invitation to participate in the project as Section 106 consulting parties.

Responses were received from the Shivwits Band, PITU, the Hopi Tribe, the Ute Tribe, and the RCDR. The Ute Indiant Tribe responded on March 11, 2010 that they would like to be kept informed on any cultural items that might be found and that they were confident that PITU would provide input on the project as a consulting party. The Shivwits responded on March 16, 2010 that they would like to be involved in the project as a consulting party in the event that UDOT encounters any archaeological sites in the APE. PITU responded on March 1, 2010 that the lands considered in the EA study area are considered part of the aboriginal Southern Paiute homelands and requested to be kept informed on any updates or changes to the project. The Hopi responded on March 5, 2010 that they be kept informed if prehistoric resources are identified that will be adversely impacted by project activities and requested review copies of cultural resource survey reports and draft treatment plans. The RCDR responded on March 11, 2010 and requested to be included in project correspondence and be consulted on any potential impacts to desert tortoise habitat. The APE was inventoried for cultural resources in December of 2011 and January of 2012. The results of the investigation were documented in a draft report that was sent to tribal and agency consulting parties on February 27, 2012 for review and comment.

3.10 PALEONTOLOGICAL RESOURCES

Paleontology is the scientific study of life in the geologic past, especially through the study of animal and plant fossils. Before expending state funds or approving an undertaking, a state agency is required to take into account the effect of the undertaking on a specimen that is included in or eligible for inclusion in the State Paleontological Register (U.C.A. 63-73-19). The Memorandum of Understanding (MOU) between the Utah Geological Survey (UGS) and UDOT outlines the process for implementing Utah Code Annotated §63-73-19.

3.10.1 AFFECTED ENVIRONMENT

A paleontological file search was conducted on November 16, 2011 with the Utah Geological Survey (see November 16, 2011 letter in Chapter 4). Results of the file search indicated that there are numerous paleontological localities recorded within the study area where the highway crosses outcrops of Mesozoic bedrock, mostly in the northern part of the study area. Quaternary and recent alluvial and volcanic deposits that are exposed over most of the southern portion of the study area have a low potential for yielding significant vertebrate fossil localities. However, the Mesozoic bedrock units, especially the Jurassic Kayenta Formation and Triassic Chinle Formation that are exposed throughout the northern part of the study area, and in limited outcrops over the rest of the study area, have a moderate to high potential for yielding significant vertebrate fossil localities and tracksites.

3.10.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not impact paleontological resources.

Preferred Alternative

Direct Impacts

If the Mesozoic bedrock units would be disturbed by construction activities as a result of the Preferred Alternative, the office of the State Paleontologist recommends that a paleontologist evaluate the project to mitigate any potential impacts to paleontological resources. Otherwise, unless fossils are discovered as a result of construction activities, the Preferred Alternative should have no impact on paleontological resources (see November 16, 2011 letter in Chapter 4).

Indirect Impacts

There would be no indirect impacts to paleontological resources as a result of the Preferred Alternative.

Mitigation

If the Mesozoic bedrock units would be disturbed as a result of the Preferred Alternative, a paleontologist will evaluate the project.

3.11 SECTION 4(F) AND SECTION 6(F) RESOURCES

Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) requires special effort to preserve the natural beauty of public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

3.11.1 IDENTIFICATION OF SECTION 4(F) RESOURCES

Section 4(f) properties identified within the study area include recreational resources and historic properties.

Recreational Resources

To qualify for protection under Section 4(f), a park or recreation area must be publicly owned and open to the public, its major purpose must be for recreational activity, and it must be significant as a park or recreation area. Recreational resources that qualify for Section 4(f) protection are listed in Table 3-27 and Table 3-28.

Table 3-27 Recreational Resources (Parks and Golf Courses) that Qualify for Section 4(f) Protection

Resource	Location	Size	Ownership	Function/ Available Activities	Existing/Planned Facilities
Southgate Golf Course 	1975 Tonaquint Drive St. George	126-acres	City of St. George	• Golfing	• 18-holes, 6,100 yard par-70 layout
J.C. Snow Park 	900 South 400 East St. George	10-acres	City of St. George	• Volleyball • Picnicking • Dog walking • Children's activities	• 3 covered pavilions with picnic tables and barbecues • Children's playground • 2 sand volleyball courts • Leash-off dog park • Trailhead access to regional trail system

Resource	Location	Size	Ownership	Function/ Available Activities	Existing/Planned Facilities
College Park 	200 South 1000 East St. George	0.8-acres	City of St. George	• Basketball • Children's activities • Picnicking	• Basketball courts • Children's playground • Picnic tables
Green Spring Golf Course 	588 North Green Spring Drive Washington	158-acres	Washington City	• Golfing	• 18-holes

Table 3-28 Recreational Resources (Trails) that Qualify for Section 4(f) Protection

Resource	Location	Length	Ownership	Function/ Available Activities	Existing/Planned Facilities
Southern Parkway Trail	Crosses I-15 at the Southern Parkway Interchange, St. George	0.3 miles	St. George	• Biking, Walking, Skating	• Paved Shared-Use Trail
Virgin River Trail 	Runs parallel to the Virgin River, St. George	8 miles	St. George	• Biking, Walking, Skating	• Paved Shared-Use Trail
Webb Hill Trail 	2150 South Hill Road, St. George	0.8 miles	St. George	• Biking, Walking, Skating	• Paved Shared-Use Trail
Hilton Drive Trail 	Runs parallel to I-15 on the west side, just north of the Santa Clara River, St. George	1.5 miles	St. George	• Biking, Walking, Skating	• Paved Shared-Use Trail

Resource	Location	Length	Ownership	Function/ Available Activities	Existing/Planned Facilities
Washington Parkway Trail	Runs parallel to Washington Parkway until it crosses I-15, Washington City	0.9 miles	Washington	• Biking, Walking, Skating	• Paved Shared-Use Trail
Coral Canyon Trail	Runs parallel to I-15 on the east, Washington City	1 mile	Washington	• Biking, Walking, Skating	• Paved Shared-Use Trail

Historic Properties

Section 4(f) protection applies to most historic properties listed on or eligible for listing on the NRHP. Historic properties located in the study area include archaeological sites. The determination of eligibility for historic properties is made by FHWA in consultation with SHPO and any other consulting parties through the Section 106 of the NHPA review process.[3] See Section 3.9 Historic and Archaeological Resources for more information on the Section 106 eligibility requirements and review process.

Eleven archaeological sites have been determined eligible for inclusion on the NRHP; three sites are protected under Section 4(f) (see Table 3-29).

Table 3-29 Historic Properties (Archaeological Sites) that Qualify for Section 4(f) Protection

Site #	Site Type
42WS2232/42WS157	Prehistoric Open Habitation / Historic Campsite
42WS4709	Prehistoric Rock Art
42WS4710	Prehistoric Rock Shelter

The remainder of the eligible archaeological sites do not warrant preservation in place. Therefore, Section 4(f) does not apply and there would be no Section 4(f) use to these sites.

3.11.2 USE OF SECTION 4(F) RESOURCES

According to 23 CFR 774.1, the Administration may not approve the use of a Section 4(f) property unless the Administration determines:

- There is no feasible and prudent avoidance alternative to the use of land from the property; and the action includes all possible planning to minimize harm to the property resulting from such use; or
- The use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact.

A Section 4(f) use is defined in 23 CFR 774.17 as an impact that occurs:

- When land is permanently incorporated into a transportation facility;
- When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in § 774.13(d); or
- When there is a constructive use of a Section 4(f) property as determined by the criteria in § 774.15.

[3] See also 36 CFR 800 (implementing regulations)

A temporary occupancy of land that meets certain conditions is considered so minimal as to not constitute a use within the meaning of Section 4(f) (see 23 CFR 774.13(d)). All of the following conditions must be met:

- Duration must be temporary , i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;
- Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal;
- There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
- The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
- There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

Recreational Resources

Table 3-30 shows the impacts associated with the Preferred Alternative on each of the recreational Section 4(f) resources, and whether a Section 4(f) "use" would occur as defined in 23 CFR 774.17.

Table 3-30 Section 4(f) Use of Recreational Resources

Resource	Section 4(f) Use	Description of Use
Southgate Golf Course	No Use	N/A
J.C. Snow Park	No Use	N/A
College Park	No Use	N/A
Green Spring Golf Course	No Use	N/A
Southern Parkway Trail	No Use	N/A
Virgin River Trail	No Use	The Preferred Alternative would require the temporary closure of the minor portions of the trail that crosses the I-15 corridor during construction. However, a detour route would be provided so as to not impair the use of the trail.
Webb Hill Trail	No Use	N/A
Hilton Drive Trail	No Use	N/A
Washington Parkway Trail	No Use	N/A
Coral Canyon Trail	No Use	N/A

The Virgin River Trail crosses under I-15 at the Virgin River bridge and therefore the portion of the trail that crosses under I-15 would need to be temporarily and periodically closed during construction in order to protect users of the trail from injury. No construction activities or other use of the trail is proposed as part of the Preferred Alternative. Further, a detour route would be provided during closure periods, thus allowing continued use of the trail.

The temporary, periodic closures of the Virgin River Trail would constitute a temporary occupancy of the Section 4(f) property. The duration of the occupancy would be temporary and occur periodically during construction activities, with no change in ownership of the land. There would be no physical changes made to the Section 4(f) property, with only a temporary closure of access to the trail during construction. There would be no permanent adverse physical impacts and, due to the inclusion of the detour route, there would be no interference with the activities, features, or attributes of the trail on either a temporary or permanent basis. Access to the trail would be fully restored once the safety concerns are no longer present. Further, the officials with jurisdiction over the trails has concurred with the temporary occupancy determination (see February 24, 2012 letter in Chapter 4). Therefore, the Preferred Alternative would not have a use to any recreational Section 4(f) resources.

Historic Properties

Table 3-31 shows the impacts associated with the Preferred Alternative on each of the historic Section 4(f) resources, and whether a Section 4(f) "use" would occur as defined in 23 CFR 774.17.

Table 3-31 Section 4(f) Use of Historic Properties

Site No.	Site Type	Section 4(f) Use	Description of Use
42WS2232 42WS157	Pueblo III Euro-American Open Habitation/ Historic Campsite	No Use	N/A - The Preferred Alternative would avoid the site
42WS4709	Aboriginal Rock Art	No Use	N/A - The Preferred Alternative would avoid the site
42WS4710	Aboriginal Rock Shelter	No Use	N/A - The Preferred Alternative would avoid the site

3.11.3 MEASURES TO MINIMIZE HARM

Recreational Resources

Detour routes would be provided during any closures of the Virgin River Trail during construction, which would maintain the continuity of the trail.

3.11.4 COORDINATION

City officials from St. George and Washington City were consulted in regards to the potential temporary closures of the Virgin River Trail during construction, as required by 23 CFR 774.13(d)(5) regarding the no use determination for those trails. As the officials with jurisdiction over the trails in question, they concurred with the determination that the temporary closures, including the provision for detour routes during construction of the project, would be of limited duration, the scope of the work would be minor, there would be no permanent adverse physical impacts or interference with the activities, features, or attributes that make the trails eligible for Section 4(f) protection on either a temporary or permanent basis, and that the land would be fully restored (see February 24, 2012 letter in Chapter 4).

3.11.5 SECTION 6(F)

The Land and Water Conservation Fund Act (LWFCA) was established in 1964 to enable the purchase of land, water, and wetlands by federal, state, and local governments for the benefit of all Americans. It has been used to protect wildlife habitat, historic treasures, and clean water sources, as well as to expand recreational opportunities such as parks and trails. Areas in which these funds were used have special protection under Section 6(f) of the LWCFA.

There is one Section 6(f) property located within or near the study area, J.C. Snow Park at 900 South 400 East in the City of St. George. The Preferred Alternative would have no direct or indirect impact on this Section 6(f) property.

3.12 WETLANDS

Clean Water Act

The U.S. Army Corps of Engineers (USACE) developed a definition of waters of the United States under the 1972 Clean Water Act (33 U.S.C. 1251). Waters of the U.S. are defined as waters currently or previously used for interstate or foreign commerce; all interstate waters; any waters, the destruction of which could affect interstate or foreign commerce; all impoundments; tributaries of the previously mentioned waters; the territorial seas; and wetlands adjacent to waters.

Wetlands are defined as a subset of waters of the U.S. and, for the purposes of regulatory guidance, are considered special aquatic sites. USACE has jurisdiction over waters of the U.S. USACE further defines wetlands in Section 404 of the Clean Water Act as:

> ...those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

USACE presently has jurisdiction over any waters that are adjacent to, bordering, or contiguous with navigable waterways. Under Section 404 of the Clean Water Act, no discharge of dredged or fill material is permitted in waters of the U.S. if there is a less environmentally damaging practicable alternative to that part of the activity that would result in a discharge of fill material to waters of the U.S. An alternative is practicable if it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics in light of the overall project purposes.

Executive Order 11990 (May 24, 1977) requires federal agencies to not undertake or provide assistance to activities that impact wetlands. If a project does impact wetlands, it must be determined by the head of the agency (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands, which may result from such use. In making this finding, the head of the agency may take into account economic, environmental, and other pertinent factors.

3.12.1 AFFECTED ENVIRONMENT

The study area is adjacent to the I-15 corridor in and near St. George and Washington City in southern Utah. The study area is crossed by several water features and washes, including the Virgin and Santa Clara Rivers, the Atkinville Wash, Mill Creek, Grapevine Pass Wash, Cottonwood Wash, and several other smaller unnamed washes. Because the study area is located in a very dry region, with under 9 inches of annual rainfall, wetlands are less common than in other, wetter regions of the U.S. The sandy, generally well-draining soils in this region also inhibit the development of the saturated anaerobic soil conditions needed for wetland development and function.

A preliminary wetland delineation was conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2008). On-site evaluation of vegetation, soils, and hydrology was performed in potential wetland areas, along with mapping of other waters of the U.S. (see Figures in Volume 2). Table 3-32 contains a summary of the identified wetlands in the study area and Table 3-33 contains a summary of the identified water features. See the *Delineation of Waters of the U.S. in Support of the Environmental Assessment for the I-15 MP 0 to MP 16 Project* in Appendix A for full descriptions of the wetlands and water features.

Table 3-32 Summary of Identified Wetlands

Wetland ID	Size (acres)
Wetland 1 (Sheet 22)	0.71
Wetland 2 (Sheet 18)	0.20
Wetland 3 (Sheet 20)	0.60
Wetland 4 (Sheet 21)	0.81
Wetland 5 (Sheet 21 and 22)	0.04
Wetland 6 (Sheet 22)	0.06
Wetland 7 (Sheet 22)	0.03
Wetland 8 (Sheet 27)	0.06
Wetland 9 (Sheet 26)	0.23
Wetland 10 (Sheet 14 and 15)	0.20
Wetland 11 (Sheet 26)	0.01
Total:	**2.95**

Table 3-33 Summary of Water Features

Water Feature ID	Size (acres)	Length (linear feet)	Type
Drainage 1 (Sheet 01, 02, and 03)	0.70	5265	Ephemeral wash
Atkinville Wash (Sheet 04)	3.59	785	Ephemeral wash
Drainage 2 (Sheet 07)	0.02	410	Ephemeral wash
Drainage 3 (Sheet 07)	0.04	656	Ephemeral wash
Drainage 4 (Sheet 07)	0.18	1460	Ephemeral wash
Virgin River (Sheet 10 and 11)	4.69	970	River
Santa Clara River (Sheet 11)	1.70	825	River
Drainage 5 (Sheet 12)	0.06	1405	Ditch
Drainage 6 (Sheet 17)	0.03	160	Perennial stream
Middleton Wash (Sheet 18)	0.22	150	Perennial stream
Drainage 7 (Sheet 19)	0.06	185	Perennial stream
Mitigation Ponds 1-4 (Sheet 20)	0.30	NA	Open water
Drainage 8 (Sheet 21)	0.03	165	Perennial stream
Mill Creek (Sheet 21 and 22)	0.41	561	Perennial stream
Drainage 9 (Sheet 22)	0.01	106	Perennial stream
Spring 1 (Sheet 22)	0.11	NA	Spring
Spring 2, 3, and 4 (Sheet 23)	NA	NA	Developed Springs
Drainage 10 (Sheet 25)	0.06	442	Ephemeral wash
Drainage 11 (Sheet 25)	0.16	950	Ephemeral wash
Drainage 12 (Sheet 25)	0.25	1460	Ephemeral wash
Drainage 13 (Sheet 26)	0.01	100	Perennial stream
Drainage 14 (Sheet 27)	0.02	290	Ephemeral wash
Grapevine Wash (Sheet 27)	0.14	870	Ephemeral wash
Drainage 15 (Sheet 28)	0.07	540	Ephemeral wash
Cottonwood Wash (Sheet 30)	0.17	930	Ephemeral wash
Drainage 16 (Sheet 22)	0.05	840	Ditch
Drainage 17 (Sheet 26)	0.01	160	Ephemeral Wash

3.12.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not involve construction activities and would therefore have no impact on wetlands or waters of the U.S. in the study area.

Preferred Alternative

Direct Impacts

Wetlands

The Preferred Alternative would avoid all wetlands identified in the study area. Impacts to wetlands in the study area were avoided by steepening slopes and constructing barrier to minimize the roadway footprint.

Water Features

The Preferred Alternative would have permanent impacts to the drainages identified in Table 3-34. See also Figures in Volume 2.

Table 3-34 Preferred Alternative Permanent Impacts to Water Features

Water Feature ID	Type	Impact	
		Linear Feet	Acres
Drainage 3	Ephemeral Wash	19-ft	0.001-acres
Grapevine Wash	Ephemeral Wash	14-ft	0.002-acres
Drainage 15	Ephemeral Wash	52-ft	0.005-acres
Cottonwood Wash	Ephemeral Wash	62-ft	0.02-acres

The Preferred Alternative would include the construction of two new bridges over the Virgin River and one new bridge and the widening of the other bridge at Atkinville Wash. The bridges would require construction work in the Virgin River and Atkinville Wash for the placement of bridge piers.

Indirect Impacts

No indirect impacts are anticipated from the Preferred Alternative.

Mitigation and Project Commitments

Project Commitments

This EA does not address the jurisdictional status of the wetlands or water features. Therefore, jurisdictional determination will be determined for the wetlands and water features identified in the wetland delineation. A Section 404 Permit will be obtained from the USACE for all work to be conducted within the Virgin River, Atkinville Wash, and any other waters of the U.S. and wetlands that are determined to be jurisdictional.

Steps will be taken during the design process to avoid wetland impacts, such as steepening slopes and constructing retaining walls to minimize the roadway footprint.

Mitigation

No mitigation required.

3.13 THREATENED AND ENDANGERED SPECIES

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) of 1973 (7 USC §136, 16 USC §1531 et seq.), as amended, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) if listed species or designated Critical Habitat may be affected by a proposed action. If adverse impacts would occur as a result of a proposed action, the ESA requires federal agencies to prepare a Biological Assessment (BA) in order to evaluate the likely affects of the proposed action, and ensure that it neither jeopardizes the continued existence of federally-listed ESA species, nor results in the destruction or adverse modification of designated Critical Habitat.

3.13.1 AFFECTED ENVIRONMENT

Table 3-35 lists the federally-listed ESA species that are known to occur in Washington County, Utah (see BA in Appendix A).

Table 3-35 Washington County ESA Species List

Species	Status	Habitat Requirements and Occurrence in the Study Area
California Condor ***Gymnogyps californianus***	Experimental Population	Nests in caves and sheltered rock outcrops. Roosts on old growth trees or snags, and on isolated rock outcrops and cliffs (Mesta 1996). Foraging occurs in grasslands. Suitable foraging areas occur in study area. No nesting or roosting areas occur in the study area. No documented occurrences. No observations or evidence of occurrence discovered in the study area.
Desert Tortoise ***Gopherus agassizii***	Threatened	Inhabits warm upland plateaus and mountain slopes in western desert habitats. Suitable habitat and designated Critical Habitat (Red Desert Reserve) is within the study area. Known to occur and evidence of occurrence discovered in the study area.
Dwarf Bear-Poppy ***Arctomecon humilis***	Endangered	Occurs on rolling low hills and ridges in barren, open desert habitats with gypsiferous clay soils. Endemic to Washington County, Utah. Suitable habitat occurs in study area. Species is known to occur and occupied habitat was discovered in the study area.
Gierisch Mallow ***Sphaeralcea gierischii***	Candidate	Only found on gypsum outcrops associated with the Harrisburg Member of the Kaibab Formation in northern Mohave County, Arizona and closely adjacent Washington County, Utah (Atwood and Welsh 2002). Suitable habitat does not occur and the species is not known to occur in the study area. No occupied habitat discovered in study area.
Holmgren Milk-vetch ***Astragalus holmgreniorum***	Endangered	Occurs on shallow, sparsely vegetated soils derived from the Virgin limestone member of the Moenkopi Formation. Suitable habitat and designated Critical Habitat is in study area. Documented occurrences in study area; occupied habitat discovered in study area.
Las Vegas Buckwheat ***Eriogonum corymbosum var. nilesi***	Candidate	Occurs in gypsum soil outcroppings in open desert habitats. Suitable habitat is in the study area. Not known to occur and no occupied habitat discovered in study area.

Species	Status	Habitat Requirements and Occurrence in the Study Area
Mexican Spotted Owl ***Strix occidentalis lucida***	Threatened	Inhabits benches above canyons associated with undisturbed mixed conifer forests. No suitable habitat and no documented occurrences in study area. No observations or evidence of occurrence discovered in study area.
Shivwits Milk-vetch ***Astragalus ampullariodes***	Endangered	Occurs in open desert habitats with purple-hued patches of soft clay of which 99% are associated with isolated outcrops of the Petrified Forest member of the Chinle geological formation; less than 1% of known occurrences are associated with the Dinosaur Canyon member of the Moenave Formation (USFWS, 2006). Suitable habitat is in the study area. Not known to occur and no occupied habitat discovered in study area.
Siler Pincushion Cactus ***Pediocactus sileri***	Threatened	Occurs on rolling hills in warm desert shrub, sagebrush-grass, and pinyon-juniper communities with gypsiferous and calcareous sandy or clay soils derived from various members of the Moenkopi Formation; also occurs on the Kaibab Formation. Suitable habitat is in the study area. Not known to occur and no occupied habitat discovered in study area.
Southwestern Willow Flycatcher ***Empidonax traillii extimus***	Endangered	Inhabits dense patches of willow or shrubs with similar structure (i.e., alder, tamarisk) along rivers, streams, and wetlands. Suitable habitat and designated Critical Habitat is in study area. Known to occur in study area.
Utah Prairie Dog ***Cynomys parvidens***	Threatened	Inhabits rangelands, grasslands, meadows, and agricultural areas in southwest Utah. No suitable habitat and no documented occurrences in study area. No observations or evidence of occurrence discovered.
Virgin River Chub ***Gila seminuda***	Endangered	Inhabits the Virgin River. Suitable habitat and designated Critical Habitat is in study area. Known to occur in study area.
Western Yellow-Billed Cuckoo ***Coccyzus americanus occidentalis***	Candidate	Inhabits dense, deciduous riparian forests, at least 25 acres in size with a canopy cover of at least 50% in both the understory and overstory; prefers tall cottonwoods and willows in western habitats (Biosystems Analysis 1989). No suitable habitat and no documented occurrences in study area.
Woundfin ***Plagopterus argentissimus***	Endangered	Inhabits the Virgin River. Suitable habitat and designated Critical Habitat is in study area. Known to occur in study area.

Source: USFWS

Surveys and habitat assessments were conducted for species that are known to occur (based on Utah Natural Heritage Program data) or have suitable habitat in the study area. The following species have suitable habitat in the study area and were discovered during surveys, or are expected to be present in the study area: desert tortoise, dwarf bear-poppy, Holmgren milk-vetch, southwestern willow flycatcher, Virgin River chub, western yellow-billed cuckoo, and woundfin, and are discussed in more detail below.

Desert Tortoise

Designated desert tortoise Critical Habitat is located within the study area. The Critical Habitat corresponds to the Red Cliffs Desert Reserve boundary in the study area (see Figures in Volume 2 for the location of the Red Cliffs Desert Reserve). No desert tortoises were observed during species-specific surveys conducted in the study area (see BA in Appendix A). However, there was evidence of desert tortoise occurrence.

Dwarf Bear-Poppy

Several dwarf bear-poppy species were discovered in the study area during both the 2010 and 2011 botanical surveys (see BA in Appendix A). Species were found inside and outside of the I-15 right-of-way, however, the majority of plants occupied areas beyond the right-of-way on the east side of I-15.

Dwarf Bear-Poppy (May 2010)

Holmgren Milk-Vetch

Designated Holmgren milk-vetch Critical Habitat is located within the study area (see Figures in Volume 2 for the location of the Critical Habitat). Several Holmgren milk-vetch species were discovered in the study area during 2010 and 2011 botanical survey (see BA in Appendix A). Species were found inside and outside of the I-15 right-of-way, including between travel lanes, and no trend was observed in their distribution.

Holmgren Milk-Vetch (April 2011)

Virgin River Chub

Designated Virgin River chub Critical Habitat is located within the study area and includes the main-stem Virgin River and its 100-year floodplain from the confluence of La Verkin Creek to Halfway Wash.

According to the BA (see Appendix A), prior to 2010, Virgin River chub were present in low numbers in the study area. During full-pass sampling of the Virgin River conducted from the Johnson Diversion to the Webb Hill Barrier in April and July 2009, the Utah Division of Wildlife Resources (UDWR) collected a total of two adult Virgin River chub in the reach of the river from the Fort Pierce Wash to the Santa Clara inflow, just upstream of the I-15 crossing. No young of the year were collected in April or July 2009, and no Virgin River chub of any lifestage were collected in the immediate vicinity of the I-15 crossing in September or October 2009.

The Virgin River experienced significant flooding in December 2010. These high flows facilitated significant recolonization of the study area by creating ideal spawning and rearing conditions for the Virgin River chub. Recent full-pass sampling efforts, completed in July and August 2011 (prior to the November 2011 rotenone treatment), yielded 28 adult Virgin River chub in July and 17 in August. During those surveys, 1,330 young of the year were collected in July, and 403 young of the year were collected in August. In addition, sampling of isolated pools found one adult and 319 young of the year in July 2011 and 1,379 young of the year in August 2011.

Although the December 2010 flood event created positive habitat conditions for the Virgin River chub, it also compromised non-native fish barriers downstream of the study area and buried the Webb Hill Barrier immediately downstream of the I-15 bridge crossing. As a result, the non-native red shiner, which was previously eradicated from the study area, was able to recolonize the study area.

In November 2011, the UDWR applied rotenone treatments to remove non-native fish species from the Johnson Diversion to the Stateline Barrier. UDWR has completed sampling of the study area since the November 2011 chemical treatment, but it has not yet summarized the data. However, native species abundance, including Virgin River chub, is likely low at the current time. According to the BA, native species will likely recolonize the study reach within 6 months if non-native species eradication is successful. For this reason, it is assumed that Virgin River chub will recolonize the study area prior to initiation of this project.

Woundfin

Designated woundfin Critical Habitat is located within the study area and includes the main-stem Virgin River and its 100-year floodplain from the confluence of La Verkin Creek to Halfway Wash.

According to the BA (see Appendix A), the section of the Virgin River near the I-15 crossing contains excellent habitat for the woundfin, and the species was relatively abundant in the area before the invasion of red shiner in the mid-1980s. The abundance of inundated sandy ledges in the study area is ideal for woundfin; however, reduced flows could negatively affect habitat. Further, increasing numbers of non-native predators in the study area, including the largemouth bass, are concerning.

Woundfin numbers in the study area fluctuate greatly depending on stocking rates, environmental conditions, and efforts to eradicate non-native species. In 2008, UDWR stocked about 1,850 woundfin below the Webb Hill Barrier, just downstream of the I-15 crossing, and about 1,800 woundfin upstream of the Webb Hill Barrier. Future stocking efforts are likely considering recent chemical treatments to remove invasive species from the study area.

During seining of vegetated deep run and pool habitats conducted by UDWR in 2009, woundfin were found to be most abundant in reaches from the Johnson Diversion to the Seegmiller Marsh inflow, several miles upstream of the I-15 crossing. In July 2009, nine woundfin young of the year were found in the reach immediately upstream of the I-15 crossing from the Fort Pierce Wash to the Santa Clara River inflow.

The December 2010 flooding event allowed for increased woundfin colonization of the study area. Post-flood woundfin collections were substantially higher than pre-flood numbers. Although no adults were captured during sampling efforts conducted in the study area during July and August 2011, 29 woundfin young of the year were collected in July, and 25 young of the year were collected in August. During both the July and August surveys, UDWR collected six young of the year from the Santa Clara inflow to the Webb Hill Barrier reach, which includes the I-15 bridge crossing location.

The December 2010 flood event compromised non-native fish barriers downstream of the study area, allowing invasive red shiners to recolonize the reach. In November 2011, UDWR treated the Virgin River reach from the Johnson Diversion to the Stateline Barrier with rotenone in an effort to remove red shiner. It is likely that woundfin were also removed from the study area during the treatment. UDWR has completed post-treatment sampling of the study area, but it has not yet summarized the data. For this reason, the current status of woundfin in the study area is unknown. According to the BA, native species will likely recolonize the study reach within 6 months if non-native species eradication is successful. Therefore, it is assumed that woundfin will be present in the study area prior to initiation of this project.

Southwestern Willow Flycatcher

Designated southwestern willow flycatcher Critical Habitiat is located within the study area and includes the Virgin River floodplain and the confluence area with the Santa Clara River (see Figures in Volume 2 for the location of the Critical Habitat). A survey of the Virgin River areas within the study area was conducted in April 2010, to determine the area's potential as southwestern willow flycatcher nesting habitat. The existing riparian habitat in the study area does not provide suitable nesting habitat for this species, especially after the recent flooding in December 2010, salt-cedar removal operations by the City of St. George in the Virgin River floodplain, and ongoing urban development. What remains of the existing riparian vegetation could still provide some migratory stop-over habitat for this species.

Yellow-billed Cuckoo

Records indicate that yellow-billed cuckoos were present in riparian areas in the area at the confluence of the Santa Clara and Virgin Rivers as recently as the summer of 2000 (see BA in Appendix A). Two other recent sightings (nesting not confirmed) were recorded in the Riverside Marsh (about 0.5 mile east of the I-15 right-of-way) and near the city of Santa Clara (about 5 miles northwest of the study area). However, the existing riparian habitat in the study area does not provide suitable nesting habitat for this species, especially after the recent flooding, salt-cedar removal operations by the City of St. George in the Virgin River floodplain, and ongoing urban development. Riverside Marsh could provide some marginal migratory stopover (temporary-use) habitat for this species, though most of this habitat is outside the Preferred Alternative construction footprint. Surveys for habitat in the study area were conducted during field visits on April 2010, but no surveys for nesting individuals were conducted.

3.13.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not impact federally-listed threatened and endangered species.

Preferred Alternative

Direct Impacts

It has been determined that the Preferred Alternative would have No Effect on the following federally-listed threatened and endangered species: California condor, Gierisch mallow, Las Vegas buckwheat, Mexican spotted owl, Shivwits milk-vetch, Siler pincushion cactus, and the Utah prairie dog. These determinations were made based on one of the following: suitable habitat does not occur in the study area, the species is not known to occur in the study area, the species was not observed during surveys of the study area, or the species is not expected to be present in the study area.

It has been determined that the Preferred Alternative is likely to adversely affect the desert tortoise, dwarf bear-poppy, Holmgren milk-vetch, Virgin River chub, and woundfin; and is not likely to adversely affect the southwestern willow flycatcher and western yellow-billed cuckoo.

Desert Tortoise

The desert tortoise is likely to be adversely affected by the Preferred Alternative as a result of habitat loss and mortality, harm, and harassment from construction activities and operational use. Approximately 0.99 acres of suitable desert tortoise habitat would be lost as a result of reconstructing the SR-9 Interchange. To minimize habitat loss the Preferred Alternative would install barriers at the edge of the pavement to steepen roadside slopes. This would reduce the areas where cut/fill would be required. Approximately 0.22 acres of suitable desert tortoise habitat would be lost as a result of the cut/fill impacts, and approximately 0.77 additional acres would need to be acquired in order to establish the new right-of-way.

To minimize impacts to the desert tortoise, all newly installed fence associated with the right-of-way acquisition would include USFWS approved exclusionary fencing, and would be installed prior to construction activities. However, if desert tortoises stray into the construction zone there is the potential that individuals would be killed or harmed as a result of being crushed or hit by construction equipment.

The Preferred Alternative is **likely to adversely affect** the desert tortoise as a result of habitat loss and mortality, harm, and harassment from construction activities and operational use.

The Preferred Alternative is **likely to adversely affect** desert tortoise Critical Habitat. However, it would not appreciably diminish the value of Critical Habitat for both the survival and recovery of the desert tortoise.

Dwarf Bear-Poppy

The dwarf bear-poppy is likely to be adversely affected by the Preferred Alternative as a result of habitat loss, an increase in habitat fragmentation, and pollinator mortality/disturbance. Field surveys conducted in 2010 and 2011 revealed the location of dwarf bear-poppy species within and adjacent to the I-15 right-of-way.

Accordingly, exclusionary zones were identified (see BA in Appendix A) to avoid impacts to individual plants, and no occupied dwarf bear-poppy habitat would be affected. To minimize habitat loss and fragmentation impacts, the Preferred Alternative would install barriers at the edge of the pavement to steepen roadside slopes. This would reduce the areas where cut/fill would be required. Approximately 8.98 acres of suitable dwarf bear-poppy habitat would be lost as a result of constructing additional travel lanes, and associated detention basins, between the Southern Parkway Interchange and the Virgin River.

The additional travel lanes and auxiliary lanes between the Southern Parkway Interchange and the Virgin River would increase the fragmentation of suitable dwarf bear-poppy habitat, and the likelihood of successful genetic interchange would be reduced. Furthermore, the additional travel lanes would reduce pollinator connectivity and increase the chance of mortality to pollinators crossing I-15. It is anticipated that the construction and operation of the Preferred Alternative would reduce the number of ground-nesting bees and thus the number of potential pollinators of dwarf bear-poppy.

The Preferred Alternative is **likely to adversely affect** the dwarf bear-poppy as a result of habitat loss, an increase in habitat fragmentation, and pollinator mortality/disturbance.

Holmgren Milk-Vetch

The Holmgren milk-vetch is likely to be adversely affected by the Preferred Alternative as a result of habitat loss, an increase in habitat fragmentation, pollinator mortality/disturbance, and displacement by exotic species. Field surveys conducted in 2010 and 2011 revealed the location of Holmgren milk-vetch species within the I-15 right-of-way. Accordingly, construction limits were identified (see BA in Appendix A) to avoid impacts to individual plants, and no occupied Holmgren milk-vetch habitat would be affected. To minimize habitat loss and fragmentation impacts, the Preferred Alternative would install barriers at the edge of the pavement to steepen roadside slopes. This would reduce the areas where cut/fill would be required. Approximately 0.39 acres of Holmgren milk-vetch suitable habitat (in designated Critical Habitat) would be lost as a result of constructing an auxiliary lane in each direction between the Port-of-Entry and Southern Parkway.

The addition of auxiliary lanes between the Port-of-Entry and Southern Parkway would increase the fragmentation of suitable Holmgren milk-vetch habitat that currently exists as a result of I-15, and the likelihood of successful genetic interchange would be reduced. Furthermore, auxiliary lanes would reduce pollinator connectivity and increase the chance of mortality to pollinators crossing I-15. Although Holmgren milk-vetch is self-compatible and not totally dependent on pollinators, it is anticipated that the construction and operation of the project would reduce the number of ground-nesting bees and thus the number of potential pollinators of Holmgren milk-vetch. However, the ultimate effects of highway construction and operation on the pollinators of Holmgren milk-vetch are unknown. Finally, additional competition, potential displacement, and an increase in the potential for wildfires would occur as a result of nonnative species.

The Preferred Alternative is **likely to adversely affect** the Holmgren milk-vetch as a result of habitat loss, an increase in habitat fragmentation, pollinator mortality/disturbance, and displacement by exotic species.

The Preferred Alternative is **likely to adversely affect** Holmgren milk-vetch Critical Habitat. However, it would not appreciably diminish the value of Critical Habitat for both the survival and recovery of the Holmgren milk-vetch.

Virgin River Chub

The Preferred Alternative is **likely to adversely affect** Virgin River chub because:

- In-water work will likely be required, including the installation of dewatering cofferdams, in habitat known to be occupied by the species. During dewatering, individuals could be subject to handling, which would constitute harassment and take as defined under the ESA.
- Although a new permanent column of bridge piers would be installed, three existing bridge pier columns would be removed from habitat below the OHWM. This could improve flood flow conveyance and floodplain connectivity. This could also reduce scouring compared to baseline conditions (due to

a reduction of infrastructure below the OHWM), which would transport less fine-grained sediments downstream of piers in the Virgin River.
- Spawning habitat is present in the study area; therefore, depending on construction timing, redds (spawning nest) or recently hatched juveniles could be adversely affected during in-water work.

Construction would occur adjacent to and over the Virgin River, which is designated as Critical Habitat for the Virgin River chub. The Preferred Alternative is **likely to adversely affect** Critical Habitat in the study area based on the following rationale:

- Construction would occur in the active channel, resulting in a temporary loss of available habitat where in-stream construction isolation structures are present.
- Construction equipment would be present in the floodplain, which could result in compaction of substrate and loss of vegetation along the riparian corridor.
- In-stream work, including cofferdam placement and removal, would result in increased sedimentation that could temporarily affect the water primary constituent elements (PCEs) as related to turbidity.
- The removal of existing bridge piers and addition of a new permanent column of piers could modify hydraulics in the Virgin River and alter floodplain dynamics near the bridge.
- Beneficial effects to Critical Habitat following in-stream and overwater construction could result from the net reduction of the number of permanent bridge piers below the OHWM. The reduction of infrastructure below the OHWM could benefit shoreline margin habitats and improve the natural flow regime, which could reduce channel scour in the vicinity of the bridge.

Woundfin

The Preferred Alternative is **likely to adversely affect** woundfin based on the same rationale presented above for Virgin River chub.

Construction would occur adjacent to and over the Virgin River, which is designated as Critical Habitat for the woundfin. The Preferred Alternative is **likely to adversely affect** designated woundfin Critical Habitat in the Virgin River based on the same rationale as presented for Virgin River chub Critical Habitat.

Southwestern Willow Flycatcher

The Preferred Alternative would not cause adverse effects to Critical Habitat for the southwestern willow flycatcher. There would not be any substantial removal of riparian vegetation, since expansion of the Virgin River Bridge would involve in-channel work (such as removal and/or addition of bridge supports) and expansion of the bridge abutments, which are in uplands and are set back from the Virgin River. The Preferred Alternative would not require any work on the Santa Clara River Bridge as that was completed during the Dixie Drive Interchange project. The Preferred Alternative would also not affect any critical nesting habitat at the I-15 crossing of the Virgin River, since this area does not support these activities.

Temporary construction activities could deter migrating flycatchers from using the Virgin River as a travel route in the study area during the construction period. However, because this species is highly mobile, other entries into the Virgin River valley, though possibly less desirable, would still be available to the species. The Preferred Alternative is not anticipated to affect any nesting either from construction activities or construction-related noise. The closest known nesting of this species (over 1.2 miles northeast of the Virgin River Bridge) is well beyond the point at which any elevated noise generated from construction activities would have returned to existing background levels.

Once the Preferred Alternative is constructed, any permanent increases in noise levels from vehicle traffic at the bridge would be minor compared to the current noise levels from the existing traffic along I-15.

The Preferred Alternative is **not likely to adversely affect** the southwestern willow flycatcher.

The Preferred Alternative would have **no effect** on southwestern willow flycatcher Critical Habitat.

Yellow-Billed Cuckoo

The potential effects to the yellow-billed cuckoo would be similar to the effects discussed above for the southwestern willow flycatcher, with the exception that the Preferred Alternative would not remove or affect any Critical Habitat as there is none designated for the yellow-billed cuckoo.

The Preferred Alternative **may affect, but is not likely to adversely affect**, the yellow-billed cuckoo.

USFWS Biological Opinion

In response to the BA for the proposed project, the USFWS is expected to issue a Biological Opinion which will determine that the project is not likely to jeopardize the continued existence of federally-listed ESA species, or adversely modify or destroy designated Critical Habitat.

Indirect Impacts

No indirect impacts to federally-listed threatened and endangered species are anticipated (see BA in Appendix A).

Mitigation and Project Commitments

Desert Tortoise

Project Commitments

- A pre-construction desert tortoise survey, and potential relocation activities, will be conducted by a qualified tortoise biologist prior to ground-disturbing activities. All surveys, handling, and burrow excavation and construction will be conducted in accordance with the protocol described in *Guidelines for Handling Desert Tortoises During Construction Projects*. Desert tortoise survey and relocation activities shall be coordinated with USFWS and the Red Cliffs Desert Reserve.
- To minimize habitat loss the Preferred Alternative will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the areas where cut/fill will be required.
- New right-of-way fence installed adjacent to desert tortoise Critical Habitat would include USFWS-approved exclusionary desert tortoise fencing, and will be installed prior to construction activities.
- No drainage basins will be located in desert tortoise Critical Habitat.

Mitigation

- Mitigation for effects to desert tortoise Critical Habitat will be implemented at a 5:1 ratio for direct impacts. All mitigation for the desert tortoise will be applied to protection of the species within the Red Cliffs Desert Reserve. Mitigation not applied within the Red Cliffs Desert Reserve for the desert tortoise will be at a 10:1 ratio for direct impacts. Mitigation shall be approved by USFWS and the Red Cliffs Desert Reserve prior to a commitment of resources, and will be conducted prior to project impacts in desert tortoise Critical Habitat.

Dwarf Bear-Poppy

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify dwarf bear-poppy occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Environmental fencing will be installed around dwarf bear-poppy occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of dwarf bear-poppy occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual dwarf bear-poppy species and minimize habitat loss in dwarf bear-poppy suitable habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.

- Broadcast applications of herbicides will be prohibited in dwarf bear-poppy suitable habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to dwarf bear-poppy occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to dwarf bear-poppy suitable habitat will be implemented at a 1:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in occupied and/or suitable habitat.

Holmgren Milk-Vetch

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify Holmgren milk-vetch occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Construction activities will be restricted in Holmgren milk-vetch Critical Habitat to the limits identified in the BA (see Appendix A). In areas of the right-of-way that are not within Holmgren milk-vetch Critical Habitat, environmental fencing will be installed around Holmgren milk-vetch occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of Holmgren milk-vetch occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual Holmgren milk-vetch species and minimize habitat loss in Holmgren milk-vetch Critical Habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in Holmgren milk-vetch Critical Habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to Holmgren milk-vetch occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to Holmgren milk-vetch Critical Habitat (unoccupied) will be implemented at a 2:1 ratio for direct impacts. All mitigation for the Holmgren milk-vetch will be applied to protection of the species within the Utah-Arizona Border Unit of designated Holmgren milk-vetch Critical Habitat. Mitigation for effects in occupied habitat that will not be applied within the Utah-Arizona Border Unit would be at a 6:1 ratio for direct impacts. Mitigation for effects in Critical Habitat (unoccupied) that will not be applied within the Utah-Arizona Border Unit would be at a 4:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in Holmgren milk-vetch occupied and/or Critical Habitat.
- Pre and post construction surveys will be conducted in areas of Holmgren milk-vetch Critical Habitat that will be temporarily impacted in order to determine whether a permanent impact has occurred where not anticipated. Pre and post construction survey activities, and associated reports, will be coordinated with USFWS. Additional mitigation that may be required as a result of unanticipated, permanent impacts shall be approved by USFWS.

Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo)

Project Commitments

- Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible.
- Prior to construction, the contractor will confirm that the conditions included in the Biological Opinion are implemented as needed.

In addition, the following BMPs will be implemented:

- Stockpile areas will be approved by UDOT or a qualified biologist prior to construction. Stockpile areas will avoid the riparian vegetation.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- The contractor will follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Revegetate disturbed areas (work sites, entrance and exit locations, stockpile sites, and pits) when appropriate after construction with native plants or certified weed-free native seed.

Aquatic Species (Virgin River Chub and Woundfin)

Project Commitments

To reduce the effects to aquatic species, in-water work will be conducted "in the dry" behind isolation structures. All fish salvage operations, if considered necessary by UDWR and USFWS, will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs, including the use of hay bales and/or silt fencing or similar practices, to reduce the amount of sediment entering the Virgin River. Further, any in-water work associated with replacement of the I-15 bridge piers will take place during periods of low flow to reduce sedimentation downstream.

- Construction activities in designated Critical Habitat for woundfin and Virgin River chub will not occur during active flooding events.
- Construction in the active channel will not occur during the spring to early summer spawning period (April through June/early July as recommended by the USFWS) of either the Virgin River chub or woundfin.
- All new bridge piers located below the OHWM will be positioned parallel to flow to reduce scouring.
- Erosion control will be provided on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Native vegetation will be established on the slope where possible. Where possible, vegetated filter strips will be provided. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.
- Large equipment will be used in floodplains only when necessary.
- Native grasses and forbs will be used to reseed disturbed soils.
- UDOT will identify and minimize the potential for accidental spills of hazardous materials by implementing BMPs and measures specified in the Storm Water Pollution Prevention Plan (SWPPP). UDOT will develop a spill prevention, control, and countermeasures (SPCC) plan and will follow it during construction. This plan will identify riparian zones and drainages and describe measures to ensure protection. The SPCC plan will give specific protection measures for activities within 100-ft of water bodies and will identify how refueling and equipment maintenance work will be performed to protect surface and ground water.
- Confine construction activities and equipment to the designated construction work areas. These areas will be designated by lathes and flagging. Construction activities will be contained in these areas. New areas will need approval.
- A UDOT Environmental Control Supervisor (ECS) will monitor all environmentally sensitive areas, BMPs, and erosion-control devices.
- To minimize adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, dewater the area behind cofferdams. An in-water work plan will be used to remove fish from the construction area. Biologists will prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams will be removed incrementally to minimize pulses of sediment downstream.

- Pile driving will be accomplished using a vibratory driver. Impact drivers will be used only to proof piles, or if geologic conditions make vibratory installation infeasible. Piles will be driven "in the dry" behind cofferdams.
- All concrete forms associated with overwater supports will be properly cured "in the dry" prior to contact with surface waters.
- Netting will be used to ensure that removed bridge sections and associated debris do not enter surface waters below. Alternatively, floating containment booms could be positioned under the bridge to prevent material from entering the water. Collected material will be removed from the containment booms on a daily basis.
- Cast-in-place concrete for new bridge infrastructure not contained within a dewatered cofferdam will be poured in a manner to prevent the spill of wet concrete into waters below. The concrete will then be protected to allow sufficient curing and protection from the elements. Concrete for overwater infrastructure use will be provided using spill prevention and control measures.

In addition, the following BMPs will be implemented:

- Best management construction practices will be used to limit the release of fine sediment into the Virgin River during construction in areas adjacent to the river. BMPs may include the use of silt-free fill, riprap (if used for rock slope protection), and silt barriers.
- If riprap is used, low-void materials will be incorporated to prevent scour below the water level for the 5-year flood event in an effort to minimize refuge habitat for non-native predatory fish.
- A construction SWPPP and operational stormwater control plan will be developed to prevent pollutants from being introduced into the river due to construction or the use of the bridge and associated roads.
- If bank stabilization and erosion-control structures are necessary, they will be designed to maintain or enhance natural stream function (sinuosity, gradient, hydrology, and sediment transport). Stabilization structures will be defined during the Clean Water Act Section 404 permitting process with the U.S. Army Corps of Engineers.
- Equipment will be cleaned to remove noxious weeds and seeds and petroleum products before being moved onsite.
- Materials will not be stockpiled immediately adjacent to the river channel.
- Fill materials will be free of fines, waste, pollutants, and noxious weeds.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- Disturbed areas will be monitored for noxious and undesirable plant species, and control actions will be implemented if necessary. Disturbed areas will be revegetated when appropriate after construction with native plants or certified weed-free native seed.

3.14 WILDLIFE

3.14.1 AFFECTED ENVIRONMENT

Pursuant to UDWR Administrative Rule R657-48, species and candidate species, which are listed under the ESA, or for which a conservation agreement is in place, automatically qualify for the Utah Sensitive Species List. The additional species on the Utah Sensitive Species List, "wildlife species of concern," are those species for which there is credible scientific evidence to substantiate a threat to continued population viability. It is anticipated that wildlife species of concern designations will identify species for which conservation actions are needed, and that timely and appropriate conservation actions implemented on their behalf will preclude the need to list these species under the provisions of the federal ESA.

Table 3-36 provides the common and scientific names, status, preferred habitat, and probability of occurrence for each of the state listed species that could be present in Washington County. The probability of occurrence is based on known and recorded accounts of possible residence (that is, courtship, nesting, and rearing of young), but such accounts could also be simple sightings as the species moved through the area. Further explanation of a species' probability of occurrence is provided in the paragraphs below. The federally-listed ESA species are not listed in the table; further discussion of these species can be found in Section 3.13.

Table 3-36 Utah Sensitive Species List

Common Name	Scientific Name	State Status*	Preferred Habitat or Known Occurrence Location**	Probability***
Allen's Big-Eared Bat	*Idionycteris phyllotis*	SPC	Rocky and riparian areas in woodland and scrubland regions.	None
American White Pelican	*Pelecanus erythrorhynchos*	SPC	Located in the northern portions of the state, specifically within the Utah Lake/Great Salt Lake ecological complex.	None
Arizona Toad	*Bufo microscaphus*	SPC	Streams, washes, irrigated crop lands, reservoirs, and uplands adjacent to water.	Low
Bald Eagle	*Haliaeetus leucocephalus*	SPC	Nests are almost always in tall trees and commonly near bodies of water where fish and waterfowl prey are available.	None
Big Free-Tailed Bat	*Nyctinomops macrotis*	SPC	Rocky and woodland habitats, roosting occurs in caves, mines, old buildings, and rock crevices.	None
Black Swift	*Cypseloides niger*	SPC	Require waterfalls for nesting; nesting sites are typically surrounded by coniferous forests, often mixed conifer or spruce-fir forests, and nest sites may include mountain shrub, aspen, or even alpine components.	None
Bluehead Sucker	*Catostomus discobolus*	CS	Fast flowing water in high gradient reaches of mountain rivers.	None
Bobolink	*Dolichonyx oryzivorus*	SPC	Occur in low abundance and in isolated patches primarily in the northern half of the state. Nest and forage in wet meadow (grasses and sedges), wet grassland, and irrigated agricultural (primarily pasture and hay fields) areas. These habitats, particularly wet meadows, tend to be associated with riparian or wetland areas.	None

Common Name	Scientific Name	State Status*	Preferred Habitat or Known Occurrence Location**	Probability***
Bonneville Cutthroat Trout	*Oncorhynchus clarkii utah*	CS	High-elevation mountain streams and lakes to low-elevation grassland streams. In all of these habitat types, however, the Bonneville cutthroat trout requires a functional stream riparian zone, which provides structure, cover, shade, and bank stability.	None
Burrowing Owl	*Athene cunicularia*	SPC	Open grassland and prairies, but it also utilizes other open situations, such as golf courses, cemeteries, and airports.	None
Common Chuckwalla	*Sauromalus ater*	SPC	Predominantly found near cliffs, boulders, or rocky slopes, where they use rocks as basking sites and rock crevices for shelter.	None
Desert Iguana	*Dipsosaurus dorsalis*	SPC	Creosote bush desert.	Low
Desert Night Lizard	*Xantusia vigilis*	SPC	Joshua tree limbs and similar cover.	None
Desert Springsnail	*Pyrgulopsis deserta*	SPC	Springs, however characteristics of these springs have not been reported.	None
Desert Sucker	*Catostomus clarkii*	SPC	The species occurs only in the Virgin River system.	Good
Ferruginous Hawk	*Buteo regalis*	SPC	Flat and rolling terrain in grassland or shrub steppe.	None
Flannelmouth Sucker	*Catostomus latipinnis*	CS	The main-stem Colorado River, as well as in many of the Colorado River's large tributaries.	Good
Fringed Myotis	*Myotis thysanodes*	SPC	Inhabits caves, mines, and buildings, most often in desert and woodland areas.	Low
Gila Monster	*Heloderma suspectum*	SPC	Large rocky shelves, sandy areas, and creosote-sagebrush areas.	None
Kit Fox	*Vulpes macrotis*	SPC	Open prairie, plains, and desert habitats.	None
Lewis's Woodpecker	*Melanerpes lewis*	SPC	Burned-over Douglas-fir, mixed conifer, pinyon-juniper, riparian, and oak woodlands, but is also found in the fringes of pine and juniper stands, and deciduous forests, especially riparian cottonwoods.	None
Long-Billed Curlew	*Numenius americanus*	SPC	Short grass (less than 30 cm tall), bare ground components, shade, and abundant vertebrate prey.	None
Mojave Rattlesnake	*Crotalus scutulatus*	SPC	Barren desert and desert scrub habitats.	Low
Mountain Plover	*Charadrius montanus*	SPC	Shortgrass prairie habitat, composed primarily of blue grama and buffalo grass.	None
Northern Goshawk	*Accipiter gentilis*	CS	Mature mountain forest and riparian zone habitats.	None
Pygmy Rabbit	*Brachylagus idahoensis*	SPC	Tall dense sagebrush and loose soils.	None

Common Name	Scientific Name	State Status*	Preferred Habitat or Known Occurrence Location**	Probability***
Short-Eared Owl	*Asio flammeus*	SPC	Grasslands, shrublands, and other open habitats.	None
Sidewinder	*Crotalus cerastes*	SPC	Sandy open terrain.	None
Speckled Rattlesnake	*Crotalus mitchellii*	SPC	Rocky desert areas.	None
Spotted Bat	*Euderma maculatum*	SPC	Variety of habitats, ranging from deserts to forested mountains.	Low
Three-Toed Woodpecker	*Picoides tridactylus*	SPC	Depend on live and dead trees for both nesting and foraging.	None
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	SPC	Can occur in many types of habitat, but the species is often found near forested areas.	None
Virgin Spinedace	*Lepidomeda mollispinis*	CS	Found throughout the Virgin River system.	Good
Western Banded Gecko	*Coleonyx variegatus*	SPC	Can be found in the Mojave Desert.	None
Western Red Bat	*Lasiurus blossevillii*	SPC	Normally found near water, often in wooded areas.	None
Western Threadsnake	*Leptotyphlops humilis*	SPC	Often live in moist loose soil.	None
Western Toad	*Bufo boreas*	SPC	Slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands.	None
Wet-Rock Physa	*Physella zionis*	SPC	Inhabits seeps and "hanging gardens", mainly on the vertical sandstone walls of the narrow canyons through which the North Fork of the Virgin River flows.	None

* SPC = Wildlife species of concern, CS = Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing.
** Source: Utah Department of Natural Resources, Division of Wildlife Resources, March 2011.
*** Probability Definitions: None = No recent records, only historic; habitat may no longer exist in or near the project area. Low = Potential for habitat identified in or near the study area; no known documented occurrences. Good = Habitat identified in or near the study area; known occurrences documented.

Arizona Toad

Historically, the Arizona toad was known to be present in the southwestern U.S. along the lower Virgin River through southwestern Utah and into Nevada and Arizona. It is believed to have disappeared from much of its original range due to land development and river alterations, hybridization with other related toad species, or a combination of these and other factors. The species prefers the quieter parts of rocky streams and rivers, pond or lakes, irrigated farmlands, riparian areas, and possibly upland areas adjacent to water. The species' elevation range varies from near sea level to over 8,000 feet.

Potential habitat in the study area includes the shoreline areas and the adjacent uplands along the Virgin River. The latest known record for this species in the St. George area is from 1999. Given the continued development in the St. George area as well as impacts to the floodplains and river channels of the Santa Clara and Virgin Rivers, it is unlikely that this species is still present in the study area.

Desert Iguana

The desert iguana occurs only in the extreme southwestern corner of Utah. Desert iguanas are tolerant of extremely high temperatures, remaining active in hot weather, although they may seek shelter in rodent burrows. The preferred habitat of the desert iguana in Utah is creosote bush desert. This species is primarily a plant eater, feeding preferentially on the creosote bush, but is also known to eat insects, carrion, and its own

fecal material. Based on Utah Natural Heritage Program (UNHP) data, there are no known occurrences recorded within the study area. In addition, the study area does not contain large populations of creosote bush, therefore it is unlikely that the desert iguana is present in the study area.

Desert Sucker

According to the BA (see Appendix A), the desert sucker is a Utah species of concern that is restricted to the Virgin River Basin. It is native to parts of the Colorado River system of the southwestern United States and northern Mexico. In Utah, the species is present only in the Virgin River system. Specifically, desert suckers are known to occupy the reach of the main-stem Virgin River in the study area, although their occurrence is relatively low and their distribution is scattered due to past efforts to eradicate non-native species.

During full-pass sampling of the Virgin River conducted from the Johnson Diversion to the Webb Hill Fish Barrier in April 2009, UDWR biologists identified 15 adult desert suckers in the reach of the river from the Fort Pierce Wash to the Santa Clara inflow just upstream of the I-15 crossing. In the same sampling period, eight adult desert suckers were collected in the reach of the Virgin River from the Santa Clara inflow to the Webb Hill Fish Barrier, a reach that includes the I-15 crossing. No young of the year were identified in the study area during sampling in April 2009 or July 2009.

Although few desert suckers were collected in the study area during 2009 sampling events, it is apparent that desert sucker benefited from improved in-stream conditions resulting from the December 2010 flooding event. UDWR sampling completed in July and August 2011 collected 29 adult desert sucker in July and 288 in August. During those surveys, 6,019 young of the year were collected in July, and 1,312 young of the year were collected in August. However, fish that were previously present in the study area might have been removed during the November 2011 rotenone treatment. UDWR has completed post-treatment sampling of the study area, but it has not yet summarized the data. For this reason, the current status of desert sucker in the study area is unknown.

Flannelmouth Sucker

According to the BA (see Appendix A), the flannelmouth sucker is native to the Colorado River and is present in the Virgin River and many of its larger tributaries. Although the species has no federal status, it is included on the Utah State Sensitive Species List as a special management species. A Conservation Agreement has been developed to protect the species and its habitat over the long term.

Flannelmouth suckers are known to occupy the reach of the main-stem Virgin River in the study area, although the prevalence of this species is low and distribution is scattered due to past efforts to eradicate non-native fish species. The habitat in the reach of the Virgin River immediately downstream of the Webb Hill Fish Barrier (just downstream of the study area) might not be ideal for flannelmouth suckers due to the abundance of sand bars and the lack of pools.

During full-pass sampling of the Virgin River from the Johnson Diversion to the Webb Hill Fish Barrier in April 2009, UDWR biologists collected one adult flannelmouth sucker in the reach of the river from the Fort Pierce Wash to the Santa Clara inflow just upstream of the I-15 crossing. In the same sampling, two adults were collected in the reach of the Virgin River from the Santa Clara inflow to the Webb Hill Fish Barrier, a reach that includes the I-15 crossing. No young of the year were identified in either reach during the April 2009 or July 2009 sampling events.

Although few flannelmouth suckers were collected in the study area during 2009 sampling events, it is apparent that they, like other native fish, benefited from improved in-stream conditions resulting from the December 2010 flooding event. UDWR full-pass sampling completed in July and August 2011 collected nine adult flannelmouth suckers in July and 30 in August. During those surveys, 3,406 young of the year were collected in July, and 245 young of the year were collected in August. However, fish that were previously present in the study area might have been removed during the November 2011 rotenone treatment. UDWR has completed post-treatment sampling of the study area, but it has not yet summarized the data. For this reason, the current status of flannelmouth sucker in the study area is unknown.

Flannelmouth suckers typically spawn in April and May in the vicinity of the study area. As of 2007, spawning had not been documented in the reaches of the study area. However, based on the collection of young of the year during July and August 2011, it appears that flannelmouth suckers might have spawned in the study area following the December 2010 flooding event.

Fringed Myotis
The fringed myotis is present from Mexico through southern Canada. Although it is not common in Utah, the fringed myotis is widely distributed throughout the state. This bat species typically roosts in caves, rock crevices, and old buildings near desert woodlands and shrublands close to streams or ponds. Fringed myotis also roost under less-traveled roadway bridges, but, since the I-15 bridges in the area are heavily used during the day, it is unlikely that these bridges are used for roosting. The cliffs near the study area above the Virgin River could provide habitat for this species. However, there is only one record of this species in the greater St. George area, and it is from 1985. Given the lack of records and the lack of roosting habitat, it is unlikely that this species occurs in the study area.

Mojave Rattlesnake
The Mojave rattlesnake ranges from southeastern Nevada through much of Mexico. In Utah, it occurs only in the extreme southwestern corner of the state, where it can be found in barren desert and desert scrub habitats. The Mojave rattlesnake is primarily nocturnal, avoiding the heat of the day. Mojave rattlesnakes eat a variety of small mammals (such as kangaroo rats, rabbits, and mice), as well as lizards and occasionally other snakes. There are no known occurrences recorded by UNHP within the study area. However because there is suitable habitat, the Mojave rattlesnake may be present in the study area.

Spotted Bat
The Spotted Bat is similar in range and roosting preferences to the fringed myotis. As with the fringed myotis, roosting habitat for the spotted bat might exist near, but probably not within, the study area (only in the cliffs above the Virgin River). There are two museum records for this species in the greater St. George area from the 1970s. As with the other bat species that could be present in this part of Utah, it is unlikely that this species occurs in the study area.

Virgin Spinedace
According to the BA (see Appendix A), the Virgin spinedace is a member of an endemic group of western minnows and is a Utah conservation species that is restricted to the Virgin River basin. The spinedace was proposed for listing as federally endangered on May 18, 1994 (59 Federal Register 25875). However, the proposal to list this species was withdrawn in 1996 after finalization of the Virgin Spinedace Conservation Agreement and Strategy, which protects the species and its habitat over the long term.

Although Virgin spinedace were historically present in the Virgin River in the vicinity of the I-15 crossing, they currently appear to be rare in the Virgin River from the Johnson Diversion to the Stateline Barrier. Although no spinedace were collected in the study area during 2009 seining conducted in the reach of the Virgin River from the Johnson Diversion to the Stateline Barrier, seven spinedace young of the year were collected in the study area in July 2011. However, spinedace might have been removed from the study area as a result of the November 2011 rotenone treatment. UDWR has completed post-treatment sampling of the study area, but it has not yet summarized the data. For this reason, the current status of spinedace in the study area is unknown, but is presumed to be extremely low.

3.14.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not impact state wildlife resources.

Preferred Alternative

Direct Impacts

Of the state listed species listed in Table 3-36, eight species have potential habitat and/or recent species accounts within the study area: Arizona toad, desert iguana, desert sucker, flannelmouth sucker, fringed myotis, Mojave Rattlesnake, spotted bat, and Virgin spinedace.

Arizona Toad

The Arizona toad has been recorded in the St. George area and has an affinity for upland and riparian areas close to water. Therefore, the Preferred Alternative could affect this species. The greatest potential for impact is mortality or habitat modification that would occur during reconstruction of the I-15 Virgin River bridges. However, since the riparian area surrounding these bridges has been altered due to recent flooding in December 2010 and salt-cedar removal operations by the City of St. George in the Virgin River floodplain, it is unlikely that any significant populations reside in this area. Accordingly, it has been determined that the Preferred Alternative would not negatively affect the Arizona toad.

Desert Iguana

Based on the level and location of anticipated impacts as a result of the Preferred Alternative, and because there are no known occurrences recorded within the study area, it is unlikely that the Preferred Alternative would negatively affect the desert iguana.

Fringed Myotis

The fringed myotis is known to roost in or on caves, cliffs, old buildings, and less-traveled roadway bridges and is historically known to be present in the greater St. George area. There are no potential roosting habitats in the study area that could be affected by the Preferred Alternative. Therefore, it has been determined that the Preferred Alternative would not affect the fringed mytosis.

Mojave Rattlesnake

Based on the level and location of anticipated impacts as a result of the Preferred Alternative, and because there are no known occurrences recorded within the study area, it is unlikely that the Preferred Alternative would negatively affect the Mojave rattlesnake.

Spotted Bat

Since the spotted bat species is similar in range and roosting preferences to the fringed myotis, it has been determined that the Preferred Alternative would not affect the spotted bat.

Virgin Spinedace

The Preferred Alternative would replace the I-15 bridges over the Virgin River. During construction, effects to spinedace could include handling during in-water work isolation activities, including dewatering and associated fish salvage. Turbidity and sedimentation could temporarily increase downstream of in-water work due to bridge pier replacement. Accordingly, it has been determined that the Preferred Alternative would negatively affect the Virgin spinedace.

Desert Sucker

The potential effects to the desert sucker due to proposed replacement of the I-15 bridge and associated piers would be similar to the effects discussed above for the Virgin spinedace. Therefore, it has been determined that the Preferred Alternative would negatively affect the desert sucker.

Flannelmouth Sucker

The potential effects to the desert sucker due to proposed replacement of the I-15 bridge and associated piers would be similar to the effects discussed above for the Virgin spinedace. Therefore, it has been determined that the Preferred Alternative would negatively affect the desert sucker.

Indirect Impacts
The Preferred Alternative would not indirectly impact state wildlife resources.

Mitigation and Project Commitments
See Section 3.13 Threatened and Endangered Species, for mitigation and project commitments to reduce the effects of the Preferred Alternative to aquatic species.

3.15 HAZARDOUS MATERIALS AND HAZARDOUS WASTE SITES
Hazardous waste sites are regulated by the Resource Conservation and Recovery Act (RCRA), by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and by Utah Administrative Code Title 19, Environmental Quality Code.

3.15.1 AFFECTED ENVIRONMENT
The project team reviewed databases from state and federal regulatory agencies to identify generators and facilities that use hazardous waste, accidental releases of hazardous wastes, sites contaminated with hazardous waste, and sites that have the potential for contamination in the proposed study area. These regulatory agency databases include the Utah Division of Environmental Response and Remediation's (DERR) interactive maps and the EPA's EnviroMapper.

Hazardous waste–related incidents and facilities were screened to identify sites with a higher probability for existing soil or groundwater contamination.

High Probability of Environmental Degradation. The following sites have a high probability of existing soil or groundwater contamination:

- **Open LUST (leaking underground storage tank) sites (not yet remediated or closed)** - Eight sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)

Moderate Probability of Environmental Degradation. The following sites have a moderate probability of environmental degradation:

- **Closed LUST sites** - 26 sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)
- **Active UST (underground storage tank) sites** - 33 sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)
- **Toxics Release Inventory (TRI) System sites** - Two sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)

Low Probability of Environmental Degradation. The following sites have a low probability of environmental degradation:

- **RCRIS (Resource Conservation and Recovery Information System) small-quantity and large-quantity waste generators (SQG and LQG)** -25 RCRIS SQG sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)
- **Removed and closed USTs** -24 sites are located within a half mile of the study area (see Table 3-37 and Figures in Volume 2)

Table 3-37 Hazardous Waste Sites within a Half Mile of the Study Area

	Site Name	Probability of Environmental Degradation	Location	Database/Site Description
Underground Storage Tanks (UST)/Leaking Underground Storage Tanks (LUST)				
1	U.H.P. Port Of Entry	Low	Port of Entry	UST (Removed/Closed)
2	UDOT No. 4473	Moderate	401 E Brigham Rd (Bloomington Hills), St. George	UST (Active) LUST (Closed)
3	Bloomington Market	Moderate	141 W Brigham Rd, St. George	UST (Active)
4	Flying J No.05101 St. George	Moderate	2841 S 60 E, St. George	UST (Active) LUST (Closed)
5	Mirastar No. 62040	Moderate	2610 S Pioneer Street, St. George	UST (Active)
6	Maverik No. 261 St. George Hilton	Moderate	336 W Hilton Dr, St. George	UST (Active)
7	Sunmart No. 953	Moderate	120 E Riverside Dr, St. George	UST (Removed/Closed) LUST (Closed)
8	Sunmart No. 887	Moderate	1572 S Convention Center Dr, St. George	UST (Active)
9	Riverside Chevron	Moderate	125 E Riverside Dr, St. George	UST (Active) LUST (Closed)
10	Crest CFN	Moderate	334 E Riverside Dr, St. George	UST (Active)
11	C-Mart No.4	High	1460 S Hilton Dr, St. George	UST (Removed/Closed) LUST (Open)
12	Kwik Mart (D.E. Schmutz)	High	1235 S Bluff St., St. George	UST (Removed/Closed) LUST (Open)
13	Rebel Car Wash & Lube	Moderate	1182 S Bluff St, St. George	UST (Removed/Closed) LUST (Closed)
14	JB Express Mart No.1	Moderate	1148 S Bluff, St. George	UST (Active) LUST (Closed)
15	Victor's Taco Express & More	Moderate	720 E 700 S, St. George	UST (Removed/Closed) LUST (Closed)
16	C-Mart Shell C-2	High	795 E 700 S, St. George	UST (Active) LUST (Open)
17	Dixie Medical Center	Moderate	544 S 400 E, St. George	UST (Active)
18	Maverik No. 229 St. George River Road	Moderate	690 S River Rd, St. George	UST (Active)
19	Dixie College Maintenance Yard and Physical Plant	Moderate	225 S 700 E, St. George	UST (Removed/Closed) LUST (Closed)
20	Fabulous Freddys Car Wash	Moderate	134 S 1300 E (River Rd), St. George	UST (Active)
21	A1 Service Inc.	Low	47 N 600 E, St. George	UST (Closed)
22	L&L Mechanical Contractors	Moderate	50 N 600 E, St. George	UST (Removed/Closed) LUST (Closed)
23	Maverik No. 242 St. George Boulevard	Moderate	702 E St. George Blvd, St. George	UST (Active)

	Site Name	Probability of Environmental Degradation	Location	Database/Site Description
24	Sunmart No. 843	High	810 E St. George Blvd, St. George	UST (Active) LUST (Open)
25	St. George Amoco	High	815 E St. George Blvd, St. George	UST (Removed/Closed) LUST (Open)
26	H & H Shell Oil	High	880 E St. George Blvd, St. George	UST (Temporarily out of use) LUST (Open)
27	Fun Stop Market	Moderate	875 E St. George Blvd, St. George	UST (Removed/Closed) LUST (Closed)
28	Red Rock Auto Sales (Old Exxon Service Station)	Moderate	916 E St. George Blvd, St. George	UST (Removed/Closed) LUST (Closed)
29	Ron's Boulevard Shell & Tire	Moderate	915 E St. George Blvd, St. George	UST (Active) LUST (Closed)
30	Sinclair No. 24955	Moderate	994 E St George Blvd, St. George	UST (Active) LUST (Closed)
31	Newby Oil DBA Hilltop Conoco	Moderate	995 E St George Blvd, St. George	UST (Active)
32	Redcliffs Market	Moderate	1409 E St George Blvd, St. George	UST (Active)
33	Norman Howard (Truck/Transporter)	Moderate	214 N Industrial Rd, St. George	UST (Removed/Closed) LUST (Closed)
34	City of St. George	Moderate	895 E Skyline Dr, Saint George	UST (Active) LUST (Closed)
35	Parkinson Substation	Low	Skyline Drive, St. George	UST (Removed/Closed)
36	Intermountain Farmers Association	Moderate	310 N Industrial Rd, St. George	UST (Removed/Closed) LUST (Closed)
37	Parke Cox Trucking Co. Inc.	Moderate	396 N Industrial Rd, St. George	UST (Active) LUST (Closed)
38	Pepsi Cola Bottling Group	Moderate	477 Industrial Rd, St. George	UST (Active) LUST (Closed)
39	St. George Ford & RV	Low	1295 N Highland Dr, St. George	UST (Removed/Closed)
40	St George Market	Moderate	81 N River Rd, St. George	UST (Active)
41	Handy Storage Center	Low	530 N 1300 E, St. George	UST (Removed/Closed)
42	St. George Bishops Storehouse	Low	516 N 1400 E, St. George	UST (Removed/Closed)
43	U.S. West 671572	High	596 N 1400 E, St. George	UST (Removed/Closed) LUST (Open)
44	St. George Steel Fab., Inc.	Moderate	1301 E 700 N, St. George	UST (Removed/Closed) LUST (Closed)
45	R.W. Jones	Low	675 N Industrial Rd, St. George	UST (Removed/Closed)
46	Randall Dist. Corp	Moderate	765 Redrock Rd, St. George	UST (Removed/Closed) LUST (Closed)
47	Haycock Petroleum	Moderate	845 N Industrial Rd, St. George	UST (Removed/Closed) LUST (Closed)

	Site Name	Probability of Environmental Degradation	Location	Database/Site Description
48	Riverbend Express	Moderate	1391 W Redledge Rd, Washington	UST (Active)
49	Costco Wholesale No. 672	Moderate	835 N 3050 E, St. George	UST (Active)
50	Harts Gas & Food	Moderate	260 S Green Spring Dr, Washington	UST (Active)
51	Red Cliffs Sinclair	Moderate	880 W Red Cliffs Dr, Washington	UST (Active) LUST (Closed)
52	Service Station Inc. Texaco	Moderate	1036 W Middleton Dr, Washington	UST (Active) LUST (Closed)
53	Freeway Chevron No. 208910 (Old Tri-mart No.1063)	High	990 Buena Vista Blvd, Washington	UST (Active) LUST (Open)
54	Mirastar No. 62040	Moderate	2610 S Pioneer Street, St. George	UST (Active)
55	Old Town & County	Moderate	471 Telegraph St, Washington	UST (Active) LUST (Closed)
56	U.S. West 671564	Moderate	100 S 200 W Washington	UST (Removed/Closed) LUST (Closed)
57	Washington Service	Moderate	214 W Telegraph St	UST (Removed/Closed) LUST (Closed)
58	Maverik No. 390	Moderate	980 N Hoodoo Way, Washington	UST (Active)
59	Sunmart No. 980	Moderate	82 N Coral Canyon Blvd, Hurricane	UST (Active)
Resource Conservation and Recovery Information System - Small-Quantity Generators				
60	Wal-Mart Supercenter #3220	Low	2610 S Pioneer Rd, St. George	RCRIS - SQG
61	Greater So. Utah Collision Repair	Low	166 W 1700 S, St. George	RCRIS - SQG
62	ARCO Facility #6334	Low	1572 COnvention Center Dr, St. George	RCRIS - SQG
63	Heritage Honda St. George	Low	1630 Hilton Dr, St. George	RCRIS - SQG
64	Newby Buick Oldsmobile General Motors Corporation	Low	1629 S Main Street, St. George	RCRIS - SQG
65	Rocky Mountain Collision of St. George	Low	1346 S 320 E #1, St. George	RCRIS - SQG
66	Stephen Wade Auto Center	Low	1175 S 150 E, St. George	RCRIS - SQG
67	Anthony Wade Inc.	Low	1175 S 150 E, St. George	RCRIS - SQG

	Site Name	Probability of Environmental Degradation	Location	Database/Site Description
68	Dixie Medical Center	Low	544 S 400 E, St. George	RCRIS - SQG
69	Lowes HIW - St. George	Low	415 S River Rd, St. George	RCRIS - SQG
70	Dixie State College of Utah	Low	225 S 700 E, St. George	RCRIS - SQG
71	Target #1357	Low	275 S River Rd, St. George	RCRIS - SQG
72	Dixie Applied Technology College	Low	46 S 1000 E, St. George	RCRIS - SQG
73	MAACO Auto Painting & Body Works	Low	1275 E Highland Dr #C, St. George	RCRIS - SQG
74	Hansens Body Shop	Low	1141 E 540 N, St. George	RCRIS - SQG
75	White Cap Construction Supply # HDWC0063	Low	1141 E 540 N, Unit #5, St. George	RCRIS - SQG
76	U S West Communications Inc.	Low	599 N 1400 E, St. George	RCRIS - SQG
77	UPS St. George	Low	625 N 1400 E, St. George	RCRIS - SQG
78	St. George Steel Fabrication	Low	1301 E 700 N, St. George	RCRIS - SQG
79	Host Transportation Inc.	Low	845 N Industrial Rd, St. George	RCRIS - SQG
80	Costco Wholesale #672	Low	835 N 3050 E, St. George	RCRIS - SQG
81	ARCO Facility #06332	Low	1036 W Middleton Drive, Washington	RCRIS - SQG
82	Neighborhood Cleaners	Low	875 W Red Cliffs Drive, Washington	RCRIS - SQG
83	The Home Depot USA #4412	Low	725 W Telegraph St, Washington	RCRIS - SQG
84	Wal-Mart Supercenter #1439	Low	625 W Telegraph St, Washington	RCRIS - SQG
Toxics Release Inventory (TRI) System Sites				
86	Aquarius Kitchen & Bath	Moderate	516 N Industrial Rd, St. George	TRI
87	St. George Steel Fabrication, Inc.	Moderate	1301 E 700 N, St. George	TRI

3.15.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Under the No-action Alternative, no improvements to I-15 would be constructed except for routine maintenance activities. Therefore, no impacts to potentially hazardous waste sites would occur.

Preferred Alternative

Direct Impacts

The impact analysis reviewed known and potentially hazardous waste sites within a half mile of the proposed improvements. Four sites were identified that could be directly or indirectly impacted by the Preferred Alternative. These sites are discussed below.

Bloomington Market (Site 3)

This site is an active gas station at 141 West Brigham Road in St. George with USTs. There has been no reported history of hazardous materials releases. The Preferred Alternative would require the acquisition of a small amount of right-of-way from this property (0.01-acres). Because appropriate measure would be taken if construction disturbs this site, no impacts to workers or the environment would be expected.

Flying J No. 05101 St. George (Site 4)

This site is an active gas station/truck stop at 2841 South 60 East in St. George with USTs and a closed LUST. Petroleum could be present in the soil from previous and/or currently undetected fuel releases. The Preferred Alternative would require the acquisition of a small amount of right-of-way from this property (0.02-acres). Soil contaminated with petroleum could be encountered in the area during construction. Because appropriate measure would be taken if construction disturbs this site, no impacts to workers or the environment would be expected.

Service Station Inc. Texaco (Site 52)

This site is an active gas station at 1036 West Red Hills Parkway in Washington City with USTs and a closed LUST. Petroleum could be present in the soil from previous and/or currently undetected fuel releases. The Preferred Alternative would require the acquisition of a small amount of right-of-way (0.2-acres) adjacent to this property. Soil contaminated with petroleum could be encountered in the area during construction. Because appropriate measure would be taken if construction disturbs this site, no impacts to workers or the environment would be expected.

Freeway Chevron No. 208910 (Old Tri-mart No.1063) (Site 53)

This site is an active gas station at 990 West Buena Vista Boulevard in Washington City with USTs and an open LUST. Petroleum could be present in the soil from previous and/or currently undetected fuel releases. The Preferred Alternative would require the acquisition of a small amount of right-of-way from this property (0.08-acres). Soil contaminated with petroleum could be encountered in the area during construction. Because appropriate measure would be taken if construction disturbs this site, no impacts to workers or the environment would be expected.

Indirect Impacts

No indirect impacts.

Mitigation

No mitigation required.

3.16 VISUAL AND AESTHETIC RESOURCES

As per the UDOT Environmental Process Manual, the visual presence of a transportation project is one of its most recognized effects. Guidance in the Environmental Process Manual acknowledges that FHWA regulations do not specifically require visual analysis, but also acknowledges that NEPA requires consideration of this resource.

3.16.1 AFFECTED ENVIRONMENT

Visually, the I-15 corridor from the Utah/Arizona State line to SR-9 is very diverse with both developed and undeveloped areas. The developed areas have many different types of land uses (as discussed previously in this chapter) that can be seen from the I-15 corridor including residential, commercial and industrial developed land. Visually the developed land is dominated by buildings, homes, signs, and trees. There are also large areas of undeveloped land or open space throughout the corridor. This land is dominated by an arid desert landscape that is void of trees, but sparsely covered with shrubs and herbaceous vegetation. Rocky outcrops, flat bluffs and hilly terrain are also present.

Some cut-slopes exist adjacent to the I-15 corridor, specifically the most prominent being at the Price City Hills (located between MP 3 and MP 4 on the east side of the corridor), north of the Virgin River through Webb Hill, north of the St. George Boulevard Interchange through Middleton Black Ridge, and approximately 1.4 miles south of the SR-9 Interchange through Washington Black Ridge or Grapevine Pass. There are also five interchanges along the I-15 corridor with structures that cross above the I-15 mainline that are visually prominent. These include the Southern Parkway Interchange, Dixie Drive Interchange, Bluff Street Interchange, St. George Boulevard Interchange, and Washington Parkway Interchange.

Primarily, there are two user groups who view the I-15 corridor through the study area. The first group is those traveling on I-15 and the second group is those adjacent to the corridor.

3.16.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not involve construction activities and therefore would not impact the visual landscape in the study area for either of the primary user groups.

Preferred Alternative

Direct Impacts

The Preferred Alternative would visually create some minor alterations to the already diverse views. In the areas that would receive a general purpose lane and/or an auxiliary lane, additional pavement width may be noticeable for those traveling the I-15 corridor, but would not be as noticeable for those adjacent to I-15. Proposed modifications at the Brigham Road Interchange and the St. George Boulevard Interchange would be visually apparent to both user groups.

There would be an increase in the existing cut-slopes at Webb Hill and at Grapevine Pass and the creation of a few new cut-slopes adjacent to the southbound lanes from Grapevine Pass to the SR-9 Interchange. The increase and creation of new cut-slopes would be primarily seen by those traveling the corridor; however, the increase and creation of new cut-slopes are not anticipated to cause a visual impact. Where possible, slope rounding and the use of variable slopes would be implemented to create a more natural look. The Preferred Alternative would also alter fill slopes in many areas throughout the corridor and these alterations would be most noticeable by those adjacent to the corridor. These altered fill slopes would not create a visual impact.

A soil nail retaining wall is proposed for the east side of I-15, just south of Dixie Drive. Soil nailing is a technique that stabilizes slopes and allows for the construction of a retaining wall from the top down. Steel tendons are drilled and grouted into the soil. Typically a shotcrete facing is applied, but there are other options, such as precast panels. The soil nail retaining wall would be primarily seen by those traveling the corridor. In the area the soil nail retaining wall is proposed, a steep cut-slope already exists. The soil nail retaining wall is not expected to create a visual impact.

Some locations throughout the corridor qualify for noise walls, as per the UDOT Noise Abatement Policy (see Section 3.8). Installation of these walls is dependent on the outcome of balloting results which would take place during the final design phase of the project. If proposed noise walls are installed, they could potentially change the views for both user groups. The UDOT Standard Drawings identify five panel surface texture options for noise walls (see Figure 3-5 below for potential noise wall treatments).

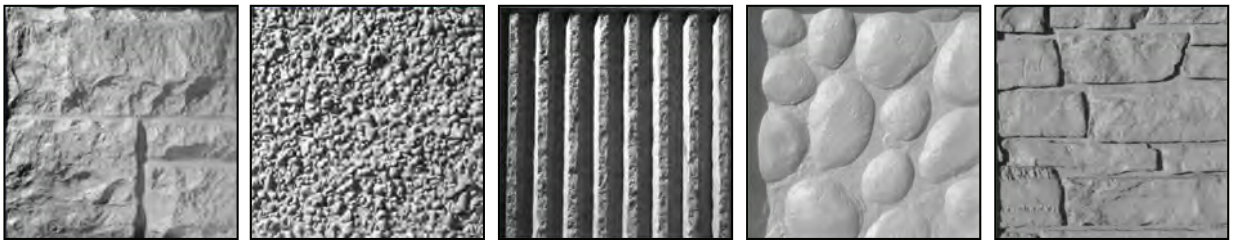


Figure 3-5 Noise Wall Panel Surface Texture Options (UDOT Standard Drawings)

Since the I-15 corridor is highly visible to the communities throughout the study area and for the many drivers who utilize this route, the UDOT Aesthetic Policy would be implemented during the final design phase of the project to determine what, if any aesthetic treatment would be incorporated as a part of the project.

Indirect Impacts
There would be no indirect impact to visual and aesthetic resources as a result of the Preferred Alternative.

Mitigation
No mitigation required.

3.17 WILD AND SCENIC RIVERS
A wild and scenic river is defined by the Wild and Scenic River Act (16 U.S.C. 1271-1287) as one which qualifies for inclusion on the Nationwide Inventory maintained by the Heritage Conservation and Recreation Service, which requires that it must be free-flowing (i.e., "existing or flowing in a natural conditions without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway") and possess "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or similar values."

3.17.1 AFFECTED ENVIRONMENT
On March 30, 2009 portions of the Virgin River and selected tributaries were designated as wild and scenic. However, the portions of the Virgin River and the selected tributaries that were designated as wild and scenic are a considerable distance from the study area.

3.17.2 ENVIRONMENTAL CONSEQUENCES
No-action Alternative
The No-action Alternative would not impact Wild and Scenic Rivers.

Preferred Alternative
The Preferred Alternative would not impact Wild and Scenic Rivers.

Mitigation
No mitigation required.

3.18 WATER QUALITY AND WATER RESOURCES

Water quality in Utah is regulated by the U.S. Environmental Protection Agency (EPA) through the federal Clean Water Act and by the regulations of the Utah Department of Environmental Quality (UDEQ) Division of Water Quality and Division of Drinking Water as described in the Utah Administrative Code, Rules 317 and 309 (UAC R317 and R309). These regulations are summarized below.

Water Quality Standards

Under the Clean Water Act, every State must establish and maintain water quality standards designed to protect, restore, and preserve the quality of waters in the state. These standards consist of narrative standards for all waters, specific numeric chemical and biological criteria necessary for protection of the designated uses, and antidegradation provisions.

Water bodies are considered to have various beneficial uses such as providing drinking water, supporting wildlife, and supporting recreation. Numeric standards for water quality are intended to protect those beneficial uses of the water. Narrative standards are more general statements that prohibit unacceptable water quality conditions such as visible pollution. Antidegradation provisions are intended to maintain high-quality waters at levels above the applicable water quality standards.

UDEQ classifies surface water bodies in the state according to how the water is used (beneficial use), and each classification has associated numeric standards. The classes of water bodies in Utah and their beneficial uses are listed in Table 3-38.

Impaired Waters and Total Maximum Daily Loads

When a lake, river, or stream fails to meet the water quality standards for its designated use, Section 303(d) of the Clean Water Act requires that the State place the water body on a list of "impaired" waters (also known as a Section 303(d) list) and prepare an analysis called a Total Maximum Daily Load (TMDL). The Division of Water Quality conducts a TMDL analysis on the impaired waters to determine the maximum contaminant load that the water body can accept and still meet the standards. The Division then assigns point-source dischargers (that is, holders of Utah Pollutant Discharge Elimination System, or UPDES, permits) a numeric limit for the maximum amount of particular pollutants they can discharge based on the TMDL analysis.

Surface Water Discharges

EPA has delegated authority for the National Pollutant Discharge Elimination System (NPDES) program in Utah to UDEQ. Under this program, industries and companies that could discharge wastewater, stormwater, or other pollutants into water bodies must obtain a UPDES permit to minimize impacts to water quality (see Table 3-39).

Table 3-38 Designated Beneficial Uses for River Streams, Lakes, and Reservoirs in Utah

Class	Description
1	Protected for use as a raw water source for domestic water systems.
1C	Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
2	Protected for recreational use and aesthetics.
2A	Protected for primary contact recreation such as swimming.
2B	Protected for secondary contact recreation such as boating, wading, or similar uses.
3	Protected for use by aquatic wildlife.
3A	Protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
3B	Protected for warm-water species of game fish and other warm-water aquatic life, including the necessary aquatic organisms in their food chain.
3C	Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.
3D	Protected for waterfowl, shore birds, and other water-oriented wildlife not included in classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
3E	Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.
4	Protected for agricultural uses including irrigation crops and stock watering.
5	The Great Salt Lake.

Source: Utah Division of Water Quality

Table 3-39 Water Quality Regulations

Regulation	Regulatory Agency and Requirement	Applicability
Clean Water Act Section 401 State Water Quality Certification	EPA requires UDEQ to certify that the project would not cause Utah water quality standards to be exceeded.	**Water Quality Certification** UDEQ provides this certification to the U.S. Army Corps of Engineers.
Clean Water Act Section 402 (UAC R317-8) NPDES Permit (UPDES in Utah) (Limits discharges)	EPA has delegated authority for the NPDES program in Utah to UDEQ. Large municipalities, such as UDOT, and industrial projects that discharge stormwater to surface water and construction projects that disturb more than 1 acre of land must obtain a UPDES permit to minimize impacts to water quality.	**UPDES Permits** Required for roadway construction UDOT has a municipal stormwater permit and must meet post construction requirements.
Clean Water Act Section 303(d) Total Maximum Daily Load for Impaired Waters (Limits discharges)	EPA requires the Utah Division of Water Quality to identify water bodies that do not meet state water quality standards and therefore do not support their designated beneficial use. The Division submits a 303(d) list of these impaired waters to EPA biannually. The Division conducts a TMDL analysis on the impaired waters to determine the maximum contaminant load that the water body can accept and still meet the standards. The Division then assigns point-source dischargers (UPDES permit holders) a numeric limit for the maximum amount of particular pollutants they can discharge based on the TMDL analysis.	**Impaired Waters** A TMDL analysis has been completed for the Virgin River Watershed, including the Santa Clara River Watershed (Utah Division of Water Quality).
UAC R317-2-7.2 Narrative Water Quality Standards (Limits discharges)	This regulation states that it is unlawful to discharge substances that could cause undesirable effects on human health or aquatic life into surface waters.	**Narrative Standards** All surface waters near the water quality analysis area.
UAC R317-2-14 Numeric Criteria (In-stream standard)	Numeric standards for water quality are based on the beneficial use, such as providing drinking water, supporting game fish, or accommodating recreation. Projects cannot cause water quality standards to be exceeded. If a standard is already being exceeded, a TMDL limit could be applied to the project.	**Numeric Standards** Discharges cannot exceed the current numeric standard.
UAC R317-2-3 Anti-degradation Policy of High-Quality Waters (In-stream standard)	UDEQ regulations state that waters whose existing quality is better than the established standards for the designated uses would be maintained at high quality (that is, the project cannot cause the existing water quality to be degraded).	**High-Quality Waters** None.

Groundwater Discharges

The Utah Water Quality Board classifies aquifers according to their quality and use (such as ecologically important, irreplaceable, drinking water quality, and saline). The Utah Division of Water Quality publishes numeric standards for each class of aquifer. Any person can petition the Board to classify an aquifer. In addition, the Division requires groundwater permits for activities that discharge pollutants into groundwater (UAC R317-6).

Drinking Water Source Protection Zones

Definitions of source protection zones are listed below.

- **Zone 1** is the area within a 100-foot radius from the wellhead or margin of the collection area.
- **Zone 2** is the area within a 250-day groundwater time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) that supply(ies) water to the groundwater source, or the groundwater divide, whichever is closer.

- **Zone 3** is the area within a 3-year groundwater time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) that supply(ies) water to the groundwater source, or the groundwater divide, whichever is closer.
- **Zone 4** is the area within a 15-year groundwater time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) that supply(ies) water to the groundwater source, or the groundwater divide, whichever is closer.

3.18.1 AFFECTED ENVIRONMENT

Surface Water Quality

The water quality analysis area is within the Virgin River Basin, which is about 1,831,000 acres. The area begins where the Virgin River Basin crosses the Utah-Arizona border south of St. George and extends to the river's origins in the Cedar and Pine Valley mountain ranges in the Dixie National Forest.

The two primary surface waters in the water quality analysis area are the Virgin River and the Santa Clara River. Mill Creek, Atkinville Wash, and Fort Pearce Wash are named but unclassified surface waters in the study area. All waters not specifically classified are presumptively classified 2B (infrequent recreation) and 3D (waterfowl). Beneficial-use criteria are stricter for the Virgin River and Santa Clara River, so the numeric analysis was limited to those waters.

Water in the Santa Clara and Virgin Rivers comes from surface runoff from rainfall and snowmelt and from the groundwater entering the channels through springs during late summer and fall. Snowmelt makes up the largest portion of the annual stream flow, though high flows often occur during heavy rain.

A TMDL water quality study was completed for the Virgin River watershed and approved by EPA on September 20, 2004 (Utah Division of Water Quality). The TMDL study stated that various segments of the Santa Clara River and Virgin Rivers are listed on Utah's 2002 Section 303(d) List of Impaired Waters. These segments were again listed in Utah's EPA-Approved 2006 303(d) List of Impaired Waters and Utah's Draft 2010 303(d) List of Impaired Waters.

Table 3-40 shows the beneficial-use classification, the segments that are in the study area or immediately downstream that are listed with impaired beneficial uses, the constituent that causes the impairment, and the source of impairment as listed in the Draft 2010 303(d) List.

Table 3-40 Impaired Beneficial Uses for the Virgin and Santa Clara Rivers

Name	Designated Beneficial Uses	Impaired Beneficial Use(s)	Cause of Impairment	Source of Impairment
Santa Clara River (confluence with Virgin River to Gunlock Reservoir)	1C, 2B, 3C, 4	4	Boron	Source unknown
		3B	Temperature	Source unknown
Virgin River (state line to confluence with Santa Clara River)	2B, 3B, 4	4	Boron	Agriculture
		3B	Temperature	Source unknown
Virgin River (Santa Clara River confluence to Quail Creek diversion; excludes Quail and Leads Creeks)	2B, 3B, 4	4	Boron	Source unknown
		3B	Temperature	Drought-related impacts

Source: Utah Division of Water Quality

The TMDL study stated that many of the impairments occur during low-flow summer conditions when pollutants tend to be concentrated and transport and resident times are decreased. The study also noted that the temperature TMDL might not be warranted for the Santa Clara River. Monitoring since 1982 showed that the average temperatures are between 15 °C (degrees Celsius) and 18 °C and that only a few readings exceeded the standard of 27 °C.

Groundwater Quality

The groundwater system in the Virgin River Basin consists of two distinct aquifer systems: valley fill and consolidated rock. Groundwater withdrawals from the valley-fill aquifers are used primarily for irrigation, while withdrawals from the deeper consolidated-rock aquifers are used for public drinking water. The main consolidated-rock aquifers are found in Navajo Sandstone and the Kayenta Formation and are referred to as the Navajo and Kayenta aquifers. Navajo Sandstone, which is 2,200 feet thick in some areas, overlies the Kayenta Formation (see memo in Appendix A).

Infiltration of precipitation as either rain or snow is thought to be the largest source for recharging the main aquifer. Recharge from the small amounts of precipitation from summer storms is minor, since most of the water is intercepted in shallow subsurface aquifers or is lost through evapotranspiration. Long-lasting storms or storms of high intensity, especially during the winter when evapotranspiration effects are minor, account for the largest percentage of recharge to the deep aquifers.

There are additional sources of groundwater recharge to the aquifers. These include seepage from streams traversing the Navajo Sandstone and Kayenta Formation outcrops, numerous ephemeral washes traversing the outcrops, seepage from overlying and underlying aquifers, and infiltration from unconsumed irrigation water. The dissolved solids concentration of samples from wells and springs in the Navajo and Kayenta aquifers ranges from 110 to 1,310 mg/L (milligrams per liter). Groundwater in most of the Navajo and Kayenta aquifers is low in dissolved minerals with an average dissolved solids concentration of about 300 mg/L. There are two distinct areas with dissolved solids concentrations greater than 500 mg/L: a large area north of St. George and smaller area about 5 miles west of Hurricane near Berry Springs. Water samples from wells and springs near these areas had an average dissolved solids concentration of 1,020 mg/L. These elevated levels might be due to hydrothermal upward flow from underlying formations, since groundwater temperatures are also elevated in these areas (see memo in Appendix A).

Points of Diversion

The points at which water is extracted for use by both private and public parties are called *points-of-diversion* (POD). The Utah Division of Water Rights records permitted PODs from both surface water and groundwater sources (see Figure 3-6).

Groundwater wells are classified according to use. Table 3-41 summarizes the recorded groundwater PODs within 0.25 mile of the Preferred Alternative. These PODs include production and non-production wells, rediversions, and springs. According to information provided by the Utah Division of Water Rights, there are 247 PODs within 0.5 mile of the water quality analysis area, of which 62 have been either terminated or unapproved, leaving a total of 185 approved and perfected PODs within 0.5 mile of I-15. Approved and perfected PODs are shown by their various types and uses in Table 3-41.

Table 3-41 Water Right Points-of-Diversion within 0.50 Mile of the Study Area

Type	Uses	Number
Abandoned well	Irrigation, unknown	3
Point to Point	Other	24
Rediversion	Irrigation, stockwatering, other	5
Return	Domestic	1
Surface	Domestic, irrigation, municipal, stockwatering, other	21
Underground	Domestic, irrigation, municipal, stockwatering, other	17

Drinking Water Source Protection Plans and Zones

There is currently one drinking water source protection zone (Zone 4) in the study area (see Figure 3-6).

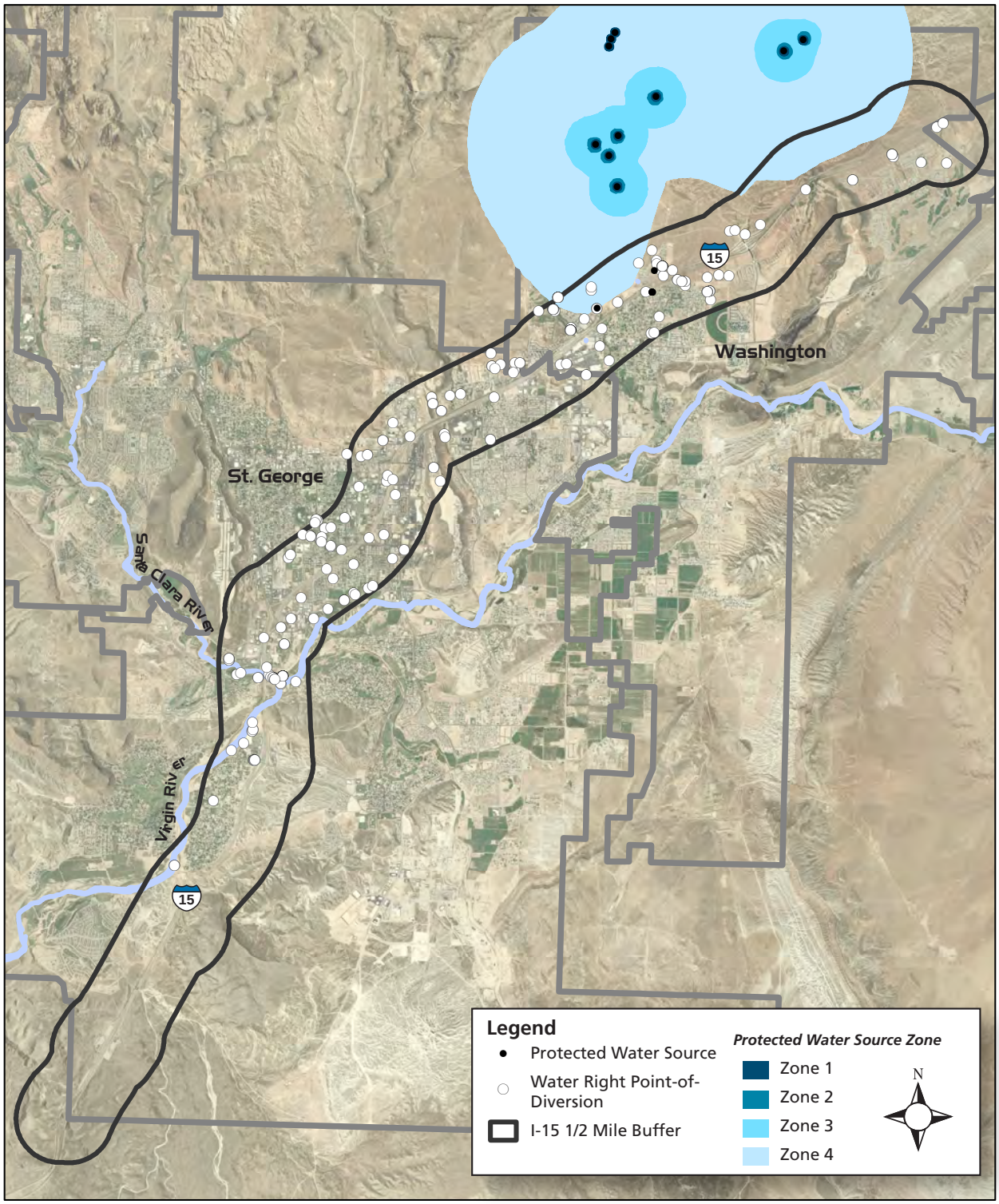


Figure 3-6 Protected Water Source Zones and Points-of-Diversion

High-Quality Waters

High-Quality Waters are those which have been determined to be of exceptional recreational or ecological importance or have been determined to be a State or National resource requiring protection. There are currently no high-quality waters in the study area or immediately downstream according to the High-Quality Waters list (see memo in Appendix A).

Storm Water

In general, areas with storm drain systems capture storm water runoff from roads and convey it to a discharge point, either through catch basins and/or detention ponds. These systems can be effective at reducing total suspended solids (TSS) if storm water is conveyed to a detention pond with discharge control devices prior to storm water entering surface waters. Discharge control devices regulate the flow exiting a detention pond, thus slowing storm water and allowing sufficient time for suspended solids to fall from the flow. Areas without storm drain systems allow storm water to sheet flow into nearby surface waters or infiltrate into the ground.

If not managed properly, roadway runoff can negatively impact water quality by increasing TDS and TSS entering nearby rivers and streams. Highway surfaces collect automobile related pollutants (mainly lead, copper, zinc, oil, grease, and rust) which are then washed off highway surfaces from rain or snowmelt. Unmanaged runoff can become concentrated, gather sediment through erosion, and enter rivers and streams unless measures are taken to reduce pollutants.

Currently, I-15 has an impervious area of about 179 acres.

3.18.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

Under the No-Action Alternative, the Preferred Alternative would not be constructed, so no impacts to water quality would occur as a result of the project. Water resources would continue to be affected and/or altered by ongoing and planned development in the area.

Preferred Alternative

Direct Impacts

Storm Water

Under the Preferred Alternative, there would be an increase in impervious surfaces of approximately 74 acres or an average of 41% over the existing paved area in the study area, resulting in an increase in stormwater runoff volumes. The Preferred Alternative proposes to detain most increases in stormwater runoff that would result from this project so as not to exacerbate existing drainage problems in the area.

Under the Preferred Alternative, detention basins would be constructed throughout the study area to detain the increase in stormwater; thereby allowing sediment and other contaminants to settle out of the water. The detention basins would act as a filter for oil and other contaminants to prevent deterioration of water quality in the Virgin and Santa Clara rivers; thereby maintaining their beneficial uses.

Potential locations for detention basins have been reviewed throughout the study area, with favorable locations being identified for further analysis during design. The potential locations for detention basins are shown in the Figures in Volume 2.

Water Quality

To evaluate impacts from the Preferred Alternative, typical contaminants from highway runoff were identified. Some of the contaminants listed in Table 3-42 were evaluated to determine if the Preferred Alternative would degrade water quality.

Table 3-42 Typical Highway Runoff Contaminants

Contaminant	Source
Bromide	Vehicle exhaust
Cadmium	Tire wear, insecticide application
Chloride	De-icing salts
Chromium	Metal plating, engine parts, brake lining wear
Copper	Metal plating, bearing wear, engine parts, brake lining wear, fungicide and insecticide use
Cyanide	Anticake compound used to keep de-icing salts granular
Iron	Auto body rust, steel structures, engine parts
Lead	Leaded gasoline, tire wear, lubricating oil and grease, bearing wear, atmospheric deposition
Manganese	Engine parts
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, brake lining wear, asphalt paving
Nitrogen, phosphorous	Atmosphere, roadside fertilizer use, sediments
Particulates (sediments or TSS)	Pavement wear, vehicles, atmosphere, maintenance, snow/ice abrasives, sediment disturbance
Pathogenic bacteria	Soil, litter, bird droppings, trucks hauling livestock/stockyard waste
Polychlorinated biphenyls (PCBs), pesticides	Spraying of highway rights-of-way, atmospheric deposition, PCB catalyst in synthetic tires
Petroleum	Spills, leaks, blow-by motor lubricants, antifreeze, hydraulic fluids, asphalt surface leachate
Rubber	Tire wear
Sodium, calcium	De-icing salts, grease
Sulfate	Roadway beds, fuel, de-icing salts
Total dissolved solids (TDS)	De-icing salts, vehicle deposits, pavement wear
Zinc	Tire wear, motor oil, grease

Source: See memo in Appendix A

Surface Water

Water quality impacts were evaluated with respect to the beneficial uses for the Santa Clara River and the Virgin River. Table 3-43 presents the primary contaminants in highway runoff that also have numeric criteria associated with the designated beneficial uses of the Santa Clara and Virgin Rivers (1C, 2B, 3B, 3C, and 4).

Table 3-43 Numeric Criteria Associated with Beneficial Uses of the Santa Clara and Virgin Rivers

Beneficial Uses of River	Phosphorus (total, mg/L)	Turbidity (increase, NTU)	pH	Dissolved Copper (mg/L)	Dissolved Lead (mg/L)	Dissolved Zinc (mg/L)	TDS[a] (Irrigation/ Stock Watering) (mg/L)
1C (domestic water supply)	—	—	6.5–9.0	—	0.015	—	—
2B (secondary contact)	0.05	10	6.5–9.0	—	—	—	—
3B (warm water aquatic life)	0.05	10	6.5–9.0	0.048[b]	0.284[b]	0.379[b]	—
3C (non-game fish)	—	15	6.5–9.0	0.048[b]	0.284[b]	0.379[b]	—
4 (agriculture)	—	—	6.5–9.0	0.2	0.1	—	1,200/2,360

Source: UAC R317

NTU = nephelometric turbidity units

[a] The Virgin River in the water quality analysis area has a site-specific TDS standard of 2,360 mg/L.

[b] Hardness-dependent metals criteria were adjusted for 400 mg/L hardness according to UAC R317-2-14.

Phosphorus, Turbidity and TSS, and pH
This section evaluates the impacts from phosphorus (includes beneficial-use classes 2B and 3B), turbidity and total suspended solids (TSS) (includes classes 2B and 3B), and pH (includes classes 1C, 2B, 3B, 3C, and 4). Turbidity is a physical measure of water clarity, and the standard applies to turbidity increases. TSS concentrations could also be used as a surrogate to evaluate turbidity. There is no numeric standard for TSS.

Phosphorus. Phosphorous levels in roadway stormwater runoff can result from erosion of roadside sediments or from direct application of phosphorus, usually in the form of fertilizer. The Preferred Alternative would include a storm drain system, so increases in phosphorus levels would be limited.

Turbidity and TSS. TSS is present in highway runoff from pavement wear, vehicles, the atmosphere, maintenance, snow/ice abrasives, and disturbed sediment. The storm drainage system proposed for the Preferred Alternative would include detention basins to control flow rates. These detention basins would allow more sediment and suspended particles associated with roadway runoff to settle out of the stormwater. TSS can also result from erosion of roadside soils when stormwater erodes roadside embankments or when high-velocity water erodes soil at the outlet of crossing culverts. The Preferred Alternative would include a storm drainage system, so erosion of roadside soils would be minor.

The greatest potential for the Preferred Alternative to increase TSS and turbidity is during construction. A construction UDPES permit, which prescribes best management practices to control pollution leaving the construction site, would be required for the Preferred Alternative. The permit conditions would require the use of erosion-control measures such as silt fences to reduce impacts to adjacent waters.

pH. The other numeric water quality criterion is pH, which is a measure of water quality. The Preferred Alternative would have no known effect on pH levels in receiving waters.

Heavy Metals
Four additional constituents were analyzed to determine the expected impacts from heavy metals to the beneficial-use classes 1C (lead), 3B (copper, lead, and zinc), 3C (copper, lead, and zinc), and 4 (copper, lead, and TDS). Copper, lead, and zinc are the dominant heavy-metal pollutants in roadway stormwater runoff and have numeric water quality criteria associated with beneficial-use classes 1C, 3B, 3C, and 4.

The toxicity of metals, including copper, lead, and zinc, to aquatic life is hardness dependent, with toxicity decreasing as hardness increases. Metals criteria for beneficial-use classes 3B and 3C can be adjusted for hardness up to a maximum of 400 mg/L hardness as calcium carbonate (UAC R317-2-14).

The Santa Clara River has an average hardness of 926 mg/L, and the Virgin River has an average hardness of 823 mg/L (EPA 2011). Therefore, a correction for hardness of 400 mg/L was used to adjust numeric criteria. These corrections are summarized in Table 3-44.

Table 3-44 Water Quality Standard Adjustment for Water Hardness

Metal	Numeric Criteria for Aquatic Wildlife (Beneficial Uses 3A–3D) (mg/L)	Equation for Hardness Correction Factor (UAC R317-2-14)	Hardness-Adjusted Beneficial-Use Criteria (mg/L)
Copper	0.009	CF × e(0.8545[ln(hardness)] – 1.702) where CF = 0.960, hardness = 400 mg/L	0.029
Lead	0.0025	CF × e(1.273[ln(hardness)] – 4.705) where CF = 1.46203–(ln hardness)(0.145712), CF = 0.559, hardness = 400 mg/L	0.010
Zinc	0.120	CF × e(0.8473[ln(hardness)] + 0.884) where CF = 0.986, hardness = 400 mg/L	0.382

The impacts from the three toxic heavy metals were modeled using the FHWA numerical water quality model.

Methodology for Analysis of Heavy Metals (Copper, Lead, and Zinc). FHWA's numerical water quality model was used to quantify the impacts of metals in the runoff. The model is explained in two FHWA research documents: FHWA-RD-88-006, *Pollutant Loadings and Impacts from Highway Stormwater Runoff,* and FHWA-RD-96-095, *Retention, Detention, and Overland Flow for Pollutant Removal from Highway Stormwater Runoff* see memo in Appendix A). The model described in these documents and used for this analysis is a probabilistic dilution model developed and applied in EPA's Nationwide Urban Runoff Program and reviewed and approved by EPA's Science Advisory Board. The model provides an estimate of the maximum in-stream concentration of a pollutant expected after mixing with the receiving water in any given 3-year period (see memo in Appendix A). This frequency is used because UDEQ allows water quality criteria to be exceeded only once in a 3-year period.

Model Inputs. Data for the model were obtained from the EPA STORET database, which was accessed online, and from project engineering data. The average river flow rate was determined by reviewing data from field measurements by the Utah Division of Water Quality taken on the Santa Clara River between 1977 and 2006 and on the Virgin River from 1984 to 2006, which were the most recent data available. Background concentrations of copper, lead, and zinc were obtained by reviewing Division data from the same period.

The data indicated that the concentrations of these pollutants were below the laboratory detection limit for the majority of samples collected (see memo in Appendix A). The background concentrations were assumed to be half the detection limit in such cases. Concentrations of copper, lead, and zinc in the stormwater runoff from the project are assumed to be similar to the event mean concentrations as analyzed from samples collected during storm events for various locations in Salt Lake County from 1992 to June 2008 (see memo in Appendix A). These event mean concentrations were used since they are more site-specific than the national-average values provided by the numerical analysis documentation (see memo in Appendix A). The values used in the analysis are shown in Table 3-45. Table 3-45 also includes typical concentrations of TSS and TDS as measured in Salt Lake County.

Table 3-45 Event Mean Concentrations during Sampled Storm Events

Pollutant	Event Mean Concentration (mg/L)
Total copper	0.068
Total lead	0.062
Total zinc	0.356
TSS	207.8

Source: See memo in Appendix A

Water Quality Treatment Considerations. Runoff from the Preferred Alternative would be controlled through the use of detention features. These features would include detention ponds, or other means to control runoff and limit stormwater discharges to current levels. To determine the impacts from the Preferred Alternative, the quality of water in the receiving stream was examined after mixing with roadway stormwater runoff after the stormwater left a "conceptual" (proposed) detention basin, which was sized to detain water from the longest stretch of roadway. The pollutant removal rates suggested by FHWA were used in the calculations. Because some amounts of the metals are dissolved in water, removal rates for specific metals are expressed as the particulate fraction multiplied by the TSS removal rate. FHWA suggests average values of the particulate fraction (that is, the fraction removed with TSS) of 90% for lead, 60% for copper, and 60% for zinc.

The conceptual detention basins are sized to detain the stormwater generated from the increased impervious (paved) area due to the Preferred Alternative. These detention basins are anticipated to provide a minimum TSS removal rate of 40%. This figure is based on the size of the basin relative to the size of the area that would drain into the basin (see memo in Appendix A). So, for example, a conceptual detention basin would remove 24% of the copper in storm runoff, because the detention basin has a TSS removal rate of 40% and the particulate percentage for copper is 60% (60% × 40% = 24%).

Note that the Preferred Alternative might use some of the larger regional detention basins that are planned for the area. If used, these larger basins would remove more pollutants than the conceptual basins that were analyzed for the Preferred Alternative.

Heavy Metals Analysis
Table 3-46 and Table 3-47 present the estimated pollutant removal rates and the modeled in-stream concentration of each pollutant in the Virgin and Santa Clara Rivers, respectively. As shown in the tables, the modeled once-every-3-years concentrations would not exceed the numeric water quality standards in Table 3-43 above, so the Preferred Alternative would not affect the beneficial-use classes 1C, 3B, 3C, or 4 of the Santa Clara or Virgin Rivers.

Table 3-46 Effects of Detention Basins on Water Quality and Water Quality Results for the Virgin River

Pollutant	Percent of Pollutant Removed by Detention Basin	Resulting Concentration (mg/L)	Numeric Criteria for Beneficial-Use Class 3C (mg/L)[a]
Copper	24%[b]	0.003	0.029
Lead	36%[b]	0.0004	0.010
Zinc	18%[b]	0.011	0.382

[a] UAC R317, adjusted to 400 mg/L hardness
[b] see memo in Appendix A

Table 3-47 Effects of Detention Basins on Water Quality and Water Quality Results for the Santa Clara River

Pollutant	Percent of Pollutant Removed by Detention Basin	Resulting Concentration (mg/L)	Numeric Criteria for Beneficial-Use Class 3C (mg/L)[a]
Copper	24%[b]	0.028	0.029
Lead	36%[b]	0.005	0.010
Zinc	24%[b]	0.140	0.382

[a] UAC R317, adjusted to 400 mg/L hardness
[b] see memo in Appendix A

Class 4 Beneficial Use (TDS Analysis)
Increases in TDS Due to Construction. The Preferred Alternative could increase the amount of TDS in receiving waters during project construction. However, the required UPDES permit would include erosion-control measures such as silt fences that would minimize TDS impacts.

Increases in TDS Due to Salt Application. The greatest potential effect to the class 4 beneficial use is from the application of salt during winter storms. However, the Preferred Alternative is located in an area with very few snowy or freezing days. Very little, if any, de icing chemicals are anticipated to be used on the constructed surfaces of the Preferred Alternative.

Impaired Waters Analysis, Surface Water Analysis
Three stream reaches within or immediately downstream from the water quality analysis area are listed on Utah's Draft 2010 Section 303(d) list of impaired waters and are identified in Table 3-40 above. The Santa Clara River, from the confluence with the Virgin River to Gunlock Reservoir, exceeds the numerical standards for beneficial-use class 3B (warm-water aquatic life) for temperature and class 4 (agriculture) for boron. The reaches of the Virgin River from the confluence with the Santa Clara River to the Quail Creek diversion, and from the Utah-Arizona border to the confluence with the Santa Clara River, also exceed the numerical standards for beneficial-use class 3B (warm-water aquatic life) for temperature and class 4 (agriculture) for boron.

The impaired reaches of the Santa Clara River and the Virgin River exceed the numerical criterion for temperature. As previously stated, the temperature TMDL might not be warranted because only a few recent readings have exceeded the numeric standard. A delisting of the temperature impairment for this reach has been recommended (see memo in Appendix A).

The area surrounding the Preferred Alternative is already a developed, urban setting, and the project would not clear any shading riparian vegetation or structures that would lead to direct heating of the stream. Therefore, the Preferred Alternative would not have any direct impacts to temperature in the Santa Clara River. It is also unlikely that the Preferred Alternative would have any indirect impacts to temperature in the Santa Clara River. Nutrient (nitrogen and phosphorus) loading and turbidity are the most common indirect causes of excess temperatures in streams. Nutrients are not common runoff constituents from highways. Increased turbidity could result from additional TDS loading, but TDS loading from the project is expected to be minor.
The impaired reaches of the Santa Clara River and Virgin River also exceed the numerical standard for boron. Boron is not a common constituent of highway runoff (See Table 3-42), and direct impacts to the Santa Clara River from boron loading are not expected. The main causes for the boron pollution are not known. The Preferred Alternative is not expected to have any direct or indirect impacts to the Santa Clara River from boron.

Groundwater Analysis

Groundwater Quality. Runoff from the Preferred Alternative could infiltrate the soil and affect the water quality of the shallow aquifer, which is used for irrigation in the water quality analysis area. However, due to the small surface area of the Preferred Alternative relative to the size of the aquifer, direct and indirect impacts are expected to be minor. In addition, there are no irrigation systems near the study area. The principal Navajo and Kayenta aquifers, which provide the drinking water for the area, would be less affected because the primary recharge for these deeper aquifers is snowmelt and rain. The small surface area of the Preferred Alternative, relative to the recharge area of the aquifers, would cause only minor direct or indirect impacts to water quality in the principal aquifers. The aquifers also receive some recharge via seepage from the shallow aquifer and from streams that traverse bedrock outcrops. Impacts to stream water quality and the shallow aquifer are expected to be minor, and this would reduce any potential impacts of the Preferred Alternative on the principal aquifers.

Groundwater Flow. In areas of shallow groundwater, the proposed roadway embankments could compact the underlying soils and alter the groundwater flow. However, the small size of the Preferred Alternative relative to the aquifer would cause only minor, if any, impacts to groundwater flow. During the final design phase of the project, detailed geotechnical evaluation and analysis would be required. At that time, the UDOT would determine the impacts to the groundwater movement from embankment fill and the appropriate mitigation measures to reduce the impacts on groundwater-dependent resources, if any.

Points-of-Diversion Analysis. The Preferred Alternative right-of-way would cross over or near land associated with 185 PODs. These PODs are summarized in Table 3-41 above.

Indirect Impacts

There would be no indirect impacts to water quality and water resources as a result of the Preferred Alternative.

Mitigation and Project Commitments

Project Commitments

Surface Water Quality

The following measures are intended to reduce erosion and apply to all areas along the Preferred Alternative that are proposed for construction. In addition to these measures, where appropriate, UDOT's UPDES Phase II manual will be used.

- ***Cut-and-Fill Slopes.*** Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible. Where possible, provide vegetated filter strips. Vegetated filter strips are UDEQ's preferred water quality treatment measure.
- ***Detention Ponds.*** Detention ponds will be provided for water quality treatment where it is necessary to detain runoff to reduce its peak flow rate. Detention basins will be designed to store runoff and discharge it within about 6 hours to minimize solar heating of the ponded water. If the TMDL analysis concludes that urban stormwater runoff is affecting temperatures in the Santa Clara River, additional stormwater mitigation measure such as infiltration basins or bioswales would also be included with detention basins to manage stormwater runoff from roadway segments that would discharge directly to impaired segments of the River.

Wells and Points-of-Diversion

During the final design of the project, UDOT will work with the property owner to determine the appropriate mitigation measure if a well head or other water right POD is affected. Mitigation could include (1) relocating a well head or surface water diversion to continue to provide irrigation water to any land that is not acquired or (2) abandoning the well and compensating the owner for the value of the associated water right.

Mitigation

No mitigation required.

3.19 FLOODPLAINS

Floodplains are defined as normally dry areas that are occasionally inundated by stormwater runoff or high lake water. Development in floodplains can reduce their flood-carrying capacity and extend the flooding hazard beyond the developed area. For this study, all floodplains within the study area were documented in order to analyze the direct and indirect impacts of the Preferred Alternative.

The principal waterways in the study area have regulatory floodplains. A regulatory floodplain is a floodplain that is recognized by the Federal Emergency Management Agency (FEMA) and adopted by the local community (that is, the community agrees to abide by FEMA regulations associated with the floodplain).

Federal Emergency Management

In response to escalating taxpayer costs for flood disaster relief, Congress established the National Flood Insurance Program (NFIP). This program is a voluntary mitigation program administered by FEMA. Under this program, the federal government makes flood insurance available in those communities that practice sound floodplain management. This incentive encourages state and local governments to develop and implement floodplain management programs.

FEMA requires that participating communities adopt and enforce a floodplain management ordinance that meets minimum NFIP standards. Participating communities in the Regular Program are provided with a Flood Insurance Rate Map and a Flood Insurance Study. FEMA also produces Flood Hazard Boundary Maps and Flood Boundary & Floodway Maps. Several areas or zones of flood hazards are commonly identified on these maps. One of these areas is the Special Flood Hazard Area; this is the area that would be inundated by a 100-year flood. The 100-year flood is defined as a runoff event with a 1 percent chance of occurring in any given year. Special Flood Hazard Areas are assigned a zone designation based on the level of detail of the FEMA study, flooding frequency or probability, and the anticipated type of flooding.

Participating communities are required to review proposed development projects to determine if they are in identified FEMA floodplains. If a project is located in a mapped Special Flood Hazard Area, the project must obtain a Floodplain Development Permit (FDP) from the community before any proposed construction or development begins to ensure that the project meets the requirements of the NFIP.

If a project will cause changes to the FEMA floodplain, one or more FEMA documents must be updated. A Letter of Map Revision (LOMR) officially revises these documents. A LOMR is generally done after the completion of the project causing the changes. In certain situations, a Conditional Letter of Map Revision (CLOMR) must be obtained from FEMA. A CLOMR is FEMA's comment on a proposed project and how it would affect the existing floodplain.

A CLOMR does not have to be done as part of a FDP, but a community may require it before the permit is issued to show anticipated impacts. Further, a CLOMR is required if a proposed project changes the base flood elevations (BFEs) more than a predetermined amount (based on FEMA's minimum standards or more stringent community adopted standards).

The study area includes the following flood zones:

- **Zone A** - Areas subject to inundation by the 1% annual chance flood event determined using approximate methodologies and no base flood elevations or flood depths are established.
- **Zone AE** - Areas subject to inundation by the 1% annual chance flood event determined by detailed methods. Base flood elevations are established.
- **Zone AH** - Areas subject to inundation by 1% annual chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base flood elevations are established.
- **Zone AO** - Areas subject to inundation by 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Base flood elevations are established. This designation is used in areas with high flood velocities such as alluvial fans and washes.
- **Zone X** - Areas subject to inundation by the 0.2% annual chance of flood; areas of 1% annual chance of flood with average depth of less than 1 foot or with drainage areas of less than 1 square mile.

Executive Order 11988, Floodplain Management

Executive Order 11988, Floodplain Management (May 24, 1977), established federal policy "to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

Based on Executive Order 11988, FHWA adopted regulations governing the development of projects that could have impacts on floodplains (23 Code of Federal Regulations [CFR] Part 650, Subpart A). These regulations state that FHWA will not approve a project that involves a "significant encroachment" on a floodplain unless FHWA finds that the proposed significant encroachment is the "only practicable alternative" (23 CFR 650.113). What constitutes a "significant encroachment" is determined on a case-by-case basis by considering adjacent development. FEMA has set a 1 foot increase in the 100-year flood elevation as the upper limit of the allowable encroachment caused by a project.

Under FHWA's regulations, a significant encroachment can arise from any of the following situations:

- Significant potential for interfering with a transportation facility that is needed for emergency vehicles or that provides a community's only evacuation route.
- A significant risk of upstream flooding.
- A significant adverse impact on natural and beneficial floodplain values.
- Natural and beneficial floodplain values include flood conveyance, storage, and control; groundwater recharge; water quality function; and wildlife habitat and diversity.

Furthermore, it is FHWA's policy "to avoid longitudinal encroachments, where practicable" (23 CFR 650.103[b]). Longitudinal encroachments are parallel or nearly parallel to a stream or the edge of a lake.

3.19.1 AFFECTED ENVIRONMENT

The study area is located within St. George City, Washington City, and Hurricane City as well as Washington County; all of which participate in the FEMA Flood Insurance Program. Presently, flood hazard data are currently developed and issued on a county-wide basis. Table 3-48 lists the FEMA community identification number for the three cities and Washington County.

Table 3-48 Communities Participating in the FEMA Flood Insurance Program in the Study Area

Community	FEMA Community Number (CID)
St. George City	490177
Washington City	490182
Hurricane City	490172
Washington County	490224

Source: FEMA

The major FEMA floodplains in the study area are described in Table 3-49. The following rivers and washes contain a mapped floodway: Atkinville Wash, Virgin River, Santa Clara River, Middleton Wash, Mill Creek, and Cottonwood Wash.

Table 3-49 FEMA Floodplains in the Floodplain Study Area

Floodplain	Description
Big Valley Wash	The Big Valley Wash floodplain is near the Utah/Arizona State line. It generally follows the I-15 corridor north, covering portions of the west side, median, and east side of I-15 until it reaches the southerly end of the Port-of- Entry where it turns westerly heading to the Virgin River. The flow generally crosses below back and forth below I-15 through a series of culverts, but the FEMA maps show that it has the potential to flow over I-15. In Utah, the floodplain lies within the boundaries of St. George City as well as unincorporated Washington County. The drainage area is approximately two square miles and generates a 100 year flow of 700 cubic feet per second (cfs). See Sheets 01, 02, and 03 in Volume 2.
Atkinville Wash	The Atkinville Wash floodplain crosses under I-15 just south of the Southern Parkway Interchange through existing bridge structures where it flows westerly through the community of Sun River until its confluence with the Virgin River. The drainage area is very large covering approximately 70 square miles and is projected to have a 100 year flow of 9,940 cfs. The floodplain has been mapped with significant detail including several recent revisions throughout the reach that crosses I-15. See Sheet 04 in Volume 2.
Virgin River	The Virgin River is the main water feature that flows through this part of Southern Utah. Nearly all tributaries throughout the corridor eventually connect to the Virgin River; this includes the Santa Clara River and Fort Pearce Wash, both major flow contributors. The drainage area is extremely large covering nearly 3,840 square miles as it extends all the way into Zion Canyon. The projected 100 year flow is 27,500 cfs. The flows through this reach are northeast to southwest; the floodplain throughout has been mapped in detail. The FEMA maps indicate that the existing I-15 structures can pass the 100 year flow. See Sheets 10 and 11 in Volume 2.
Santa Clara River	The Santa Clara River collects nearly all the drainage in the western portion of Washington County. This river basin extends high into the mountains above Gunlock Reservoir and collects nearly all drainage between Gunlock Reservoir and its confluence with the Virgin River. This confluence happens only a few hundred feet downstream from the point where I-15 crosses over the Santa Clara. This basin has a drainage area of over 540 square miles and delivers a 100 year flow of 13,000 cfs. Unlike many of the washes that contribute to the Virgin River Drainage, the Santa Clara River flows year round providing irrigation uses throughout its reach. This basin also collects flow from the Main Street drainage basin that runs along the west side of I-15 between the Bluff Street Interchange and the new Dixie Drive Interchange. Due to the proximity of the confluence with the Virgin River, both the Santa Clara River and the Virgin River floodplains impact the I-15 corridor in this area. Major modifications have taken place to the Santa Clara floodplain due to the construction of the Dixie Drive Interchange which will eventually result in a LOMR being issued by FEMA. See Sheet 11 in Volume 2.
Hilton Drive Drainage	See 400 East St. George discussion below. See Sheets 12 in Volume 2.
400 East St. George	The 400 East St. George floodplain runs along the northwesterly side of I-15 from approximately 300 East, southwesterly to the Main Street area near the Bluff Street Interchange. It collects flood water from the 400 East and the Main Street drainage basins as well as overflow from the basins to the north along I-15. The Main Street and 400 East drainage basins are very similar in nature; both originate above the St. George City urbanized area and both collect significant urban runoff by the time they reach I-15. Flows collecting near 400 East and I-15 are carried under the freeway through a 72-inch diameter pipe that stays underground and discharges to the Virgin River. Excess flow travels southwesterly along the northwesterly side of I-15 joining with other drainage on its way to combining with flows from the Main Street basin where they are carried under Bluff Street via a large culvert into a drainage channel (Hilton Drive floodplain) that discharges into the Santa Clara River. Hydraulic conditions in the Bluff Street culvert area suggest that flood flows would reach the edges of the adjacent southbound off-ramp as well as mainline I-15. The area of the drainage basin is approximately four square miles generating a 100 year flow of 890 cfs. It should be noted that St. George City is in the process of constructing a large outfall pipe under I-15 at approximately 200 East as part of their Storm Drain Master Plan. When completed this work may affect the operation of the floodplain. See Sheet 13 in Volume 2.

Floodplain	Description
Industrial area/Rim Rock Wash	The Industrial area/Rim Rock Wash floodplain collects the majority of its water from the basin above the St. George Industrial Park and from the Industrial Park itself. The basin extends approximately one mile above the Industrial Park with a total area of about two square miles. A large pipe was installed when I-15 was built to convey the drainage water from north to south. Through growth and development, the wash has been piped and doesn't surface until south of 100 South Street. While it is the intent to carry a large part of the flow through the I-15 culvert, much of the generated flood flows do not reach the inlet and move via surface flow to the south. This surface flow is combined with the water generated within the Industrial Park area creating a large amount of runoff that is directed along the west side of I-15 from approximately 350 North, south across the southbound off ramp and adjacent to mainline I-15 below St. George Boulevard Interchange. Flows in this reach of the wash can be upwards of 600 cfs. See Sheets 16 and 17 in Volume 2.
Middleton Wash	The Middleton Wash drainage basin originates in the area north of I-15 in the Red Cliffs Desert Reserve. The majority of the basin is in the Reserve and encompasses roughly nine square miles. The floodplain generally follows the toe of East Black Ridge crossing the I-15 corridor through a large multi-plate structure. Except for a few road crossings the wash generally remains open all the way to the Virgin River. The 100 year flow from this wash is projected at 2,300 cfs. The floodplain is mapped as it approaches I-15 both upstream and downstream. The FEMA designations are A and AE. See Sheet 18 in Volume 2.
2450 East Wash	The 2450 East Wash has it origins north of Middleton Drive and the adjacent residential areas. A relatively small basin, it is projected to have a 100 year flow of 400 cfs. Flows from this basin are in a natural wash between Middleton Drive and Red Hills Parkway where it is conveyed through a pipe under I-15. Once crossing under I-15, the drainage is contained in local pipe and street networks as it makes its way to the Virgin River. The floodplain is mapped north of I-15 as an A zone but has been removed from the maps to the south due to the developed systems. See Sheet 19 in Volume 2.
Green Springs	The Green Springs floodplain receives the majority of its flows from the Green Springs residential area as well as the Green Springs Golf course located northwesterly of the I-15 corridor. There are a number of springs and ponds throughout the golf course that contribute to the flows. The estimated 100 year flow in this area is 650 cfs. The FEMA maps show that the runoff is conveyed under and over the I-15 corridor where it collects on the southwest side of the freeway and flows northeasterly along the I-15 corridor and along other surface routes until it connects to the Mill Creek floodplain. The floodplain is mapped upstream, across, and downstream of I-15 and is within Washington City limits and is generally designated as Zone A and Zone X. A recent map revision in 2010, to account for localized detention and commercial runoff in the area immediately south of I-15, has been put in place which changes the maps in the localized vicinity. See Sheet 21 in Volume 2.
Mill Creek	Mill Creek is the largest wash that runs through this area of Washington City. It originates high above the developed area north of I-15 where it encompasses a drainage area of 20 square miles. The wash is an open drainage that generally runs along the edges of the developed areas as it makes its way towards I-15. At the freeway it crosses underneath through a large double box culvert where it joins with flows from the Green Springs area. The wash continues downstream with urban development on both sides, crossing under various roadways, including Telegraph Street on its way to the Virgin River. The floodplain is generally mapped in limited detail both upstream and downstream of I-15 and is designated as a Zone AE. The estimated 100 year flow through this reach of the drainage is 3,600 cfs. See Sheets 21 and 22 in Volume 2.
Grapevine Pass Wash	The Grapevine Pass Wash is another large wash in the area. With a drainage area of 13 square miles, only about three square miles lie north of I-15. The 100 year flow for the reach crossing I-15 is estimated to be 1,220 cfs. The wash flows from north to south under I-15 through a large structure. It continues to flow southerly where it confluences with the Cottonwood Wash eventually crossing under Telegraph Street on its way to the Virgin River. Currently the FEMA mapping exists only south of I-15 where the wash is mapped as a Zone A for several hundred feet downstream of I-15 at which point the detailed study starts and a Zone AE continues. See Sheet 27 in Volume 2.

Floodplain	Description
Cottonwood Wash	Cottonwood Wash originates north of I-15 in Washington City and in unincorporated Washington County. As the wash approaches I-15 it enters the City of Hurricane corporate boundaries. It remains in within the City of Hurricane for a short distance until it crosses under SR-9 where it again enters Washington City. The wash continues southerly through a large residential development and golf course, joining with a large unnamed wash. From this confluence it again continues southerly, joining with the Grapevine Pass Wash before entering the Virgin River. The 100 year flow in the reach that crosses I-15 is 1,650 cfs with a corresponding drainage area of approximately four square miles. The FEMA mapped floodplain does not begin until the wash re-enters Washington City boundaries down-stream of SR-9 where it is mapped in detail and designated as a Zone AE. See Sheet 29A in Volume 2.

3.19.2 ENVIRONMENTAL CONSEQUENCES

The 100-year flood event is used to establish regulatory floodplains and is used as the basis of hydraulic design for structures in areas with regulatory floodplains. Although there is a risk of flooding for infrastructure and development in 0.2% annual chance flood zones, the discussion of environmental consequences is limited to the Zone A, Zone AE, Zone AH, and Zone AO (100-year) flood zones.

No-action Alternative

Direct Impacts

Under the No-action Alternative no impacts to floodplains would occur. However, it is important to note that parts of the existing I-15 corridor are located within regulatory floodplains.

Indirect Impacts

There would be no indirect impacts to floodplains as a result of the No-action Alternative.

Preferred Alternative

Direct Impacts

Efforts to avoid or minimize encroaching on floodplains were incorporated into the Preferred Alternative. Impacts to floodplains in the study area are described below in Table 3-50.

Table 3-50 Floodplain Impacts

Floodplain	Impact
Big Valley Wash	The Preferred Alternative would not impact the floodplain.
Atkinville Wash	The Preferred Alternative may impact the 100-year floodplain with fill slopes associated with the new northbound Atkinville Wash structure; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Virgin River	The Preferred Alternative may impact the 100-year floodplain with fill slopes associated with the new Virgin River northbound structure; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Santa Clara River	The Preferred Alternative would not impact the floodplain.
Hilton Drive Drainage	The Preferred Alternative may impact the 100-year floodplain with the additional auxiliary lane and travel lane in each direction and their associated fill slopes; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
400 East St. George	The Preferred Alternative may impact the 100-year floodplain with fill slopes associated with the additional southbound travel lane; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.

Floodplain	Impact
Industrial area/Rim Rock Wash	The Preferred Alternative would impact the 100-year floodplain with the additional southbound travel lane and its associated cut slope; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Middleton Wash	The Preferred Alternative would impact the 100-year floodplain with a proposed detention basin on the northwest side of I-15; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
2450 East Wash	The Preferred Alternative would not impact the floodplain.
Green Springs	The Preferred Alternative may impact the 100-year floodplain with the additional travel lane in each direction and their associated fill slopes; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Mill Creek	The Preferred Alternative may impact the 100-year floodplain with the additional travel lane in each direction and their associated fill slopes; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Grapevine Pass Wash	The Preferred Alternative may impact the 100-year floodplain with the additional auxiliary lane and travel lane in each direction and their associated fill slopes; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Cottonwood Wash	The Preferred Alternative may impact the 100-year floodplain with the approach of the improved southbound exit deceleration loop ramp and the reconstruction of the northbound off and on-ramps; however, this impact would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.

Indirect Impacts

There would be no indirect impacts to floodplains as a result of the Preferred Alternative.

Mitigation and Project Commitments

Project Commitments

Measures will be taken to ensure that the Preferred Alternative will comply with applicable local, state, and federal regulations. These measures include the following:

- The Preferred Alternative would require new structures over Atkinville Wash and the Virgin River at I-15. The design of hydraulic structures will follow the UDOT Manual of Instruction as well as FEMA and local floodplain requirements. Where impacts to the floodplain are unavoidable, proper steps will be taken with the local community and FEMA to obtain a Letter of Map Revision. These steps include obtaining the following:
    - Local (St. George, Washington City, or Hurricane) approval of Conditional Letter of Map Revision documentation;
    - A Conditional Letter of Map Revision from FEMA;
    - A floodplain development permit from the St. George, Washington City or Hurricane; and
    - Following project completion, a Letter of Map Revision from FEMA.
- UDOT or its construction contractor will obtain Stream Alteration Permits from the Utah Division of Water Rights for all stream crossings.
- UDOT or its construction contractor will file a General Permit with the Utah Division of Forestry, Fire, and State Lands for all new crossings to obtain an easement over and/or upon the stream bed.
- UDOT or its engineer will perform detailed hydraulic modeling, scour analyses, and scour countermeasure design to properly assess flooding and scour potential and mitigate against flood and scour events. The design will take into account the established Erosion Hazard Boundary and meet the requirements of St. George City Code Section 10-23-7.

- Where feasible, roadway elevations will be designed to be above the 100-year floodplain.
- New structures proposed in the Preferred Alternative which encroach on the 100-year floodplain and/or the erosion hazard zone will include design elements that provide protection from riverine lateral migration and erosion and will be designed to convey the 100-year event.

Mitigation
No mitigation required.

3.20 ENERGY

3.20.1 BACKGROUND

In the context of transportation projects, energy is consumed during both the construction and the operational phases of the project. For construction, it is used to manufacture and transport materials and to operate construction machinery. During operation of the facility, energy is primarily related to vehicle fuel consumption, which is dependent upon vehicle miles traveled, traffic flow, and travel conditions, i.e. vehicle type, speed, weather conditions, and roadway conditions such as vertical grade, roadway geometry, and the type and condition of the pavement.

3.20.2 AFFECTED ENVIRONMENT

The energy requirements were analyzed for the construction and operational needs for both the No-action Alternative and Preferred Alternative. Construction energy requirements were analyzed on a qualitative basis as to whether the alternative would require construction activities and is discussed in Section 3.22 Construction. Operational energy requirements were analyzed using the daily Vehicle Miles Traveled (VMT) calculated by the traffic model for this project and an analysis of the LOS for the existing conditions, the No-action Alternative, and the Preferred Alternative.

Table 3-51 Comparison of Vehicle Miles Traveled for I-15 Mainline

I-15 Mainline Segment	Alternatives (Vehicles Miles Traveled)		
	Existing Conditions	No-action Alternative	Preferred Alternative
State line to Southern Parkway	57,490	104,840	104,840
Southern Parkway to Brigham Road	58,710	187,110	189,570
Brigham Road to Bluff Street	71,830	180,320	183,540
Bluff Street to St. George Boulevard	70,630	204,570	213,660
St. George Boulevard to Green Springs Drive	106,720	231,970	246,170
Green Springs Drive to Washington Parkway	114,300	260,810	281,270
Washington Parkway to SR-9	98,350	261,280	279,460

As shown in Table 3-51, travel demand on I-15 for the Preferred Alternative and the No-action Alternative would be similar. The Preferred Alternative would have a slightly higher travel demand due in part because the proposed improvements increase the efficiency of the roadway and would attract rerouted trips from elsewhere in the transportation network.

Under existing conditions, the majority of the segments of the I-15 mainline operated at LOS B or better. With the increased travel demand under the No-action Alternative, combined with the lack of any improvements to handle the increased travel demand, the majority of the I-15 segments would operate at LOS E or F. For the I-15 interchanges in the study area, existing conditions have the majority of the interchange movements operating at LOS B or better, while the No-action Alternative would have just over half of the interchange movements operating at LOS E or F (with all of the remaining interchanges operating at LOS B except one that would operate at LOS D). See Tables 1-2 and 1-3 in Chapter 1. As discussed in Chapter 2, the Preferred Alternative was designed specifically to provide LOS D or better for all of the I-15 mainline segments, as well as the interchange movements within the study area. Therefore, the improvements included in the Preferred

Alternative would address the congestion and delay that would occur under the No-action Alternative in the areas where the projected LOS would exceed LOS D.

3.21.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

According to Table 3-51, the No-action Alternative would have a similar number of vehicle miles traveled in the project area as the Preferred Alternative, regardless of whether the project is undertaken. However, as discussed above, the No-action Alternative would result in an increase in congestion and a higher LOS in the study area that would in turn reduce vehicle efficiency and increase fuel consumption over time.

Preferred Alternative

According to the above comparison, the Preferred Alternative would have a similar number of vehicle miles traveled in the study area as the No-action Alternative. This comparison, however, does not take into account the reduction in congestion that would occur under the Preferred Alternative due to the implementation of the proposed improvements. With the Preferred Alternative, traffic would flow more smoothly and, as discussed above, would result in a lower LOS in the study area, thereby improving fuel efficiency and decreasing fuel consumption over time.

The Preferred Alternative would result in an overall decrease in energy requirements over the long term, as compared to the No-action Alternative.

Mitigation

No mitigation is required.

3.21 INVASIVE SPECIES

Executive Order 13112 directs federal agencies to expand and coordinate their efforts to combat the introduction and spread of plants and animals not native to the United States. Non-native flora and fauna can cause substantial changes to ecosystems, upset the ecological balance, and cause economic harm to our nation's agricultural and recreational sectors. Since roadway corridors provide opportunities for the movement of invasive species through the landscape, it is important that roadway projects include measures to combat the introduction and spread of invasive species.

3.21.1 AFFECTED ENVIRONMENT

Land uses and degrees of development vary throughout the study area (see Section 3.1 Land Use). There are highly developed areas that are well maintained that would provide little opportunity for the movement of invasive species. However, there is also vacant and undeveloped land that is not maintained. These areas provide the greatest opportunity for movement and the spread of invasive species.

3.21.2 ENVIRONMENTAL CONSEQUENCES

No-action Alternative

The No-action Alternative would not provide direct opportunities for movement of invasive species in the study area.

Preferred Alternative

Direct Impacts

Non-native plants can cause substantial changes to ecosystems, upset ecological balance, and cause economic harm to our nation's agricultural and recreational sectors. Since roadway corridors provide opportunities for the movement of invasive species through the landscape, it is important that roadway projects include measures to combat the introduction and spread of invasive species. The Preferred Alternative includes highway construction and would provide opportunities for the movement of invasive species through the landscape.

Indirect Impacts
As a result of the Preferred Alternative, development of adjacent properties may be accelerated. This development would provide opportunities for the movement of invasive species.

Mitigation
No mitigation required.

3.22 CONSTRUCTION IMPACTS
3.22.1 ENVIRONMENTAL CONSEQUENCES
No-action Alternative
There would be no construction impacts associated with the No-action Alternative.

Preferred Alternative
Social Conditions and Environmental Justice
Local residents as well as people traveling through the study area would experience frustrations associated with traffic congestion, delays, and detours during the construction period. In addition, some residents who live in close proximity to the study corridor may experience disturbance effects from noise and dust generated by construction activities. However, such effects would occur only during the project's construction phase.

Project Commitments
Impacts during construction will be mitigated through implementation of a traffic-control plan with advance notice to those affected.

Economic Conditions
Most of the Preferred Alternative would not limit access from existing roadways to businesses. There may be some short-term construction impacts to businesses located near the Brigham Road Interchange, the St. George Boulevard Interchange, and the SR-9 Interchange during the reconfiguration of these interchanges. There may also be some short-term construction impacts to businesses during the construction of an I-15 overpass at Mall Drive and the re-configuration of the Red Hills Parkway/Green Springs Drive intersection to a thru-turn configuration. These inconveniences are expected to be of shorter duration. Overall, construction is not expected to substantially impact business access, operations or sales.

Project Commitments
Access to businesses in the construction area will be maintained during the construction and post-construction phases of this project, as this is UDOT's policy with respect to access issues on all UDOT roadway improvement projects. UDOT will coordinate with property owners and businesses to evaluate ways to maintain access while still allowing efficient construction operations.

Pedestrians and Bicyclist Issues
The Preferred Alternative would require the temporary closure of the Virgin River Trail where the trail crosses I-15.

Project Commitments
A detour route will be provided for the Virgin River Trail.

Air Quality
Construction of the Preferred Alternative would result in temporary negative effects to air quality in the study area due to increased dust and particulates. PM_{10} emissions from construction activities are usually local and short-term and last only for the duration of the construction period. Construction activity may also generate a temporary increase in MSAT emissions, especially for long-term construction projects.

Project Commitments
Construction mitigation includes strategies that reduce engine activity or reduce emissions per unit of operating time, such as reducing the numbers of trips and extended idling. Operational agreements that reduce or redirect work or shift times to avoid community exposures can have positive benefits when sites are near populated areas.

Construction emissions for PM_{10} will be minimized through good construction practices such as watering exposed surfaces, minimizing the amount of exposed and disturbed surfaces, minimizing construction equipment and vehicle speeds, and properly maintaining vehicle engines.

The Utah Air Quality Rules will require a dust-control plan from all sources whose activities or equipment could produce fugitive dust or airborne dust. A dust-control plan will be prepared for the construction phase of the proposed project. Dust-control measures could include planting vegetative cover, providing synthetic covers, and watering and/or chemically stabilizing unpaved haul roads.

Noise
Area residents would experience temporary inconvenience due to construction noise. Extended disruption of normal activities is not anticipated, since no one receptor is expected to be exposed to construction noise of long duration.

Project Commitments
Construction noise impacts are considered temporary and will be minimized through adherence to UDOT Standard Specification 01355 - Environmental Compliance, Part 3.6 - Noise and Vibration Control.

Cultural (Archaeological and Architectural) Resources
There is the possibility to impact undiscovered archaeological sites during construction of the Preferred Alternative.

Project Commitments
The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Paleontology
There is the possibility to impact undiscovered paleontological sites during construction of the Preferred Alternative.

Project Commitments
The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Section 4(f) and Section 6(f) Resources
Recreational Resources
The Preferred Alternative would require the temporary closure of the Virgin River Trail (a Section 4(f) resource) where the trail crosses I-15.

Cultural Resources
There is the possibility to impact undiscovered archaeological sites, eligible for Section 4(f), during construction of the Preferred Alternative.

Project Commitments
- A detour route will be provided for the Virgin River Trail.
- The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Wetlands

The Preferred Alternative would include the construction of two new bridges over the Virgin River and one new bridge and the widening of the other bridge at Atkinville Wash. Replacement of the bridges would require construction work in the channels of Atkinville Wash and in the Virgin River for the placement of bridge piers.

Project Commitments

A Section 404 Permit will be obtained from the U.S. Army Corps of Engineers (USACE) for all work to be conducted within the Virgin River, Atkinville Wash, and any other waters of the U.S. and wetlands that are determined to be jurisdictional.

Threatened & Endangered Species

Desert Tortoise: The desert tortoise is likely to be adversely affected by construction of the Preferred Alternative as a result of mortality, harm, and harassment from construction activities. To minimize impacts to the desert tortoise, all newly installed fence associated with the right-of-way acquisition would include USFWS approved exclusionary fencing, and would be installed prior to construction activities. However, if desert tortoises stray into the construction zone there is the potential that individuals would be killed or harmed as a result of being crushed or hit by construction equipment.

Dwarf Bear-Poppy: It is anticipated that the construction of the Preferred Alternative would reduce the number of ground-nesting bees and thus the number of potential pollinators of dwarf bear-poppy.

Holmgren milk-vetch: Although Holmgren milk-vetch is self-compatible and not totally dependent on pollinators, it is anticipated that the construction of the project would reduce the number of ground-nesting bees and thus the number of potential pollinators of Holmgren milk-vetch. However, the ultimate effects of highway construction and operation on the pollinators of Holmgren milk-vetch are unknown.

Aquatic Species (Virgin River Chub and Woundfin): The following impacts are a result of construction of the Preferred Alternative may occur:

- Construction of the Preferred Alternative would require work below the Ordinary High Water Mark (OHWM), within the active channel, and adjacent to the river channel and may disturb Virgin River chub and woundfin through the temporary introduction of sediments and increased turbidity associated with construction along the banks and within the floodplain.
- In-water work will likely be required during the construction of the Preferred Alternative, including the installation of dewatering cofferdams, in habitat known to be occupied by the Virgin River chub and woundfin. During dewatering, individuals could be subject to handling, which would constitute harassment and take as defined under the ESA.
- Spawning habitat is present in the study area; therefore, depending on construction timing, redds or recently hatched juveniles could be adversely affected during in-water work.
- Construction would occur in the active channel, resulting in a temporary loss of available habitat where in-stream construction isolation structures are present.
- Construction equipment would be present in the floodplain, which could result in compaction of substrate and loss of vegetation along the riparian corridor.
- In-stream work, including cofferdam placement and removal, would result in increased sedimentation that could temporarily affect the water primary constituent elements (PCEs) as related to turbidity.

Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo): Temporary construction activities could deter migrating flycatchers from using the Virgin River as a travel route in the study area during the construction period. However, because this species is highly mobile, other entries into the Virgin River valley, though possibly less desirable, would still be available to the species. The Preferred Alternative is not anticipated to affect any nesting either from construction activities or construction-related noise. The closest known nesting of this species (over 1.2 miles northeast of the Virgin River Bridge) is well beyond the point at which any elevated noise generated from construction activities would have returned to existing background levels.

Mitigation and Project Commitments

Desert Tortoise

Project Commitments

- A pre-construction desert tortoise survey, and potential relocation activities, will be conducted by a qualified tortoise biologist prior to ground-disturbing activities. All surveys, handling, and burrow excavation and construction will be conducted in accordance with the protocol described in *Guidelines for Handling Desert Tortoises During Construction Projects*. Desert tortoise survey and relocation activities shall be coordinated with USFWS and the Red Cliffs Desert Reserve.
- To minimize habitat loss the Preferred Alternative will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the areas where cut/fill would be required.
- New right-of-way fence installed adjacent to desert tortoise Critical Habitat would include USFWS-approved exclusionary desert tortoise fencing, and will be installed prior to construction activities.
- No drainage basins will be located in desert tortoise Critical Habitat.

Mitigation

- Mitigation for effects to desert tortoise Critical Habitat will be implemented at a 5:1 ratio for direct impacts. All mitigation for the desert tortoise will be applied to protection of the species within the Red Cliffs Desert Reserve. Mitigation not applied within the Red Cliffs Desert Reserve for the desert tortoise will be at a 10:1 ratio for direct impacts. Mitigation shall be approved by USFWS and the Red Cliffs Desert Reserve prior to a commitment of resources, and will be conducted prior to project impacts in desert tortoise Critical Habitat.

Dwarf Bear-Poppy

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify dwarf bear-poppy occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Environmental fencing will be installed around dwarf bear-poppy occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of dwarf bear-poppy occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual dwarf bear-poppy species and minimize habitat loss in dwarf bear-poppy suitable habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in dwarf bear-poppy suitable habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to dwarf bear-poppy occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to dwarf bear-poppy suitable habitat will be implemented at a 1:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in occupied and/or suitable habitat.

Holmgren Milk-Vetch

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify Holmgren milk-vetch occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.

- Construction activities will be restricted in Holmgren milk-vetch Critical Habitat to the limits identified in the BA (see Appendix A). In areas of the right-of-way that are not within Holmgren milk-vetch Critical Habitat, environmental fencing will be installed around Holmgren milk-vetch occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of Holmgren milk-vetch occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual Holmgren milk-vetch species and minimize habitat loss in Holmgren milk-vetch Critical Habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in Holmgren milk-vetch Critical Habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to Holmgren milk-vetch occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to Holmgren milk-vetch Critical Habitat (unoccupied) will be implemented at a 2:1 ratio for direct impacts. All mitigation for the Holmgren milk-vetch will be applied to protection of the species within the Utah-Arizona Border Unit of designated Holmgren milk-vetch Critical Habitat. Mitigation for effects in occupied habitat that will not be applied within the Utah-Arizona Border Unit would be at a 6:1 ratio for direct impacts. Mitigation for effects in Critical Habitat (unoccupied) that will not be applied within the Utah-Arizona Border Unit would be at a 4:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in Holmgren milk-vetch occupied and/or Critical Habitat.
- Pre and post construction surveys will be conducted in areas of Holmgren milk-vetch Critical Habitat that will be temporarily impacted in order to determine whether a permanent impact has occurred where not anticipated. Pre and post construction survey activities, and associated reports, will be coordinated with USFWS. Additional mitigation that may be required as a result of unanticipated, permanent impacts shall be approved by USFWS.

Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo)

Project Commitments

- Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible.
- Prior to construction, the contractor will confirm that the conditions included in the Biological Opinion are implemented as needed.

In addition, the following BMPs will be implemented:

- Stockpile areas will be approved by UDOT or a qualified biologist prior to construction. Stockpile areas will avoid the riparian vegetation.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- The contractor will follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Revegetate disturbed areas (work sites, entrance and exit locations, stockpile sites, and pits) when appropriate after construction with native plants or certified weed-free native seed.

Aquatic Species (Virgin River Chub and Woundfin)

Project Commitments

To reduce the effects to aquatic species, in-water work will be conducted "in the dry" behind isolation structures. All fish salvage operations, if considered necessary by UDWR and USFWS, will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs, including the use of hay bales and/or silt fencing or similar practices, to reduce the amount of sediment entering the Virgin River. Further, any in-

water work associated with replacement of the I-15 bridge piers will take place during periods of low flow to reduce sedimentation downstream.

- Construction activities in designated Critical Habitat for woundfin and Virgin River chub will not occur during active flooding events.
- Construction in the active channel will not occur during the spring to early summer spawning period (April through June/early July as recommended by the USFWS) of either the Virgin River chub or woundfin.
- All new bridge piers located below the OHWM will be positioned parallel to flow to reduce scouring.
- Erosion control will be provided on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Native vegetation will be established on the slope where possible. Where possible, vegetated filter strips will be provided. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.
- Large equipment will be used in floodplains only when necessary.
- Native grasses and forbs will be used to reseed disturbed soils.
- UDOT will identify and minimize the potential for accidental spills of hazardous materials by implementing BMPs and measures specified in the Storm Water Pollution Prevention Plan (SWPPP). UDOT will develop a spill prevention, control, and countermeasures (SPCC) plan and will follow it during construction. This plan will identify riparian zones and drainages and describe measures to ensure protection. The SPCC plan will give specific protection measures for activities within 100-ft of water bodies and will identify how refueling and equipment maintenance work will be performed to protect surface and ground water.
- Confine construction activities and equipment to the designated construction work areas. These areas will be designated by lathes and flagging. Construction activities will be contained in these areas. New areas will need approval.
- A UDOT Environmental Control Supervisor (ECS) will monitor all environmentally sensitive areas, BMPs, and erosion-control devices.
- To minimize adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, dewater the area behind cofferdams. An in-water work plan will be used to remove fish from the construction area. Biologists will prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams will be removed incrementally to minimize pulses of sediment downstream.
- Pile driving will be accomplished using a vibratory driver. Impact drivers will be used only to proof piles, or if geologic conditions make vibratory installation infeasible. Piles will be driven "in the dry" behind cofferdams.
- All concrete forms associated with overwater supports will be properly cured "in the dry" prior to contact with surface waters.
- Netting will be used to ensure that removed bridge sections and associated debris do not enter surface waters below. Alternatively, floating containment booms could be positioned under the bridge to prevent material from entering the water. Collected material will be removed from the containment booms on a daily basis.
- Cast-in-place concrete for new bridge infrastructure not contained within a dewatered cofferdam will be poured in a manner to prevent the spill of wet concrete into waters below. The concrete will then be protected to allow sufficient curing and protection from the elements. Concrete for overwater infrastructure use will be provided using spill prevention and control measures.

In addition, the following BMPs will be implemented:

- Best management construction practices will be used to limit the release of fine sediment into the Virgin River during construction in areas adjacent to the river. BMPs may include the use of silt-free fill, riprap (if used for rock slope protection), and silt barriers.

- If riprap is used, low-void materials will be incorporated to prevent scour below the water level for the 5-year flood event in an effort to minimize refuge habitat for non-native predatory fish.
- A construction SWPPP and operational stormwater control plan will be developed to prevent pollutants from being introduced into the river due to construction or the use of the bridge and associated roads.
- If bank stabilization and erosion-control structures are necessary, they will be designed to maintain or enhance natural stream function (sinuosity, gradient, hydrology, and sediment transport). Stabilization structures will be defined during the Clean Water Act Section 404 permitting process with the U.S. Army Corps of Engineers.
- Equipment will be cleaned to remove noxious weeds and seeds and petroleum products before being moved onsite.
- Materials will not be stockpiled immediately adjacent to the river channel.
- Fill materials will be free of fines, waste, pollutants, and noxious weeds.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- Disturbed areas will be monitored for noxious and undesirable plant species, and control actions will be implemented if necessary. Disturbed areas will be revegetated when appropriate after construction with native plants or certified weed-free native seed.

Wildlife

Native species in the Virgin River (Virgin spinedace, desert sucker, and flannelmouth sucker) would experience similar effects as the aquatic species discussed in the threatened and endangered species section during construction of the Preferred Alternative.

Mitigation and Project Commitments

See Threatened and Endangered Species section above for mitigation and project commitments.

Hazardous Materials and Hazardous Waste Sites

There is the possibility to impact undiscovered hazardous waste sites during construction of the Preferred Alternative.

Project Commitment

Hazardous waste sites could be encountered during construction. In such a case, all work will stop in the area of the contamination according to UDOT Standard Specification, Section 01355, Part 3.1 and the contractor will consult with UDOT and UDEQ to determine the appropriate remedial measures.

Visual and Aesthetic Resources

There would be some temporary visual impacts to the study area with the addition of construction signs, barricades, exposed earth, and construction equipment during construction of the Preferred Alternative.

Project Commitment

Visual impacts due to construction activities are considered temporary and no mitigation is required.

Water Quality and Water Resources

During construction, there is the potential for temporary soil erosion and sediment/siltation impacts. In addition, the Preferred Alternative could increase the amount of TDS, TSS, and turbidity in receiving waters during project construction.

Project Commitment

The Preferred Alternative would disturb more than 1 acre of land and would require coverage under the UPDES stormwater permit. To obtain a UPDES permit, a notice of intent must be submitted to the Utah Division of Water Quality describing the construction activities. A Storm Water Pollution Prevention Plan (SWPPP) must be developed prior to submitting the notice of intent for the UPDES permit. The SWPPP identifies best management practices as well as site-specific measures to reduce erosion and prevent eroded sediment from leaving the construction zone.

Energy
The Preferred Alternative would involve construction activities and would therefore directly consume energy in the form of energy used to operate construction machinery, provide construction lighting, and produce and transport materials used in the construction of the project, such as asphalt. Calculations for anticipated energy consumption for construction activities were not undertaken in this analysis.

Invasive Species
The potential exists for invasive species to be introduced or propagated in the study area due to construction activities that disturb the existing ground cover.

Project Commitment
To minimize the movement of invasive species, the Contractor will be required to comply with UDOT's Special Provision 02926S - Invasive Weed Control.

3.23 CUMULATIVE EFFECTS

The Council on Environmental Quality (CEQ) regulations requires the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts result from incremental impacts of the Preferred Alternative when added to other past, present, and reasonably foreseeable future actions, regardless of the agency or person(s) that undertakes the other actions (40 CFR 1508.7). Cumulative impact analysis is focused on the sustainability of the environmental resource in light of all the forces acting upon it and can result from individually minor but collectively significant actions taking place over time. For a project to have a cumulative effect, however, it must first have a direct or indirect effect on the resource in question.

A review of impacts to the various environmental resources was conducted to identify where the Preferred Alternative would result in impacts to environmental resources of a type and nature that could combine with those of other past, present, and reasonably foreseeable future actions. As will be shown in the discussion of the environmental resources below, cumulative effects are possible for the Dwarf Bear-Poppy and Holmgren Milk-vetch endangered species. Critical Habitat for the Holmgren Milk-vetch exists on both sides of I-15 south of the Southern Parkway Interchange, and southwest of River Road from approximately Commerce Drive to Atkinville Wash. Suitable habitat for the Dwarf Bear-Poppy exists on both sides of I-15 between Atkinville Wash and the Brigham Road Interchange. Based on this information, the geographic area to be included in the cumulative effects analysis is the area south of the Virgin River on both sides of I-15 within the City of St. George limits.

The time frame used for the cumulative impact analysis is the 1960s to the present. This time frame represents a period of rapid development and growth in the area, beginning with the construction of I-15, and extending through the most recent surge in population in the last 15 to 20 years. The time frame for future actions is through 2040, which coincides with the planning period for this EA.

3.23.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past Actions

Past actions that have impacted the development of St. George in the study area include:

- **Construction of I-15 and associated interchanges:** I-15 was constructed in the 1960s, resulting in easier access to St. George from the metropolitan areas both north along the Wasatch Front and south from Arizona and Nevada.
- **St. George Municipal Airport:** The new St. George Municipal Airport, located in southeast St. George, opened in January 2011.
- **Southern Parkway:** The southern leg of Southern Parkway, which provides access to the St. George Municipal Airport, was completed in November 2010.
- **Population Growth and Residential Development:** Population in St. George has experienced rapid growth in the last 15 to 20 years, being consistently ranked as one of the fastest growing areas in the country. Recent growth and development includes the area east of I-15.

Present and Reasonably Foreseeable Future Actions

Transportation Projects

Transportation planning in the project area is the responsibility of the Dixie Metropolitan Planning Organization (DMPO) and the City of St. George. The applicable planning studies are the Dixie MPO 2011 – 2040 Regional Transportation Plan (RTP) and the City of St. George Road Master Plan (2011). Present and reasonably foreseeable transportation projects that would potentially impact the project area for cumulative impacts are listed in Table 3-52.

Table 3-52 Present and Reasonably Foreseeable Transportation Projects With Potential Impacts to the Study Area

Project	Description
Southern Parkway in St. George, Eastbound flyover at I-15 MP 2	Construct new flyover ramp
Brigham Road	Widen to four lanes
River Road	Widen to four lanes from Fort Pierce Drive to Southern Parkway
3000 East	Widen and improve to arterial standards from 2450 South to Price City Hills Road.
Little Valley Road	Extend and improve from 2450 South to Price City Hills Road
Price City Hills Road	Construct new road from River Road to Hidden Valley Drive (two phases)
Horseman Park Road	Extend and improve road from River Road to Price City Hills Road
White Dome Frontage Road	Construct new road from Southern Parkway to the St. George Municipal Airport
Western Corridor	New construction from I-15 MP-2 to old Highway 91.

State and Private Land Development

The cities along I-15, the City of St. George and Washington, as well as other communities in Washington County, have experienced rapid growth and this is expected to continue. The geographic area for evaluation of cumulative effects is targeted for development over the next 30 years. Land in private ownership and state land administered by the School and Institutional Trust Lands Administration (SITLA) are anticipated to be developed during the 30-year analysis period. The evaluation area is zoned for development, with zoning including mining and grazing, residential, manufacturing, commercial, and open space. (See Section 3.1 Land Use for information on zoning.)

Proposed residential and commercial developments (see Figure 3-7) that could affect the evaluation area include the following developments on SITLA land:

- **Fort Pierce Business Park:** An industrial park in St. George has been established along River Road on approximately 190 acres of Trust land in 1998 and has since expanded to approximately 1230 acres. Since 1998 about 530 net acres have been sold, about 170 acres are currently improved and ready for sale.
- **Hidden Valley Commercial:** The Hidden Valley Commercial parcel is an 11 acre parcel, located on the south side of St. George along Brigham Road, a little over a mile east of the Brigham Road Interchange. An office building was constructed on the northern 1.6 acres, and is currently in use as the sales office for the adjacent Hidden Valley master planned community. The balance of the property is available for other commercial uses.
- **Hidden Valley Residential:** In 2006 SITLA entered into a development lease for the development of Hidden Valley. Hidden Valley is located along Brigham Road approximately a mile east of the Brigham Road Interchange. It has been master planned to provide a variety of residential units ranging from affordable multifamily housing to high end single family lots. The 450 acre project, located south of St. George has a projected build out in 2020.
- **South Block:** The South Block property is located within the St. George city limits and is a 6,800-acre development parcel, the largest development parcel in Washington County. The property lies mostly east of I-15 and north of the Arizona border, with a few parcels (approximately 192 acres) west of the Southern Parkway Interchange. The White Dome Nature Preserve for the dwarf bear-poppy is in the eastern portion of this development area.

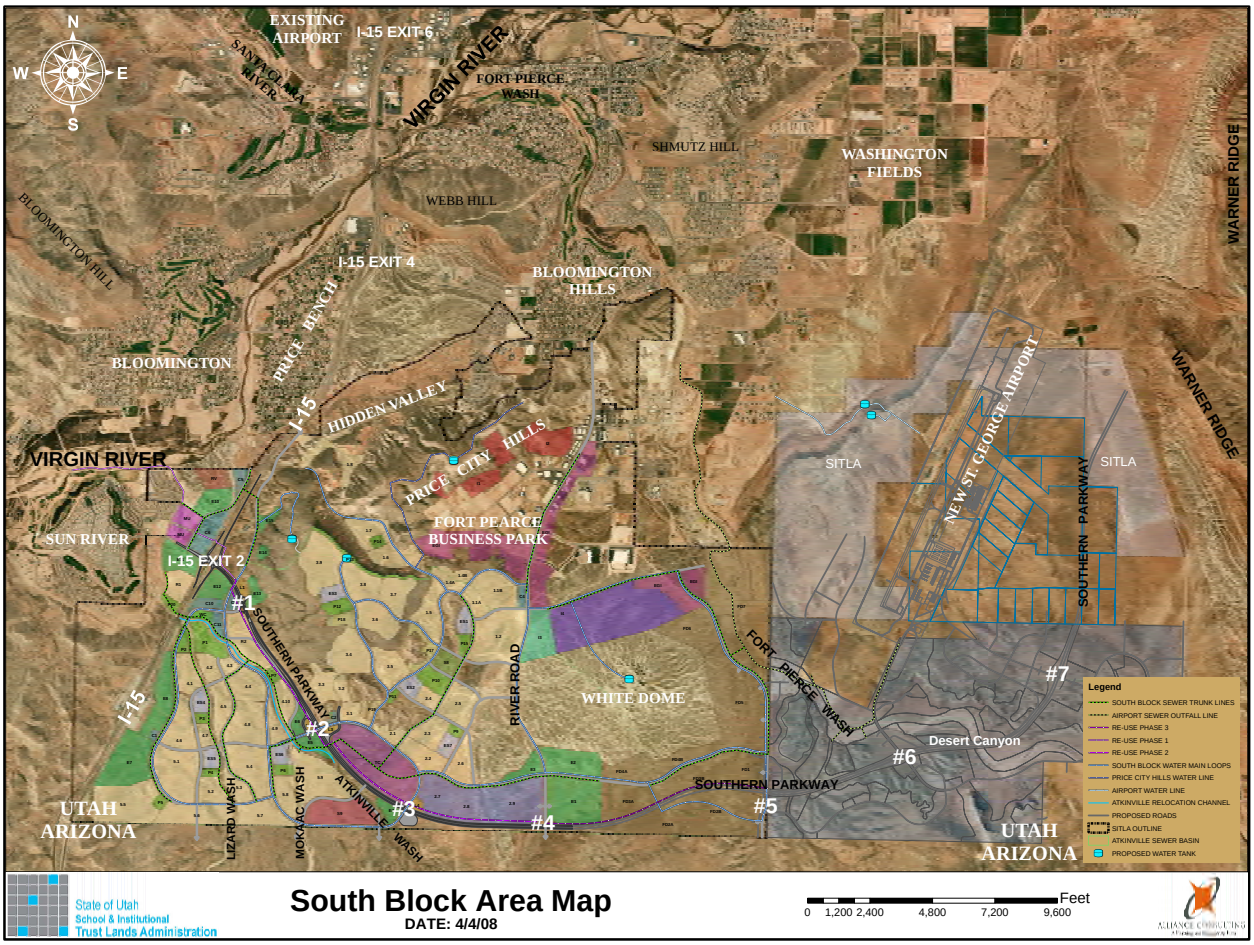


Figure 3-7 SITLA South Block Area Map

In April 2005, Sun River (a retirement community west of I-15 near the Southern Parkway Interchange) received residential zoning approval for the portion of SITLA property which they have under a development lease allowing the expansion of Sun River. Mixed-use zoning was approved by the St. George City Council in February 2007, on approximately 516 acres around the Southern Parkway Interchange. The Master Land Use Plan for the entire remaining South Block parcel was adopted by the St. George City Council in May 2007 as an amendment to their General Plan. Zoning will still be required on the approximately 6,300 acres for the portions of the South Block that have Master Plan approval.

Proposed residential and commercial developments that could affect the evaluation area include the following development on private land:

- **Desert Canyons Master Planned Community:** This development, east of the South Block near the St. George Municipal Airport, consists of 2,432 acres within the St. George city limits. The plans provide for residential, commercial, industrial, resort, and mixed use development. Commercial properties near the airport exit are currently available.

3.23.2 CUMULATIVE IMPACTS

The cumulative impact analysis focused on environmental resources which would have direct impacts and which, when combined with other actions in or near the study area, would result in substantive cumulative impacts. Most resources will either not have direct impacts or they are not of a nature to result in cumulative impacts. Impacts to threatened and endangered species and wildlife resources have the potential to result in cumulative impacts and will be discussed in this section.

The Preferred Alternative would have no effect or a minimal effect on many environmental resources and therefore there would be no cumulative effect to these resources. The resources where there would be a minimal or no effect are:

- Land Use
- Farmland
- Social Impacts
- Economic Impacts
- Relocations
- Pedestrians and Bicyclists
- Air Quality
- Noise
- Paleontological
- Section 4(f) and Section 6(f)
- Wetlands
- Hazardous Materials
- Visual Resources
- Wild and Scenic Rivers
- Energy
- Invasive Species

The impacts to some environmental resources are small, are temporary in duration, or are of a nature that does not result in a cumulative effect. These are:

- **Right-of-Way and Relocations:** Approximately 6.4 acres of right-of-way would be required by the Preferred Alternative. Right-of-way would be from 21 property owners and the amount of right-of-way from each property owner is generally very small; the two parcels which exceed an acre in size are vacant land and are for detention basins. No relocations would be required.

  The amount and type of impacts to this resource are not of a nature that would combine with the impacts of other actions.

- **Pedestrians and Bicyclist Issues:** There would be some temporary closures of the Virgin River Trail during the reconstruction of the I-15 structures over the Virgin River. These closures would be temporary in duration and an alternate route is available.

  Because of the temporary impact, it would not combine with impacts of other actions.

- **Noise:** There would be some noise impacts as a result of the additional lanes, auxiliary lanes, and interchange reconstructions. Noise walls will be considered to mitigate the noise impact.

  Noise impacts are not of a nature that would combine with the impacts of other actions.

- **Water Quality:** The Preferred Alternative would increase the impervious surface by approximately 74 acres, or an increase of 41 percent over the existing I-15 and associated roadways in the project corridor. Detention basins and BMPs would be used to treat increases in stormwater runoff which would result in a minimal effect to water quality in receiving streams and the underlying aquifers.

  This impact is minimal and would not appreciably combine with impacts of other actions.

- **Floodplains:** The Preferred Alternative would have an impact to some floodplains in the study area. However, measures will be taken to ensure that the Preferred Alternative will comply with applicable local, state, and federal regulations.

  This impact is minimal and would not appreciably combine with impacts of other actions.

The Preferred Alternative has impacts to environmental resources that have the potential to combine with the impacts of other actions. These are:

- **Threatened and Endangered Species:** Seven threatened or endangered species would be impacted by the Preferred Alternative. The cumulative effect to these species are:

- **Desert Tortoise:** The interchange improvements for the SR-9 Interchange at MP 16 would impact approximately **0.99 acres** of desert tortoise habitat. Mitigation for this minor amount of habitat loss would provide for protection of habitat in other areas of the Red Cliffs Desert Reserve, a Habitat Conservation Plan which has the primary goal of recovering the threatened desert tortoise. Because of the minor habitat impact and the mitigation addition to an existing habitat reserve, there would be no cumulative impacts.

- **Dwarf Bear-Poppy:** Past actions have resulted in habitat loss for the dwarf bear-poppy, beginning with the earliest settlement. Current actions as well as future actions will continue to result in the loss of habitat. This loss results both from development as well as recreation activities such as off-road vehicle use. The Southern Parkway Environmental Impact Statement (EIS) determined that urban growth projected for the southern portion of St. George would take place with or without the construction of the Southern Parkway, and it is reasonable to assume this would be the same for the Preferred Alternative.

  The Preferred Alternative would require the use of **8.98-acres** of suitable dwarf bear-poppy habitat within the existing I-15 right-of-way between the Southern Parkway Interchange and the Virgin River crossing. This habitat loss is an area where both public and private developments are having an impact on the dwarf bear-poppy habitat.

  The potential for impacts to the dwarf bear-poppy is high, primarily because of the urban growth in St. George. The impact from the Preferred Alternative is minimal and would not increase the significance of the cumulative impact. To reduce the habitat loss, the White Dome Nature Preserve has been established through the joint efforts of the SITLA, USFWS, UDOT, and the Nature Conservancy. This 800-acre preserve has been created to protect habitat for the dwarf bear-poppy as well as other threatened and endangered species. Mitigation for habitat loss by the Preferred Alternative would aid in the effort for long-term protection of habitat.

- **Holmgren Milk-vetch:** Past actions have resulted in habitat loss for the holmgren milk-vetch, beginning with the earliest settlement. Current actions as well as future actions will continue to result in the loss of habitat. This loss results both from development as well as recreation activities such as off-road vehicle use. The Southern Parkway EIS determined that urban growth projected for the southern portion of St. George would take place with or without the construction of the Southern Parkway, and it is reasonable to assume this would be the same for the Preferred Alternative.

  The Preferred Alternative would require the use of **0.39-acres** of Critical Habitat for the holmgren milk-vetch within the existing I-15 right-of-way south of the Southern Parkway Interchange. This habitat loss is in the area where the South Block development is planned which would also impact the Critical Habitat.

  The potential for impacts to the holmgren milk-vetch Critical Habitat is high, primarily because of the urban growth in St. George. The impact to Critical Habitat by the Preferred Alternative is minor and would not increase the significance of the impacts from private development. Efforts by Federal and state agencies are underway to protect sensitive lands of critical holmgren milk-vetch habitat in the St. George area, similar to the White Dome Nature Preserve for dwarf bear-poppy. Mitigation for habitat loss by the Preferred Alternative could aid in this effort for long-term protection of Critical Habitat.

- **Virgin River Chub:** There may be impacts to the Virgin River chub during the demolition and reconstruction of the bridges over the Virgin River. The existing three piers within the river channel would be replaced by a single pier which would improve the habitat upon project completion. Because the impacts are temporary during construction, and because the habitat would be improved, there would not be a contribution to cumulative impact by other actions.

- **Woundfin:** There may be impacts to the woundfin during the demolition and reconstruction of the bridges over the Virgin River. The existing three piers within the river channel would be replaced by a single pier which would improve the habitat upon project completion. Because the impacts are temporary during construction, and because the habitat would be improved, there would not be a contribution to cumulative impact by other actions.

- **Southwest Willow Flycatcher:** There may be impacts to the southwest willow flycatcher by disrupting travel routes along the Virgin River during bridge construction. This impact is temporary and other entry routes to the Virgin River Valley are available for this highly mobile species. Because the impacts are temporary during construction, there would not be a contribution to cumulative impact by other actions.

- **Yellow Billed Cuckoo:** There may be impacts to the yellow billed cuckoo by disrupting travel routes along the Virgin River during bridge construction. This impact is temporary and other entry routes to the Virgin River Valley are available for this highly mobile species. Because the impacts are temporary during construction, there would not be a contribution to cumulative impact by other actions.

- **Wildlife:** The Preferred Alternative would have a negative impact to three Utah Sensitive Species. The Virgin spinedace, desert sucker, and flannelmouth sucker are known to occupy the Virgin River within the limits of the Preferred Alternative, although their prevalence is low and distribution is scattered. Effects to these species would be turbidity and sedimentation during the Virgin River bridge replacement. Because the impacts to these species are temporary during construction, and because the habitat would be improved, there would not be a contribution to cumulative impact by other actions.

3.24 SUMMARY OF IMPACTS AND MITIGATION
3.24.1 SUMMARY OF IMPACTS

Table 3-53 Summary of Impacts

Environmental Issue	No-action Alternative	Preferred Alternative
Land Use	No changes to planned land uses.	The following would be converted to detention basin and roadway use: • 1.3-acres of commercial property • 4-acres of open space • 0.7-acres of planned development • 0.4-acres of residential property
Farmland	No impact.	No impact.
Social Impacts and Environmental Justice	• Existing social conditions and trends in the study area would remain intact. • No disproportionately high and adverse effects on minority and low-income populations.	• Would be unlikely to cause substantial adverse impacts on community social conditions. • No disproportionately high and adverse effects on minority and low-income populations.
Economics	• Current market forces and trends would continue to influence the local economy. • Increased congestion could hamper access to local businesses from the I-15 corridor; however, I-15 is a major thoroughfare through Washington County, which is not likely to change even if the proposed improvements are not implemented.	• Would not displace commercial and industrial businesses. • Current market forces and trends would continue to influence the local economy. Access to local businesses from the I-15 corridor would be easier. • Some local businesses may lose some patronage during construction. • Would benefit the local economy in the long term by reducing congestion, improving safety, and making businesses more accessible.
Relocations	No right-of-way acquisitions or relocations would be required.	Approximately 6.4-acres of property would be acquired.
Pedestrian and Bicyclist Issues	No impact.	• Would construct new pedestrian facilities that would cross I-15 at the Brigham Road and the St. George Boulevard Interchanges. • Would maintain existing facilities as presently constituted and would not preclude the implementation of any additional planned pedestrian and bicycle facilities. • Any and all trails and/or bicycle routes that cross I-15 would not be permanently impaired and the connection would be maintained.
Air Quality	Because Washington County is not in a non-attainment area for all priority pollutants and there have been no air pollution issues in the past, air quality impacts under the No-action Alternative are not expected.	No expected to cause air quality impacts.
Noise	• Noise levels would generally increase over the existing noise levels. • Noise levels would range from 57 dBA to 78 dBA, with an average noise level of about 66 dBA.	• Noise levels would generally increase over the existing and No-action noise levels. • Noise levels would range from 58 dBA to 81 dBA, with an average noise level of about 68 dBA.

Environmental Issue	No-action Alternative	Preferred Alternative
Cultural (Archaeological and Architectural) Resources	No impact.	The Preferred Alternative would have an overall adverse effect on historic properties.
Paleontological Resources	No impact.	Unless fossils are discovered as a result of construction activities, the Preferred Alternative should have no impact on paleontological resources
Section 4(f) and Section 6(f) Resources	No impact.	• The Preferred Alternative would have a No Use for all Section 4(f) properties • No impact to Section 6(f) properties
Wetlands	No impact.	• No impacts to wetlands • Minor impacts to four drainages
Threatened and Endangered Species	No impact.	• **Desert Tortoise:** likely to adversely affect the desert tortoise and desert tortoise Critical Habitat. • **Dwarf Bear-Poppy:** likely to adversely affect the dwarf bear-poppy. • **Holmgren Milk-Vetch:** likely to adversely affect the holmgren milk-vetch and holmgren milk-vetch Critical Habitat. • **Virgin River Chub:** likely to adversely affect the Virgin River chub and Virgin River chub Critical Habitat. • **Woundfin:** likely to adversely affect the woundfin and woundfin Critical Habitat. • **Southwestern Willow Flycatcher:** not likely to adversely affect the southwestern willow flycatcher and would not affect southwestern willow flycatcher Critical Habitat. • **Yellow-Billed Cuckoo:** not likely to adversely affect the yellow-billed cuckoo and would not affect yellow-billed cuckoor Critical Habitat.
Wildlife	No impact.	Would negatively affect the Virgin spinedace and the flannelmouth sucker.
Hazardous Materials and Hazardous Waste Sites	No impact.	No impact.
Visual and Aesthetic Resources	No impact.	Would visually create some minor alterations as a result of additional pavement width, proposed modifications to interchanges, new cut slopes, a soil nail retaining wall, and potential noise walls.
Wild and Scenic Rivers	No impact.	No impact.

Environmental Issue	No-action Alternative	Preferred Alternative
Water Quality	No impact.	Would increase the impervious surface by approximately 74 acres, or an increase of 41 percent over the existing I-15 and associated roadways in the project corridor. Detention basins and BMPs would be used to treat increases in stormwater runoff which would result in a minimal effect to water quality in receiving streams and the underlying aquifers.
Floodplains	No impact.	Would have impacts to several floodplains; however, impacts would not cause a 1 foot increase in the 100-year flood elevation. Therefore the impact would not constitute a "significant encroachment" as defined by FHWA regulations.
Energy	The No-action Alternative would result in an increase in congestion that would in turn reduce vehicle efficiency and increase fuel consumption over time.	Under the Preferred Alternative traffic would flow more smoothly and would result in a lower LOS in the study area, thereby improving fuel efficiency and decreasing fuel consumption over time.
Invasive Species	No impacts.	Would provide opportunities for the movement of invasive species through the landscape.

Environmental Issue	No-action Alternative	Preferred Alternative
Construction Impacts	No impact.	**Social Conditions and Environmental Justice:** Local residents as well as people traveling through the study area would experience frustrations associated with traffic congestion, delays, and detours during the construction period. In addition, some residents who live in close proximity to the study corridor may experience disturbance effects from noise and dust generated by construction activities. **Economic Conditions** Would not limit access from existing roadways to businesses, except at a few locations. These inconveniences are expected to be of shorter duration. Overall, construction is not expected to substantially impact business access, operations or sales. **Pedestrians and Bicyclist Issues** Would require the temporary closure of the Virgin River Trail where the trails cross I-15. **Air Quality** Would result in temporary negative effects to air quality in the study area due to increased dust and particulates. **Noise** Area residents would experience temporary inconvenience due to construction noise. **Cultural (Archaeological and Architectural) Resources** There is the possibility to impact undiscovered archaeological sites during construction. **Paleontology** There is the possibility to impact undiscovered paleontological sites during construction.

Environmental Issue	No-action Alternative	Preferred Alternative
Construction Impacts (Continued)	No impact.	**Section 4(f) and Section 6(f) Resources** Would require the temporary closure of the Virgin River Trail (a Section 4(f) resource) where the trail crosses I-15. There is the possibility to impact undiscovered archaeological sites, eligible for Section 4(f), during construction. **Wetlands** Would require construction work in the channels of Atkinville Wash and in the Virgin River itself for the placement of bridge piers. **Threatened & Endangered Species** Desert Tortoise: The desert tortoise is likely to be adversely affected by construction as a result of mortality, harm, and harassment from construction activities. Dwarf Bear-Poppy: Construction would reduce the number of ground-nesting bees and thus the number of potential pollinators of dwarf bear-poppy. Holmgren milk-vetch: Although Holmgren milk-vetch is self-compatible and not totally dependent on pollinators, it is anticipated that the construction would reduce the number of ground-nesting bees and thus the number of potential pollinators of Holmgren milk-vetch. However, the ultimate effects of highway construction and operation on the pollinators of Holmgren milk-vetch are unknown. Aquatic Species (Virgin River Chub and Woundfin): impacts to aquatic species would likely occur during the demolition and reconstruction of the bridges over the Virgin River. Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo): Temporary construction activities could deter migrating flycatchers from using the Virgin River as a travel route in the study area during the construction period. However, because this species is highly mobile, other entries into the Virgin River valley, though possibly less desirable, would still be available to the species. **Wildlife** Native species in the Virgin River (Virgin spinedace, desert sucker, and flannelmouth sucker) would experience similar effects as the aquatic species discussed in the threatened and endangered species section during construction.

Environmental Issue	No-action Alternative	Preferred Alternative
Construction Impacts (Continued)	No impact.	**Hazardous Materials and Hazardous Waste Sites:** There is the possibility to impact undiscovered hazardous waste sites during construction. **Visual and Aesthetic Resources** There would be some temporary visual impacts to the study area with the addition of construction signs, barricades, exposed earth, and construction equipment during construction. **Water Quality and Water Resources** There is the potential for temporary soil erosion and sediment/siltation impacts. In addition, construction could increase the amount of TDS, TSS, and turbidity in receiving waters. **Energy** Construction activities would directly consume energy in the form of energy used to operate construction machinery, provide construction lighting, and produce and transport materials used in the construction of the project, such as asphalt. **Invasive Species** The potential exists for invasive species to be introduced or propagated in the study area due to construction activities that disturb the existing ground cover.

3.24.2 SUMMARY OF MITIGATION AND PROJECT COMMITMENTS

Land Use
No mitigation required.

Farmland
No mitigation required.

Social Impacts and Environmental Justice
No mitigation required.

Economics
No mitigation required.

Right-of-Way and Relocations
No mitigation required.

Pedestrian and Bicyclist Issues
No mitigation required.

Air Quality
No mitigation required.

Noise

The following noise walls (see Figures in Volume 2) meet all the criteria outlined in UDOT's Noise Abatement Policy (revised July 13, 2011), and are therefore recommended for inclusion in the proposed project, pending balloting efforts:

- **Southern Parkway to Brigham Road West Wall 1:** West side of I-15 from about Sugar Leo Road to Rocket Bar Road in St. George
- **Brigham Road to Dixie Drive West Wall 1:** West side of I-15 from north of the Virgin River to Dixie Drive in St. George
- **Bluff Street to St. George Boulevard West Wall 1:** West side of I-15 from 1160 South to 700 East in St. George
- **Bluff Street to St. George Boulevard East Wall 1:** East side of I-15 from 400 East to 770 East in St. George
- **Bluff Street to St. George Boulevard West Wall 2:** West side of I-15 from about 700 South to 100 South in St. George
- **Bluff Street to St. George Boulevard East Wall 2:** East side of I-15 from 600 South to 200 South in St. George.
- **St. George Boulevard to Green Springs Drive East Wall 1:** East side of I-15 from about Mall Drive to 850 North in St. George
- **Green Springs Drive to Washington Parkway East Wall 1:** East side of I-15 from about 500 West to 300 East in Washington.

Cultural (Architectural and Archaeological Resources)

Construction of the preferred alternative will be completed in phases over the course of 10-20 years. In order to adequately address and resolve any adverse effects of the project's multiple phased undertakings, FHWA is inviting UDOT, the BLM, SITLA, USACE, the RCDR, the State Historic Preservation Officer, other consulting parties, and the Advisory Council on Historic Preservation to participate in developing a Programmatic Agreement (PA) in accordance with 36 CFR 800.6 and 36 CFR 800.14(4)(b) to take into account and resolve any potential adverse effects that the proposed undertaking may have on historic properties in the APE. The PA will require development of a written data recovery plan and research design for individual sites that will be submitted for review and approval by the consulting parties and the SHPO prior to implementation.

Proposed mitigation for sites 42WS1220 and 42WS1221 will include archaeological data recovery in advance of construction. Those sites with boundaries plotted adjacent to or within 15 meters of the outside margin of the APE, 42WS0355 and 42WS4283, will be staked when the highway section is under active development to determine whether they will be affected or not. If affected, these sites will go to data recovery under the written treatment plan developed per stipulations in the PA. Unaffected site portions located outside areas designated for construction use will be protected from ground disturbing activities through implementation of a special provision in the construction contract that explicitly identifies the areas needing protection and requires construction of temporary fencing.

Paleontological Resources

If the Mesozoic bedrock units would be disturbed as a result of the Preferred Alternative, a paleontologist will evaluate the project. See Construction Section for mitigation for impacts during construction.

Section 4(f) and Section 6(f) Resources

No mitigation required.

Wetlands

Project Commitments

This EA does not address the jurisdictional status of the wetlands or water features. Therefore, an approved jurisdictional determination will be conducted for the wetlands and water features identified in the wetland delineation. A Section 404 Permit will be obtained from the USACE for all work to be conducted within

the Virgin River, Atkinville Wash, and any other waters of the U.S. and wetlands that are determined to be jurisdictional.

Mitigation

No mitigation required.

Threatened and Endangered Species

Desert Tortoise

Project Commitments

- A pre-construction desert tortoise survey, and potential relocation activities, will be conducted by a qualified tortoise biologist prior to ground-disturbing activities. All surveys, handling, and burrow excavation and construction will be conducted in accordance with the protocol described in *Guidelines for Handling Desert Tortoises During Construction Projects*. Desert tortoise survey and relocation activities shall be coordinated with USFWS and the Red Cliffs Desert Reserve.
- To minimize habitat loss the Preferred Alternative will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the areas where cut/fill will be required.
- New right-of-way fence installed adjacent to desert tortoise Critical Habitat would include USFWS-approved exclusionary desert tortoise fencing, and will be installed prior to construction activities.
- No drainage basins will be located in desert tortoise Critical Habitat.

Mitigation

- Mitigation for effects to desert tortoise Critical Habitat will be implemented at a 5:1 ratio for direct impacts. All mitigation for the desert tortoise will be applied to protection of the species within the Red Cliffs Desert Reserve. Mitigation not applied within the Red Cliffs Desert Reserve for the desert tortoise will be at a 10:1 ratio for direct impacts. Mitigation shall be approved by USFWS and the Red Cliffs Desert Reserve prior to a commitment of resources, and will be conducted prior to project impacts in desert tortoise Critical Habitat.

Dwarf Bear-Poppy

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify dwarf bear-poppy occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Environmental fencing will be installed around dwarf bear-poppy occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of dwarf bear-poppy occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual dwarf bear-poppy species and minimize habitat loss in dwarf bear-poppy suitable habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in dwarf bear-poppy suitable habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to dwarf bear-poppy occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to dwarf bear-poppy suitable habitat will be implemented at a 1:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in occupied and/or suitable habitat.

Holmgren Milk-Vetch

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify Holmgren milk-vetch occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Construction activities will be restricted in Holmgren milk-vetch Critical Habitat to the limits identified in the BA (see Appendix A). In areas of the right-of-way that are not within Holmgren milk-vetch Critical Habitat, environmental fencing will be installed around Holmgren milk-vetch occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of Holmgren milk-vetch occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual Holmgren milk-vetch species and minimize habitat loss in Holmgren milk-vetch Critical Habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in Holmgren milk-vetch Critical Habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to Holmgren milk-vetch occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to Holmgren milk-vetch Critical Habitat (unoccupied) will be implemented at a 2:1 ratio for direct impacts. All mitigation for the Holmgren milk-vetch will be applied to protection of the species within the Utah-Arizona Border Unit of designated Holmgren milk-vetch Critical Habitat. Mitigation for effects in occupied habitat that will not be applied within the Utah-Arizona Border Unit would be at a 6:1 ratio for direct impacts. Mitigation for effects in Critical Habitat (unoccupied) that will not be applied within the Utah-Arizona Border Unit would be at a 4:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in Holmgren milk-vetch occupied and/or Critical Habitat.
- Pre and post construction surveys will be conducted in areas of Holmgren milk-vetch Critical Habitat that will be temporarily impacted in order to determine whether a permanent impact has occurred where not anticipated. Pre and post construction survey activities, and associated reports, will be coordinated with USFWS. Additional mitigation that may be required as a result of unanticipated, permanent impacts shall be approved by USFWS.

Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo)

Project Commitments

- Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible.
- Prior to construction, the contractor will confirm that the conditions included in the Biological Opinion are implemented as needed.

In addition, the following BMPs will be implemented:

- Stockpile areas will be approved by UDOT or a qualified biologist prior to construction. Stockpile areas will avoid the riparian vegetation.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- The contractor will follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Revegetate disturbed areas (work sites, entrance and exit locations, stockpile sites, and pits) when appropriate after construction with native plants or certified weed-free native seed.

Aquatic Species (Virgin River Chub and Woundfin)

Project Commitments

To reduce the effects to aquatic species, in-water work will be conducted "in the dry" behind isolation structures. All fish salvage operations, if considered necessary by UDWR and USFWS, will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs, including the use of hay bales and/or silt fencing or similar practices, to reduce the amount of sediment entering the Virgin River. Further, any in-water work associated with replacement of the I-15 bridge piers will take place during periods of low flow to reduce sedimentation downstream.

- Construction activities in designated Critical Habitat for woundfin and Virgin River chub will not occur during active flooding events.
- Construction in the active channel will not occur during the spring to early summer spawning period (April through June/early July as recommended by the USFWS) of either the Virgin River chub or woundfin.
- All new bridge piers located below the OHWM will be positioned parallel to flow to reduce scouring.
- Erosion control will be provided on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Native vegetation will be established on the slope where possible. Where possible, vegetated filter strips will be provided. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.
- Large equipment will be used in floodplains only when necessary.
- Native grasses and forbs will be used to reseed disturbed soils.
- UDOT will identify and minimize the potential for accidental spills of hazardous materials by implementing BMPs and measures specified in the Storm Water Pollution Prevention Plan (SWPPP). UDOT will develop a spill prevention, control, and countermeasures (SPCC) plan and will follow it during construction. This plan will identify riparian zones and drainages and describe measures to ensure protection. The SPCC plan will give specific protection measures for activities within 100-ft of water bodies and will identify how refueling and equipment maintenance work will be performed to protect surface and ground water.
- Confine construction activities and equipment to the designated construction work areas. These areas will be designated by lathes and flagging. Construction activities will be contained in these areas. New areas will need approval.
- A UDOT Environmental Control Supervisor (ECS) will monitor all environmentally sensitive areas, BMPs, and erosion-control devices.
- To minimize adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, dewater the area behind cofferdams. An in-water work plan will be used to remove fish from the construction area. Biologists will prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams will be removed incrementally to minimize pulses of sediment downstream.
- Pile driving will be accomplished using a vibratory driver. Impact drivers will be used only to proof piles, or if geologic conditions make vibratory installation infeasible. Piles will be driven "in the dry" behind cofferdams.
- All concrete forms associated with overwater supports will be properly cured "in the dry" prior to contact with surface waters.
- Netting will be used to ensure that removed bridge sections and associated debris do not enter surface waters below. Alternatively, floating containment booms could be positioned under the bridge to prevent material from entering the water. Collected material will be removed from the containment booms on a daily basis.
- Cast-in-place concrete for new bridge infrastructure not contained within a dewatered cofferdam will be poured in a manner to prevent the spill of wet concrete into waters below. The concrete will then be protected to allow sufficient curing and protection from the elements. Concrete for overwater infrastructure use will be provided using spill prevention and control measures.

In addition, the following BMPs will be implemented:

- Best management construction practices will be used to limit the release of fine sediment into the Virgin River during construction in areas adjacent to the river. BMPs may include the use of silt-free fill, riprap (if used for rock slope protection), and silt barriers.
- If riprap is used, low-void materials will be incorporated to prevent scour below the water level for the 5-year flood event in an effort to minimize refuge habitat for non-native predatory fish.
- A construction SWPPP and operational stormwater control plan will be developed to prevent pollutants from being introduced into the river due to construction or the use of the bridge and associated roads.
- If bank stabilization and erosion-control structures are necessary, they will be designed to maintain or enhance natural stream function (sinuosity, gradient, hydrology, and sediment transport). Stabilization structures will be defined during the Clean Water Act Section 404 permitting process with the U.S. Army Corps of Engineers.
- Equipment will be cleaned to remove noxious weeds and seeds and petroleum products before being moved onsite.
- Materials will not be stockpiled immediately adjacent to the river channel.
- Fill materials will be free of fines, waste, pollutants, and noxious weeds.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- Disturbed areas will be monitored for noxious and undesirable plant species, and control actions will be implemented if necessary. Disturbed areas will be revegetated when appropriate after construction with native plants or certified weed-free native seed.

Wildlife

See Threatened and Endangered Species Section, for mitigation and project commitments to reduce the effects of the Preferred Alternative to aquatic species.

Hazardous Materials and Hazardous Waste Sites

No mitigation required.

Visual and Aesthetic Resources

No mitigation required.

Wild and Scenic Rivers

No mitigation required.

Water Quality

Project Commitments

Surface Water Quality

The following measures are intended to reduce erosion and apply to all areas along the Preferred Alternative that are proposed for construction. In addition to these measures, where appropriate, UDOT's UPDES Phase II manual will be used.

- ***Cut-and-Fill Slopes.*** Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible. Where possible, provide vegetated filter strips. Vegetated filter strips are UDEQ's preferred water quality treatment measure.
- ***Detention Ponds.*** Detention ponds will be provided for water quality treatment where it is necessary to detain runoff to reduce its peak flow rate. Detention basins will be designed to store runoff and discharge it within about 6 hours to minimize solar heating of the ponded water. If the TMDL analysis concludes that urban stormwater runoff is affecting temperatures in the Santa Clara River, additional

stormwater mitigation measure such as infiltration basins or bioswales would also be included with detention basins to manage stormwater runoff from roadway segments that would discharge directly to impaired segments of the River.

Wells and Points-of-Diversion

During the final design of the project, UDOT will work with the property owner to determine the appropriate mitigation measure if a well head or other water right POD is affected. Mitigation could include (1) relocating a well head or surface water diversion to continue to provide irrigation water to any land that is not acquired or (2) abandoning the well and compensating the owner for the value of the associated water right.

Mitigation

No mitigation required.

Floodplains

Project Commitments

Measures will be taken to ensure that the Preferred Alternative will comply with applicable local, state, and federal regulations. These measures include the following:

- The Preferred Alternative would require new structures over Atkinville Wash and the Virgin River at I-15. The design of hydraulic structures will follow the UDOT Manual of Instruction as well as FEMA and local floodplain requirements. Where impacts to the floodplain are unavoidable, proper steps will be taken with the local community and FEMA to obtain a Letter of Map Revision. These steps include obtaining the following:
    - Local (St. George, Washington City, or Hurricane) approval of Conditional Letter of Map Revision documentation;
    - A Conditional Letter of Map Revision from FEMA;
    - A floodplain development permit from the St. George, Washington City or Hurricane; and
    - Following project completion, a Letter of Map Revision from FEMA.
- UDOT or its construction contractor will obtain Stream Alteration Permits from the Utah Division of Water Rights for all stream crossings.
- UDOT or its construction contractor will file a General Permit with the Utah Division of Forestry, Fire, and State Lands for all new crossings to obtain an easement over and/or upon the stream bed.
- UDOT or its engineer will perform detailed hydraulic modeling, scour analyses, and scour countermeasure design to properly assess flooding and scour potential and mitigate against flood and scour events. The design will take into account the established Erosion Hazard Boundary and meet the requirements of St. George City Code Section 10-23-7.
- Where feasible, roadway elevations will be designed to be above the 100-year floodplain.
- New structures proposed in the Preferred Alternative which encroach on the 100-year floodplain and/or the erosion hazard zone will include design elements that provide protection from riverine lateral migration and erosion and will be designed to convey the 100-year event.

Mitigation

No mitigation required.

Energy

No mitigation is required.

Invasive Species

No mitigation required.

Construction Impacts

Social Conditions and Environmental Justice

Project Commitments

Impacts during construction will be mitigated through implementation of a traffic-control plan with advance notice to those affected.

Economics

Project Commitments

Access to businesses in the construction area will be maintained during the construction and post-construction phases of this project, as this is UDOT's policy with respect to access issues on all UDOT roadway improvement projects. UDOT will coordinate with property owners and businesses to evaluate ways to maintain access while still allowing efficient construction operations.

Pedestrians and Bicyclist Issues

Project Commitments

A detour route will be provided for the Virgin River Trail.

Air Quality

Project Commitments

Construction mitigation includes strategies that reduce engine activity or reduce emissions per unit of operating time, such as reducing the numbers of trips and extended idling. Operational agreements that reduce or redirect work or shift times to avoid community exposures can have positive benefits when sites are near populated areas.

Construction emissions for PM_{10} will be minimized through good construction practices such as watering exposed surfaces, minimizing the amount of exposed and disturbed surfaces, minimizing construction equipment and vehicle speeds, and properly maintaining vehicle engines.

The Utah Air Quality Rules will require a dust-control plan from all sources whose activities or equipment could produce fugitive dust or airborne dust. A dust-control plan will be prepared for the construction phase of the proposed project. Dust-control measures could include planting vegetative cover, providing synthetic covers, and watering and/or chemically stabilizing unpaved haul roads.

Noise

Project Commitments

Construction noise impacts are considered temporary and will be minimized through adherence to UDOT Standard Specification 01355 - Environmental Compliance, Part 3.6 - Noise and Vibration Control.

Cultural (Archaeological and Architectural) Resources

Project Commitments

The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Paleontology

Project Commitments

The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Section 4(f) and Section 6(f) Resources

Project Commitments

- A detour route will be provided for the Virgin River Trail.
- The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Compliance, Part 3.8, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, or Human Remains.

Wetlands

Project Commitments

A Section 404 Permit will be obtained from the U.S. Army Corps of Engineers (USACE) for all work to be conducted within the Virgin River, Atkinville Wash, and any other waters of the U.S. and wetlands that are determined to be jurisdictional.

Threatened & Endangered Species

Mitigation and Project Commitments

Desert Tortoise

Project Commitments

- A pre-construction desert tortoise survey, and potential relocation activities, will be conducted by a qualified tortoise biologist prior to ground-disturbing activities. All surveys, handling, and burrow excavation and construction will be conducted in accordance with the protocol described in *Guidelines for Handling Desert Tortoises During Construction Projects*. Desert tortoise survey and relocation activities shall be coordinated with USFWS and the Red Cliffs Desert Reserve.
- To minimize habitat loss in desert tortoise Critical Habitat, the Preferred Alternative will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the areas where cut/fill will be required.
- New right-of-way fence installed adjacent to desert tortoise Critical Habitat would include USFWS-approved exclusionary desert tortoise fencing, and will be installed prior to construction activities.
- No drainage basins will be located in desert tortoise Critical Habitat.

Mitigation

- Mitigation for effects to desert tortoise Critical Habitat will be implemented at a 5:1 ratio for direct impacts. All mitigation for the desert tortoise will be applied to protection of the species within the Red Cliffs Desert Reserve. Mitigation not applied within the Red Cliffs Desert Reserve for the desert tortoise will be at a 10:1 ratio for direct impacts. Mitigation shall be approved by USFWS and the Red Cliffs Desert Reserve prior to a commitment of resources, and will be conducted prior to project impacts in desert tortoise Critical Habitat.

Dwarf Bear-Poppy

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify dwarf bear-poppy occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Environmental fencing will be installed around dwarf bear-poppy occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of dwarf bear-poppy occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual dwarf bear-poppy species and minimize habitat loss in dwarf bear-poppy suitable habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in dwarf bear-poppy suitable habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to dwarf bear-poppy occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to dwarf bear-poppy suitable habitat will be implemented at a 1:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in occupied and/or suitable habitat.

Holmgren Milk-Vetch

Project Commitments

- A pre-construction botanical survey will be conducted in order to identify Holmgren milk-vetch occupied habitat within the existing right-of-way.
- Disturbance of natural vegetation within the right-of-way will be limited in order to maintain native plant species composition and minimize impacts to pollinators. Disturbed areas within the right-of-way will be revegetated with native shrubs and grasses.
- Construction activities will be restricted in Holmgren milk-vetch Critical Habitat to the limits identified in the BA (see Appendix A). In areas of the right-of-way that are not within Holmgren milk-vetch Critical Habitat, environmental fencing will be installed around Holmgren milk-vetch occupied habitat (see BA in Appendix A) in order to create exclusionary zones where construction activities will be prohibited. The exclusionary zones will also include any new areas of Holmgren milk-vetch occupied habitat that are discovered during pre-construction botanical surveys.
- To avoid impacts to individual Holmgren milk-vetch species and minimize habitat loss in Holmgren milk-vetch Critical Habitat, the proposed project will install barriers at the edge of the pavement to steepen roadside slopes. This will reduce the area where cut/fill will be required.
- Broadcast applications of herbicides will be prohibited in Holmgren milk-vetch Critical Habitat that occurs in the existing right-of-way; spot treatments of herbicides will be used to treat noxious weeds in these right-of-way areas.

Mitigation

- Mitigation for effects to Holmgren milk-vetch occupied habitat will be implemented at a 3:1 ratio for direct impacts. Mitigation for effects to Holmgren milk-vetch Critical Habitat (unoccupied) will be implemented at a 2:1 ratio for direct impacts. All mitigation for the Holmgren milk-vetch will be applied to protection of the species within the Utah-Arizona Border Unit of designated Holmgren milk-vetch Critical Habitat. Mitigation for effects in occupied habitat that will not be applied within the Utah-Arizona Border Unit would be at a 6:1 ratio for direct impacts. Mitigation for effects in Critical Habitat (unoccupied) that will not be applied within the Utah-Arizona Border Unit would be at a 4:1 ratio for direct impacts. Mitigation shall be approved by USFWS prior to a commitment of resources, and will be conducted prior to project impacts in Holmgren milk-vetch occupied and/or Critical Habitat.
- Pre and post construction surveys will be conducted in areas of Holmgren milk-vetch Critical Habitat that will be temporarily impacted in order to determine whether a permanent impact has occurred where not anticipated. Pre and post construction survey activities, and associated reports, will be coordinated with USFWS. Additional mitigation that may be required as a result of unanticipated, permanent impacts shall be approved by USFWS.

Avian Species (Southwestern Willow Flycatcher and Yellow-Billed Cuckoo)

Project Commitments

- Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible.
- Prior to construction, the contractor will confirm that the conditions included in the Biological Opinion are implemented as needed.

In addition, the following BMPs will be implemented:

- Stockpile areas will be approved by UDOT or a qualified biologist prior to construction. Stockpile areas will avoid the riparian vegetation.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- The contractor will follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Revegetate disturbed areas (work sites, entrance and exit locations, stockpile sites, and pits) when appropriate after construction with native plants or certified weed-free native seed.

Aquatic Species (Virgin River Chub and Woundfin)

Project Commitments

To reduce the effects to aquatic species, in-water work will be conducted "in the dry" behind isolation structures. All fish salvage operations, if considered necessary by UDWR and USFWS, will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs, including the use of hay bales and/or silt fencing or similar practices, to reduce the amount of sediment entering the Virgin River. Further, any in-water work associated with replacement of the I-15 bridge piers will take place during periods of low flow to reduce sedimentation downstream.

- Construction activities in designated Critical Habitat for woundfin and Virgin River chub will not occur during active flooding events.
- Construction in the active channel will not occur during the spring to early summer spawning period (April through June/early July as recommended by the USFWS) of either the Virgin River chub or woundfin.
- All new bridge piers located below the OHWM will be positioned parallel to flow to reduce scouring.
- Erosion control will be provided on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Native vegetation will be established on the slope where possible. Where possible, vegetated filter strips will be provided. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.
- Large equipment will be used in floodplains only when necessary.
- Native grasses and forbs will be used to reseed disturbed soils.
- UDOT will identify and minimize the potential for accidental spills of hazardous materials by implementing BMPs and measures specified in the Storm Water Pollution Prevention Plan (SWPPP). UDOT will develop a spill prevention, control, and countermeasures (SPCC) plan and will follow it during construction. This plan will identify riparian zones and drainages and describe measures to ensure protection. The SPCC plan will give specific protection measures for activities within 100-ft of water bodies and will identify how refueling and equipment maintenance work will be performed to protect surface and ground water.
- Confine construction activities and equipment to the designated construction work areas. These areas will be designated by lathes and flagging. Construction activities will be contained in these areas. New areas will need approval.
- A UDOT Environmental Control Supervisor (ECS) will monitor all environmentally sensitive areas, BMPs, and erosion-control devices.
- To minimize adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, dewater the area behind cofferdams. An in-water work plan will be used to remove fish from the construction area. Biologists will prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams will be removed incrementally to minimize pulses of sediment downstream.
- Pile driving will be accomplished using a vibratory driver. Impact drivers will be used only to proof piles, or if geologic conditions make vibratory installation infeasible. Piles will be driven "in the dry" behind cofferdams.
- All concrete forms associated with overwater supports will be properly cured "in the dry" prior to contact with surface waters.
- Netting will be used to ensure that removed bridge sections and associated debris do not enter surface waters below. Alternatively, floating containment booms could be positioned under the bridge to prevent material from entering the water. Collected material will be removed from the containment booms on a daily basis.
- Cast-in-place concrete for new bridge infrastructure not contained within a dewatered cofferdam will be poured in a manner to prevent the spill of wet concrete into waters below. The concrete will then be protected to allow sufficient curing and protection from the elements. Concrete for overwater infrastructure use will be provided using spill prevention and control measures.

In addition, the following BMPs will be implemented:

- Best management construction practices will be used to limit the release of fine sediment into the Virgin River during construction in areas adjacent to the river. BMPs may include the use of silt-free fill, riprap (if used for rock slope protection), and silt barriers.
- If riprap is used, low-void materials will be incorporated to prevent scour below the water level for the 5-year flood event in an effort to minimize refuge habitat for non-native predatory fish.
- A construction SWPPP and operational stormwater control plan will be developed to prevent pollutants from being introduced into the river due to construction or the use of the bridge and associated roads.
- If bank stabilization and erosion-control structures are necessary, they will be designed to maintain or enhance natural stream function (sinuosity, gradient, hydrology, and sediment transport). Stabilization structures will be defined during the Clean Water Act Section 404 permitting process with the U.S. Army Corps of Engineers.
- Equipment will be cleaned to remove noxious weeds and seeds and petroleum products before being moved onsite.
- Materials will not be stockpiled immediately adjacent to the river channel.
- Fill materials will be free of fines, waste, pollutants, and noxious weeds.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- Disturbed areas will be monitored for noxious and undesirable plant species, and control actions will be implemented if necessary. Disturbed areas will be revegetated when appropriate after construction with native plants or certified weed-free native seed.

Wildlife

See Threatened and Endangered Species section above for mitigation and project commitments.

Hazardous Materials and Hazardous Waste Sites

Project Commitment

Hazardous waste sites could be encountered during construction. In such a case, all work will stop in the area of the contamination according to UDOT Standard Specification, Section 01355, Part 3.1 and the contractor will consult with UDOT and UDEQ to determine the appropriate remedial measures.

Visual and Aesthetic Resources

Visual impacts due to construction activities are considered temporary and no mitigation is required.

Water Quality and Water Resources

Project Commitment

The Preferred Alternative would disturb more than 1 acre of land and would require coverage under the UPDES stormwater permit. To obtain a UPDES permit, a notice of intent must be submitted to the Utah Division of Water Quality describing the construction activities. A SWPPP must be developed prior to submitting the notice of intent for the UPDES permit. The SWPPP identifies best management practices as well as site-specific measures to reduce erosion and prevent eroded sediment from leaving the construction zone.

Invasive Species

Project Commitment

To minimize the movement of invasive species, the Contractor will be required to comply with UDOT's Special Provision 02926S - Invasive Weed Control.