



### 3.11 ECOSYSTEMS

The Dixie Drive Interchange project ecosystem study area is located in St. George in Washington County, Utah. The ecosystem study area includes areas where construction would occur, areas downriver that could be affected by sedimentation, and areas where construction noise could be audible above the background noise (see Figure 3-20).



Figure 3-20 Ecosystem Study Area

Because wildlife are mobile, some of the following discussion focuses on areas that are outside the ecosystem study area but that could be indirectly affected by project activity.

The ecosystem study area is located in a part of Washington County that has historically been used for agriculture. The original conversion of native habitats that existed before European settlement to agricultural uses changed the type and distribution of habitats that are currently available for use by fish and wildlife. Recent growth trends in Washington County have led to higher-density residential and commercial development, which has converted undeveloped land to suburban and urban uses and further fragmented and reduced natural habitats.

Several methods were used to collect data on the vegetation, wildlife, fish, and wetland resources that could be affected by the Dixie Drive Interchange project. These methods consisted of reviewing previously completed surveys, reports, and general information; consulting with agency personnel; requesting and acquiring species records kept by state and federal agencies; and performing field investigations in December 2007 and January 2008.



1 **Endangered Species Act**

2 The Endangered Species Act requires federal agencies to ensure that  
 3 their actions neither jeopardize the continued existence of species listed  
 4 as endangered or threatened nor result in the destruction or adverse  
 5 modification of the critical habitat of these species. Federal agencies  
 6 must consult with the U.S. Fish and Wildlife Service (USFWS) if an action  
 7 would result in “take” of a listed animal species, where “take” means  
 8 to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or  
 9 collect... [an individual of a protected species]” (16 United States Code  
 10 [U.S.C.] 1532 et seq.). The Endangered Species Act could apply to the  
 11 Dixie Drive Interchange project if construction would directly affect a  
 12 species listed under the act.

14 **Bald and Golden Eagle Protection Act**

15 The Bald and Golden Eagle Protection Act prohibits the take, sale,  
 16 purchase, possession, barter, or transport, or offer to do any of the  
 17 above, of either the bald eagle (*Haliaeetus leucocephalus*) or golden  
 18 eagle (*Aquila chrysaetos*) at any time or in any manner (16 U.S.C. 668a–  
 19 d). The Bald and Golden Eagle Protection Act could apply to the Dixie  
 20 Drive Interchange project if any individual or nest of these two eagle  
 21 species could be affected.

23 **Migratory Bird Treaty Act**

24 The Migratory Bird Treaty Act with Canada, Mexico, and Japan (16  
 25 U.S.C. 703–712) makes it unlawful at any time, by any means, or in any  
 26 manner, to pursue, hunt, take, capture, kill, or sell migratory birds. The  
 27 law grants full protection to any bird parts (such as feathers) and applies  
 28 to the removal of nests (such as swallow nests on bridges) occupied by  
 29 migratory birds during the breeding season. This statute applies to all  
 30 migratory birds in the U.S. with the exception of a few exotic species  
 31 such as the European starling and house sparrow.

33 Executive Order 13186, signed by President Bill Clinton on January  
 34 10, 2001, directs federal agencies whose activities are likely to have a  
 35 measurable negative effect on migratory birds to undertake actions in  
 36 support of the Migratory Bird Treaty Act. One of these actions is for  
 37 federal agencies to ensure that the environmental analyses required  
 38 by the National Environmental Policy Act (NEPA) evaluate the effects  
 39 of actions and agency plans on migratory birds, with an emphasis on  
 40 species of concern. The U.S. Army Corps of Engineers (USACE) must  
 41 comply with this executive order when it considers all Clean Water Act  
 42 Section 404 permit applications.

44 **Fish and Wildlife Coordination Act**

45 The Fish and Wildlife Coordination Act (16 U.S.C. 661–667e, as  
 46 amended) states that, whenever construction within the waters or  
 47 channel of a body of water is planned by a department or agency of  
 48 the U.S., the department or agency must consult with USFWS and the  
 49 head of the agency that administers the wildlife resources of the state  
 50 where construction would occur, with the intent of conserving wildlife  
 51 resources. The act’s purposes include ensuring that wildlife conservation  
 52 receives equal consideration and is coordinated with other features of  
 53



1 water resource development programs. USACE would coordinate with  
2 USFWS under this act as part of the Clean Water Act Section 404 permit  
3 process.

4  
5 **Clean Water Act**

6 USACE developed a definition of waters of the United States under the  
7 1972 Clean Water Act (33 U.S.C. 1251). Waters of the U.S. are defined  
8 as waters currently or previously used for interstate or foreign commerce;  
9 all interstate waters; any waters, the destruction of which could affect  
10 interstate or foreign commerce; all impoundments; tributaries of the  
11 previously mentioned waters; the territorial seas; and wetlands adjacent  
12 to waters.

13  
14 Wetlands are defined as a subset of waters of the U.S. and, for the  
15 purposes of regulatory guidance, are considered special aquatic sites.

16 USACE has jurisdiction over waters of the U.S. USACE further defines  
17 wetlands in Section 404 of the Clean Water Act as:

18  
19 ...those areas that are inundated or saturated by surface or ground water  
20 at a frequency and duration sufficient to support, and that under normal  
21 circumstances do support, a prevalence of vegetation typically adapted  
22 for life in saturated soil conditions. Wetlands generally include swamps,  
23 marshes, bogs, and similar areas.

24  
25 USACE presently has jurisdiction over any waters that are adjacent to,  
26 bordering, or contiguous with navigable waterways. Under Section  
27 404 of the Clean Water Act, no discharge of dredged or fill material  
28 is permitted in waters of the U.S. if there is a less environmentally  
29 damaging practicable alternative to that part of the activity that would  
30 result in a discharge of fill material to waters of the U.S. An alternative  
31 is practicable if it is available and capable of being implemented after  
32 taking into consideration cost, existing technology, and logistics in light  
33 of the overall project purposes.

34  
35 **Federal “No Net Loss of Wetlands” Policy**

36 “No net loss” has been a key policy in wetlands protection at the federal  
37 level. Beginning with President George H.W. Bush’s administration, each  
38 administration has adopted the “no net loss of wetlands” policy (White  
39 House Office of Environmental Policy 1993). The original intent was  
40 acknowledged through a December 2002 joint USACE/EPA Regulatory  
41 Guidance Letter that outlined procedures to improve wetland protections  
42 through compensatory mitigation. At the same time, EPA, USACE, and  
43 the Departments of Agriculture, Commerce, Interior, and Transportation  
44 released the National Wetlands Mitigation Action Plan, a collaborative  
45 plan that listed 17 action items that federal agencies would undertake  
46 to improve the effectiveness of wetlands restoration. The primary intent  
47 of the action plan was to affirm the national policy of “no net loss” of  
48 wetlands (EPA and others 2006). USACE must consider the “no net loss”  
49 policy when reviewing requests for authorizing the discharge of fill under  
50 Section 404 of the Clean Water Act.

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### 3.11.1 AFFECTED ENVIRONMENT

#### Vegetation Communities

Three primary vegetation communities were identified as potential habitats for vegetation, wildlife, and fish in and near the study area:

- River channel (open water) and wetlands
- Riparian (mostly upland)
- Landscaped or disturbed

**River Channel and Wetlands.** Wetland areas in the ecosystem study area are located within the armored banks of the Santa Clara River (all below the ordinary high-water mark [OHWM]) where the river channel winds through and is frequently braided into various smaller channels. Mostly unvegetated sand and gravel bars also can be found between the braided channels. The Virgin River floodplain is similar in some ways to the Santa Clara River floodplain; though the Virgin River is much larger than the Santa Clara, less armoring has been constructed along the Virgin River, and this armoring is set farther back within the floodplain. Fluvial wetlands are present along the banks of the Virgin River. Wetlands are also found within the oxbows of the confluence area, where sufficient hydrology still remains to support wetlands.

The typical vegetation types in riverine areas along the Santa Clara and Virgin Rivers in the ecosystem study area are cattails (*Typha angustifolia*), bulrushes (*Scirpus* spp.), rushes (*Juncus* spp.), salt-cedar (*Tamarix ramosissima*), willows (*Salix* spp.), cottonwoods (*Populus* spp.), arrowweed (*Pluchea sericea*), rough cockle-bur (*Xanthium strumarium*), and sand burgrass (*Cenchrus longispinus*). Within the consistent low-water channel, various algae are sometimes present, depending on the length of time after a recent scouring flood event. Some of the willows in wetland areas along both rivers were planted after the flood of 2005.

**Riparian.** The riparian areas in the ecosystem study area are limited to remnant patches along the Santa Clara River, near the confluence of the Santa Clara and Virgin Rivers, and along the Virgin River. Many of these riparian areas are in non-wetland habitats (uplands), although some areas outside the ecosystem study area but within the Virgin River floodplain can be classified as wetlands (typically scrub-shrub wetlands). Typically, the vegetation types in these riparian areas within the ecosystem study area include cottonwoods (*Populus* spp.), willows (*Salix* spp.), and salt-cedar (*Tamarix ramosissima*). However, considering that many of these riverside riparian areas are uplands, they can also contain many typically upland species such as big saltbush (*Atriplex lentiformis*), arrowweed (*Pluchea sericea*), Russian thistle (*Salsola iberica*), sweet clover (*Melilotus* spp.), common sunflower (*Helianthus annuus*), upland grasses (*Festuca* spp. and *Poa* spp.), and the introduced Bermuda grass (*Cynodon dactylon*).

**Landscaped or Disturbed.** This land type is becoming increasingly common in the St. George area as development moves into previously agricultural or native areas. Within the ecosystem study area, landscaped and disturbed areas are primarily found along the upland banks (above the channel armoring) of the Santa Clara River within the golf course operated by the City of St. George. There is one large cropland with surrounding cleared land on the western end of the ecosystem study



1 area that is planned to be converted to golf course land as mitigation  
 2 for the loss of golf course land removed by the construction of the  
 3 Dixie Drive Interchange. In addition, some parcels on the eastern end of  
 4 the ecosystem study area are under construction as a part of the Dixie  
 5 Convention Center area development. The typical vegetation types in  
 6 these landscaped areas include planted golf turf grass (various species)  
 7 and planted cottonwoods (*Populus* spp.). Along some of the disturbed  
 8 edges of the golf course and areas soon to be or currently under  
 9 construction are invasive species such as Russian thistle (*Salsola iberica*),  
 10 Bermuda grass (*Cynodon dactylon*), salt-cedar (*Tamarix ramosissima*),  
 11 and an assortment of other, smaller annual weeds such as tall tumbling  
 12 mustard (*Sisymbrium altissimum*).

13  
 14 **Terrestrial Wildlife**

15 **Wildlife Species**

16 The types of wildlife species that typically use the riverine channels and  
 17 associated wetlands include bird, mammal, and invertebrate species.  
 18 However, since river channels are prone to flooding, little or no nesting  
 19 or reproduction is likely to occur here with the exception of reproduction  
 20 by some invertebrate species.

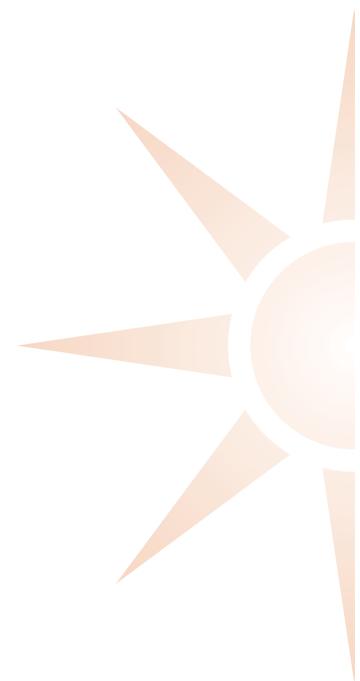
21  
 22 Bird species that either forage in or migrate through this riverine habitat  
 23 include song sparrow (*Melospiza melodia*), yellow and Wilson's warblers  
 24 (*Dendroica petechia* and *Wilsonia pusilla*), common yellowthroat  
 25 (*Geothlypis trichas*), greater roadrunner (*Geococcyx californianus*),  
 26 mallard (*Anas platyrhynchos*), Cooper's hawk (*Accipiter cooperii*),  
 27 western screech-owl (*Megascops kennicottii*), red-tailed hawk (*Buteo*  
 28 *jamaicensis*), and the greater roadrunner (*Geococcyx californianus*).

29  
 30 Mammal species that either forage or live in the riverine habitat include  
 31 mice (*Peromyscus* or *Perognathus* spp.), muskrats (*Ondatra zibrthica*),  
 32 and raccoon (*Procyon lotor*) as well as mule deer (*Odocoileus hemionus*)  
 33 in more protected areas and during low-flow times.

34  
 35 Invertebrate species, such as insects, are numerous and adequate to  
 36 support a healthy population of birds and insectivorous mammals.

37  
 38 The riparian habitats provide foraging habitat and possibly nesting  
 39 habitat for many of the same local and migratory species found in the  
 40 riverine habitat. In addition to the bird species that use riverine wetlands,  
 41 these riparian habitats could support bushtit (*Psaltriparus minimus*),  
 42 spotted towhee (*Pipilo maculatus*), summer tanager (*Piranga rubra*),  
 43 yellow-breasted chat (*Icteria virens*), and possibly southwestern willow  
 44 flycatcher (*Empidonax trailli extimus*). Additional mammal species in  
 45 the riparian habitats could include voles (*Microtus* spp.), kangaroo rats  
 46 (*Dipodomys* spp.), striped skunk (*Mephitis mephitis*), and possibly desert  
 47 cottontail (*Sylvilagus audubonii*).

48  
 49 The area within and surrounding the Dixie Drive Interchange project is  
 50 part of an important migratory flyway for birds in the Intermountain  
 51 West and provides important migratory stopover (temporary-use) habitat  
 52 for birds traveling north and south.



1 The open spaces around human environments, such as the golf course  
2 and its associated landscaped and disturbed areas, tend to be used by  
3 wildlife species that are well adapted to some or all of these types of  
4 manipulated environments. In addition to the possible use by species in  
5 adjacent habitats, these human environments are often used by well-  
6 adapted species such as starling (*Sturnus vulgaris*), house sparrow (*Passer*  
7 *domesticus*), black-billed magpie (*Pica hudsonia*), northern mockingbird  
8 (*Mimus polyglottos*), raccoon, and deer mouse (*Peromyscus maniculatus*).  
9 The golf course and its associated human-made water features (variously  
10 sized ponds and pools) can also attract waterfowl such as mallard,  
11 American coot (*Fulica americana*), Canada goose (*Branta canadensis*),  
12 and bufflehead (*Bucephala albeola*).  
13

14 **Terrestrial Special-Status Species**

15 Federally Listed Species

16 Table 3-26 provides the common and scientific names, status, and  
17 probability of occurrence of the federally listed terrestrial species in the  
18 ecosystem study area. Southwestern willow flycatcher (endangered) and  
19 yellow-billed cuckoo (candidate) have a slight chance of being present  
20 in or close to the ecosystem study area and are discussed in more detail  
21 below. Relict leopard frog (candidate) is historically known to have been  
22 present near the ecosystem study area and is also discussed in more  
23 detail below.  
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**Table 3-26 Federally Listed Terrestrial Species in the Ecosystem Study Area**

| Species (Scientific Name)   | Status <sup>a</sup> | Probability of Occurrence <sup>b</sup> |
|---|---------------------|--|
| <b>Birds</b>  |                     |  |
| Mexican spotted owl ( <i>Strix occidentalis lucida</i> )            | T                   | None                                   |
| Southwestern willow flycatcher ( <i>Empidonax trailli extimus</i> ) | E                   | Low                                    |
| Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )                 | C                   | Low                                    |
| <b>Amphibians and Reptiles</b>                                      |                     |  |
| Desert tortoise ( <i>Gopherus agassizii</i> )                       | T                   | None                                   |
| Relict leopard frog ( <i>Rana onca</i> )                            | C - Extirpated      | None <sup>c</sup>                      |
| <b>Mammals</b>  |                     |  |
| Brown (grizzly) bear ( <i>Ursus arctos</i> )                        | T - Extirpated      | None                                   |
| Gray wolf ( <i>Canis lupis</i> )                                    | E - Extirpated      | None                                   |
| <b>Plants</b>   |                     |  |
| Dwarf bearclaw-poppy ( <i>Arctomecon humilis</i> )                  | E                   | None                                   |
| Holmgren milkvetch ( <i>Astragalus holmgreniorum</i> )              | E                   | None                                   |
| Shivwits or Shem milkvetch ( <i>Astragalus ampullariodes</i> )      | E                   | None                                   |
| Siler pincushion cactus ( <i>Pediocactus sileri</i> )               | T                   | None                                   |

Source: Utah Division of Wildlife Resources 2008a

<sup>a</sup>Status definitions:

E = A species that is listed as endangered by USFWS.

T = A species that is listed as threatened by USFWS.

C = A species for which USFWS has on file enough information on biological vulnerability and threats to justify its being a "candidate" for listing as endangered or threatened (but the species is not yet legally protected).

<sup>b</sup>Probability definitions:

None = No habitat identified in or near the study area; no known occurrences documented.

Low = Potential for habitat identified in or near the study area; no known occurrences documented.

Good = Habitat identified in or near the study area; known occurrences documented.

<sup>c</sup> Habitat could still exist for this species close to the study area, but the species has not been recorded in Utah for nearly 60 years.

**Southwestern Willow Flycatcher (Endangered).** This subspecies of the willow flycatcher is a rare summer breeder in southern Utah. This species typically inhabits a fairly broad range, in terms of both elevation and plant community, of healthy riparian habitat. It prefers a mosaic of dense stands of willow and/or salt-cedar communities interspersed with openings and shorter vegetation. However, for nesting habitat, this species prefers that these riparian areas are inundated for large portions of the year with surface water very close to or surrounded by vegetation. These areas of vegetation must also be at least 30 feet wide if in a linear



1 configuration or over 2 acres in size otherwise.  
 2 Most of the small patches of riparian vegetation in the ecosystem study  
 3 area are not large enough for nesting habitat and are also marginal  
 4 for migratory stopover habitat. The closest nesting habitat is about 1.2  
 5 miles to the northeast along the Virgin River in the Riverside Marsh. This  
 6 species also nests about another 2 miles northeast of the Riverside Marsh  
 7 in the Seegmiller Marsh (3.5 miles total from the ecosystem study area).  
 8 The riparian habitat surrounding the confluence of the Santa Clara and  
 9 Virgin Rivers has been used as temporary migratory stopover habitat for  
 10 the species in recent years (HDR 2007a, 2007b).

11  
 12 **Yellow-Billed Cuckoo (Candidate).** Yellow-billed cuckoos were  
 13 historically common-to-uncommon summer visitors in Utah and across  
 14 the Great Basin. The current distribution of yellow-billed cuckoos in  
 15 Utah is poorly understood, although they appear to be an extremely  
 16 rare breeder in lowland riparian habitats statewide. These birds arrive  
 17 in late May or early June and breed during late June through July.  
 18 Cuckoos typically start their southerly migration by late August or early  
 19 September. Yellow-billed cuckoos are considered a riparian obligate  
 20 species (a species that requires riparian habitat) and are usually found  
 21 in large tracts of cottonwood/willow habitat (100 to 200 acres or more)  
 22 with a well-developed overstory of cottonwoods and a dense subcanopy  
 23 of willows and shrubs.

24  
 25 Records show the presence of yellow-billed cuckoos in riparian areas  
 26 near the ecosystem study area (at the confluence of the Santa Clara and  
 27 Virgin Rivers) as recently as the summer of 2000 (HDR 2007b). Two other  
 28 recent sightings (nesting not confirmed) were recorded in the Riverside  
 29 Marsh (about 1.2 miles northeast of the ecosystem study area) and near  
 30 the city of Santa Clara (about 5 miles northwest of the ecosystem study  
 31 area). However, the existing riparian habitat in the ecosystem study area  
 32 does not provide suitable nesting habitat for this species, especially after  
 33 the recent flooding and after the City of St. George removed salt-cedars  
 34 in the confluence area. However, the confluence area could provide  
 35 some marginal migratory stopover habitat for this species, though most  
 36 of this habitat is beyond the eastern border of the actual construction  
 37 impact area.

38  
 39 **Relict Leopard Frog (Candidate).** This species is thought to be  
 40 extirpated from Utah after 1950, though the reasons for its disappearance  
 41 are unknown (possibilities include predation and/or competition by other  
 42 exotic amphibians and hybridization with other frog species). Very little is  
 43 known about this species' specific habitat needs because too few remain  
 44 in North America to conduct detailed research. The only historically  
 45 known location in Utah for this frog species was along the Virgin River  
 46 near the City of St. George in Washington County.

47  
 48 State Listed Species  
 49 State sensitive species (not including fish species) that could be present  
 50 in or near the ecosystem study area are the Arizona toad and three  
 51 bat species: big free-tailed bat, fringed myotis, and spotted bat. For  
 52 information on state listed fish species, see the section Native Fish  
 53 Communities.

54



1  
2 Table 3-27 provides the common and scientific names, status, and  
3 probability of occurrence for each of the state listed species that could be  
4 present in this part of Washington County. The probability of occurrence  
5 is based on known and recorded accounts of possible residence (that  
6 is, courtship, nesting, and rearing of young), but such accounts could  
7 also be simple sightings as the species moved through the area. Further  
8 explanation of a species' probability of occurrence is provided in the  
9 paragraphs below.

10  
11 **Table 3-27 State Species of Concern in the Study Area**

| Species (Scientific Name)                                   | Status <sup>a</sup> | Probability <sup>b</sup> |
|---|---------------------|--------------------------|
| <b>Birds</b>  |                     |                          |
| American white pelican ( <i>Pelecanus erythrorhynchos</i> ) | SPC                 | None                     |
| Black swift ( <i>Cypseloides niger</i> )                    | SPC                 | None                     |
| Bobolink ( <i>Dolichonyx oryzivorus</i> )                   | SPC                 | None                     |
| Burrowing owl ( <i>Athene cunicularia</i> )                 | SPC                 | None                     |
| Ferruginous hawk ( <i>Buteo regalis</i> )                   | SPC                 | None                     |
| Greater sage-grouse ( <i>Centrocercus urophasianus</i> )    | SPC                 | None                     |
| Lewis's woodpecker ( <i>Melanerpes lewis</i> )              | SPC                 | None                     |
| Long-billed curlew ( <i>Numenius americanus</i> )           | SPC                 | None                     |
| Mountain plover ( <i>Charadrius montanus</i> )              | SPC                 | None                     |
| Northern goshawk ( <i>Accipiter gentilis</i> )              | CS                  | None                     |
| Short-eared owl ( <i>Asio flammeus</i> )                    | SPC                 | None                     |
| Three-toed woodpecker ( <i>Picoides dorsalis</i> )          | SPC                 | None                     |
| <b>Amphibians and Reptiles</b>                              |                     |                          |
| Arizona toad ( <i>Bufo microscaphus</i> )                   | SPC                 | Low                      |
| Common chuckwalla ( <i>Sauromalus ater</i> )                | SPC                 | None                     |
| Desert iguana ( <i>Dipsosaurus dorsalis</i> )               | SPC                 | None                     |
| Desert night lizard ( <i>Xantusia vigilis</i> )             | SPC                 | None                     |
| Gila monster ( <i>Heloderma suspectum</i> )                 | SPC                 | None                     |
| Mojave rattlesnake ( <i>Crotalus scutulatus</i> )           | SPC                 | None                     |
| Sidewinder ( <i>Crotalus cerastes</i> )                     | SPC                 | None                     |
| Speckled rattlesnake ( <i>Crotalus mitchellii</i> )         | SPC                 | None                     |
| Western banded gecko ( <i>Coleonyx variegatus</i> )         | SPC                 | None                     |
| Western threadsnake ( <i>Leptotyphlops humilis</i> )        | SPC                 | None                     |
| Western toad ( <i>Bufo boreas</i> )                         | SPC                 | None                     |
| Zebra-tailed lizard ( <i>Callisaurus draconoides</i> )      | SPC                 | None                     |
| <b>Mammals</b>  |                     |                          |
| Allen's big-eared bat ( <i>Idionycteris phyllotis</i> )     | SPC                 | None                     |
| Big free-tailed bat ( <i>Nyctinomops macrotis</i> )         | SPC                 | Low                      |
| Fringed myotis ( <i>Myotis thysanodes</i> )                 | SPC                 | Low                      |
| Kit fox ( <i>Vulpes macrotis</i> )                          | SPC                 | None                     |



| Species (Scientific Name)                                   | Status <sup>a</sup> | Probability <sup>b</sup> |
|---|---------------------|--------------------------|
| Pygmy rabbit ( <i>Brachylagus idahoensis</i> )              | SPC                 | None                     |
| Spotted bat ( <i>Euderma maculatum</i> )                    | SPC                 | Low                      |
| Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> ) | SPC                 | None                     |
| Western red bat ( <i>Lasiurus blossevillii</i> )            | SPC                 | None                     |
| Invertebrates   |                     |                          |
| Desert springsnail ( <i>Pyrgulopsis deserta</i> )           | SPC                 | None                     |
| Wet-rock physa ( <i>Physella zionis</i> )                   | SPC                 | None                     |

Source: Utah Division of Wildlife Resources 2008b,c

<sup>a</sup> Status definitions:

SPC = Special Concern Species

CS = Conservation Species

<sup>b</sup> Probability definitions:

None = No recent records, only historic; habitat may no longer exist in or near the study 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 (*Bufo microscaphus*).** Historically, this species was known to be present in the southwestern U.S. along the lower Virgin River through southwestern Utah and into Nevada and Arizona. The Arizona toad 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 ecosystem 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 a museum specimen from 1999 (UDWR 2005). 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 ecosystem study area.

**Big Free-Tailed Bat (*Nyctinomops macrotis*).** This species is present from South America through the central U.S. In Utah, it is present primarily in the southern part of the state, though it is only a summer resident. It roosts primarily in cliff crevices but also in buildings. Since it is a strong flier, the big free-tailed bat is believed to be able to fly greater distances than other bats in southern Utah. The cliffs near the ecosystem study area above the Virgin River could provide habitat for this species. However, there is only one record of this species in the St. George area, and it is from 1965 (UDWR 2005). It is unlikely that this species roosts in the ecosystem study area since there are many cliffs outside the area and this species is not known to roost under roadway bridges.



1 **Fringed Myotis (*Myotis thysanodes*).** This species is present from  
 2 Mexico through southern Canada. Although it is not common in Utah,  
 3 the fringed myotis is widely distributed throughout the state. This bat  
 4 species typically roosts in caves, rock crevices, and old buildings near  
 5 desert woodlands and shrublands close to streams or ponds. Fringed  
 6 myotis also roost under less-traveled roadway bridges, but, since the  
 7 Interstate 15 (I-15) bridges in the area are heavily used during the day,  
 8 it is unlikely that these bridges are used for roosting. The cliffs near the  
 9 ecosystem study area above the Virgin River could provide habitat for this  
 10 species. However, there is only one record of this species in the greater  
 11 St. George area, and it is from 1985 (UDWR 2005). Given the lack of  
 12 records and the lack of roosting habitat, it is unlikely that this species  
 13 roosts in the ecosystem study area.

14  
 15 **Spotted Bat (*Euderma maculatum*).** This species is similar in range and  
 16 roosting preferences to the fringed myotis. As with the fringed myotis,  
 17 roosting habitat for the spotted bat might exist near, but probably not  
 18 within, the ecosystem study area (only in the cliffs above the Virgin River).  
 19 There are two museum records for this species in the greater St. George  
 20 area from the 1970s (UDWR 2005). As with the other bat species that  
 21 could be present in this part of Utah, it is unlikely that this species roosts  
 22 in the ecosystem study area.

23  
 24 **Native Fish Communities**  
 25 **Aquatic Habitat**

26 Within the ecosystem study area, the Virgin River is a slightly entrenched,  
 27 meandering, sand-dominated, riffle/pool channel with a well developed  
 28 floodplain. The reach in the vicinity of the I-15 bridge is somewhat  
 29 narrowly confined with upper bank slopes of less than 30 percent on  
 30 both the left and right banks. The lower banks are mostly unvegetated,  
 31 although there is some tamarisk and coyote willow. Sand and small gravels  
 32 make up both the bed and bank material, and these contribute to a  
 33 highly sediment-mobile system. The river supports a riparian community  
 34 that primarily consists of tamarisk and coyote willow and several grasses,  
 35 rushes, and forbs.

36  
 37 Seegmiller Marsh is an oxbow-created marsh that formed in the 1980s  
 38 following flood-induced shifts in channel morphology. The marsh  
 39 is located about 3.5 miles upstream of the I-15 river crossing. It is 15  
 40 acres and is fed by irrigation return flows carried by drains from the  
 41 Washington/St. George fields. Riverside Marsh is about 10 acres and is  
 42 located about 1.2 miles upstream of the bridge crossing. This marsh is  
 43 fed by surface stormwater runoff from St. George's Flood Street and  
 44 irrigated fields just north of the marsh.

45  
 46 Virgin River water diversions during low-flow periods remove substantial  
 47 flow from the river, particularly at the Quail Creek and Washington  
 48 Fields diversions upstream of the ecosystem study area (see Figure  
 49 21). However, high flows in the river are relatively unrestricted due to  
 50 significant local rainfall events (Cross 1985) and input from numerous  
 51 springs and irrigation return flow (Heckmann and others 1987). In the  
 52 ecosystem study area, Virgin River surface flow is present year-round.  
 53 Average monthly streamflow data for the Virgin River near St. George  
 54 are presented in Table 3-28.

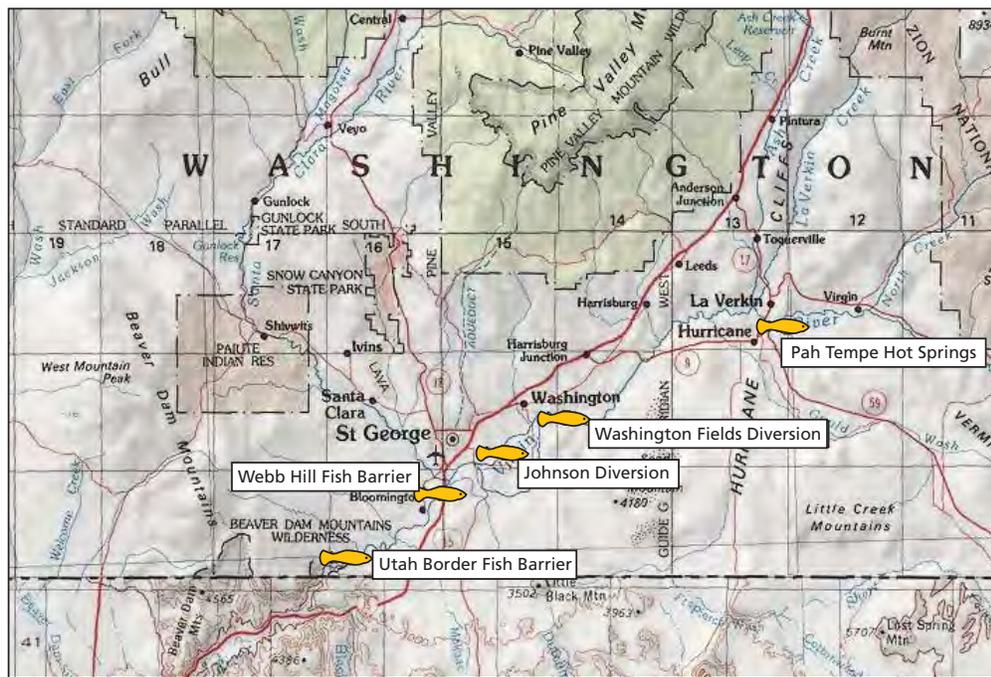


1 The hydrologic profile of the Virgin River is similar to that of most  
 2 southwestern desert riparian areas. Flows are highly variable with daily  
 3 and seasonal fluctuations in temperature, flow, and physical and chemical  
 4 parameters (Deacon and others 1987). Water in the Virgin River has high  
 5 salinity and turbidity. High flows during spring runoff are common in  
 6 April and May with extreme low flows during the dry summer months,  
 7 typically July and August. Monsoon rains later in summer can cause  
 8 flash floods, and peak annual flows are most common in August and  
 9 September.

11 **Table 3-28 Average Monthly Flows for the Virgin and Santa Clara**  
 12 **Rivers near St. George, Utah (shown in cfs)**

| River             | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Virgin River      | 258 | 242 | 302 | 362 | 394 | 116 | 68  | 111 | 90  | 110 | 139 | 153 |
| Santa Clara River | 23  | 25  | 37  | 25  | 19  | 15  | 5.9 | 7.1 | 4.3 | 4.4 | 6.9 | 8.3 |

19 Source: USGS 2007



43 Figure 3-21 St. George Vicinity Showing Virgin River Recovery Team Collection Locations

45 After flash floods the Virgin River frequently forms new channels  
 46 within the wider parts of the floodplain, which results in braiding and  
 47 disconnected oxbows. Aquatic vegetation in the channels is limited by  
 48 variable-flow conditions and unstable substrates. The absence of major  
 49 dams on the main stem of the Virgin River allows relatively natural flooding  
 50 to occur within the floodplain during peak flows. Quail Creek Dam and  
 51 Sand Hollow Dam are off the main stem; however, water is diverted  
 52 to them from the main stem, and these diversions affect both flood  
 53 and base flows. Several other diversions are present on the river; these  
 54 diversions could function similarly to dams at lower flows in that water

1 is ponded behind the diversion structures and the channel morphology  
 2 directly downstream of the structures is altered. These diversions have  
 3 also depleted average stream flows in the Virgin River. The majority of  
 4 the Virgin River streambed has not been channelized, which allows the  
 5 river to frequently change course within the floodplain and form braided  
 6 channels, oxbows, and backwaters that help promote the formation of  
 7 riparian and wetland vegetation.

8  
 9 Within the ecosystem study area, the Santa Clara River has a relatively low  
 10 gradient from a variable-width stream bed (about 8 to 50 feet), a normal  
 11 active channel width of about 12 feet, and a substrate of coarse alluvial  
 12 sand and/or gravel with a high degree of silt and embeddedness. There  
 13 is surface flow in the vicinity of the ecosystem study area year-round  
 14 during all years on record (USGS 2007); however, flows during drought  
 15 years, most recently 2002 and 2003, were near zero. During drought  
 16 years, extreme low to nonexistent flows effectively eliminate habitat for  
 17 fish species near the City of St. George. During summer monsoons, flash  
 18 floods are common. Average monthly stream flow data for the Santa  
 19 Clara River at St. George are presented in Table 3-28.

20  
 21 Several mitigation and revegetation projects have been completed by  
 22 the Natural Resources Conservation Service (NRCS) near the proposed  
 23 project, and mitigation associated with the St. George sewer line crossing  
 24 (sewer main to cross the Virgin and Santa Clara Rivers) is proposed in  
 25 the area. An established native vegetation area is located immediately  
 26 downstream of the diversion dam near the mouth of the Santa Clara  
 27 River.

28  
 29 **Aquatic Special-Status Species**

30 Six native fish are present in the Virgin River (see Table 3-29) including  
 31 the speckled dace (*Rhinichthys osculus*) and the federally endangered  
 32 woundfin (*Plagopterus argentissimus*) and Virgin River chub (*Gila*  
 33 *seminuda*). The other three species, Virgin spinedace (*Lepidomeda*  
 34 *mollispinis mollispinis*), desert sucker (*Catostomus discobolus*), and  
 35 flannemouth sucker (*Castostomus latipinnis*), are listed as Utah state  
 36 species of concern. Currently, all six native fish species use the reaches  
 37 of the Virgin River within the ecosystem study area. Within the past 5  
 38 years, both woundfin and Virgin River chub have been collected near the  
 39 ecosystem study area along the Virgin River (Golden 2008b). The Virgin  
 40 River Program's ongoing red shiner (*Cyprinella lutrensis*) eradication  
 41 efforts have eliminated most fish in the Virgin and Santa Clara Rivers  
 42 below a 10-foot dam near the confluence of the rivers (Golden 2007).  
 43 This dam was constructed to help remove non-native species from  
 44 the Virgin River. It effectively excludes non-native species but has also  
 45 excluded the flannemouth sucker, woundfin, and Virgin River chub from  
 46 the Santa Clara River.

47  
 48 In October 2007, the Utah Division of Wildlife Resources (UDWR)  
 49 completed a rotenone treatment on the Virgin River between Johnson  
 50 Diversion and the Arizona border (see Figure 3-21). The same area was  
 51 treated the previous two years, but all six native species have been  
 52 documented in the Virgin River close to the ecosystem study area from  
 53 2005 to 2007. The section of the river that includes the ecosystem study  
 54 area is reported to contain some of the best habitat for the woundfin



prior to the invasion of red shiner in the mid-1980s (Golden 2007). The purpose of ongoing eradication efforts is to restore habitat for woundfin and other native fish.

**Table 3-29 Native Fish Species in the Study Area**

| Common Name         | Scientific Name                           | Sensitive Status <sup>a</sup> |       | Probability of Occurrence                             |
|---------------------|---|-------------------------------|-------|---|
|                     |   | Federal                       | State |   |
| Woundfin            | <i>Plagopterus argentissimus</i>          | E                             | E     | Present in Virgin River                               |
| Virgin River chub   | <i>Gila seminuda</i>                      | E                             | E     | Present in Virgin and Santa Clara <sup>b</sup> Rivers |
| Virgin spinedace    | <i>Lepidomeda mollispinis mollispinis</i> | —                             | CA    | Present in Virgin and Santa Clara Rivers              |
| Desert sucker       | <i>Catostomus clarki</i>                  | —                             | SOC   | Present in Virgin and Santa Clara Rivers              |
| Flannelmouth sucker | <i>Catostomus latipinnis</i>              | —                             | CA    | Present in Virgin River                               |
| Speckled dace       | <i>Rhinichthys osculus</i>                | —                             | —     | Present in Virgin and Santa Clara Rivers              |

<sup>a</sup> Status definitions:

E = endangered

SOC = species of concern

CA = Conservation Agreement in place for species

<sup>b</sup> The occurrence in the Santa Clara River is a single transient that was collected immediately upstream of the Bloomington Diversion in the early 2000s (Golden 2008c).

The Santa Clara River upstream of the dam is dominated by desert sucker and speckled dace. Part of the Virgin Spinedace Conservation Agreement and Strategy is to restore Virgin spinedace to the Santa Clara River from Gunlock Reservoir downstream to the Virgin River confluence. In March 2007, UDWR relocated some Virgin spinedace to the lower Santa Clara River near the Mathis Road Bridge (see Figure 3-22). As of November 2007, these fish and some of their progeny were still being collected, primarily between Malaga Road and the Valley View Road bridge. Based on these findings, these spinedace have successfully reproduced and have survived through the critical summer low-flow periods (Golden 2007).

The Santa Clara River is considered devoid of woundfin and flannelmouth sucker (Golden 2008c) because neither species has been collected during the September-to-December 2007 sampling surveys of the Santa Clara River (Boman and Buckel 2007; Stamieszkin 2007a, 2007b). UDWR reports that a Virgin River chub was collected in the early 2000s immediately upstream of the Bloomington Diversion (Golden 2008c), though this species has not been captured in recent surveys conducted in the vicinity of the ecosystem study area (Boman and Buckel 2007; Stamieszkin 2007a, 2007b).



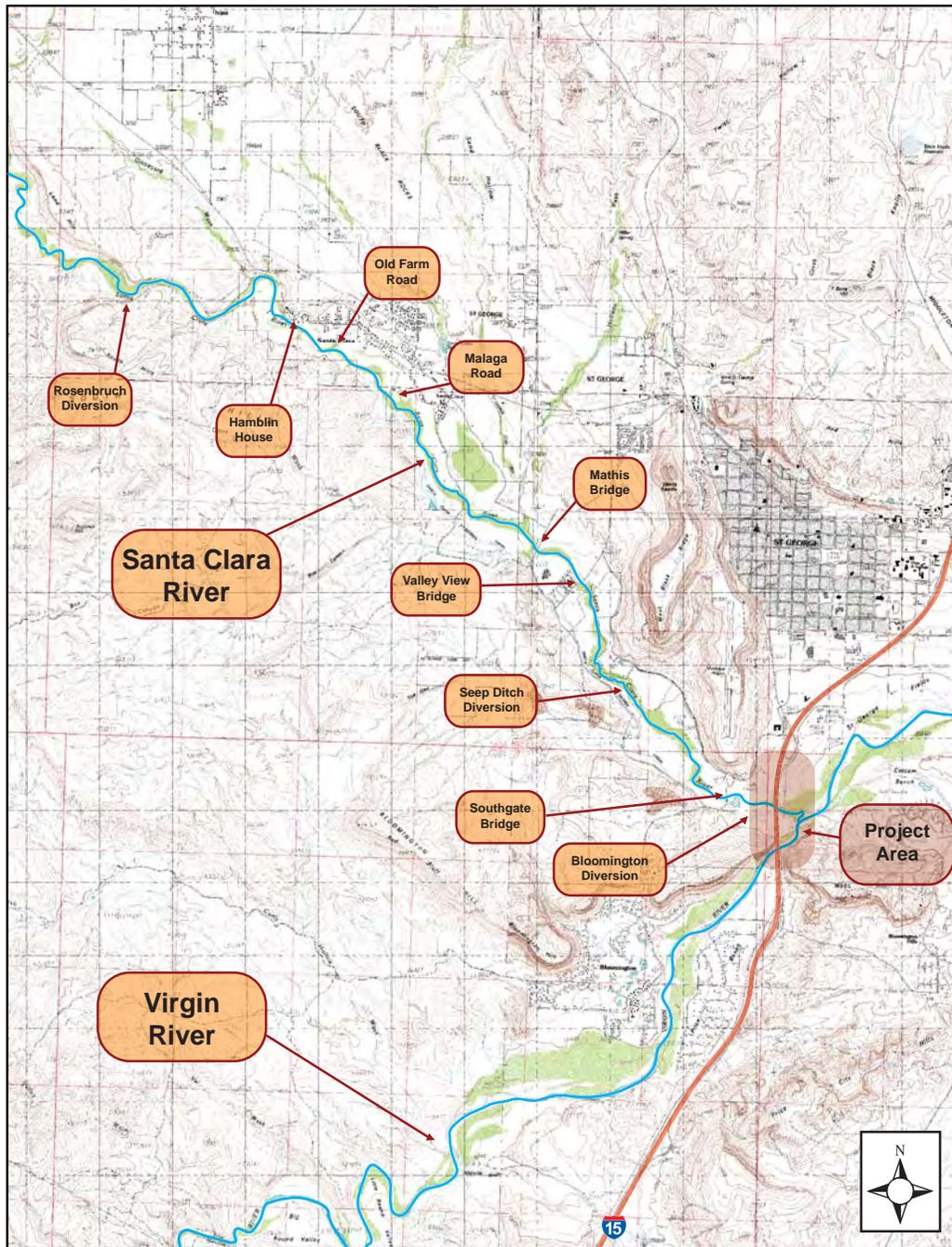


Figure 3-22 Santa Clara River Showing Existing Diversion Structures and Collection Reaches

The following sections describe each native fish species known to be present in the ecosystem study area. Federally listed species are presented first, followed by state sensitive species.

Federally Listed Species

*Virgin River Chub*

**Status, Habitat, and Distribution.** The Virgin River chub (*Gila seminuda*) is a rare minnow that is present only in the Virgin River system of southwestern Utah, southern Nevada, and northwestern Arizona. In Utah, the species is restricted to limited areas of the main-

1 stem Virgin River. The Virgin River chub was listed as endangered under  
 2 the Endangered Species Act in 1989 (54 Federal Register 35305) due to  
 3 drastic reductions in numbers compared to historic conditions. Critical  
 4 habitat was designated for this species on January 25, 2000 (65 Federal  
 5 Register 4140 and 4156), and includes the main-stem Virgin River and  
 6 its 100-year floodplain from the confluence of La Verkin Creek in Utah  
 7 to Halfway Wash in Nevada. The Santa Clara River is not included in this  
 8 critical habitat; however, the shared floodplain with the Virgin River at  
 9 the confluence of the two rivers is included as critical habitat.

10

11 **Occurrence in the Ecosystem Study Area.** Due to the high number of  
 12 non-native fishes in the ecosystem study area until recently, the presence  
 13 of native species, including the Virgin River chub, in this area has been  
 14 inconsistent (Golden 2007). However, the Virgin River Program has been  
 15 stocking Virgin River chub into reaches in the ecosystem study area  
 16 (Meismer 2007). Due to this stocking, this memorandum assumes that  
 17 Virgin River chub use all reaches in the Virgin River part of the ecosystem  
 18 study area, although the prevalence of this species is likely very limited  
 19 and distribution is fragmented due to the ongoing red shiner eradication  
 20 efforts. Within the past 5 years, Virgin River chub have been collected  
 21 in the vicinity of the I-15 bridge crossings of the Virgin River (Golden  
 22 2008b).

23

24 A transient Virgin River chub was reportedly captured in the Santa Clara  
 25 River by UDWR biologists just upstream of the Bloomington Diversion (see  
 26 Figure 3-22) in the early 2000s (Golden 2008c). However, the presence  
 27 of this species in the Santa Clara River part of the ecosystem study area  
 28 is likely low to nonexistent, and there are no viable populations upstream  
 29 of the non-native species exclusion barrier. Virgin River chub are not  
 30 documented as having spawned in the ecosystem study area since the  
 31 1980s (Meismer 2007).

32

33 *Woundfin*

34 **Status, Habitat, and Distribution.** The woundfin (*Plagopterus*  
 35 *argentissimus*) is a species of minnow endemic to the Virgin River. It was  
 36 listed as federally endangered in 1970 (35 Federal Register 16047) in  
 37 response to drastic population reductions, mainly due to the introduction  
 38 of non-native species and the loss of habitat due to flow modifications.  
 39 Critical habitat was designated in 2000 (65 Federal Register 4140) and  
 40 includes the Virgin River and its 100-year floodplain from the Virgin River  
 41 confluencæ with La Verkin Creek in Utah to Halfway Wash in Nevada  
 42 (USFWS 2000). The Santa Clara River is not included in critical habitat  
 43 except for the shared floodplain with the Virgin River at the confluence.

44

45 **Occurrence in the Ecosystem Study Area.** Woundfin numbers in the  
 46 Virgin River ecosystem study area fluctuate greatly depending on stocking  
 47 rates, environmental conditions, and efforts to eradicate non-native  
 48 species. Due to the high number of non-native fishes in the ecosystem  
 49 study area until recently, the presence of native species, including the  
 50 woundfin, has been inconsistent. However, the Virgin River Program has  
 51 been stocking woundfin into reaches of the Virgin River in the ecosystem  
 52 study area. Within the past 5 years, woundfin have been collected in the  
 53 Virgin River near the ecosystem study area (Golden 2008b); however,  
 54 spawning has not been documented in the area (Meismer 2007).



1 Woundfin have not been captured in the Santa Clara River upstream of  
 2 the non-native species exclusion dam (Golden 2007; Meisner 2007).

3  
 4 State Sensitive Species

5 *Virgin Spinedace*

6 **Status, Habitat, and Distribution.** The Virgin spinedace (*Lepidomeda*  
 7 *mollispinis mollispinis*) is a member of an endemic group of western  
 8 minnows and is a Utah conservation species that is restricted to the  
 9 Virgin River basin. The spinedace was proposed for listing as federally  
 10 endangered on May 18, 1994 (59 Federal Register 25875). However,  
 11 the proposal to list this species was withdrawn in 1996 after finalization  
 12 of the Virgin Spinedace Conservation Agreement and Strategy, which  
 13 protects the species and its habitat over the long term.

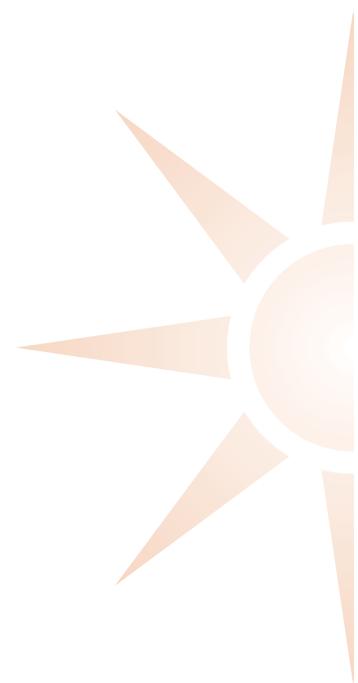
14  
 15 **Occurrence in the Ecosystem Study Area.** Due to the high number of  
 16 non-native fish in the ecosystem study area until recently, the presence  
 17 of native species, including the Virgin spinedace, has been inconsistent.  
 18 However, the Virgin River Program has been stocking spinedace into  
 19 Santa Clara River reaches upstream of the ecosystem study area. At this  
 20 time, spinedace are not known to use or spawn in the river reaches of  
 21 the ecosystem study area.

22  
 23 In March 2007, UDWR relocated some Virgin spinedace to the lower  
 24 Santa Clara River near the Mathis Road Bridge upstream of the  
 25 ecosystem study area (see Figure 3-22). As of November 2007, these fish  
 26 and some of their progeny were still being collected, primarily between  
 27 Malaga Road and the Valley View Road bridge (Golden 2007), which is  
 28 upstream of the ecosystem study area. Based on these findings, these  
 29 spinedace have successfully reproduced and have survived through the  
 30 critical summer low-flow periods. However, the frequency of use of the  
 31 ecosystem study area reaches of the Santa Clara River by this species is  
 32 believed to be low, and spawning and/or use of the ecosystem study  
 33 area is unlikely (Golden 2008a).

34  
 35 *Desert Sucker*

36 **Status, Habitat, and Distribution.** The desert sucker (*Catostomus clarki*)  
 37 is a Utah species of concern that is restricted to the Virgin River Basin. It is  
 38 native to parts of the Colorado River system of the southwestern United  
 39 States and northern Mexico. In Utah, the species is present only in the  
 40 Virgin River system.

41  
 42 **Occurrence in the Ecosystem Study Area.** Desert suckers are known  
 43 to occupy the reach of the main-stem Virgin River in the ecosystem study  
 44 area, although the prevalence of this species is low and distribution is  
 45 scattered due to ongoing efforts to eradicate non-native species. The  
 46 Santa Clara River upstream of the exclusion dam is dominated by desert  
 47 sucker and speckled dace (Golden 2007). In recent sampling conducted  
 48 by UDWR in the vicinity of the Bloomington diversion (see Figure 3-22),  
 49 desert suckers were collected (Stamieszkin 2007a, 2007b). Although  
 50 desert suckers typically spawn from February to early July, spawning  
 51 has not been documented in the reaches of the ecosystem study area  
 52 (Meisner 2007). However, desert suckers might spawn in the reaches of  
 53 the Santa Clara River near the golf course, since young fish (less than 1  
 54 year old) have been collected there (Golden 2008c).



1 *Flannelmouth Sucker*

2 **Status, Habitat, and Distribution.** The flannelmouth sucker  
3 (*Catostomus latipinnis*) is native to the Colorado River and is present in  
4 the Virgin River and many of its larger tributaries. Flannelmouth suckers  
5 are usually absent from impoundments. Although the species has no  
6 federal status, it is included on the Utah State Sensitive Species List as  
7 a special management species. A Conservation Agreement has been  
8 developed to protect the species and its habitat over the long term.

9  
10 **Occurrence in the Ecosystem Study Area.** Flannelmouth suckers  
11 are known to occupy the reach of the main-stem Virgin River in the  
12 ecosystem study area, although the prevalence of this species is low  
13 and distribution is scattered due to ongoing efforts to eradicate non-  
14 native species. Although flannelmouth suckers typically spawn in April  
15 and May in the vicinity of the proposed project, spawning has not been  
16 documented in the reaches of the ecosystem study area (Meismer 2007).  
17 UDWR has no recent collection reports of flannelmouth suckers in the  
18 Santa Clara River (Golden 2008c).

19  
20 *Speckled Dace*

21 **Status, Habitat, and Distribution.** The speckled dace (*Rhinichthys*  
22 *osculus*) is a small minnow that is native to the western United States.  
23 In Utah, the species is quite common and occurs in many of the state's  
24 major streams and in numerous desert springs. No special status has  
25 been assigned to this species.

26  
27 **Occurrence in the Ecosystem Study Area.** Speckled dace are known  
28 to occupy the reach of the main-stem Virgin River in the ecosystem study  
29 area, although the prevalence of this species is low and distribution  
30 is scattered due to ongoing efforts to eradicate non-native species.  
31 Along with the desert sucker, the speckled dace dominates the fish  
32 community of the Santa Clara River upstream of the exclusion dam. In  
33 recent sampling conducted by UDWR in the vicinity of the Bloomington  
34 diversion (see Figure 3-22), speckled dace were the most common fish  
35 species collected (UDWR 2008a).

36  
37 **Waters of the U.S., Including Wetlands**

38 Wetlands and waters of the U.S. were identified through a formal  
39 delineation process consistent with the *Corps of Engineers Wetlands*  
40 *Delineation Manual* (Environmental Laboratory 1987) and the *Interim*  
41 *Regional Supplement to the Corps of Engineers Wetland Delineation*  
42 *Manual: Arid West Region* (Environmental Laboratory 2006). Through  
43 the delineation process, the study team identified the types and amounts  
44 of wetlands and other waters of the U.S. in the delineation study area,  
45 which is slightly different than the ecosystem study area (see Figure 3-  
46 23).

47  
48 There are no Section 10 waters in the delineation study area, so regulation  
49 under the Rivers and Harbors Act does not apply. There are, however, a  
50 number of waters subject to regulation under Section 404 in the region  
51 and in the delineation study area.

52  
53 To confirm the nature and extent of jurisdictional features, UDOT  
54 completed a preliminary delineation of waters of the U.S., including



1 wetlands, in the 150-acre delineation study area in February 2008. Table  
2 3-30 and Figure 3-23 summarizes the results of the survey. Detailed  
3 results are available in the *Delineation of Waters of the U.S. in Support*  
4 *of the Dixie Drive Interchange Project* (HDR 2008) in Appendix A. The  
5 delineation study was approved by the USACE in February 2009 (see  
6 February 25, 2009 letter in Chapter 4).

8 **Table 3-30 Summary of the Jurisdictional Waters of the U.S. in**  
9 **the Wetland Study Area**

| Type                     | Total Number of Features <sup>a</sup> | Total Amount (acres) |
|--------------------------|---------------------------------------|----------------------|
| Emergent marsh           | 1                                     | 0.1                  |
| Scrub-shrub              | 1                                     | 0.16                 |
| Open water               |                                       |                      |
| <i>River channel</i>     | 2                                     | 13.3                 |
| <i>Pond (Artificial)</i> | 1                                     | 3.2                  |
| <i>Ditch</i>             | 1                                     | 0.06                 |
| <b>Total:</b>            |                                       | <b>16.8</b>          |

21 *Source: HDR 2008*

22 <sup>a</sup> Mapped in the field as part of the wetland delineation and determined to be  
23 jurisdictional by the USACE (February 25, 2009) and therefore regulated under  
24 Section 404 of the Clean Water Act.

25 As shown in Table 3-30, the delineated area supports jurisdictional  
26 waters. Each of these types is described below. (The river channel and  
27 pond types have been combined into open water.)

29 **Emergent Marsh Wetland.** This wetland (0.1 acre) is categorized as  
30 (disturbed) emergent marsh instead of a more specific classification  
31 because the floodplain for the Santa Clara River and parts of the Virgin  
32 River has been constricted with bank armoring to maintain a predescribed  
33 floodplain (see Figure 3-23). This constriction has changed the dynamics  
34 of the wetlands below and just above the OHWM to a more disturbed  
35 condition than what would naturally exist.

37 The emergent marsh wetland community in the delineation study area  
38 supports coyote willow (*Salix exigua*) and salt-cedar (*Tamarix ramosissima*)  
39 with a lesser component of narrow-leaf cottonwood (*Populus fremontii*)  
40 in the sapling/shrub stratum and rush (*Juncus* spp.), redtop (*Agrostis*  
41 *stolonifera*), Bermuda grass (*Cynodon dactylon*), and a mixture of other  
42 obligate, facultative, and facultative upland species in the herb stratum.

44 **Scrub-Shrub Wetland.** This wetland is in the eastern section of the  
45 delineation study area adjacent to the Virgin River. The wetland is on the  
46 western bank of a previous river channel (now an oxbow) and covers a  
47 total of about 0.16 acre in the delineation study area (see Figure 3-23).  
48 Hydrology is supplied by the Virgin River, as the wetland abuts a previous  
49 channel of the river. The main channel of the Virgin River has since  
50 shifted to the east. However, water still flows through this oxbow, and  
51 the wetland is within the historic floodplain and is probably supported in  
52 part through groundwater.





**Figure 3-23**  
**Delineation Features within**  
**the Delineation Study Area**

1 Vegetation in this scrub-shrub community consists primarily of coyote  
 2 willow and arrowweed (*Pluchea sericea*) in the sapling/shrub stratum  
 3 and common reed (*Phragmites australis*) in the herb stratum.

4  
 5 **Open Water.** Open water consists of both the channel areas (below the  
 6 OHWM) of the Santa Clara and Virgin Rivers, two ditches, the ponds  
 7 on the Southgate Golf Course, and a private pond in the upland areas  
 8 adjacent to the Santa Clara River (see Figure 3-23). The river channels  
 9 are dynamic, and their acreages can sometimes change seasonally  
 10 depending on the degree of bank armoring and flood conditions. The  
 11 open-water ponds in the Southgate Golf Course are maintained, and  
 12 therefore the depths fluctuate little as long as the rainfall overflow drains  
 13 are not blocked. Out of all of these aquatic features, only the two rivers,  
 14 one ditch (Ditch 1), and the largest of the golf ponds were determined  
 15 to be jurisdictional by the USACE (see Table 3-30).

16  
 17 **Ditch.** There are two ditches in the delineation study area. Ditch 1 is a  
 18 stormwater outlet that originates from the developments north of the  
 19 delineation study area. This ditch, which appears to flow perennially,  
 20 emerges from a large culvert in the northern section of the delineation  
 21 study area and flows into the Santa Clara River (see Figure 3-23). Ditch  
 22 2 is an irrigation ditch that originates to the northwest, outside the  
 23 delineation study area, from a pipe to a short section of concrete-lined  
 24 ditch and then continues in a native soil ditch where irrigation water is  
 25 then dispersed by sheet flow into an alfalfa field (see Figure 3-23). Ditch  
 26 2 does not appear to have an outlet to the Santa Clara River and was  
 27 determined not to be jurisdictional by the USACE.

28  
 29 **3.11.2 ENVIRONMENTAL CONSEQUENCES**

30 The project team used literature searches, resource agency consultations,  
 31 and field observations to assess the expected effects of the Preferred  
 32 Alternative on vegetation, fish, and wildlife resources and associated  
 33 habitats. Basic literature and documented information searches were  
 34 conducted using various means such as internet search engines, library  
 35 document searches, and state and federal mapping and reports. These  
 36 searches yielded current documents and information along with any  
 37 relevant and available literature.

38  
 39 The project team consulted with agencies and organizations such as  
 40 USFWS, UDWR, USACE, and the Utah Natural Heritage Program by e  
 41 mail, phone, and meetings throughout the project impact analysis in  
 42 2007 and 2008. As a result, the agencies provided correspondence that  
 43 describes the expected impacts to common and sensitive species and  
 44 their habitats.

45 In addition, the project team visited the project area to perform various  
 46 tasks such as the wetland delineation, which allowed the project  
 47 team to observe and verify information in the field. The project team's  
 48 professional judgment and expertise in this area of Utah and with this  
 49 type of environment also played an important role in this analysis.



1 **No-action Alternative**

2 Under the No-action Alternative, the Dixie Drive Interchange would not  
3 be built. The Southgate Golf Course would remain in its current location;  
4 however, the proposed mitigation area to the northwest would likely be  
5 developed for residential uses in the future. The riparian areas within  
6 the confluence would remain the same, though more development is  
7 expected in the area east and northeast of the Convention Center; this  
8 would increase the ambient noise levels in the vicinity of the confluence.  
9 Development would likely continue on the east bank of the Virgin River,  
10 which would affect the confluence area by increasing ambient noise  
11 levels and sediment runoff.

12  
13 In addition, under the No-action Alternative, the existing I-15 bridge piers  
14 in the Santa Clara River would remain in their current alignment, which  
15 would continue to constrict river flow. Similarly, the Tonaquint Bridge  
16 would remain in its current location, where it constricts the channel and  
17 prevents natural hydraulic processes both upstream and downstream of  
18 the bridge.

19  
20 **Preferred Alternative**

21 **Wildlife Habitats**

22 Impacts

23 As described above in the section Vegetation Communities, three primary  
24 habitats for vegetation, fish, and wildlife were identified: river channel  
25 and wetlands, riparian, and landscaped or disturbed.

26  
27 **River Channel and Wetlands.** Construction of the Dixie Drive  
28 Interchange would not remove any wetlands and would have a minor  
29 impact to the river channel area due to the installation of bridge piers for  
30 the I-15 overpass at the Santa Clara River.

31  
32 **Riparian.** The Dixie Drive Interchange project would eliminate a small  
33 amount (<0.2 acre) of fringe riparian habitat between and on the east  
34 side of the existing I-15 bridges over the Santa Clara River. Much of  
35 this riparian habitat, which consists of a mix of exotic and native  
36 species, is between the river and the eroded banks, the existing bridge  
37 abutments, or the bicycle/pedestrian path. Although this habitat would  
38 be permanently lost, it is of lower value than the more extensive, high-  
39 value riparian habitat elsewhere in the area, such as along the Virgin  
40 River or in Seegmiller Marsh.

41  
42 **Landscaped or Disturbed.** Most of the acreage that would be developed  
43 by the Dixie Drive Interchange project is landscaped or disturbed land.  
44 This acreage is mainly associated with the Southgate Golf Course and  
45 parcels of commercial land. Since these lands typically do not provide  
46 valuable habitat for wildlife species and are easily replaced elsewhere,  
47 the loss of this land type of area does not represent a substantial loss to  
48 wildlife species.

49  
50 **Terrestrial Wildlife**

51 Impacts

52 Since the Dixie Drive Interchange project would not significantly affect  
53 native, terrestrial wildlife habitat, there are no anticipated, significant  
54 impacts to wildlife species from this project. With the construction of the

**What impacts would the No-action Alternative have on ecosystems?**

- Existing I-15 bridge piers in Santa Clara River would remain in current alignment, constricting river flow.
- Tonaquint Bridge would remain in current location, constricting the Santa Clara River channel and preventing natural hydraulic processes.

**What impacts would the Preferred Alternative have on ecosystems?**

- Would not remove any wetlands and would only have a minor impact to river channel.
- Would eliminate <0.2 acres or riparian habitat.
- Temporary impacts to aquatic wildlife during construction.
- Native fish in Santa Clara River could benefit from the Tonaquint Bridge removal

Federally Listed Species:

- **Southwestern willow flycatcher:** Temporary construction noise could affect the southwestern willow flycatcher. *Preliminary may affect, but is not likely to adversely affect determination.*
- **Yellow-billed cuckoo:** No effect.
- **Virgin River Chub:** *Preliminary may affect, but is not likely to adversely affect determination.*
- **Woundfin:** *Preliminary may affect, but is not likely to adversely affect determination*

State-Sensitive Species:

- May have some impact on the virgin spinedace, desert sucker, flannelmouth sucker, and speckled dace, but would not likely adversely impact the species.

1 section of Dixie Drive between the existing Dixie Drive bridge crossing  
 2 and the I-15 bridge crossing, wildlife would be at greater risk of being  
 3 killed by vehicle strikes. However, since there are other existing, busy  
 4 roads in the area, this would not substantially increase the risk of vehicle  
 5 strikes above current levels. Project construction would also temporarily  
 6 increase noise levels within about 0.25 mile of the project footprint.  
 7 Although the increased noise during construction could affect common  
 8 species in the area, the discussion below in the section Terrestrial Special  
 9 -Status Species, Federally Listed Species, focuses on noise impacts to two  
 10 federally listed bird species.

11  
 12 The Dixie Drive Interchange project could affect the nests of migratory  
 13 birds during project construction. If protected species are nesting in the  
 14 construction zone or buffer zone during construction, the UDOT would  
 15 need to consult with the appropriate authorities in order to comply with  
 16 the Migratory Bird Treaty Act.

17  
 18 **Aquatic Wildlife**

19 Impacts

20 The effects to aquatic wildlife due to construction and use of the proposed  
 21 Dixie Drive Interchange are presented by topic below.

22  
 23 ***In-Water Elements (Bridges over the Santa Clara River and***  
 24 ***Tonaquint Bridge Removal)***. Under the Preferred Alternative, existing  
 25 I-15 bridge structures would be removed and replaced with wider  
 26 structures that should decrease channel constriction. Removing the  
 27 existing I-15 bridge piers, constructing four new over-water structures,  
 28 and removing the existing Tonaquint Bridge would require the use of  
 29 heavy equipment that would temporarily disturb river substrates and  
 30 adjacent streambanks. Such actions would directly affect water quality  
 31 in the Santa Clara River, and, if the effects are substantial, they could  
 32 extend downstream to the Virgin River. Fugitive dust and runoff carrying  
 33 silt from rainstorms could increase the turbidity of the water in this area  
 34 and downstream. Although these effects would likely displace individuals  
 35 temporarily, the infrequent use of the area by most sensitive fish species  
 36 suggests that the effects would be minor, particularly because native  
 37 fish are relatively tolerant of increases in suspended sediments. Other  
 38 aquatic species could be temporarily displaced, although they would  
 39 likely recolonize construction areas after in-water work is completed.

40  
 41 In-water work would be required to remove the existing I-15 piers and  
 42 Tonaquint Bridge abutments. In-water work would also be required  
 43 to pour the new pier foundations, at least one of which would likely  
 44 be located within the active flow of the river, even during summer  
 45 periods of low flow. Cofferdams may be used to isolate in-channel  
 46 work areas from river flow to prevent entry of concrete debris to the  
 47 river. Although fish would likely move away from the construction area  
 48 as in-water construction isolation structures are being installed, if fish  
 49 are observed behind the structures, removal and salvage operations  
 50 would be employed to safely relocate native fish. Such salvage activities  
 51 would be performed by qualified fish biologists, as determined through  
 52 consultation with UDWR biologists.

53  
 54



1 Replacing the bridge foundations is a permanent change that would  
 2 alter the channel bottom and flow pattern of the Santa Clara River. The  
 3 river around the construction and downstream could be contaminated  
 4 when concrete is poured. All new concrete used during construction  
 5 that could come in contact with the Santa Clara River will be properly  
 6 cured so that no hazardous materials from the concrete could leach into  
 7 the surface waters.

8

9 **Armoring along Portions of Dixie Drive in the Floodplain.** Portions  
 10 of Dixie Drive would be constructed below the OHWM of the Santa  
 11 Clara River just downstream of Tonaquint Drive. This alignment would  
 12 require removing riparian vegetation along a linear stretch of 700 to  
 13 2,500 feet (pending hydraulic analysis and further design). The removal  
 14 of this vegetation could increase the potential for shoreline erosion and  
 15 sedimentation during high flows, and a loss of streamside habitat could  
 16 increase the complexity of in-water habitat.

17

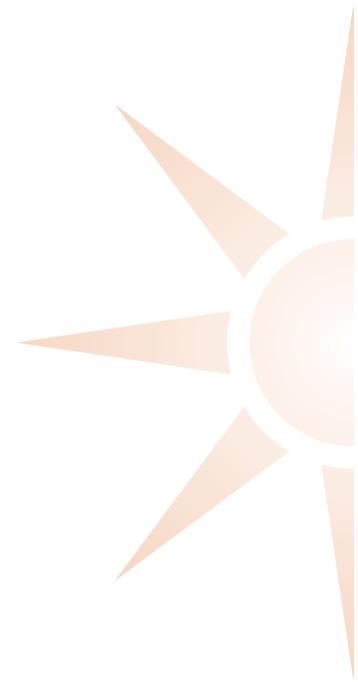
18 To protect the new roadway in this location from the erosive forces of  
 19 the river during high flows, armoring along the edge of the southern  
 20 shoulder would be required. Armoring would be achieved with structural  
 21 elements to maintain a natural channel appearance. Piling, if used, would  
 22 be driven in the dry, and therefore noise associated with pile driving  
 23 should not produce underwater sound pressure waves that affect fish.  
 24 The proposed bank stabilization would be placed at existing grades and  
 25 constructed so that the size and flood-carrying capacity of the existing  
 26 Santa Clara River channel are maintained. The installation of such  
 27 armoring, since it would be conducted in the floodplain and close to the  
 28 channel, could introduce sediments and temporarily increase turbidity  
 29 in the immediate construction area. However, use of BMPs including silt  
 30 fencing or similar practices landward of the river bank would reduce  
 31 adverse effects.

32

33 **Discharge of Contaminants during Construction or Use of Roads  
 34 and Bridges.** The unintentional introduction of petroleum products  
 35 during construction adjacent to the Santa Clara River could harm aquatic  
 36 wildlife. Sources of fuel and oil spills or leakage into the Santa Clara River  
 37 could include heavy equipment and products stored onsite throughout  
 38 the duration of the project. Specific impact minimization measures  
 39 have been established regarding storing fuel, fueling equipment, and  
 40 containing spills. These measures should reduce or eliminate the potential  
 41 for spills and thereby reduce or eliminate any effects to aquatic organisms.  
 42 To reduce the magnitude and effects of erosion and sedimentation, a  
 43 Storm Water Pollution Prevention Plan (SWPPP) would be developed  
 44 for this project and would identify BMPs to be implemented during  
 45 construction. Such SWPPPs typically include erosion-control measures  
 46 and a requirement to fuel vehicles and equipment outside the active  
 47 channel and floodplain.

48

49 **Hydraulic Modifications to the Santa Clara River Due to Structures  
 50 below the OHWM.** Adding armoring portions of the floodplain, as well  
 51 as removing Tonaquint Bridge, could modify the river hydraulics. Similar  
 52 effects could occur from constructing the proposed new bridge piers  
 53 for the I-15 mainline bridges and the on and off ramps for Dixie Drive.  
 54 Because the bed and bank materials in the vicinity of proposed in-water



1 and streambank activities are sand and gravel, an increase in scouring  
 2 around structures below the OHWM could transport more fine-grained  
 3 material downstream to the confluence of the Virgin River. Such effects  
 4 would likely be restricted to periods of high flow when the river swells  
 5 following storms. A temporary increase in sediment input to the Virgin  
 6 River would not likely be measurable compared to existing conditions,  
 7 particularly considering that flood-prone hydrology and high turbidity  
 8 are natural characteristics of both the Santa Clara and Virgin Rivers.

9  
 10 After the Tonaquint Bridge is removed, the river gradient in the vicinity  
 11 of the bridge should equalize over time as upstream sediments fill scour  
 12 pockets downstream. This should result in more efficient and natural  
 13 flow conveyance and sediment transport through the reach and could  
 14 improve flooding and erosion problems upstream and downstream of  
 15 the structure over time as the river re-establishes equilibrium. Based on  
 16 this expected condition, native fish in this stretch of the Santa Clara River  
 17 could benefit from bridge removal through improved water quality and  
 18 flow conditions over the long term.

19  
 20 **Stormwater Inputs.** The proposed project would increase impervious  
 21 surface areas within 300 feet of the Santa Clara River. Increased  
 22 impervious surfaces could increase stormwater inputs to adjacent water  
 23 bodies. If sediments and contaminants are transported in stormwater  
 24 from new roads into the Santa Clara and Virgin Rivers, this could cause  
 25 direct effects to aquatic species. Roadway pollutants of concern include  
 26 sediment, hydrocarbons, and metals.

27  
 28 An evaluation of pollutant runoff to the Santa Clara River from the Dixie  
 29 Drive project, including overwater structures and the new road, was  
 30 presented in the Water Quality section. That evaluation determined that  
 31 there would be no impacts to water quality from runoff associated with  
 32 new impervious surfaces, particularly if UDOT's standards for stormwater  
 33 treatment and detention are followed before the runoff is discharged into  
 34 surface waters. The anticipated runoff from the Dixie Drive project would  
 35 not exceed state standards for the pollutants analyzed. Additionally,  
 36 a SWPPP would be developed and incorporated into the final project  
 37 design, and a Notice of Intent form would be submitted to the Utah  
 38 Division of Water Quality before the project is constructed. Given this  
 39 information, it is unlikely that stormwater runoff from this project would  
 40 have any measurable effect on the water quality, and therefore aquatic  
 41 wildlife in, the Virgin or Santa Clara Rivers.

42  
 43 **Terrestrial Special-Status Species**

44 Federally Listed Species

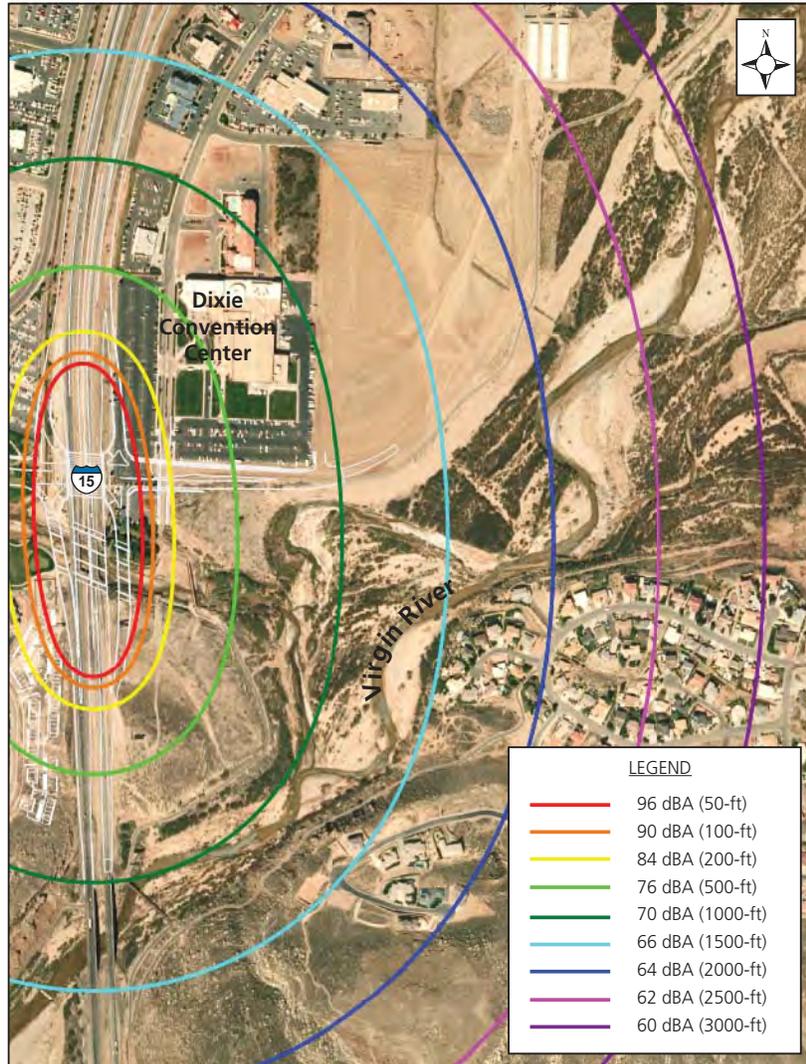
45 *Impacts*

46 Of the 11 federally listed terrestrial species listed previously in Table 3-  
 47 26, only two species, southwestern willow flycatcher and yellow-billed  
 48 cuckoo, have a small chance of being present within or near to the  
 49 ecosystem study area.

50  
 51 **Southwestern Willow Flycatcher.** The proposed project would not  
 52 remove or affect any critical nesting or foraging habitat at the I-15 crossing  
 53 of the Santa Clara River, since the area does not have critical nesting or  
 54 foraging habitat at that location and already has two existing overpasses

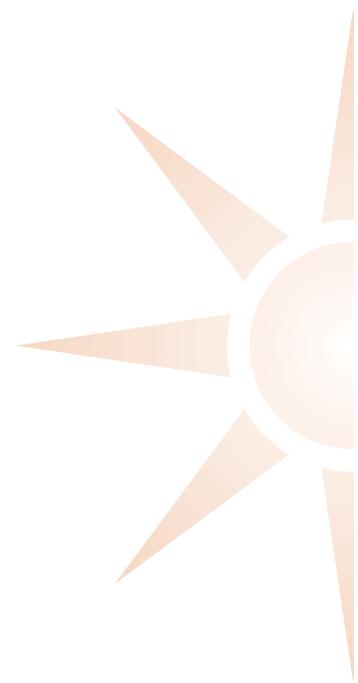


1 over the river. Other land taken for the construction of the interchange  
 2 either has existing roads or structures or is currently maintained as a golf  
 3 course and is not considered habitat for this or any other native species.  
 4 Increased noise levels from project construction could have direct effects  
 5 on southwestern willow flycatchers in the Virgin River area. The noise  
 6 analysis of the worst-case scenario, use of the pile driver, shows that the  
 7 confluence area of the Santa Clara and Virgin Rivers would have a noise  
 8 level of between 66 and 76 dBA during construction (see Figure 3-24).  
 9



43 *Figure 3-24 Results of the FHWA Roadway Construction Noise Model*

45 Beyond 3,000 feet from the I-15 bridge construction area, noise levels  
 46 would diminish and would return to existing background levels (between  
 47 51 and 60 dBA). These temporary construction activities could deter  
 48 migrating individuals from using the Santa Clara River as a travel route  
 49 near the confluence with the Virgin River during the construction period.  
 50 However, because this species can fly, other entries into the Santa Clara  
 51 River valley, though possibly less desirable, would still be available to the  
 52 species. Temporary construction noise could also affect the movements  
 53 of southwestern willow flycatchers within the Virgin River confluence  
 54 area by deterring flycatchers from using the area during construction.



1 Once the project is constructed, any permanent increases in noise  
 2 levels from vehicle traffic at the interchange would be minor ( $\pm 1$  dBA)  
 3 compared to the current noise levels from the existing traffic along I-15  
 4 (see Figure 3-25).



38 Figure 3-25 Existing and Future Noise Levels

41 After reviewing the anticipated effects of the proposed action, the  
 42 project team concludes that construction of the Dixie Drive Interchange  
 43 *may affect, but is not likely to adversely affect*, the southwestern willow  
 44 flycatcher. However, this is a preliminary effect determination until  
 45 consultations between FHWA and USFWS are complete. The rationale for  
 46 this preliminary determination is based on the fact that any individuals in  
 47 the vicinity of the bridge construction could be temporarily disturbed by  
 48 the noise from construction (primarily from the pile driving), and there  
 49 is critical habitat for this species within the ecosystem study area, along  
 50 with documented nesting over 1 mile away. However, no flycatchers are  
 51 known to reside within the ecosystem study area, nor is any critical habitat  
 52 or known nesting habitat being removed or substantially altered.



1 **Yellow-Billed Cuckoo.** The effects on the species from the proposed  
2 project would be very similar to those on the southwestern willow  
3 flycatcher. However, construction of the Dixie Drive Interchange would  
4 have *no effect* on the yellow-billed cuckoo. The rationale for this  
5 preliminary determination is based on the following factors:

- 6
- 7 • No critical habitat for this species has been designated either
- 8 within the ecosystem study area or anywhere in North America,
- 9 so none would be affected.
- 10 • No marginal nesting or foraging habitat for this species would
- 11 be removed or significantly altered.
- 12 • Any individuals in the vicinity could be temporarily disturbed by
- 13 the noise from construction; however, no cuckoos are known to
- 14 reside within the ecosystem study area.

15

16 State Listed Species

17 *Impacts*

18 Of the state listed species listed in Table 3-27, only four species have  
19 potential habitat and/or recent species accounts within the ecosystem  
20 study area: Arizona toad, big free-tailed bat, fringed myotis, and spotted  
21 bat.

22

23 **Arizona Toad (*Bufo microscaphus*).** Since this species has been  
24 recorded in the St. George area, and since it has an affinity for upland  
25 and riparian areas close to water, the Dixie Drive Interchange project  
26 could affect this species. The greatest potential area of impact is in the  
27 in-water work associated with the I-15 and Tonaquint Street bridges.  
28 However, since both areas surrounding these bridges have been  
29 extensively developed and altered, from golf course development to  
30 other construction and landscaping, it is unlikely that any individuals still  
31 reside in these areas, if they did historically. Therefore, the Dixie Drive  
32 Interchange project may have some impact on the Arizona toad, but is  
33 unlikely to adversely impact the species.

34

35 **Big Free-Tailed Bat (*Nyctinomops macrotis*).** This species is known  
36 to roost in cliffs and old buildings and is historically known to be present  
37 in the St. George area. However, no cliffs or old buildings would be  
38 affected by this project; therefore, the Dixie Drive Interchange project  
39 would have no impact on the big free-tailed bat.

40

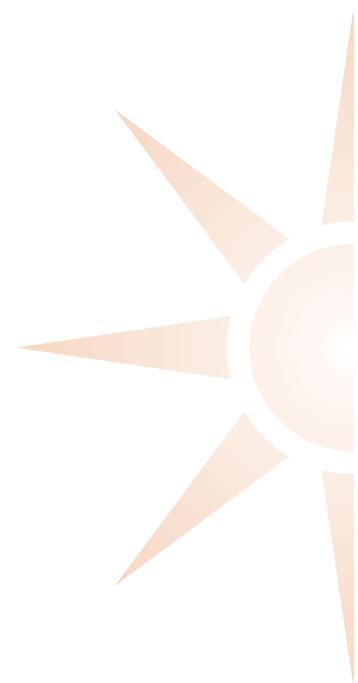
41 **Fringed Myotis (*Myotis thysanodes*).** This species is known to roost  
42 in or on caves, cliffs, old buildings, and less-traveled roadway bridges  
43 and is historically known to be present in the greater St. George area.  
44 The only potential roosting habitat that could be affected by the project  
45 is the Tonaquint Street Bridge, though this bridge might have too much  
46 traffic (local traffic and golf carts) to be used for roosting by this species.  
47 Therefore, the Dixie Drive Interchange project would have no impact on  
48 the fringed myotis.

49

50 **Spotted Bat (*Euderma maculatum*).** Since this species is similar in  
51 range and roosting preferences to the fringed myotis, the Dixie Drive  
52 Interchange project would have no impact on the spotted bat.

53

54



1 ***Aquatic Special-Status Species***

2 Federally Listed Species

3 *Impacts*

4 ***Virgin River Chub.*** As previously stated, Virgin River chub have been  
 5 recently collected in the vicinity of the I-15 bridge crossings of the Virgin  
 6 River (Golden 2008b), though spawning has not been documented since  
 7 the 1980s (Meisner 2007). The presence of Virgin River chub in the  
 8 Santa Clara portion of the ecosystem study area is likely very low to  
 9 nonexistent, and there are no viable populations upstream of the non-  
 10 native species exclusion barrier (Golden 2008c).

11  
 12 Because Virgin River chub are known to be present in the Virgin River  
 13 near the confluence with the Santa Clara River, direct construction effects  
 14 (displacement or harassment during dewatering, etc.) are possible though  
 15 unlikely, considering the nature of proposed actions and the distance  
 16 of the Virgin River from proposed construction areas along the Santa  
 17 Clara. Temporary increases in turbidity and sedimentation could occur  
 18 associated with installing new piers (bridge supports) for reconstructing  
 19 portions of the I-15 bridge and for on and off ramps connecting I-15 to  
 20 Dixie Drive. Direct effects to Virgin River chub as a result of an accidental  
 21 spill or introduction of hazardous materials into aquatic habitats could  
 22 include injury or mortality if a large volume of fuel or hazardous material  
 23 is spilled. However, these effects would likely be minor given the  
 24 distance of proposed activities from the Virgin River, where the species is  
 25 documented to be present and critical habitat is designated, and given  
 26 the proposed implementation of best management practices. Therefore,  
 27 the proposed Dixie Drive Interchange project *may affect, but is not likely*  
 28 *to adversely affect* Virgin River chub.

29  
 30 ***Woundfin.*** As previously discussed, woundfin have been collected in  
 31 the Virgin River near the confluence of the Virgin and Santa Clara Rivers;  
 32 however, they have not been captured in the Santa Clara River upstream  
 33 of the non-native species exclusion dam (Golden 2007; Meisner 2007).  
 34 Therefore, direct and indirect impacts to individual woundfin due to the  
 35 proposed action would be limited to those actions that could affect the  
 36 Virgin River at the confluence. Impacts associated with construction  
 37 activities adjacent to and over the Santa Clara River would have minor,  
 38 if any, effects on woundfin unless water quality impairments (increased  
 39 sedimentation, for example) are significant enough to affect the Virgin  
 40 River. During construction, such effects are unlikely.

41  
 42 Indirect effects include increased sedimentation and turbidity associated  
 43 with increased scouring at new bridge piers placed below the OHWM of  
 44 the Santa Clara River. During extreme high flows, river flow could scour  
 45 the bases of the new piers and transport that increased sediment load to  
 46 the Virgin River. It is likely, however, that this is an existing condition given  
 47 the location of the existing I-15 bridge piers. Increases in scour would  
 48 not likely be measurable at the confluence of the Virgin River where  
 49 woundfin are known to be present. Effects to individual woundfin and  
 50 associated critical habitat within the Virgin River floodplain are therefore  
 51 possible, but are unlikely to have a measurable effect on the species.  
 52 Therefore, the proposed Dixie Drive Interchange project *may affect, but*  
 53 *is unlikely to adversely affect* woundfin.

54



1 State-Sensitive Species

2 *Impacts*

3 **Virgin Spinedace.** At this time, spinedace are not known to spawn  
 4 in the river reaches of the ecosystem study area. However, spinedace  
 5 are present in the Virgin and Santa Clara Rivers, though likely in low  
 6 numbers in the Santa Clara River (Golden 2008a). Effects to Virgin  
 7 spinedace could include displacement and disturbance due to in-water  
 8 work and increased turbidity associated with construction and removal  
 9 of in-water structures. Changes to in-stream hydraulics due to bank  
 10 armoring along portions of Dixie Drive would not likely significantly  
 11 alter in-stream habitat conditions for the spinedace. Additionally, such  
 12 potential hydraulic effects would likely be mitigated to some extent by  
 13 removing Tonaquint Bridge and realigning in-stream bridge foundations  
 14 at the I-15 crossing. Therefore, the proposed project may have some  
 15 impact on the Virgin spinedace, but is unlikely to adversely impact the  
 16 species.

17  
 18 **Desert Sucker.** Desert suckers are known to be present in the reach of  
 19 the main-stem Virgin River in the ecosystem study area and are one of the  
 20 dominant fish species in the Santa Clara River upstream of the exclusion  
 21 dam (Golden 2007). The effects on the desert sucker would be similar  
 22 to those for the Virgin spinedace, though the intensity and frequency of  
 23 construction effects would likely be greater for desert suckers since they  
 24 are abundant in the Santa Clara River.

25  
 26 **Flannelmouth Sucker.** Flannelmouth suckers are known to occupy the  
 27 reach of the main-stem Virgin River in the ecosystem study area, although  
 28 the prevalence of this species is low and distribution is scattered due to  
 29 ongoing eradication efforts targeting non-native species. They are not  
 30 likely to be present in the Santa Clara River. Based on this distribution,  
 31 effects to flannelmouth sucker would be similar to those described for  
 32 woundfin.

33  
 34 **Speckled Dace.** Speckled dace are known to occupy the reach of  
 35 the main-stem Virgin River in the ecosystem study area, although the  
 36 prevalence of this species is low and distribution is scattered. Along with  
 37 the desert sucker, the speckled dace dominates the fish community of the  
 38 Santa Clara River upstream of the exclusion dam. The effects on speckled  
 39 dace would be similar to those described for the Virgin spinedace, with  
 40 levels of intensity of impact similar to those for the desert sucker.

41  
 42 ***Waters of the U.S., Including Wetlands***

43 The Dixie Drive Interchange project would not remove or otherwise  
 44 impact any wetlands in the ecosystem study area. Any impacts to the  
 45 Santa Clara River channel areas, such as from the installation of bridge  
 46 piers or the removal of the Tonaquint Bridge, would be minimal and are  
 47 not anticipated to alter the hydraulics of the Santa Clara River sufficiently  
 48 to affect the hydrological support for the wetlands within the ecosystem  
 49 study area.

50  
 51 Construction of the Preferred Alternative may accelerate the time  
 52 frame of development in the project area, but this development would  
 53 not impact any wetlands in the ecosystem study area. The City of St.  
 54 George owns land just south of the Dixie Convention Center where a



1 0.16-acre wetland exists. This land is planned for possible expansion  
 2 of the Confluence Trailhead as well as additional parking for the Dixie  
 3 Convention Center. However, these planned improvements would not  
 4 impact this wetland.

5  
 6 As mentioned above, there would be some impacts below the OHWM to  
 7 the Santa Clara River, a water of the U.S., from the installation of bridge  
 8 piers and related structures for the I-15 bridges, and from the bank  
 9 protection construction where the active river channel directly abuts the  
 10 proposed Dixie Drive roadway. Any channel re-alignments needed for  
 11 the bank protection, anticipated to be minor, should conform to the  
 12 template design as outlined in the Santa Clara River Master Plan (Natural  
 13 Channel Design, 2005). There would also be some temporary impacts to  
 14 the river channel area in the area of existing Tonaquint Bridge from the  
 15 removal of the Tonaquint Bridge and its abutments. Any impacts to the  
 16 river bank from the removal operation would be stabilized and replanted  
 17 with appropriate riparian vegetation. The removal of this undersized  
 18 bridge should result in improved flow and sediment transportation for  
 19 this reach of the Santa Clara River.

20  
 21 **Mitigation**

22 Wildlife Habitats

23 Any impacts to the Santa Clara River channel from bridge construction  
 24 will be minimized as to the extent possible while maintaining the safety  
 25 and integrity of the bridge. Best management practices (BMPs) will  
 26 be in place to minimize any temporary construction impacts, such as  
 27 sedimentation. Erosion-control measures, such as native vegetation  
 28 plantings and vegetated filter strips, will also be employed on all cut-  
 29 and-fill slopes. Vegetation plantings in the riparian zone of the river  
 30 banks (that are not shaded by the bridge structures) will be replanted  
 31 with native riparian species. In upland areas, eco-region-appropriate  
 32 seed mixes will be used to reseed the cut-and-fill slope areas.

33  
 34 Terrestrial Wildlife

35 Any potential mitigation measures for impacts to terrestrial wildlife  
 36 species are discussed below in the section Terrestrial Special-Status  
 37 Species, Federally Listed Species, as they relate to two federally listed  
 38 bird species.

39  
 40 Aquatic Wildlife

41 To reduce the effects to aquatic species, in-water work will be conducted  
 42 in the dry behind isolation structures. All fish salvage operations, if they  
 43 are considered necessary by UDWR and USFWS, will be performed by  
 44 qualified fish biologists. Work below the OHWM will be done using BMPs,  
 45 including the use of hay bales and/or silt fencing or similar practices, to  
 46 reduce the amount of sediment entering the Santa Clara River. Further,  
 47 any in-water work associated with removing the I-15 bridge piers or  
 48 Tonaquint Bridge abutments will take place during periods of extreme  
 49 low flow to reduce sedimentation downstream.

50  
 51 Removing the Tonaquint Bridge is proposed as a measure to mitigate  
 52 the effects of the project on the Santa Clara River's hydraulic profile  
 53 due to in-water construction and bank armoring along portions of Dixie  
 54 Drive. Over time, the Tonaquint Bridge has constricted the Santa Clara



1 River flow, effectively “fixing” the river to a constricted migratory path,  
 2 preventing the river’s natural ability to disperse energy, and creating an  
 3 imbalance of flow upstream and downstream of the structure. Upstream  
 4 of the bridge, velocities are slowed and fine sediments are deposited,  
 5 effectively raising the streambed elevation and creating a gradient shift.  
 6 Downstream of the bridge, water moves at higher velocities, resulting  
 7 in bed degradation and scouring. Removing the Tonaquint Bridge will  
 8 eliminate the constriction point and allow the river to return to its natural  
 9 equilibrium over time. The proposed removal of the Tonaquint Bridge is  
 10 supported by both USFWS and UDWR.

11  
 12 Replacing the bridge foundations is a permanent change that will alter  
 13 the channel bottom and flow pattern of the Santa Clara River. The river  
 14 around the construction and downstream could be contaminated when  
 15 concrete is poured. All new concrete used during construction that could  
 16 come in contact with the Santa Clara River will be properly cured so that  
 17 no hazardous materials from the concrete could leach into the surface  
 18 waters. See the Dixie Drive Biological Evaluation in Appendix A for more  
 19 details on proposed mitigation measures for Aquatic Wildlife.

20  
 21 Terrestrial Special-Status Species

22 *Federally Listed Species*

23 No mitigation is required.

24  
 25 *State Listed Species*

26 No mitigation is required.

27  
 28 Aquatic Special-Status Species

29 *Federally Listed Species*

30 See mitigation under the Aquatic Wildlife section.

31  
 32 *State-Sensitive Species*

33 See mitigation under the Aquatic Wildlife section.

34  
 35 Waters of the U.S., Including Wetlands

36 Mitigation measures for impacts to the Santa Clara River will include  
 37 a de-watering plan for the bridge piers and BMPs in place to minimize  
 38 impacts to water quality during construction (See Mitigation in Aquatic  
 39 Wildlife section). In addition, any impacted vegetation will need to be  
 40 revegetated with a native seed mix.



41  
 42 **3.12 INVASIVE SPECIES**

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



1 **3.12.1 AFFECTED ENVIRONMENT**

2 Land uses and degrees of development vary throughout the project area.  
3 There are highly developed areas that are well maintained that would  
4 provide little opportunity for the movement of invasive species. However,  
5 there is also vacant and abandoned land that is not maintained. These  
6 areas provide the greatest opportunity for movement and the spread  
7 of invasive species. Observations of the project corridor revealed the  
8 presence of the following invasive species: Russian thistle (*Salsola iberica*),  
9 Bermuda grass (*Cynodon dactylon*), salt-cedar (*Tamarix ramosissima*),  
10 and an assortment of other, smaller annual weeds such as tall tumbling  
11 mustard (*Sisymbrium altissimum*).  
12

13 **3.12.2 ENVIRONMENTAL CONSEQUENCES**

14 **No-action Alternative**

15 The No-action Alternative would not provide direct opportunities for  
16 movement of invasive species in the project area.  
17

18 **Preferred Alternative**

19 **Direct Impacts**

20 Non-native plants and animals can cause substantial changes to  
21 ecosystems, upset ecological balance, and cause economic harm  
22 to our nation’s agricultural and recreational sectors. Since roadway  
23 corridors provide opportunities for the movement of invasive species  
24 through the landscape, it is important that roadway projects include  
25 measures to combat the introduction and spread of invasive species.  
26 The Preferred Alternative includes highway construction and would  
27 provide opportunities for the movement of invasive species through the  
28 landscape.  
29

30 **Indirect Impacts**

31 As a result of the Preferred Alternative, development of adjacent properties  
32 may be accelerated. This development would provide opportunities for  
33 the movement of invasive species.  
34

35 **Mitigation**

36 See Section 3.20 Construction Impacts for mitigation for impacts during  
37 construction.  
38  
39

40 **3.13 WILD AND SCENIC RIVERS**



41 A wild and scenic river is defined by the Wild and Scenic  
42 River Act (16 U.S.C. 1271-1287) as one which qualifies for  
43 inclusion on the Nationwide Inventory maintained by the  
44 Heritage Conservation and Recreation Service, which requires that it  
45 must be free-flowing (i.e., “existing or flowing in a natural conditions  
46 without impoundment, diversion, straightening, rip-rapping, or other  
47 modification of the waterway”) and possess “outstandingly remarkable  
48 scenic, recreational, geologic, fish and wildlife, historic, cultural, or  
49 similar values.”  
50  
51  
52  
53  
54

---

**What impacts would the No-action Alternative have on invasive species?**

- No impact.
- 

---

**What impacts would the Preferred Alternative have on invasive species?**

- Would provide opportunities for the movement of invasive species through the landscape.
- 



1 **3.13.1 AFFECTED ENVIRONMENT**

2 The state of Utah has no rivers designated as a Wild and Scenic River. A  
 3 0.68 mile section of the North Fork Virgin River in Kane County from its  
 4 headwaters to the Dixie National Forest boundaries is considered eligible  
 5 for a Wild and Scenic River designation. However, this portion of the  
 6 Virgin River is a considerable distance from the project area.

8 **3.13.2 ENVIRONMENTAL CONSEQUENCES**

9 **No-action Alternative**

10 The No-action Alternative would not impact Wild and Scenic Rivers.

12 **Preferred Alternative**

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

15 **Mitigation**

16 No mitigation will be required.

19  **3.14 ARCHAEOLOGICAL AND ARCHITECTURAL RESOURCES**

21 Historic properties include archaeological resources (both  
 22 prehistoric and historic), architectural resources (buildings and structures),  
 23 and traditional cultural properties. The Advisory Council on Historic  
 24 Preservation (ACHP) defines a historic property as “any prehistoric or  
 25 historic district, site, building, structure, or object included in, or eligible  
 26 for inclusion in, the NRHP (National Register of Historic Places)<sup>1</sup>” (i.e.,  
 27 generally historic properties at least 50 years old). The term includes  
 28 artifacts, records, and remains related to and located within such  
 29 properties, and includes properties of traditional religious and cultural  
 30 importance to a Native American tribe. The term “eligible for inclusion”  
 31 in the National Register includes both properties formally determined as  
 32 such, and all other properties that meet the National Register criteria,  
 33 which are described below.

35 The National Historic Preservation Act (NHPA) of 1966, as amended, and  
 36 its implementing regulations (36 CFR §800) establish the national policy  
 37 and procedures regarding historic properties. Section 106 of the NHPA  
 38 requires consideration of the effects of federal projects and policies on  
 39 historic properties. Also, the Utah Historic Preservation Act (UCA §9-8-  
 40 102 et seq.) was passed to provide protection of “all antiquities, historic  
 41 and prehistoric ruins, and historic sites, buildings, and objects which,  
 42 when neglected, desecrated, destroyed or diminished in aesthetic value,  
 43 result in an irreplaceable loss to the people of this state.”

45 **3.14.1 AFFECTED ENVIRONMENT**

46 The Section 106 review process requires historic properties to be identified  
 47 and evaluated for eligibility and listing on the NRHP, based upon whether  
 48 “the quality of significance in American history, architecture, archeology,  
 49 engineering, and culture is present in districts, sites, buildings, structures,  
 50 and objects that possess integrity of location, design, setting, materials,  
 51 workmanship, feeling, and association,<sup>2</sup>” and meet one or more of the  
 52 criteria in Table 3-31.

54 <sup>1</sup> 16 U.S.C. Section 470(w)(5).

<sup>2</sup> NPS Bulletin 15

---

**What impacts would the No-action Alternative have on Wild and Scenic Rivers?**

- No impact.

---

**What impacts would the Preferred Alternative have on Wild and Scenic Rivers?**

- No impact.
- 



**Table 3-31 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)

### Determination of Eligibility and Finding of Effect

A Determination of Eligibility and Finding of Effect (DOEFOE), which outlines the eligibility determinations for each architectural and archaeological resource, is being prepared by UDOT, on behalf of FHWA, and will be submitted for concurrence by the State Historic Preservation Officer (SHPO).

### Archaeological Resources

In October 2008, Bighorn Archaeological Consultants inventoried the project area for archaeological resources and documented their findings in *A Cultural Resource Inventory of the Dixie Drive Interchange Project, Washington County, Utah*. Nine archaeological sites were identified in the project area and, of those, seven have been determined eligible for inclusion on the NRHP (see Table 3-32).

**Table 3-32 Archaeological Sites**

| Site #               | Description                                   | Eligibility for NRHP |
|----------------------|---|----------------------|
| 42WS209              | Prehistoric Rock Art Panels                   | Eligible C and D     |
| 42WS2232/<br>42WS157 | Prehistoric Open Habitation/Historic Campsite | Eligible D           |
| 42WS4371             | Historic Canal System                         | Not Eligible         |
| 42WS4706             | Prehistoric Open Artifact Scatter             | Eligible D           |
| 42WS4707             | Prehistoric Open Habitation/Historic Campsite | Eligible D           |
| 42WS4708             | Prehistoric Open Artifact Scatter             | Not Eligible         |
| 42WS4709             | Prehistoric Rock Art Panels                   | Eligible D           |
| 42WS4710             | Prehistoric Rockshelter                       | Eligible D           |
| 42WS4711             | Prehistoric Rockshelters                      | Eligible D           |



1 **Architectural Resources**

2 A windshield survey of the Dixie Drive project area was conducted on  
 3 June 21, 2008 by an architectural historian associated with Horrocks  
 4 Engineers. The only property within the project area with historic buildings  
 5 was the Imlay property located at 563 South Indian Hills Drive. While the  
 6 outbuildings appeared to be historic, the house on the property did not,  
 7 so contact was made with the homeowner, Arthur B. Imlay, to determine  
 8 the age of the buildings. Mr. Imlay explained that the buildings were  
 9 indeed historic, but that they had both been moved onto the property  
 10 after the house was built in 1979. Due to the change in location after  
 11 the historic period, neither building is eligible for the NRHP.

12  
 13 **Consultation**

14 As part of Section 106 regulations, coordination has included  
 15 correspondence between FHWA and Native American tribes that may  
 16 have cultural and historical interest within the project area. Letters dated  
 17 December 6, 2007 were sent to the Hopi Tribe, the Paiute Indian Tribe  
 18 of Utah, the Shivwits Band of Paiutes, the Cedar Band of Paiute Indians,  
 19 and the Kaibab Band of Paiute Indians (see Chapter 4 - Comments and  
 20 Coordination). These letters informed the tribes that historians and  
 21 archeologists would begin studying the area, and the tribe's participation  
 22 in preserving the cultural resources in the project area would be welcomed.  
 23 No verbal or written responses to the letters were received.

24  
 25 **3.14.2 ENVIRONMENTAL CONSEQUENCES**

26 Effects are defined as "alteration[s] to the characteristics of a historic  
 27 property qualifying it for inclusion in or eligibility for the National Register"  
 28 (36 CFR §800.16(i)). Impacts to historic properties are categorized as No  
 29 Historic Properties Affected, No Adverse Effect, and Adverse Effect.

30  
 31 A finding of **No Historic Properties Affected** is made when "[e]ither  
 32 there are no historic properties present or there are historic properties  
 33 present but the undertaking will have no effect upon them as defined in  
 34 §800.16(i)" (See 36 CFR §800.1(d)(1)).

35  
 36 A finding of **No Adverse Effect** is made "[w]hen the undertaking's  
 37 effects do not meet the criteria of paragraph (a)(1) of this section [see  
 38 Adverse Effect definition] or the undertaking is modified or conditions are  
 39 imposed... to ensure consistency with the Secretary's standards for the  
 40 treatment of historic properties (36 CFR §68) to avoid adverse effects"  
 41 (See 36 CFR §800.5(b)).

42  
 43 A finding of **Adverse Effect** is made "[w]hen an undertaking may alter,  
 44 directly or indirectly, any of the characteristics of a historic property that  
 45 qualify the property for inclusion in the National Register in a manner that  
 46 would diminish the integrity of the property's location, design, setting,  
 47 materials, workmanship, feeling, and association. Consideration shall be  
 48 given to all qualifying characteristics of a historic property, including those  
 49 that may have been identified subsequent to the original evaluation of  
 50 the property's eligibility for the National Register. Adverse effects may  
 51 include reasonably foreseeable effects caused by the undertaking that  
 52 may occur later in time, be farther removed in distance or be cumulative"  
 53 (See 36 CFR §800.5(a)(1)).



**Determination of Eligibility and Finding of Effect**

A DOEFOE, which outlines the type of effect that would result from the implementation of the Preferred Alternative, is being prepared by UDOT, on behalf of FHWA, and will be submitted for concurrence by the SHPO. UDOT will be making an Adverse Effect determination.

**No-action Alternative**

The No-action Alternative would not affect historic properties in the project area.

**Preferred Alternative**

**Direct Impacts**

See Table 3-33 for impacts the Preferred Alternative would have to historic properties in the project area (only those properties eligible for the NRHP are included).

**Table 3-33 Impacts of the Preferred Alternative on Historic Properties**

| Site #               | Description                                   | Type of Impact to Property  |
|----------------------|---|---|
| 42WS209              | Prehistoric Rock Art Panels                   | None  |
| 42WS2232/<br>42WS157 | Prehistoric Open Habitation/Historic Campsite | The site would be impacted by construction of the Preferred Alternative |
| 42WS4706             | Prehistoric Open Artifact Scatter             | The site would be impacted by construction of the Preferred Alternative |
| 42WS4707             | Prehistoric Open Habitation/Historic Campsite | The site would be impacted by construction of the Preferred Alternative |
| 42WS4709             | Prehistoric Rock Art Panels                   | None  |
| 42WS4710             | Prehistoric Rockshelter                       | The site would be impacted by construction of the Preferred Alternative |
| 42WS4711             | Prehistoric Rockshelters                      | None  |

**Indirect Impacts**

Selection of the Preferred Alternative may speed up the time frame of development in the project area. Historic properties may be destroyed, with no additional documentation, as a result of this development.

**Mitigation**

A Memorandum of Agreement (MOA) to resolve adverse effects to historic properties will be prepared and agreed upon and executed by FHWA, UDOT, and SHPO. Mitigation measures outlined in the MOA would likely include data recovery.

See Section 3.20 Construction Impacts for mitigation for potential impacts during construction.

**What impacts would the No-action Alternative have on Archaeological and Architectural Resources?**

- No impact.

**What impacts would the Preferred Alternative have on Archaeological and Architectural Resources?**

- The project would have an overall adverse effect on historic properties.



**3.15 SECTION 4(F)**

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.

**3.15.1 IDENTIFICATION OF SECTION 4(F) RESOURCES**

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

**Recreational Resources**

For a park, recreation area, or wildlife/waterfowl refuge to qualify for Section 4(f) protection, it must be publicly owned and open to the public with its major purpose and function being that of a park, recreation area, or wildlife/waterfowl refuge and have been determined as significant by officials with jurisdiction over it. The following recreational resources qualify for Section 4(f) protection (see Figure 3-26).

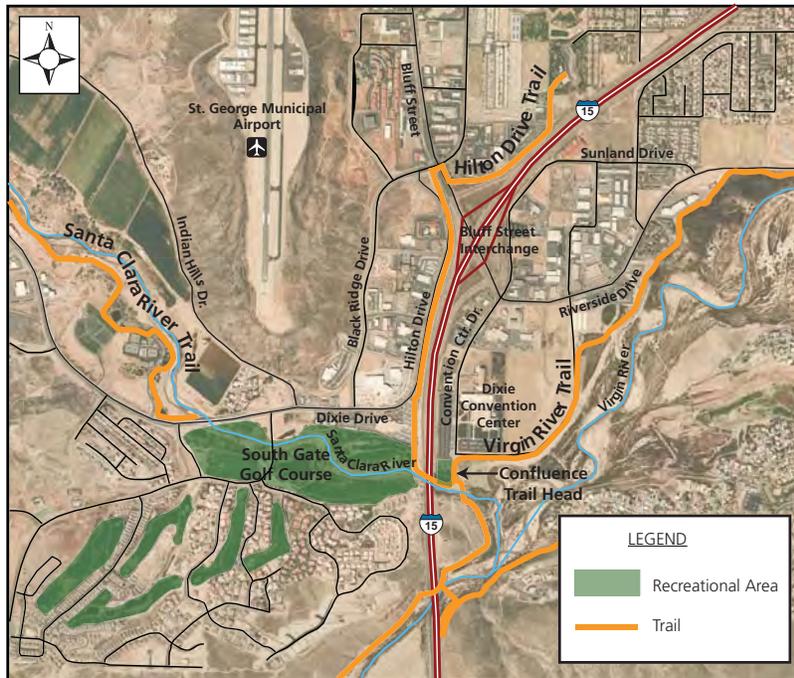


Figure 3-26 Recreation Resources Protected Under Section 4(f)

**Southgate Golf Course**

The Southgate Golf Course is located at 1975 Tonaquint Drive and is owned and managed by the City of St. George. The course is an 18-hole, 6,100-yard par-70 layout. Part of the front nine lies within the Santa Clara River floodplain. Holes are located on both sides of the Santa Clara River with two pedestrian/golf cart bridge crossings over the river.

The Southgate Golf Course has undergone several changes to its layout and configuration since it was first constructed. The original layout of the course included 9-holes that were located north of Hilton Drive in the area that now contains several businesses, car dealerships, hotels, and other



Southgate Golf Course

1 retail and commercial land uses. The course at that time was privately  
 2 owned and operated. These holes were abandoned and relocated to the  
 3 area south of the club house when the Southgate residential community  
 4 was developed in the 1980's in order to make way for the retail and  
 5 commercial development that now exists in the Hilton Drive/Black Ridge  
 6 Drive area. It was during this time, after the course was reconfigured, that  
 7 the City of St. George bought the course and took over the operations.  
 8 Since that time, the course has experienced several other changes and  
 9 modifications done by the City to enhance the course.

10  
 11 In addition to changes to the golf course for business reasons, the course  
 12 has undergone several changes due to natural occurrences. It has always  
 13 been prone to flooding due to its location within the Santa Clara River  
 14 floodplain and has been damaged to one extent or another by multiple  
 15 flooding events over its lifetime. The most recent flood event that caused  
 16 substantial damage occurred in January 2005 and destroyed five to six  
 17 holes. These holes were rebuilt and slightly reconfigured.

18  
 19 **Hilton Drive Trail**

20 The Hilton Drive Trail is a 10-ft wide paved trail that is approximately 1.5  
 21 miles in length and runs along Hilton Drive west of I-15. It is owned and  
 22 managed by the City of St. George. It connects the Virgin River Trail to  
 23 J.C. Snow Park and is accessible from the Park, the Virgin River Trail, or  
 24 the Confluence Trailhead near the Dixie Center. The trail crosses beneath  
 25 I-15 at the Santa Clara River bridges.

26  
 27 **Virgin River Trail**

28 The Virgin River Trail is a 10-ft wide paved trail that is roughly eight miles  
 29 long, parallel to the Virgin River. It is owned and managed by the City of  
 30 St. George. The trail can be accessed from three points: the Man of War  
 31 Trailhead, the Confluence Trailhead, and the Riverside Trailhead.

32  
 33 **Santa Clara River Trail**

34 The Santa Clara River Trail is a paved trail that begins off Dixie Drive  
 35 adjacent to Southgate Golf Course and continues north for 3.2 miles  
 36 along the Santa Clara River. The trail is owned and managed by the City  
 37 of St. George and can be accessed from the Tonaquint Park and Tennis  
 38 Center.

39  
 40 **Confluence Trailhead**

41 The Confluence Trailhead is owned and operated by the City of St.  
 42 George. The trailhead links the Virgin River Trail, Hilton Drive Trail, and  
 43 the Santa Clara River Trail. Amenities of the trailhead include paved  
 44 parking, restrooms, landscaping, an information kiosk, and a grassy area  
 45 with picnic tables.

46  
 47 **Planned Trails**

48 The City of St. George's Regional Trail Master Plan approved by the City  
 49 Council in October 2006 includes a planned trail connection between  
 50 the Virgin River Trail/Hilton Drive Trail intersection and the southern end  
 51 of the paved Santa Clara River Trail at Tonaquint Park.

52  
 53  
 54



Hilton Drive Trail



Virgin River Trail



Santa Clara River 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 project 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.<sup>3</sup> See Section 3.14 Historic and Archaeological Resources for more information on the Section 106 eligibility requirements and review process.

Seven archaeological sites have been determined eligible for inclusion on the NRHP; one site is protected under Section 4(f) (see Table 3-34). Sites 42WS2232/42WS157, 42WS4706, 42WS4707, 42WS4709, 42WS4710, and 42WS4711 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.

**Table 3-34 Section 4(f) Archaeological Sites**

| Site #  | Description                 |
|---------|-----------------------------|
| 42WS209 | Prehistoric Rock Art Panels |

**3.15.2 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.

**Recreational Resources**

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.

In August of 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was enacted as Public Law 109-59. Section 6009(a) of SAFETEA-LU amended the existing Section 4(f) legislation to simplify the processing and approval of projects that have only minor (*de minimis*) impacts on resources protected by Section 4(f). According to Section 6009 of SAFETEA-LU, the requirements of Section 4(f) will be considered satisfied with respect to a Section 4(f)

<sup>3</sup> See also 36 CFR 800 (implementing regulations)



resource if it is determined that a transportation project will have only a *de minimis* impact on the Section 4(f) resource.

According to 23 CFR 774.17:

- For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Table 3-35 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 (see Figure 3-27).

**Table 3-35 Impacts of the Preferred Alternative on Recreational Resources**

| Resource   | Section 4(f) Use      | Description of Use   |
|--|-----------------------|--|
| Southgate Golf Course  | <i>De Minimis</i> Use | The proposed project would require approximately 13 acres of the golf course area to be acquired for roadway improvements, impacting up to four holes (#3, #4, #5, and #9 - these holes were previously impacted by a January 2005 flood event and had to be rebuilt and slightly reconfigured). |
| Hilton Drive Trail   | <i>De Minimis</i> Use | <ul style="list-style-type: none"> <li>Approximately 3,000 feet of the Hilton Drive Trail would be impacted by roadway improvements.</li> <li>The proposed Dixie Drive alignment would cross over and block the Hilton Drive Trail.</li> </ul>   |
| Virgin River Trail   | <i>De Minimis</i> Use | Approximately 1,200 feet of the Virgin River Trail east of I-15 (including 200 feet of trail located between the Confluence Trailhead and the Hilton Drive Trail) would be impacted by roadway improvements.   |
| Santa Clara River Trail  | No Use                | ---  |
| Confluence Trailhead   | <i>De Minimis</i> Use | <ul style="list-style-type: none"> <li>Access to the trailhead would be blocked by the east segment of Dixie Drive.</li> <li>The project would impact 0.3 acres.</li> <li>Approximately 40 parking stalls would be impacted.</li> <li>The Restrooms structure would be impacted.</li> </ul>      |
| Planned trail connection between Virgin River Trail/Hilton Drive Trail and Santa Clara River Trail | No Use                | ---  |

**Historic Properties**

The Preferred Alternative would avoid archaeological site 42WS209, therefore, the Preferred Alternative would not result in a Section 4(f) "use" to any historic properties protected under Section 4(f).



1 **3.15.3 MEASURES TO MINIMIZE HARM**

2 **Southgate Golf Course**

3 The project will assist in the relocation of the golf course whether by  
4 acquiring right-of-way, participating in construction, or other means as  
5 determined by UDOT and the City of St. George.  
6

7 **Hilton Drive Trail**

8 The project will include the following mitigation for impacts to portions  
9 of the Hilton Drive Trail (see Figure 3-27):  
10

- 11 • Impacted portions of the Hilton Drive Trail will be realigned and  
12 reconstructed.
- 13 • A grade-separated crossing will be constructed so that the Hilton  
14 Drive Trail can cross beneath the proposed Dixie Drive roadway  
15 on the west side of I-15.

16 **Virgin River Trail**

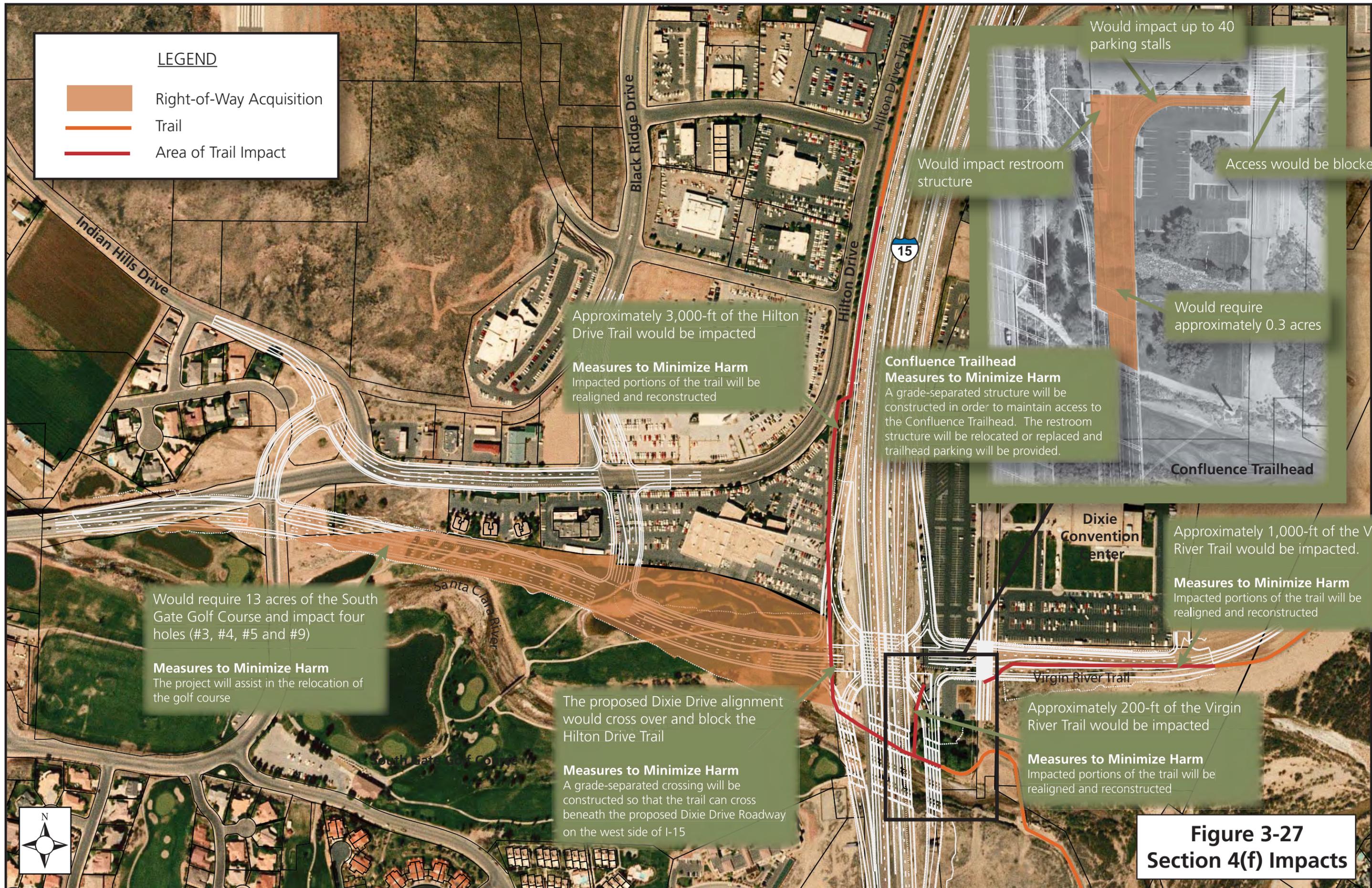
17 Impacted portions of the Virgin River Trail will be realigned and  
18 reconstructed (see Figure 3-27).  
19

20 **Confluence Trailhead**

21 The project will include the following mitigation for impacts to the  
22 Confluence Trailhead (see Figure 3-27):  
23

- 24 • A grade-separated structure for Dixie Drive over Convention  
25 Center Drive will be constructed in order to maintain access to  
26 the Confluence Trailhead.
- 27 • The restroom structure will be relocated or replaced and  
28 trailhead parking will be provided, according to designs to be  
29 agreed upon with the City of St. George.  
30





**LEGEND**

- Right-of-Way Acquisition
- Trail
- Area of Trail Impact



Approximately 3,000-ft of the Hilton Drive Trail would be impacted

**Measures to Minimize Harm**  
Impacted portions of the trail will be realigned and reconstructed

Would impact restroom structure

**Confluence Trailhead Measures to Minimize Harm**  
A grade-separated structure will be constructed in order to maintain access to the Confluence Trailhead. The restroom structure will be relocated or replaced and trailhead parking will be provided.

Would impact up to 40 parking stalls

Access would be blocked

Would require approximately 0.3 acres

**Confluence Trailhead**

Would require 13 acres of the South Gate Golf Course and impact four holes (#3, #4, #5 and #9)

**Measures to Minimize Harm**  
The project will assist in the relocation of the golf course

Approximately 1,000-ft of the Virgin River Trail would be impacted.

**Measures to Minimize Harm**  
Impacted portions of the trail will be realigned and reconstructed

The proposed Dixie Drive alignment would cross over and block the Hilton Drive Trail

**Measures to Minimize Harm**  
A grade-separated crossing will be constructed so that the trail can cross beneath the proposed Dixie Drive Roadway on the west side of I-15

Approximately 200-ft of the Virgin River Trail would be impacted

**Measures to Minimize Harm**  
Impacted portions of the trail will be realigned and reconstructed

**Figure 3-27**  
**Section 4(f) Impacts**

**3.15.4 COORDINATION**

According to 23 CFR 774.3, prior to making *de minimis* impact determinations under § 774.3(b), the following coordination shall be undertaken:

For parks, recreation areas, and wildlife and waterfowl refuges:

- Public notice and an opportunity for public review and comment concerning the effects on the protected activities, features, or attributes of the property must be provided. This requirement can be satisfied in conjunction with other public involvement procedures, such as a comment period provided on a NEPA document.
- The Administration shall inform the official(s) with jurisdiction of its intent to make a *de minimis* impact finding. Following an opportunity for public review and comment as described in paragraph (b)(2)(i) of this section, the official(s) with jurisdiction over the Section 4(f) resource must concur in writing that the project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection. This concurrence may be combined with other comments on the project provided by the official(s).

Based on the impacts and measures to minimize harm described above, UDOT and FHWA have determined that effects of the proposed project on the Southgate Golf Course, the Hilton Drive Trail, the Virgin River Trail, and the Confluence Trailhead do not “adversely affect the activities, features, and attributes” of the resources and result in a *de minimis* impact finding (see March 5, 2009 letter in Chapter 4).

The City of St. George (which has jurisdiction over the Southgate Golf Course, the Hilton Drive Trail, the Virgin River Trail, and the Confluence Trailhead) has concurred with UDOT’s assessment that implementation of the Dixie Drive Interchange project, including measures to minimize harm, would not have an adverse effect on the activities, features, or attributes of these resources (see March 5, 2009 letter in Chapter 4). Although the proposed project impacts the existing layout of the Southgate Golf Course north of the Santa Clara River, the course layout has been impacted several times throughout its history. The Preferred Alternative provides an opportunity to improve the golf course layout and design by relocating some of the holes to a different location along the river in a more favorable floodplain area. The grading within the floodplain areas for the new holes, as part of the golf course redesign, will lessen the potential impacts of flooding events. The removal of the existing Tonaquint Bridge and associated regrading of the floodplain will greatly improve the floodplain in this area as well as lessen the potential for future flooding impacts to the golf course. It is for these reasons that the City of St. George views the Preferred Alternative as an opportunity to improve the existing golf course layout and configuration and improve the floodplain to lessen the risk of damage to the Southgate Golf Course as a result of future flooding events.

An opportunity for public review and comment on the proposed impacts and measures to minimize harm to the Southgate Golf Course, Hilton



1 Drive Trail, the Virgin River Trail, and Confluence Trailhead was provided  
 2 through issuance of a public notice on January 30, 2009 and January 31,  
 3 2009 in the St. George Spectrum newspaper (see Proof of Publication in  
 4 Chapter 4). The comment period was open from the date of issuance  
 5 through March 1, 2009. No comments were received in response to the  
 6 public notice.  
 7

8 **3.16 PALEONTOLOGY**

9 Paleontology is the scientific study of life in the geologic past, especially  
 10 through the study of animal and plant fossils. Before expending state  
 11 funds or approving an undertaking, a state agency is required to take into  
 12 account the effect of the undertaking on a specimen that is included in  
 13 or eligible for inclusion in the State Paleontological Register (U.C.A. 63-  
 14 73-19). The Memorandum of Understanding (MOU) between the Utah  
 15 Geological Survey (UGS) and UDOT outlines the process for implementing  
 16 Utah Code Annotated §63-73-19.  
 17

18 **3.16.1 AFFECTED ENVIRONMENT**

19 A paleontological file search was completed on October 27, 2008 with  
 20 the UGS in Salt Lake City, Utah (see October 27, 2008 letter in Chapter  
 21 4). Results of the file search indicated that there is one paleontological  
 22 locality recorded within the project area, consisting of fossil plant  
 23 material from the Shinarump Conglomerate Member of the Triassic  
 24 Chinle Formation. However, this locality is rated as insignificant. Surficial  
 25 deposits along most of this project right-of-way consist primarily of  
 26 Quaternary and Recent alluvial deposits, which have a low potential for  
 27 yielding significant fossil localities. There may also be some exposures of  
 28 the Shinarump Conglomerate and Petrified Forest Members of the Chinle  
 29 Formation that has the potential for yielding significant fossil localities.  
 30  
 31

32 **3.16.2 ENVIRONMENTAL CONSEQUENCES**

33 **No-action Alternative**

34 The No-action Alternative would not impact paleontological resources.  
 35

36 **Preferred Alternative**

37 **Direct Impacts**

38 Unless fossils are discovered as a result of construction activities, the  
 39 Preferred Alternative should have no impact on paleontological resources  
 40 (see October 27, 2008 letter in Chapter 4).  
 41

42 **Indirect Impacts**

43 The Preferred Alternative would not indirectly impact paleontological  
 44 resources.  
 45

46 **Mitigation**

47 See Section 3.20 Construction Impacts for mitigation for potential  
 48 impacts during construction.  
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---

**What impacts would the No-action Alternative have on Paleontology?**

- No impact.

---

**What impacts would the Preferred Alternative have on Paleontology?**

- Unless fossils are discovered as a result of construction activities, the Preferred Alternative should have no impact on paleontological resources.
-



### 3.17 HAZARDOUS WASTE SITES

The study area for hazardous waste sites is the area within 0.5 miles of the proposed project improvements.

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.

#### 3.17.1 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 and EnviroFacts resources (EPA 2008).

Hazardous waste-related incidents and facilities were screened to identify sites that are more likely to contain contaminated soil or groundwater. The screening process identified the sites that have a reasonable chance of affecting or being affected by the proposed project. Site screening focuses on the types of sites that were identified during the review of the regulatory agency databases mentioned above.

The first step in evaluating sites of concern was to categorize the types of sites identified in the study area by the relative likelihood of finding contamination. Sites were categorized as having a high, moderate, or low probability of environmental degradation.

**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)

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

- Closed LUST sites
- Active UST (underground storage tank) sites

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

- Removed and closed USTs
- RCRIS (Resource Conservation and Recovery Information System) sites



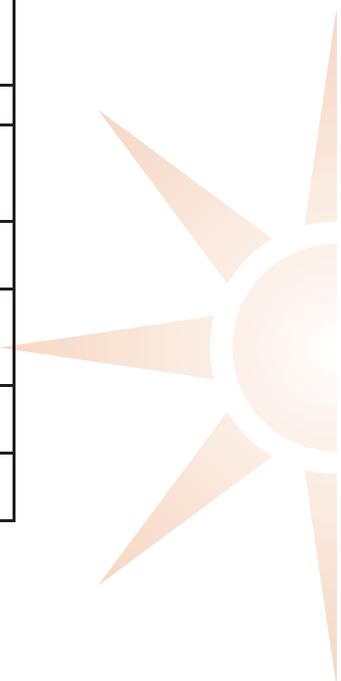
1 Table 3-36 lists the sites in the study area that contain potentially  
 2 hazardous materials. The locations of these sites are shown in Figure  
 3 3-28 and are identified by the map identifier in Table 3-36.

4  
 5 **Table 3-36 Potentially Hazardous Sites in the Study Area**

| Map Identifier | Site Name                              | Probability of Environmental Degradation | Location                                      | Database/Site Description |
|----------------|--|--|---|---------------------------|
| 1              | Maverick #261                          | Moderate                                 | 336 W. Hilton Drive                           | UST                       |
| 2              | Sunmart #953                           | Moderate                                 | 120 E. Riverside Drive                        | UST<br>LUST               |
| 3              | Sunmart #887                           | Moderate                                 | 1572 S. Convention Center Drive               | UST                       |
| 4              | Crest CFN                              | Moderate                                 | 334 Riverside Drive                           | UST                       |
| 5              | Riverside Chevron & Automotive         | Moderate                                 | 125 E. Riverside Drive                        | UST<br>LUST               |
| 6              | JB Express Mart #1                     | Moderate                                 | 1148 S. Bluff Street                          | UST<br>LUST               |
| 7              | Mirastar #62040                        | Moderate                                 | 2610 S. Pioneer Street                        | UST                       |
| 8              | Kwik Mart                              | Moderate                                 | 1235 S. Bluff Street                          | UST<br>LUST               |
| 9              | C-Mart #4                              | Moderate                                 | 1460 S. Hilton Drive                          | LUST                      |
| 10             | Acro Facility #6334                    | Low                                      | 1572 Convention Center Drive                  | RCRIS                     |
| 11             | Greater Southern Utah Collision Repair | Low                                      | 166 West 1700 South                           | RCRIS                     |
| 12             | Heritage Honda                         | Low                                      | 1630 Hilton Drive                             | RCRIS                     |
| 13             | Newby Buick General Motors             | Low                                      | 1629 S. Convention Center Drive               | RCRIS                     |
| 14             | Southern Utah Asphalt                  | Low                                      | Portable asphalt plant                        | RCRIS                     |
| 15             | Blackridge Drive Asbestos Site         | Moderate                                 | Intersection of Blackridge/Hilton/Dixie Drive | NA <sup>a</sup>           |
| 16             | Rebel Car Wash & Lube <sup>b</sup>     | Low                                      | 1182 S. Bluff Street                          | UST                       |
| 17             | Southgate Golf Course                  | Moderate                                 | 1700 S. Dixie Drive                           | UST                       |

49 <sup>a</sup> The asbestos site identified in the study area is not in the DERR or EPA databases.

50 <sup>b</sup> This site is now called St. George Car Wash & Detail Center.



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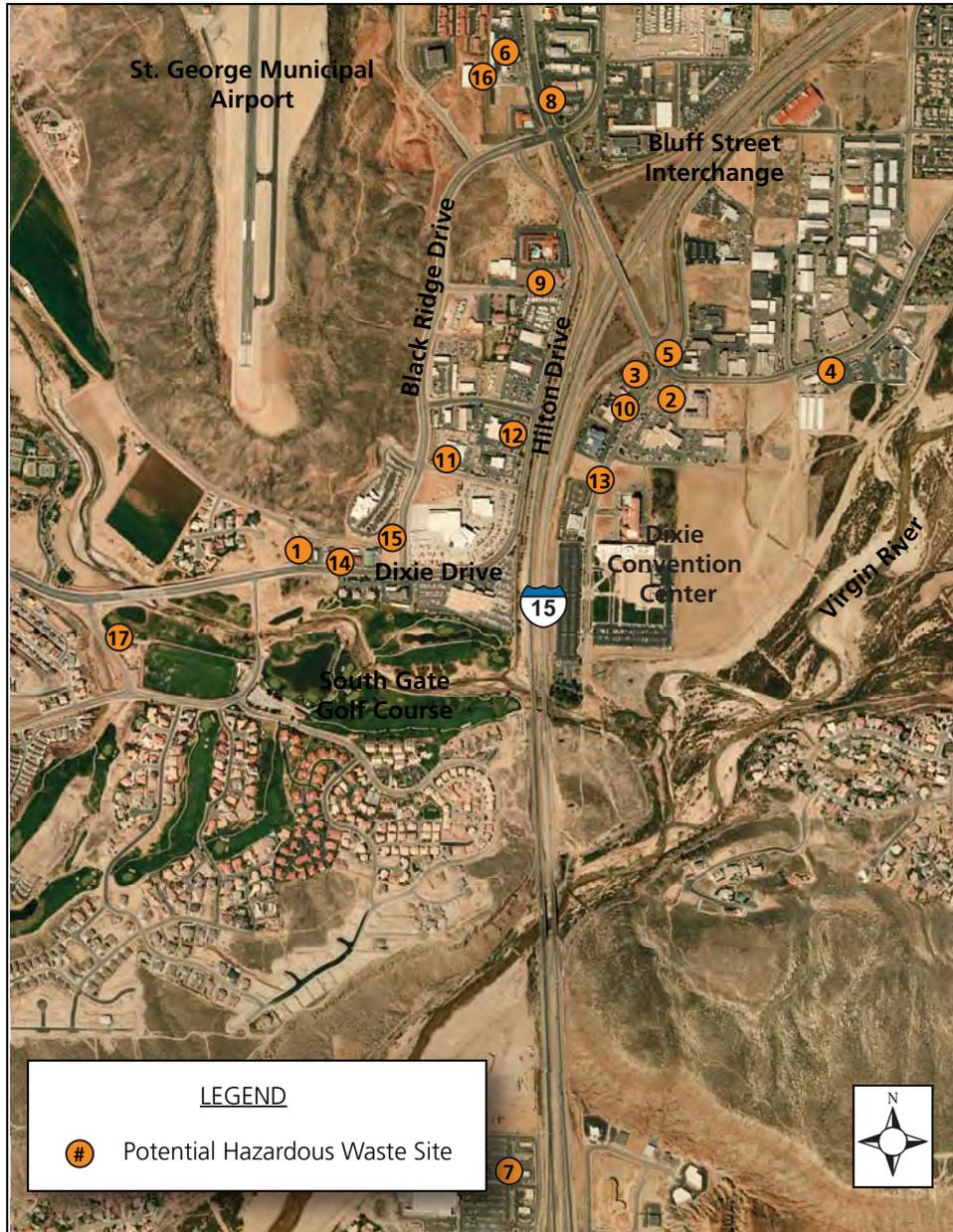


Figure 3-28 Potentially Hazardous Waste Sites in the Study Area

The following paragraphs describe the sites with a high or moderate probability of environmental degradation in the study area. Because the low-probability sites described in Table 3-36 are not adjacent to the proposed project and have little potential to affect the project, they are not described below and their further consideration in this document is not relevant.

**Maverik #261.** Maverik #261 is an active gas station. There are three USTs on the property that contain gasoline. Tanks at this site are reinforced and have leak-detection technology.

**Sunmart #953.** Sunmart #953 is a closed gas station. All four USTs are currently out of use and have been removed from the site. A LUST was



1 also found on this property during permanent closure procedures. The  
2 tank has been removed, and the site has been remediated.

3  
4 **Sunmart #887.** Sunmart #887 is an active gas station. There are two USTs  
5 on the property, one containing gasoline and the other containing diesel  
6 fuel. Both tanks are double walled and have leak-detection technology.

7  
8 **Crest CFN.** The Crest CFN site is a gas station that is currently in use. The  
9 site has five USTs, three containing diesel fuel and two containing gasoline.  
10 All tanks are double walled and have leak-detection technology.

11  
12 **Riverside Chevron & Automotive.** The Riverside Chevron is an active  
13 gas station. There are five USTs on site, three containing gasoline and  
14 one containing diesel fuel. One of the USTs on the site was closed in  
15 place in 2001. A LUST was detected on the site and was closed in 2000,  
16 was remediated, and is currently being monitored.

17  
18 **JB Express Mart #1.** JB Express Mart is an active gas station. There are  
19 three USTs containing gasoline on this site. Three LUSTs were located on  
20 the site but have been removed, and the site was remediated in 1998. All  
21 remaining tanks are double walled and have leak-detection technology.

22  
23 **C-Mart #4.** The C-Mart was a gas station with six USTs. The tanks were  
24 closed and removed from the ground in 2000. Two tanks were detected  
25 to be leaking upon closure, and the site has been remediated.

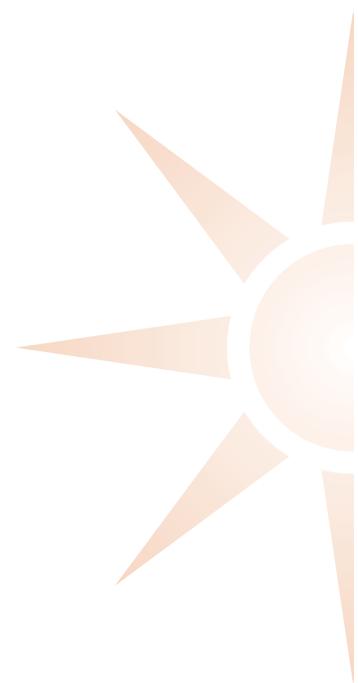
26  
27 **Mirastar #62040.** Mirastar #62040 is a gas station that is currently in  
28 use. There are two USTs on the site. Both are doubled walled and have  
29 leak-detection technology.

30  
31 **Kwik Mart.** Kwik Mart was a gas station with five USTs. Four LUSTs were  
32 removed, and the site was remediated in 1989. One tank remains and is  
33 federally regulated.

34  
35 **Blackridge Drive Asbestos Site.** The presence of asbestos has been  
36 documented in the study area. The land under the road surface at the  
37 southern intersection of Hilton Drive and Blackridge Drive and extending  
38 about 750 feet north of the intersection has been used for disposing  
39 asbestos-contaminated waste materials. The site covers 1.2 acres and  
40 is regulated by the federal government subject to 40 Code of Federal  
41 Regulations (CFR) Part 61, Subpart M, and Utah Administrative Code  
42 Rule R307-801, Asbestos (Demus 2008).

43  
44 **Southgate Golf Course.** The Southgate Golf Course is an active  
45 recreation area that consists of a club house, training center, and  
46 6,100 yards of playing greens. The golf course has been extensively  
47 renovated during the past 15 years. During this time, one UST and one  
48 LUST containing gasoline were found near the club house. These were  
49 permanently removed in 1994. No other potentially hazardous materials  
50 are reported to be present at this site.

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**3.17.2 ENVIRONMENTAL CONSEQUENCES**

This section discusses the expected impacts from the No-action and Preferred Alternatives on known and potential hazardous waste sites in the study area. Only those sites that have the potential to directly affect or be directly affected by the project are described in detail.

The following issues are a concern when a transportation project could affect hazardous waste sites:

- The spread of existing soil or groundwater contamination through road-construction activities
- Potential for increased construction costs
- Potential for construction delays
- Construction worker health and safety
- The short-term and long-term liability associated with acquiring environmentally distressed properties

During the final design phase for the project and before any property is acquired, assessments would be conducted on sites of concern to determine the presence of contamination and establish the nature and limits of the chemical hazard. See the section titled Mitigation Measures for more information.

**No-action Alternative**

Under the No-action Alternative, no improvements to the Dixie Drive Interchange study area would be made except for routine maintenance of existing facilities. Therefore, no impacts or disturbances to potentially hazardous waste sites would occur.

**Preferred Alternative**

***Direct Impacts***

The impact analysis for hazardous waste sites included a review of known and potential hazardous waste sites within 0.5 mile of the proposed improvements. A review of these sites against the Preferred Alternative only identified two sites that could be directly or indirectly affected by the project. These sites are described below.

Maverik #261

This site is an active gas station with three USTs (DERR 2008). The likelihood that groundwater flows through this site toward the river (this site is assumed to be up-gradient of the Santa Clara River) and the project makes this property a site of concern. UDOT is aware of possible soil contamination and would take appropriate steps to prevent construction workers from being exposed to or spreading hazardous chemicals when working near this facility. Because appropriate measures would be taken if construction disturbs this site, no impacts to workers or the environment would be expected.

Blackridge Drive Asbestos Site

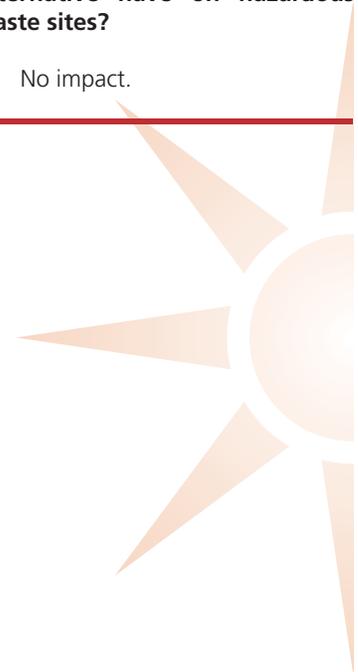
Construction of Preferred Alternative could disturb and expose asbestos under the pavement at the intersection of Blackridge Drive and Hilton Drive.

**What impacts would the No-action Alternative have on hazardous waste Sites?**

- No impact.

**What impacts would the Preferred Alternative have on hazardous waste sites?**

- No impact.



1 Disturbing asbestos during construction could present health risks to  
 2 construction workers and the community. Asbestos would be handled,  
 3 removed, and disposed of according to the regulations of the Utah  
 4 Department of Environmental Quality and the U.S. Environmental  
 5 Protection Agency and any local requirements. Because appropriate  
 6 measures would be taken if construction disturbs this site no impacts to  
 7 workers or the environment would be expected.

8  
 9 **Indirect Impacts**

10 Continued residential and commercial development in the study area  
 11 could disturb some potentially hazardous waste sites.

12  
 13 **Mitigation**

14 See Section 3.20 Construction Impacts for mitigation for potential  
 15 impacts during construction.

16  
 17  **3.18 VISUAL QUALITY**

18  The scenic quality of an area depends on its visual resources—  
 19  the physical features that make up the visible landscape,  
 20 including land, water, vegetation, and human-made features  
 21 such as buildings, roads, and structures. The study area for the Bluff Street  
 22 Interchange visual resources analysis includes the I-15 corridor from just  
 23 north east of the Bluff Street Interchange to south of the Virgin River,  
 24 the area surrounding the Bluff Street Interchange, and the viewshed of  
 25 these areas. A viewshed is the surface area visible from a given viewpoint  
 26 or series of viewpoints; it is also the area from which that viewpoint or  
 27 series of viewpoints can be seen (FHWA 1983). A viewshed is a tool for  
 28 identifying the views that a project could affect and is influenced by  
 29 existing topography, vegetation, and structures.

30  
 31 Visual sensitivity depends on viewer perceptions, the types of activities  
 32 that people engage in while viewing the proposed project, and the  
 33 distance from which the proposed project would be seen. Within the  
 34 visual study area, viewer groups consist of residents of neighborhoods  
 35 and subdivisions, recreational users of the Southgate Golf Course and  
 36 trails, and travelers on I-15. Generally, residents and people engaged in  
 37 outdoor recreation have a high sensitivity to visual quality. Travelers on  
 38 I-15 generally have a lower sensitivity to visual quality.

39  
 40 The existing visual study area environment was analyzed in terms of its  
 41 visual resources (land form, land cover, and human-made elements).  
 42 Views are described looking from the proposed improvements and  
 43 looking toward the proposed improvements from adjacent parcels or  
 44 roads. Where applicable, foreground, middle-ground, and background  
 45 views are described.

46  
 47 In Technical Advisory T6640.8A, *Guidance for Preparing and Processing*  
 48 *Environmental and Section 4(f) Documents* (FHWA 1987), the Federal  
 49 Highway Administration (FHWA) provides guidance on when and how  
 50 a visual resource analysis should be completed as part of the National  
 51 Environmental Policy Act (NEPA) process. The methodology used for  
 52 this analysis is found in the FHWA manual *Visual Impact Assessment for*  
 53 *Highway Projects* (FHWA 1983).



1 The FHWA Technical Advisory states that, when visual quality could be  
 2 affected, the environmental document should identify the impacts to  
 3 the existing visual resource, the relationship of the impacts to potential  
 4 viewers of and from the project, and measures to avoid, minimize, or  
 5 reduce the adverse impacts.

6  
 7 The methodology used for this visual analysis is based on the FHWA  
 8 manual *Visual Impact Assessment for Highway Projects* (FHWA 1983).  
 9 The first step in the FHWA methodology is to determine the baseline  
 10 visual character and any visual management objectives for the area.  
 11 Existing land uses and the natural landscape were considered in order to  
 12 define the existing visual character and quality and to provide the context  
 13 for assessing the impacts of the alternatives. The affected environment is  
 14 described through the use of the following visual characteristics identified  
 15 in the FHWA guidance on visual impact assessment:

- 16
- 17 • **Vividness:** the memorability of the visual impression created  
 18 by contrasting landscape elements as they combine to form a  
 19 striking and distinctive visual pattern.
- 20 • **Intactness:** the integrity of visual order in the natural and human-  
 21 created landscape, and the extent to which the landscape is free  
 22 from visual encroachment.
- 23 • **Unity:** the degree to which the landscape’s visual resources  
 24 join together to form a coherent, harmonious visual pattern.  
 25 Unity refers to the compositional harmony of inter-compatibility  
 26 between landscape elements.
- 27

### 28 **3.18.1 AFFECTED ENVIRONMENT**

#### 29 **Geographic Setting of the Visual Impact Analysis Area**

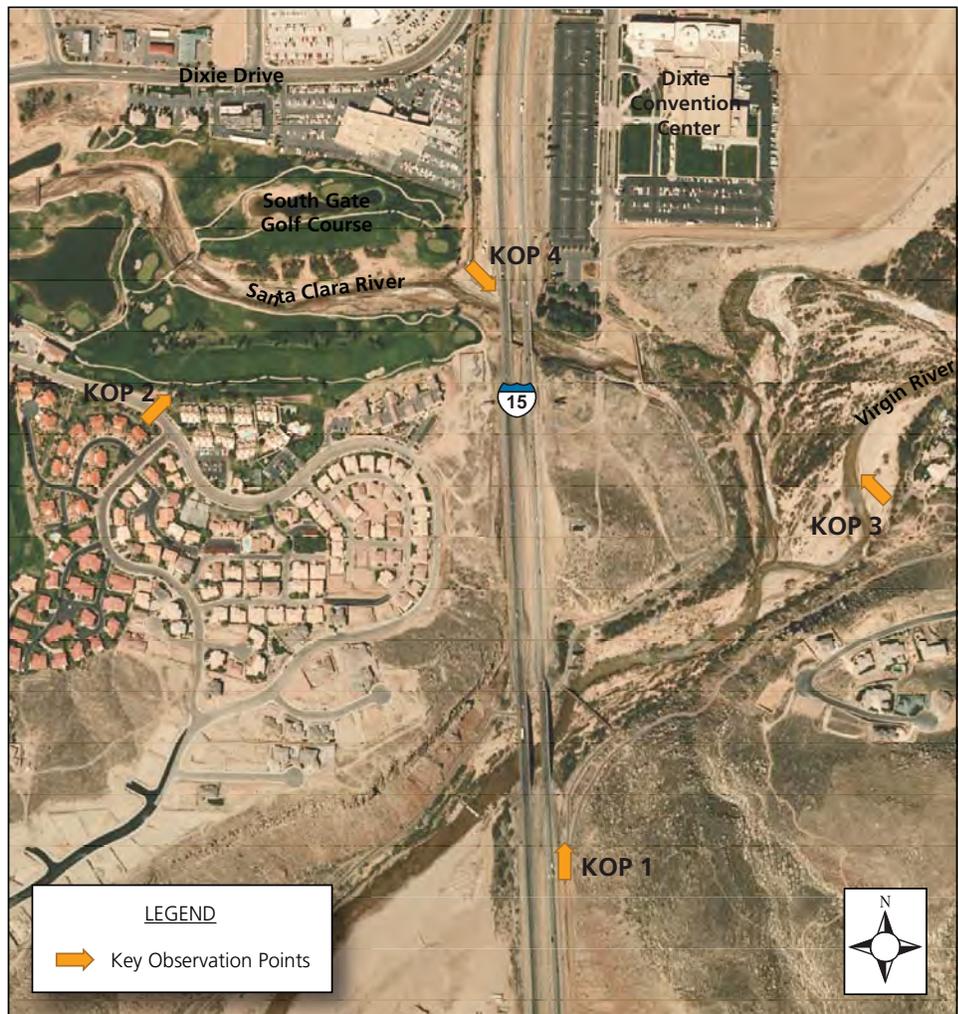
30 The visual study area is in St. George in Washington County, which is  
 31 located in the Dixie Basin in southwestern Utah. The Dixie Basin is situated  
 32 in a transition zone where two major physiological provinces meet: the  
 33 Basin and Range and the Colorado Plateau. The local physiographic  
 34 boundaries are formed by the Beaver Dam Mountains to the west and the  
 35 Hurricane Cliffs to the east (Hansen 1997). The study area itself is largely  
 36 urbanized, with the primary land uses being residential, commercial,  
 37 and recreational. The Virgin River trail winds through the study area and  
 38 passes under I-15 along the Santa Clara River. One of the trailheads for  
 39 this trail is also in the study area.

#### 40 **Key Observation Points**

41 The study area was inventoried for existing foreground, middle-ground,  
 42 and background views. Foreground views are those that are immediately  
 43 visible; they define the local character of the area. The foreground is  
 44 defined as the area within 0.5 mile of the viewer. The middle ground is  
 45 defined as views within 0.5 to 4 miles, and the background views are 4  
 46 miles away or more. The existing foreground and middle-ground views  
 47 in all directions generally consist of urban and suburban development,  
 48 including a mix of commercial, residential, and some recreational land  
 49 associated with Southgate Golf Course and a recreational trail system  
 50 along the Santa Clara and Virgin Rivers. The two rivers provide some  
 51 natural setting among the commercial and residential developments,  
 52 the I-15 freeway, and the few remaining undeveloped parcels between  
 53 developments. Background views from the I-15 corridor include the  
 54



1 Hurricane Cliffs to the east and the Beaver Dam Mountains to the west.  
 2 Distant views of the Dixie National Forest can be seen to the north.  
 3  
 4 Several typical views, called key observation points (KOPs), were selected  
 5 in the study area to represent different types of views. Four KOPs in the  
 6 visual study area were chosen to represent the visual resources of the  
 7 corridor, as shown in Figure 3-29, Key Observation Points. Representative  
 8 photos of the views at each KOP were taken and are described below.  
 9 Some features described in the text are not visible in the photo for each  
 10 KOP because of the direction from which the photo was taken.



45 Figure 3-29 Key Observation Points (KOP)

48 For each KOP, the visual characteristics of vividness, intactness, and unity  
 49 were ranked on a scale of 1 to 7 with 1 being very low, 4 being medium,  
 50 and 7 being very high. An overall visual quality ranking for each KOP  
 51 was also derived by taking the average of the vividness, intactness, and  
 52 unity rankings.

**I-15 at South End of Project (KOP 1)**

KOP 1 is located at the south end of the study area on I-15. The view in Photo 1 is looking north along I-15 at south end of study area. Photo 1 shows the view that would be seen by drivers on I-15 heading north into St. George. Note the Virgin River Bridge in the middle ground. This vantage provides a view of the four-lane cross-section of I-15 and the highway median barrier. On the left side of the middle ground is the rock cut created to accommodate I-15; this rock cut has a red, black, and grey face with a crumbly texture. In the immediate foreground on the right side is a brown and grey rock cut with a rocky, erosive texture that supports some plant life.



Photo 1: KOP 1 - Facing North

**Table 3-37 Visual Characteristic Ratings for KOP 1**

| Visual Characteristic       | Rating   | Comments  |
|-----------------------------|----------|---|
| Vividness                   | 7        | The landform here is memorable due the steep red-rock rock face and the crossing of the Virgin River. |
| Intactness                  | 1        | The large rock highway cut reduces the visual intactness of the natural environment.                  |
| Unity                       | 1        | The large rock highway cut reduces the unity between the built and natural environments.              |
| <b>Total visual quality</b> | <b>3</b> | <b>Moderately Low</b>   |

**Tonaquint Indian Hills (KOP 2)**

KOP 2 is located at the northern edge of the Tonaquint Indian Hills subdivision at the intersection of Balboa Way and 2025 South Circle. KOP 2 shows the view from the residences that line the south side of the Southgate Golf Course, which is in the foreground of Photo 2. The nonirrigated riparian trees associated with the Santa Clara River can be seen just beyond the green golf course. Beyond the Santa Clara River is another section of the golf course with tall netting to keep golf balls on the fairway. Beyond the golf course is I-15. Businesses along Dixie Drive can be seen just beyond the golf course netting. In the background is the bluff at the northern side of St. George.



Photo 2: KOP 2 - Facing Northeast

**Table 3-38 Visual Characteristic Ratings for KOP 2**

| Visual Characteristic       | Rating   | Comments   |
|-----------------------------|----------|--|
| Vividness                   | 4        | This scene is moderately vivid with the open space of the golf course in the foreground. The commercial center in the background detracts from the scene's memorability. |
| Intactness                  | 3        | The golf course in the foreground is an intact scene, but the golf netting and commercial center in the background detract from the overall visual intactness.           |
| Unity                       | 2        | The dichotomy of the urban commercial shopping centers in the background and the manicured golf course contributes to low unity in this scene.                           |
| <b>Total visual quality</b> | <b>3</b> | <b>Moderately low</b>  |

**Bloomington Hills North (KOP 3)**

KOP 3 is located on the west side of the Bloomington Hills North subdivision east of the study area. KOP 3 shows the views from the residences on the east side of the proposed project (see Photo 3). At KOP 3, facing northwest, freshly disturbed soil from new home construction lies in the immediate foreground. The Virgin River floodplain and associated riparian vegetation lie just beyond the new construction. In the middle ground is the Dixie Convention Center and I-15. In the background is the barren slope of the St. George Airport bluff.



Photo 3: KOP 3 - Facing Northwest  
(Note Golf Course Netting and Car Dealership in the Middle-ground)

**Table 3-39 Visual Characteristic Ratings for KOP 3**

| Visual Characteristic       | Rating   | Comments  |
|-----------------------------|----------|---|
| Vividness                   | 2        | There is nothing particularly memorable in this scene. The Virgin River floodplain and bluff bring the vividness above a rating of 1. |
| Intactness                  | 2        | The variety of land uses in this scene disrupts overall visual intactness.  |
| Unity                       | 2        | The unity between the natural and human-made landscapes is not particularly harmonious.   |
| <b>Total visual quality</b> | <b>2</b> | <b>Low</b>  |

**Dixie Drive West B (KOP 4)**

KOP 4 is located at the proposed new alignment of the Bluff Street Interchange. KOP 4 shows the view seen by users of the citywide trail system that goes under I-15 at the Santa Clara River. The view in Photo 4 is facing southeast. In the immediate foreground is part of the citywide trail system. The trail is a multi-use path that is striped down the center to divide the directions of bicycle and pedestrian traffic. The photo also shows riprap. In the foreground beyond the riprap is the Santa Clara River floodplain and the I-15 bridge over the river. The Price City Hills are in the middle ground and block distant views to the horizon. Electrical transmission lines run through the middle ground near I-15, and there are several communication towers on the Price City Hills in the background.



Photo 4: KOP 4 - Facing Southeast

**Table 3-40 Visual Characteristic Ratings for KOP 4**

| Visual Characteristic       | Rating   | Comments  |
|-----------------------------|----------|---|
| Vividness                   | 4        | This scene of the multi-use path along the Santa Clara River has altered the natural setting but is somewhat memorable.   |
| Intactness                  | 4        | The integrity of visual order is somewhat disturbed by the riprap along the left side of the footpath.  |
| Unity                       | 4        | The footpath meanders along the alignment of the Santa Clara River in an unobtrusive way. The visual impact of the I-15 bridge on the surrounding landscape results in a minor distraction from the natural setting, which contributes to moderately high visual unity. |
| <b>Total visual quality</b> | <b>4</b> | <b>Medium</b>   |

**3.18.2 ENVIRONMENTAL CONSEQUENCES**

The methodology used for the visual analysis is based on the FHWA manual *Visual Impact Assessment for Highway Projects* (FHWA 1983). For the environmental analysis, the proposed changes from the project were evaluated based on how they affected the baseline visual environment. The same methods used to rate the baseline conditions were used to evaluate the visual environment with the proposed Dixie Drive project. A rating for each KOP was developed with the project so that a comparison to baseline conditions could be provided.

**No-action Alternative**

Under the No-action Alternative, the Dixie Drive project would not be built, so there would be no long-term impacts from the project on visual and aesthetic resources in the study area. The long-term visual impacts of the No-action Alternative would come from continued commercial and residential development in the study area, which would leave the small natural corridor of the Santa Clara and Virgin River floodplains as the only remaining undeveloped area.

**Preferred Alternative**

**Direct Impacts**

Preferred Alternative consists of the following project elements that would change the visual environment:

- A new interchange structure over existing I-15 next to the Dixie Convention Center north of the Santa Clara River.
- Two additional bridges on either side of I-15 over the Santa Clara River to support the new interchange.
- Widening of Dixie Drive east of I-15 and a new road west of I-15 to provide access to the interchange. The new road west of I-15 would remove a small section of the Southgate Golf Course north of the Santa Clara River.
- Connecting ramps on I-15 between the new interchange and the Bluff Street Interchange.
- Removal of farmland and open space to replace the section of the Southgate Golf Course used by the new interchange.

Although the Preferred Alternative consists of the above elements, the addition of these elements would not alter the overall urban character of the study area, which currently consists of commercial and residential developments and existing roads including I-15. No visual resources in the study area are considered of particular importance to local viewers except the view of the Southgate Golf Course from the homes that line the course. However, many residents enjoy the distant views of red-rock cliffs in the area, such as those shown in Photo 1. Because the residential areas are on rises above and away from the proposed project elements, including the new interchange, the distant views of the red-rock cliffs would not be obstructed by the project, but some middle-ground views would include the proposed project elements.

A small portion of the golf course would be removed, but this would not be visible from the homes that line the course, so it would not change that foreground visual environment for the residents. The few commercial buildings that line the golf course on the north side of the Santa Clara River would face the new section of road west of I-15.

**What impacts would the No-action Alternative have on visual quality?**

- No impact.

**What impacts would the Preferred Alternative have on visual quality?**

- Not expected to substantially change the visual environment.



1 To mitigate the removal of the small portion of the golf course,  
2 a replacement area would be built by the City of St. George. The  
3 replacement area of the golf course would be built on existing farmland  
4 and open area. This would benefit the residents in this area because the  
5 farmland would likely have been converted to residential development  
6 in the future. Overall, the project is not expected to substantially alter  
7 the visual environment as described further in the sections for each KOP  
8 below.

9  
10 KOP 1

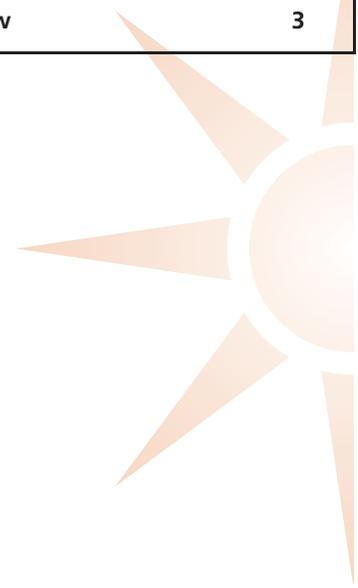
11 KOP 1 shows the view that would be seen by drivers on I-15 heading  
12 north into St. George. The important landforms in the foreground would  
13 not be affected by the project, although the new interchange would add  
14 an additional visual element to the middle ground. However, because  
15 the area around the interchange is lined by commercial developments  
16 and billboards, the overall urban nature would not substantially change  
17 from existing conditions. The background view of the mountains by I-  
18 15 users would not be obstructed. As shown in Table 3-41, the overall  
19 rating at KOP 1 under the proposed project would not change from  
20 existing conditions.

21  
22 **Table 3-41 Visual Impact Ratings for KOP 1**

| Visual Characteristic       | Existing Conditions   | Rating   | Preferred Alternative   | Rating   |
|-----------------------------|---|----------|---|----------|
| Vividness                   | The landform here is memorable due the steep red-rock rock face and the crossing of the Virgin River. | 7        | Minor change. Although the new interchange structure would add to the visual environment, it would not change the existing rock face. | 7        |
| Intactness                  | The large rock highway cut reduces the visual intactness of the natural environment.                  | 1        | No change to the viewer. The rock cut would not be affected by the project.   | 1        |
| Unity                       | The large rock highway cut reduces the unity between the built and natural environments.              | 1        | No change. The rock cut would continue to reduce unity.   | 1        |
| <b>Total visual quality</b> | <b>Moderately Low</b>   | <b>3</b> | <b>Moderately Low</b>   | <b>3</b> |

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37  
38 KOP 2

39 KOP 2 shows the view from the residences that line the south side of the  
40 Southgate Golf Course. For these residents, the most important element  
41 of the visual environment is the golf course and vegetation of the Santa  
42 Clara River in the foreground, which would not be affected by the  
43 project. In the middle-ground view, the new road and interchange would  
44 introduce a new vertical element into the study area and would likely  
45 block views of the car dealership. The proposed project would not be any  
46 higher than the existing commercial buildings (car dealership) and would  
47 not block any important distant visual elements such as mountains to the  
48 north. The project would blend in with the urban nature of the middle-  
49 ground views. Users of the golf course would see the new road instead  
50 of the commercial buildings north of the course. As shown in Table 3-42,  
51 the overall rating at KOP 2 under the proposed project would not change  
52 from existing conditions.



1 **Table 3-42 Visual Impact Ratings for KOP 2**

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| Visual Characteristic       | Existing Conditions  | Rating   | Preferred Alternative  | Rating     |
|-----------------------------|--|----------|--|------------|
| Vividness                   | This scene is moderately vivid with the open space of the golf course in the foreground. The commercial center in the background detracts from the scene's memorability. | 4        | Minor change. The golf course in the foreground would not be affected, and the vegetation associated with the Santa Clara River would remain. Instead of viewing the commercial center, residents would likely see the new interchange and parts of the commercial center. | 3          |
| Intactness                  | The golf course in the foreground is an intact scene, but the golf netting and commercial center in the background detract from the overall visual intactness.           | 3        | No change. The golf course would not change. Instead of the commercial center, residents would likely see portions of the new interchange along with the commercial center.  | 3          |
| Unity                       | The dichotomy of the urban commercial shopping centers in the background and the manicured golf course contributes to low unity in this scene.                           | 2        | No change. There would still be low unity of the commercial centers and new road with the golf course.   | 2          |
| <b>Total visual quality</b> | <b>Moderately Low</b>  | <b>3</b> | <b>Moderately Low</b>  | <b>2.7</b> |

24 KOP 3

25 KOP 3 shows the views from the residences on the east side of the  
 26 proposed project. For these residents, the important views are the natural  
 27 setting of the Virgin River floodplain in the foreground and the bluffs in  
 28 the background. As seen in Photo 3, the middle-ground view includes  
 29 the commercial area adjacent to I-15. The proposed new interchange  
 30 would become visible in the middle-ground but would blend in with the  
 31 existing commercial area along I-15. The project would not affect the  
 32 foreground views or the background views of the bluffs. As shown in  
 33 Table 3-43, the overall rating at KOP 3 under the proposed project would  
 34 not change from existing conditions.  
 35

36 **Table 3-43 Visual Impact Ratings for KOP 3**

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| Visual Characteristic       | Existing Conditions   | Rating   | Preferred Alternative   | Rating   |
|-----------------------------|---|----------|---|----------|
| Vividness                   | There is nothing particularly memorable in this scene. The Virgin River floodplain and bluff bring the vividness above a rating of 1. | 2        | Minor change. The foreground would not be affected, but the new interchange would be visible in the background and would blend in with the existing commercial development. | 2        |
| Intactness                  | The variety of land uses in this scene disrupts overall visual intactness.  | 2        | No change. The land uses that disrupt the visual intactness would not be affected by the project.   | 2        |
| Unity                       | The unity between the natural and human-made landscapes is not particularly harmonious.   | 2        | No change. The unity would not change since the new interchange would blend in with the existing human-made landscapes.   | 2        |
| <b>Total visual quality</b> | <b>Low</b>  | <b>2</b> | <b>Low</b>  | <b>2</b> |

1 KOP 4  
 2 KOP 4 shows the view of users of the citywide trail system that goes  
 3 under I-15 at the Santa Clara River. The view includes both the Santa  
 4 Clara River and the I-15 bridge over the river. Under the proposed project,  
 5 the trail location would be maintained, but the trail would be routed  
 6 through a box culvert under the new interchange and then would cross  
 7 under two new bridges over the Santa Clara River. The project would  
 8 modify some of the natural setting by adding more roadway structures,  
 9 which would give the area a more urban feel. As shown in Table 3-44,  
 10 the overall rating would change from medium to low as a result of the  
 11 project. However, given that the visual environment of the trail in this  
 12 area includes I-15 and the commercial setting of car dealerships (just  
 13 north of the view in Photo 4) and the Dixie Convention Center (just west  
 14 of KOP 4), the overall setting would remain urban.

15  
 16 **Table 3-44 Visual Impact Ratings for KOP 4**

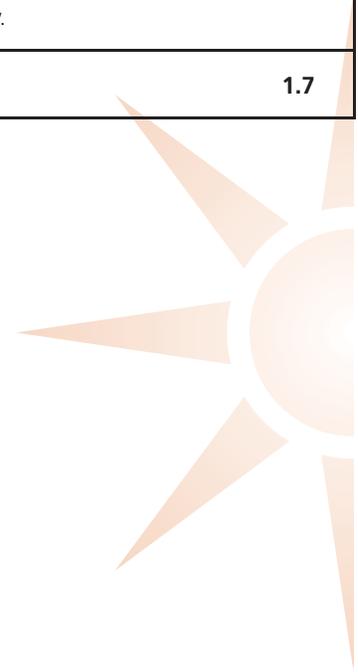
| Visual Characteristic       | Existing Conditions   | Rating   | Preferred Alternative  | Rating     |
|-----------------------------|---|----------|--|------------|
| Vividness                   | This scene of the multi-use path along the Santa Clara River has altered the natural setting but is somewhat memorable.   | 4        | By placing the trail into a box culvert and under two new bridges most of the remaining natural setting would be altered to more of an urban visual environment.   | 2          |
| Intactness                  | The integrity of visual order is somewhat disturbed by the riprap along the left side of the footpath.  | 4        | The visual integrity would be further disturbed with the proposed project.   | 2          |
| Unity                       | The footpath meanders along the alignment of the Santa Clara River in an unobtrusive way. The visual impact of the I-15 bridge on the surrounding landscape results in a minor distraction from the natural setting, which contributes to moderately high visual unity. | 4        | The foot path would still follow the Santa Clara River but now would be crossing under two new bridges and in a box culvert. This would result in a much greater distraction to the natural setting of the river and would result in a low visual unity. | 1          |
| <b>Total visual quality</b> | <b>Medium</b>   | <b>4</b> | <b>Low</b>   | <b>1.7</b> |

37  
 38 Landscaping

39 The City of St. George community, elected officials, and City management  
 40 take great pride in the appearance of developed grounds. The Preferred  
 41 Alternative would have some impact on currently landscaped features.  
 42 For example, the City of St. George has installed landscaping in the Hilton  
 43 Drive right-of-way to enhance the experience of the traveling public and  
 44 trail users. These landscape amenities include mature trees, shrubs, and  
 45 rock mulch. Construction of the Dixie Drive southbound off-ramp and  
 46 the associated cut and fill may impact these landscaping improvements.

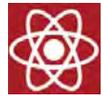
47  
 48 **Indirect Impacts**

49 There would be no indirect impacts to visual quality as a result of the  
 50 Preferred Alternative.



**Mitigation**

Because the project is not expected to substantially change the visual environment, no specific mitigation is required. However, because the Dixie Drive Interchange is in a high visibility area at the core of the City of St. George, UDOT will work with the local municipality during the final design phase of the project to determine if any context-sensitive solutions could be incorporated into the project. These could include using directional lighting with the interchange, planting vegetation to help enhance the interchange, and incorporating architectural features such as railings, the color of the bridges, and style of retaining walls.



**3.19 ENERGY**

Construction energy requirements were analyzed on a qualitative basis as to whether the alternative would require construction activities. Operational energy requirements were analyzed on a quantitative basis, primarily in the form of vehicle fuel consumption. Fuel consumption is dependent upon vehicle miles traveled and travel conditions, i.e., vehicle type, speed, the grade of the roadway, and pavement type. The area studied for the energy analysis included the area covered by the Dixie MPO Travel Demand Model since the Preferred Alternative would impact traffic patterns regionally.

This analysis consisted of dividing the average daily vehicle miles traveled by an average vehicle fuel efficiency estimate obtained from the U.S. Department of Energy, Energy Information Administration's Annual Energy Outlook 2008 (U.S. Department of Energy 2008), which includes on-the-road estimates for both cars and light trucks. For 2035 conditions for both the No-action and the Preferred Alternative, an average vehicle fuel efficiency of 30.0 mpg was used (see Table 3-45).

**Table 3-45 Construction and Operational Energy Requirements**

| Alternative                | Construction? | Vehicle Miles Traveled | Consumption (gallons) |
|----------------------------|---------------|------------------------|-----------------------|
| 2035 No-action Alternative | No            | 9,875,398              | 329,180               |
| 2035 Preferred Alternative | Yes           | 9,862,069              | 328,736               |

**3.19.1 ENVIRONMENTAL CONSEQUENCES**

**No-action Alternative**

The No-action Alternative would not have additional energy requirements because of construction. According to the analysis, the No-action Alternative would have similar operational energy consumption requirements as the Preferred Alternative based upon a similar number of vehicle miles traveled. This analysis, however, does not take into account the increase in congestion leading to stop-and-go traffic with a lower LOS in the project area, which would reduce vehicle efficiency and thereby, increase fuel consumption.

**What impacts would the No-action Alternative have on Energy?**

- No energy required for construction.
- Similar operational energy requirements as the Preferred Alternative.

1 **Preferred Alternative**

2 The Preferred Alternative would have energy demands during  
3 construction. According to the analysis, the Preferred Alternative  
4 would have similar operational energy consumption requirements as  
5 the No-action Alternative, based upon a similar number of vehicle miles  
6 traveled. This analysis, however, does not take into account the reduction  
7 in congestion along the roadway. Once construction is completed,  
8 congestion would be relieved and traffic would flow more smoothly than  
9 with the No-action Alternative, thus maintaining vehicle speeds and fuel  
10 efficiency. The Preferred Alternative would decrease energy requirements  
11 over the long term, as compared to the No-action Alternative.

12

13 **Mitigation**

14 No mitigation is planned.

15

16  **3.20 CONSTRUCTION IMPACTS**  
17 **3.20.1 ENVIRONMENTAL CONSEQUENCES**  
18 **No-action Alternative**

19 There would be no construction impacts associated with the No-action  
20 Alternative.

21

22  
23 **Preferred Alternative**

24 **Construction Phasing**

25 The Dixie Drive interchange project is anticipated to be constructed in  
26 phases due to the magnitude of the project and limited funding. The  
27 initial construction is expected to include:

28

- 29 • SPI interchange at I-15
- 30 • One-way collector/distributor roads system and ramps to tie the  
31 Dixie Drive Interchange to the Bluff Street Interchange
- 32 • Reconstruction of the I-15 mainline bridges and the construction  
33 of the Dixie Drive southbound on-ramp and northbound off-  
34 ramp over the Santa Clara River
- 35 • A minimum five lane section for the new Dixie Drive alignment
- 36 • The re-configuration of the local road system on the west side to  
37 reconnect Hilton Drive, Indian Hills Drive and Black Ridge Drive  
38 to the new Dixie Drive alignment

39

40 Future construction phases would include the widening of Dixie Drive  
41 to seven lanes, as well as the possible addition of turning lanes at  
42 intersections and some ramp and/or collector/distributor road widening.  
43 The extent of the construction would depend on how much of the ultimate  
44 design is able to be implemented with the available funding which won't  
45 be determined until the detailed design plans and construction cost  
46 estimates are prepared.

47

48 **Social Conditions**

49 Area residents and commuters would experience minor, temporary  
50 inconveniences due to noise, dust, and travel delays. Access to all  
51 properties would be maintained; however, there would be some  
52 temporary construction impacts to the accesses of some properties.

53

54

**What impacts would the Preferred Alternative have on Energy?**

- Energy required for construction.
- Similar operational energy requirements as the No-action Alternative.



1 Mitigation

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

4  
5 **Economic Conditions**

6 Most of the Dixie Drive project would be on new alignment and would  
7 not limit access from existing roadways to businesses. There may be  
8 some short-term construction impacts during the reconfiguration of the  
9 Black Ridge Drive and Hilton Drive intersection and with the realignment  
10 of Hilton Drive to Indian Hills Drive but these are expected to be of  
11 shorter duration. As most of the businesses in this area are considered  
12 destination businesses, they would be only slightly affected by these  
13 temporary construction activities. Overall, construction is not expected  
14 to substantially impact business access, operations or sales.

15  
16 Mitigation

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

23  
24 **Air Quality**

25 Construction of the Preferred Alternative would result in temporary  
26 negative effects to air quality in the project area due to increased dust  
27 and particulates.

28  
29 Mitigation

30 The Utah Air Quality Rules will require a dust-control plan from all sources  
31 whose activities or equipment could produce fugitive dust or airborne  
32 dust. A dust-control plan will be prepared for the construction phase of  
33 the Dixie Drive Interchange project.

34  
35 **Noise**

36 Area residents would experience temporary inconvenience due to  
37 construction noise.

38  
39 Mitigation

40 Construction noise impacts are considered temporary and will be  
41 minimized through adherence to UDOT Standard Specification 01355  
42 - Environmental Protection Section 1.8 - Noise and Vibration Control.  
43 Extended disruption of normal activities is not anticipated, since no  
44 one receptor is expected to be exposed to construction noise of long  
45 duration.

46  
47 **Water Quality**

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

52  
53  
54



1 Mitigation

2 Construction projects that disturb more than 1 acre of land must be  
3 covered under the statewide UPDES stormwater permit. The Preferred  
4 Alternative would disturb more than 1 acre of land and would require  
5 coverage under the UPDES stormwater permit. To obtain a UPDES permit,  
6 a notice of intent must be submitted to the Utah Division of Water Quality  
7 describing the construction activities. A Storm Water Pollution Prevention  
8 Plan that includes a Temporary Erosion and Sediment Control Plan must  
9 be developed prior to submitting the notice of intent for the UPDES  
10 permit. The Temporary Erosion and Sediment Control Plan identifies best  
11 management practices as well as site-specific measures to reduce erosion  
12 and prevent eroded sediment from leaving the construction zone.

13  
14 **Ecosystems**

15 The unintentional introduction of petroleum products during construction  
16 adjacent to the Santa Clara River could harm aquatic wildlife. Sources of  
17 fuel and oil spills or leakage into the Santa Clara River could include  
18 heavy equipment and products stored onsite throughout the duration  
19 of the project. However, mitigation measures are available to reduce or  
20 eliminate any effect to aquatic wildlife (see mitigation section).

21  
22 The river around the construction and downstream could be contaminated  
23 when concrete is poured. However, mitigation measures are available  
24 to reduce or eliminate any effect to aquatic wildlife (see mitigation  
25 section).

26  
27 During construction, noise levels would be between about 66 and  
28 76 dBA during the worst-case scenario when the pile driver is in use.  
29 Beyond 3,000 feet from the I-15 bridge construction area, noise levels  
30 would diminish and would return to existing background levels (between  
31 51 and 60 dBA). These temporary construction activities could deter  
32 migrating individuals, such as the southwestern willow flycatcher and the  
33 yellow-billed cuckoo from using the Santa Clara River as a travel route  
34 near the confluence with the Virgin River during the construction period.  
35 However, because these species can fly, other entries into the Santa Clara  
36 River valley, though possibly less desirable, would still be available to the  
37 species. Temporary construction noise could also affect the movements  
38 of southwestern willow flycatchers and yellow-billed cuckoos within the  
39 Virgin River confluence area by deterring these species from using the  
40 area during construction.

41  
42 Mitigation

43 Specific impact minimization measures have been established regarding  
44 storing fuel, fueling equipment, and containing spills. These measures  
45 should reduce or eliminate the potential for spills and thereby reduce or  
46 eliminate any effects to aquatic organisms. To reduce the magnitude and  
47 effects of erosion and sedimentation, a Storm Water Pollution Prevention  
48 Plan (SWPPP) will be developed for this project and will identify BMPs  
49 to be implemented during construction. Such SWPPPs typically include  
50 erosion-control measures and a requirement to fuel vehicles and  
51 equipment outside the active channel and floodplain.

52  
53 To reduce the effects to aquatic species, in-water work will be conducted  
54 in the dry behind isolation structures. All fish salvage operations, if they



1 are considered necessary by UDWR and USFWS, will be performed by  
 2 qualified fish biologists. Work below the OHWM will be done using BMPs,  
 3 including the use of hay bales and/or silt fencing or similar practices, to  
 4 reduce the amount of sediment entering the Santa Clara River. Further,  
 5 any in-water work associated with removing the I-15 bridge piers or  
 6 Tonaquint Bridge abutments will take place during periods of extreme  
 7 low flow to reduce sedimentation downstream.

8  
 9 Raw concrete is highly toxic to fish and other aquatic organisms. All new  
 10 concrete used during construction that could come in contact with the  
 11 Santa Clara River will be properly cured so that no hazardous materials  
 12 from the concrete could leach into the surface waters.

13  
 14 Mitigation measures for impacts to the Santa Clara River will include  
 15 a de-watering plan for the bridge piers and BMPs in place to minimize  
 16 impacts to water quality during construction. In addition, any impacted  
 17 vegetation will need to be revegetated with a native seed mix.

18  
 19 ***Invasive Species***

20 The potential exists for invasive species to be introduced or propagated  
 21 in the project area due to construction activities that disturb the existing  
 22 ground cover.

23  
 24 Mitigation

25 To minimize the movement of invasive species, the Contractor will be  
 26 required to comply with UDOT's Special Provision 02926S - Invasive Weed  
 27 Control to minimize the spread and introduction of invasive species.  
 28 Some of the measures in the Special Provision include:

- 29  
 30 • Cleaning all earth-moving equipment entering the project area  
 31 • Treating existing noxious weeds ten days before starting  
 32 earthwork operations  
 33 • Controlling invasive weeds using pre-emergent, selective, and  
 34 non-selective herbicides, as appropriate

35  
 36 ***Archaeological and Architectural Resources***

37 There is the possibility to impact undiscovered archaeological sites during  
 38 construction of the Preferred Alternative.

39  
 40 Mitigation

41 The contractor will be required to abide by UDOT Standard Specification  
 42 01355 - Environmental Protection, Part 1.13, Discovery of Historical,  
 43 Archaeological, or Paleontological Objects, Features, Sites, Human  
 44 Remains, or Migratory Avian Species.

45  
 46 ***Paleontology***

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

49  
 50 Mitigation

51 The contractor will be required to abide by UDOT Standard Specification  
 52 01355 - Environmental Protection, Part 1.13, Discovery of Historical,  
 53 Archaeological, or Paleontological Objects, Features, Sites, Human  
 54 Remains, or Migratory Avian Species.



1 **Hazardous Waste Sites**

2 Construction of Preferred Alternative could disturb and expose asbestos  
3 under the pavement at the intersection of Blackridge Drive and Hilton  
4 Drive. Disturbing asbestos during construction could present health  
5 risks to construction workers and the community. However, mitigation  
6 measures are available to reduce or eliminate harmful effects to  
7 construction workers (see mitigation section).

8  
9 Mitigation

10 Hazardous waste sites could be encountered during construction. In such  
11 a case, all work will stop in the area of the contamination according to  
12 UDOT Standard Specifications, and the contractor will consult with UDOT  
13 and UDEQ to determine the appropriate remedial measures. Hazardous  
14 wastes will be handled according to UDOT Standard Specifications and  
15 state and federal regulations.

16  
17 If disturbance of the Black Ridge asbestos site is required, asbestos will be  
18 handled, removed, and disposed of according to the regulations of the  
19 Utah Department of Environmental Quality and the U.S. Environmental  
20 Protection Agency and any local requirements. The selected construction  
21 contractor will be made aware of the site and will be responsible for the  
22 asbestos remediation and disposal.

23  
24 **Visual Conditions**

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

29  
30 Mitigation

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

33  
34 **Soil Settlement**

35 Construction of the Preferred Alternative may result in some soil  
36 settlement due to the weight of the roadway overpass structures over I-  
37 15 and the Santa Clara River. No structures are expected to be impacted  
38 by settlement as a result of construction.

39  
40  
41 **3.21 CUMULATIVE EFFECTS**

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

53  
54 The resources evaluated in this cumulative effect analysis are those which



1 are regional in nature and for which there is not already a monitoring  
 2 mechanism in place (i.e., floodplains, water quality). Resources evaluated  
 3 include:

- 4
- 5 • Ecosystem
- 6 • Architectural and Archaeological Resources
- 7

8 The geographic area addressed in the cumulative impacts analysis is the St.  
 9 George metropolitan area, with the exception of the ecosystem analysis.  
 10 The geographic area addressed in the cumulative impacts analysis of  
 11 this resource is the Virgin and Santa Clara river basins, chosen because  
 12 the majority of any impacts from the proposed project would be felt  
 13 within this area. The time frame used for the cumulative impact analysis  
 14 is the 1960s to the present, chosen because this time frame represents  
 15 a period of rapid development and growth in the area, beginning with  
 16 the construction of the Federal Interstate System (including I-15) and  
 17 extending through the most recent surge in population in the last 15 to  
 18 20 years.

19

20 **3.21.1 PAST, PRESENT, AND REASONABLY**  
 21 **FORESEEABLE FUTURE ACTIONS**

22 **Past Actions**

23 Past actions that have impacted the development of St. George in the  
 24 project area include:

- 25
- 26 • **Construction of I-15 and associated interchanges:** I-15 was  
 27 constructed in the 1960s, resulting in easier access to St. George  
 28 from the metropolitan areas both north along the Wasatch Front  
 29 and south from Arizona and Nevada.
- 30 • **I-15 Corridor as a Major Canada/US/Mexico Trade Route:**  
 31 The I-15 Corridor was designated as a priority corridor for  
 32 Canada/US/Mexico trade under the National Highway System  
 33 Designation Act of 1995, which is important due to the North  
 34 American Free Trade Act that created preferential economic  
 35 relationships between the North American countries. This  
 36 designation resulted in higher truck traffic volumes along this  
 37 route.
- 38 • **St. George Municipal Airport:** The construction of the St.  
 39 George Municipal Airport (along with direct connections to the  
 40 Salt Lake International Airport) made the St. George area more  
 41 readily accessible from the Salt Lake metropolitan area, as well  
 42 as other urban centers.
- 43 • **Dixie State College:** The Dixie State College replaced the Dixie  
 44 Academy as a two-year community college/technical school,  
 45 with the current campus being opened in the 1960s. Current  
 46 enrollment is approximately 5,000 students.
- 47 • **Population Growth and Residential Development:**  
 48 Population in St. George has experienced rapid growth in the  
 49 last 15 to 20 years, being consistently ranked as one of the  
 50 fastest growing areas in the country.
- 51
- 52
- 53
- 54



**Present and Reasonably Foreseeable Future Actions**

Present and reasonably foreseeable future actions that are anticipated to affect the project area include:

- Transportation projects
- Future land use, zoning and MPO planning
- Private development

**Transportation Projects**

Transportation planning in the project area is the responsibility of the Dixie MPO and the City of St. George. The applicable planning studies are the Dixie MPO 2007 – 2030 Regional Transportation Plan (RTP) and the City of St. George’s Master Traffic and Transportation Study (2008). Present and reasonably foreseeable transportation projects that would potentially impact the project area are listed in Table 3-46.

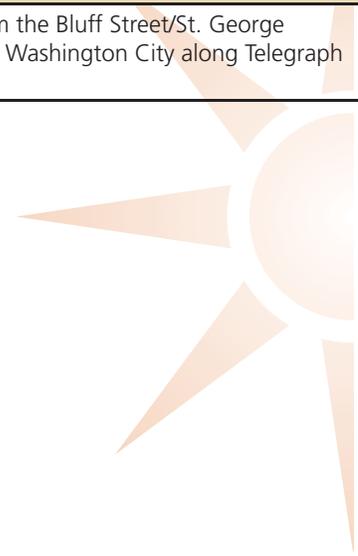
**Table 3-46 Present and Reasonably Foreseeable Transportation Projects With Potential Impacts to the Project Area**

| Project   | Description   |
|---|---|
| <b>Highway Improvements</b>                       |   |
| Bluff Street Interchange                          | Widen Bluff Street and realign the I-15 access ramps at the Bluff Street Interchange  |
| Red Hills Parkway: SR-18 (Bluff Street)           | Expand to five lanes and improve alignment within existing right-of-way   |
| Western Corridor                                  | Corridor Preservation for a route to extend from Ivins through Santa Clara and connect to I-15 south of St. George  |
| Southern Corridor                                 | New construction from the Atkinville Interchange at MP2 to Hurricane (currently under construction from River Road to the new St. George airport)   |
| I-15: Exit 4 Bloomington Interchange Modification | Interchange improvements  |
| I-15: South of Bluff Street to Washington         | Roadway improvements, including the addition of mainline lanes and auxiliary lanes  |
| Valley View Dr. Bridge                            | Replacement of the bridge structure over the Santa Clara River  |
| Virgin River Bridge                               | Widening of the Virgin River Bridge on Washington Fields Road in Washington City  |
| <b>Transit Improvements</b>                       |   |
| Bus Rapid Transit (BRT)                           | Potential for a BRT route along St. George Boulevard from the Bluff Street/St. George Boulevard intersection to Red Cliffs Drive, then to SR-9 in Washington City along Telegraph Street and ending in Hurricane near Main Street |

**Private Land Development**

The project area is mostly zoned commercial, with some areas designated as open areas, including the Southgate Golf Course. Most of the land in the project area is currently developed, with further developmental prospects being somewhat limited by the Virgin River and the I-15 corridor. Proposed residential and commercial developments that could have an effect on the project area include:

- **Redevelopment of the St. George Municipal Airport area:**  
The location of the current airport serving the St. George area is planned to be redeveloped using a multi-use approach to ensure the highest and best use of the land. Accordingly, a redevelopment plan has been prepared, known as the St. George Municipal Airport Redevelopment Plan. This plan is currently under public review.



- **Commercial development adjacent to the Dixie Convention Center:** The land near the Dixie Convention Center is currently zoned for commercial development and local streets have been developed so as to maximize the land available for development.

### 3.21.2 CUMULATIVE IMPACTS

#### **Ecosystem**

The ecosystem discussion includes impacts to wetlands and the wildlife in the project area, which encompasses threatened and endangered species, state sensitive species, and critical habitat for these species.

#### **Wetlands**

As discussed in the Ecosystem section, there would be no direct impacts to wetlands from the Preferred Alternative and only minor impacts (less than 0.2 acres) of riparian habitat.

The majority of the identified transportation projects are in the planning stages and it is not possible to identify wetland impacts at this point. Of the projects that are in the environmental study or design phase, none are anticipated to have wetland impacts. Future transportation projects would have to mitigate any wetland impacts to those wetlands deemed jurisdictional in order to obtain a 404 permit from the USACE under the Clean Water Act; therefore, it is unlikely that there would be a cumulative impact to wetlands from the identified projects and future development.

#### **Wildlife**

The Preferred Alternative would have only minor impacts to the aviary species identified in the Ecosystem Section due to noise impacts during construction. No critical habitat would be removed or substantially altered and there are no known occurrences of either the southwestern willow flycatcher or the yellow-billed cuckoo in the project area. For the yellow-billed cuckoo, there would be no cumulative impacts due to the other planned projects in the area because there is no critical habitat for this species designated either within the ecosystem study area or anywhere else in North America so none would be affected by any other planned projects. Therefore, there would be no cumulative impacts on this species from the identified projects.

For the southwestern willow flycatcher, there is critical habitat, as well as a documented nesting just over a mile away from the project area in the Riverside Marsh and another just over three miles away in the Seegmiller March. None of the planned projects identified in this discussion would impact either the Riverside Marsh or the Seegmiller Marsh; therefore, there would be no cumulative impacts on this species from the identified projects.

The Preferred Alternative would have impacts on aquatic species (both threatened and endangered and state sensitive) in the project area. These impacts would result from both construction impacts and changes to the channel bottom and flow pattern, as well as the hydraulics, of the Santa Clara River due to the removal of the Tonaquint Bridge and the inclusion of new bridge structures with their associated in-water elements (e.g., piers, bank armoring or riprap).



1 The Santa Clara River could be impacted by the proposed bridge  
2 replacement project and the Virgin River could be impacted by the planned  
3 widening of the bridge on Washington Field Road in Washington City,  
4 both of which would be subject to consultation with the USFWS due to  
5 the presence of threatened and endangered species in both rivers.

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7 Also, there are other active efforts to restore, preserve, and enhance  
8 both the Virgin and Santa Clara rivers for habitat for native aquatic  
9 species. Currently, the Natural Resources Conservation Service (NRCS)  
10 is conducting several mitigation and revegetation projects in the area.  
11 The Utah Division of Wildlife Resources (UDWR) has been involved in  
12 eradication efforts against non-native fish species in order to restore habitat  
13 for the woundfin and other native fish species. The Virgin Spinedace  
14 Conservation Agreement and Strategy aims to restore Virgin spinedace  
15 to the Santa Clara River from the Gunlock Reservoir downstream to the  
16 Virgin River confluence. These efforts will help ensure that there are no  
17 negative cumulative impacts on the identified aquatic species from the  
18 planned projects.

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20 The Preferred Alternative would have only minor impacts to the identified  
21 state sensitive species identified in the Ecosystem Section due to noise  
22 impacts during construction. Since this impact is only of a temporary  
23 duration, no cumulative impact analysis was prepared.

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### 25 **Architectural and Archaeological Resources**

26 The Preferred Alternative would have impacts on four archaeological  
27 resources eligible for the NRHP.

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29 The majority of the identified transportation projects are in the planning  
30 stages and it is not possible to identify impacts to architectural or  
31 archaeological resources at this point. Of the projects that are in the  
32 environmental study or design phase, the Southern Corridor would  
33 have adverse impacts on 20 sites. Cumulatively, it is possible that other  
34 future transportation projects and private land development would have  
35 impacts on these resources.

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37 Future transportation projects that have a federal nexus (either through  
38 federal funding or the need for federal permitting authority) would be  
39 subject to the Section 4(f) policy regarding those cultural resources that  
40 are eligible for inclusion on the NRHP, including avoidance and mitigation  
41 for adverse effects that cannot be avoided. Private development  
42 would not be subject to the same restrictions; however, there are state  
43 regulations regarding the protection of historic sites (i.e., the Utah  
44 Historic Preservation Act, UCA §9-8-102 et seq., which ) The rate at  
45 which cultural resources would be removed by private development  
46 depends on future population growth, market forces, the availability of  
47 suitable alternative sites, and governmental incentives for preservation.

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## 3.22 SUMMARY OF IMPACTS AND MITIGATION

Table 3-47 Summary of Impacts and Mitigation

| Environmental Issue  | No-action Alternative  | Preferred Alternative   | Summary of Mitigation   |
|--|--|---|-------------------------|
| <b>Land Use</b><br>                                   | No changes to planned land uses.   | <p>Would require approximately 23 acres to convert to roadway right-of-way:</p> <ul style="list-style-type: none"> <li>• 3 acres commercial property</li> <li>• 13 acres recreational property</li> <li>• 7 acres property that is currently vacant (zoned as residential (2.1-acres), commercial (4.3-acres), planned development (0.3-acres), and open space (0.03-acres))</li> </ul> <p>Would convert up to 9 acres of cultivated farmland, which is currently zoned as residential, to recreational use as part of the Southgate Golf Course redesign.</p> <p>Consistent with the City of St. George's zoning and land use plans.</p> | No mitigation required. |
| <b>Farmland</b><br>                                 | <ul style="list-style-type: none"> <li>• No impact to prime, unique, statewide important, or APA designated farmlands.</li> <li>• Nine acres of cultivated farmland would likely be converted to residential use.</li> </ul>   | <ul style="list-style-type: none"> <li>• No impact to prime, unique, statewide important, or APA designated farmlands.</li> <li>• Would acquire up to nine acres of cultivated farmland (currently zoned residential) to be used as part of the Southgate Golf Course redesign.</li> </ul>  | No mitigation required. |
| <b>Social Impacts and Environmental Justice</b><br> | <ul style="list-style-type: none"> <li>• Existing social conditions and trends in the study area would remain intact.</li> <li>• Residents of St. George would continue to experience congestion at the Bluff Street Interchange.</li> <li>• No impact to minority or low income populations in the project area.</li> </ul> | <ul style="list-style-type: none"> <li>• Would not result in changes to social composition or levels of social interaction and cohesion currently present in neighborhoods near the project site.</li> <li>• Temporary construction impacts.</li> <li>• Reduced levels of traffic congestion.</li> <li>• No disproportionately high and adverse effects on minority and low-income populations.</li> </ul>  | No mitigation required. |

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| Environmental Issue   | No-action Alternative  | Preferred Alternative   | Summary of Mitigation  |
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| <p><b>Relocations</b></p>  | <ul style="list-style-type: none"> <li>No right-of-way acquisitions or relocations would be required.</li> </ul> | <ul style="list-style-type: none"> <li>No relocations would be required.</li> <li>Approximately 23-acres of right-of-way would be required.</li> </ul>  | <p>Acquired land will be purchased by the Utah Department of Transportation (UDOT) according to the Uniform Relocation Assistance Act, as amended; Title VI of the Civil Rights Act of 1964; and 49 Code of Federal Regulations 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.</p> |
| <p><b>Economics</b></p>    | <p>Heavy traffic congestion could make the area less desirable for new businesses and shoppers.</p>              | <ul style="list-style-type: none"> <li>Would require some right-of-way acquisition and parking spaces from some businesses in the project area.</li> <li>Overall, not expected to decrease local employment, wages, or income.</li> <li>Would reduce congestion in area and improve access, positively affecting the operation and success of local businesses.</li> <li>Temporary construction impacts.</li> </ul> | <p>See Construction Impacts for mitigation for impacts during construction.</p>  |



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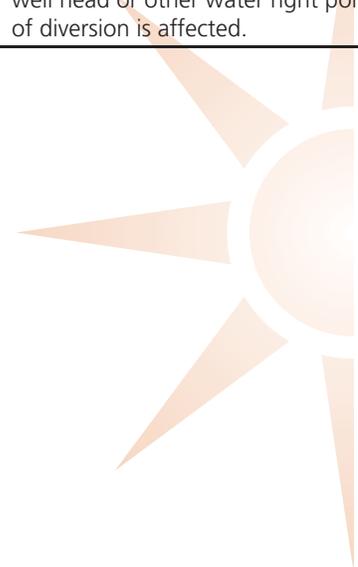
| Environmental Issue  | No-action Alternative   | Preferred Alternative   | Summary of Mitigation  |
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| <p><b>Recreational Resources and Pedestrian and Bicyclist Considerations</b></p>  | <p>No impact to recreational facilities, pedestrian, or bicycle facilities.</p>   | <ul style="list-style-type: none"> <li>• Would impact the Southgate Golf Course, the Confluence Trailhead, the Hilton Drive Trail and the Virgin River Trail.</li> <li>• Would not limit the ability of the City of St. George to construct planned trails.</li> <li>• Would not eliminate any existing pedestrian or bicycle facilities</li> <li>• Would accommodate pedestrian and bicyclist movements along the proposed Dixie Drive.</li> </ul> | <p><u>Southgate Golf Course</u><br/>Will assist in the relocation of the golf course whether by acquiring right-of-way, participating in construction, or other means as determined by UDOT and the City of St. George.</p> <p><u>Confluence Trailhead</u></p> <ul style="list-style-type: none"> <li>• A grade-separated structure for Dixie Drive over Convention Center Drive will be constructed in order to maintain access to the Confluence Trailhead.</li> <li>• The restroom structure will be relocated or replaced and trailhead parking will be provided, according to designs to be agreed upon with the City of St. George.</li> </ul> <p><u>Hilton Drive Trail and Virgin River Trail</u></p> <ul style="list-style-type: none"> <li>• Impacted portions of the Hilton Drive Trail will be realigned and reconstructed.</li> <li>• A grade-separated crossing will be constructed so that the Hilton Drive Trail can cross beneath the proposed Dixie Drive roadway on the west side of I-15.</li> <li>• Impacted portions of the Virgin River Trail will be realigned and reconstructed.</li> </ul> <p>Further mitigation details will be outlined in a MOA between the City of St. George and UDOT.</p> |
| <p><b>Air Quality</b></p>   | <p>Because Washington County is an 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.</p> | <p>Not expected to cause air quality impacts.</p>   | <p>See Construction Impacts for mitigation for impacts during construction.</p>  |

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| Environmental Issue   | No-action Alternative                        | Preferred Alternative  | Summary of Mitigation  |
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| <p><b>Noise</b></p>          | <p>No increase in noise levels expected.</p> | <ul style="list-style-type: none"> <li>Increased noise in project area averaging about 2 dBA.</li> <li>Temporary construction noise.</li> </ul>  | <p>A proposed noise abatement wall at the Southgate Townhomes meets all criteria outlined in UDOT's Noise Abatement Policy, and is therefore recommended for inclusion in the proposed project, pending balloting efforts. See Construction Impacts for mitigation for impacts during construction.</p>  |
| <p><b>Floodplains</b></p>  | <p>No impacts.</p>                           | <ul style="list-style-type: none"> <li>19.3 acres of floodplain from the Santa Clara River, the Virgin River, and an unnamed drainageway would be affected.</li> <li>Removal of the Tonaquint Bridge would have a positive hydraulic impact on the Santa Clara River and floodplain.</li> <li>Letter of Map Revision would be required to formally change the floodplain and floodway boundaries.</li> </ul> | <ul style="list-style-type: none"> <li>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.</li> <li>UDOT or its construction contractor will obtain Stream Alteration Permits from the Utah Division of Water Rights for all stream crossings.</li> <li>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.</li> <li>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.</li> <li>Where feasible, roadway elevations will be designed to be above the 100-year floodplain.</li> <li>New structures 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.</li> </ul> |

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| Environmental Issue   | No-action Alternative | Preferred Alternative  | Summary of Mitigation   |
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| <p><b>Water Quality</b></p>  | <p>No impacts.</p>    | <ul style="list-style-type: none"> <li>• <b>Phosphorus:</b> Increases in phosphorus levels would be limited.</li> <li>• <b>Turbidity and TSS:</b> May increase during construction, however, a UPDES permit would be required.</li> <li>• <b>pH:</b> No effect.</li> <li>• <b>Heavy Metals:</b> Would not affect the beneficial-use classes 1C, 3B, 3C, and 4 of the Santa Clara or Virgin Rivers.</li> <li>• Could increase the amount of TDS during project construction, however, a UPDES permit would be required that would minimize TDS impacts.</li> <li>• Potential minor impacts to water quality in the principal groundwater aquifers.</li> </ul> | <p><u>Surface Water Quality</u></p> <ul style="list-style-type: none"> <li>• <b>Cut-and-Fill Slopes.</b> Provide erosion control on all cut-and-fill slopes.</li> <li>• <b>Detention Basins.</b> Detention basins 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 during a 10-year storm event. If the TMDL analysis concludes that urban stormwater runoff is affecting temperatures, additional stormwater mitigation measures such as infiltration basins or bioswales will also be included with detention basins to manage stormwater runoff from roadway segments that will discharge directly to segments of the Virgin and Santa Clara Rivers.</li> </ul> <p>See Construction Impacts for mitigation for impacts during construction.</p> <p><u>Wells and Points of Diversions</u><br/>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 point of diversion is affected.</p> |



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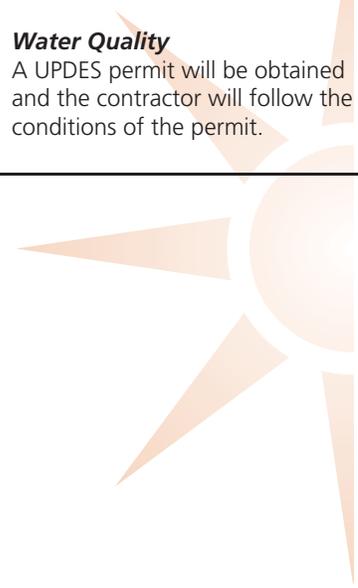
| Environmental Issue  | No-action Alternative  | Preferred Alternative   | Summary of Mitigation   |
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| <p><b>Ecosystems</b></p>  | <ul style="list-style-type: none"> <li>Existing I-15 bridge piers in Santa Clara River would remain in current alignment, constricting river flow.</li> <li>Tonaquint Bridge would remain in current location, constricting the Santa Clara River channel and preventing natural hydraulic processes.</li> </ul> | <ul style="list-style-type: none"> <li>Would not remove any wetlands and would only have a minor impact to river channel.</li> <li>Would eliminate &lt;0.2 acres or riparian habitat.</li> <li>Temporary impacts to aquatic wildlife during construction.</li> <li>Native fish in Santa Clara River could benefit from the Tonaquint Bridge removal</li> </ul> <p>Federally Listed Species:</p> <ul style="list-style-type: none"> <li><b>Southwestern willow flycatcher:</b> Temporary construction noise could affect the southwestern willow flycatcher. <i>Preliminary may affect, but is not likely to adversely affect determination.</i></li> <li><b>Yellow-billed cuckoo:</b> No effect.</li> <li><b>Virgin River Chub:</b> <i>Preliminary may affect, but is not likely to adversely affect determination.</i></li> <li><b>Woundfin:</b> <i>Preliminary may affect, but is not likely to adversely affect determination</i></li> </ul> <p>State-Sensitive Species:</p> <ul style="list-style-type: none"> <li>May have some impact on the virgin spinedace, desert sucker, flannelmouth sucker, and speckled dace, but would not likely adversely impact the species.</li> </ul> | <ul style="list-style-type: none"> <li>BMPs will be in place to minimize temporary construction impacts. Erosion-control measures will also be employed on all cut-and-fill slopes. Vegetation plantings in the riparian zone of the river banks (that are not shaded by the bridge structures) will be replanted with native riparian species. In upland areas, eco-region-appropriate seed mixes will be used to reseed the cut-and-fill slope areas.</li> <li>In-water work will be conducted in the dry behind isolation structures. All fish salvage operations will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs. Any in-water work associated with removing the I-15 bridge piers or Tonaquint Bridge abutments will take place during periods of extreme low flow to reduce sedimentation downstream.</li> <li>Removing the Tonaquint Bridge will eliminate a constriction point and allow the river to return to its natural equilibrium over time. The proposed removal of the Tonaquint Bridge is supported by both USFWS and UDWR.</li> <li>All new concrete used during construction that could come in contact with the Santa Clara River will be properly cured so that no hazardous materials from the concrete could leach into the surface waters.</li> <li>Mitigation measures for impacts to the Santa Clara River will include a de-watering plan for the bridge piers and BMPs in place to minimize impacts to water quality during construction. In addition, any impacted vegetation will need to be revegetated with a native seed mix.</li> </ul> |

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| Environmental Issue  | No-action Alternative | Preferred Alternative   | Summary of Mitigation  |
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| <b>Invasive Species</b><br>                           | No impacts.           | Would provide opportunities for the movement of invasive species through the landscape.   | See Construction Impacts for mitigation for impacts during construction.   |
| <b>Wild and Scenic Rivers</b><br>                     | No impact.            | No impact.  | No mitigation required.  |
| <b>Archaeological and Architectural Resources</b><br> | No impact.            | The project would have an overall adverse effect on historic properties.  | <p>A MOA to resolve adverse effects to historic properties will be prepared and agreed upon and executed by FHWA, UDOT, and SHPO. Mitigation measures outlined in the MOA would likely include data recovery.</p> <p>See Construction Impacts for mitigation for potential impacts during construction.</p>  |
| <b>Paleontology</b>  | No impact.            | Unless fossils are discovered as a result of construction activities, the Preferred Alternative should have no impact on paleontological resources. | See Construction Impacts for mitigation for potential impacts during construction.   |
| <b>Hazardous Waste Sites</b><br>                    | No impact.            | No impact.  | See Construction Impacts for mitigation for potential impacts during construction.   |
| <b>Visual Quality</b><br>                           | No impact.            | Not expected to substantially change the visual environment.  | <p>Because the project is not expected to substantially change the visual environment, no specific mitigation is required. However, because the Dixie Drive Interchange is in a high visibility area at the core of the City of St. George, UDOT will work with the local municipality during the final design phase of the project to determine if any context-sensitive solutions could be incorporated into the project. These could include using directional lighting with the interchange, planting vegetation to help enhance the interchange, and incorporating architectural features such as railings, the color of the bridges, and style of retaining walls.</p> |

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| Environmental Issue   | No-action Alternative   | Preferred Alternative   | Summary of Mitigation   |
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| <p><b>Energy</b></p>                 | <ul style="list-style-type: none"> <li>No energy required for construction.</li> <li>Similar operational energy requirements as the Preferred Alternative.</li> </ul> | <ul style="list-style-type: none"> <li>Energy required for construction.</li> <li>Similar operational energy requirements as the No-action Alternative.</li> </ul>  | <p>No mitigation required.</p>  |
| <p><b>Construction Impacts</b></p>  | <p>No impact.</p>   | <p><b>Social Conditions</b><br/>Area residents and commuters would experience minor, temporary inconveniences due to noise, dust, and travel delays. Access to all properties would be maintained; however, there would be some temporary construction impacts to the accesses of some properties.</p> <p><b>Economic Conditions</b><br/>Not expected to substantially impact business access, operations or sales.</p> <p><b>Air Quality</b><br/>Would result in temporary negative effects to air quality in the project area due to increased dust and particulates.</p> <p><b>Noise</b><br/>Area residents would experience temporary inconvenience due to construction noise.</p> <p><b>Water Quality</b><br/>Potential for temporary soil erosion and sediment/siltation impacts. The amount of TDS in receiving waters could increase during project construction.</p> | <p><b>Social Conditions</b><br/>Impacts will be mitigated through implementation of a traffic-control plan with advance notice to those affected.</p> <p><b>Economic Conditions</b><br/>Access to businesses in the construction area will be maintained during the construction and post-construction phases of this project. The project team will coordinate with property owners and businesses to evaluate ways to maintain access while still allowing efficient construction operations.</p> <p><b>Air Quality</b><br/>A dust-control plan will be prepared.</p> <p><b>Noise</b><br/>Construction noise impacts are considered temporary and will be minimized through adherence to UDOT Standard Specification 01355 - Environmental Protection Section 1.8 - Noise and Vibration Control.</p> <p><b>Water Quality</b><br/>A UPDES permit will be obtained and the contractor will follow the conditions of the permit.</p> |



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| Environmental Issue  | No-action Alternative | Preferred Alternative   | Summary of Mitigation  |
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| <p><b>Construction Impacts (continued)</b></p>  | <p>No impact.</p>     | <p><b>Ecosystems</b><br/>The unintentional introduction of petroleum products could harm aquatic wildlife.</p> <p>The river around the construction and downstream could be contaminated when concrete is poured.</p> <p>During construction, noise levels would be between about 66 and 76 dBA during the worst-case scenario. These temporary construction activities could deter migrating individuals from using the Santa Clara River as a travel route near the confluence with the Virgin River during the construction period. However, other entries into the Santa Clara River valley would still be available to the species. Temporary construction noise could also affect the movements of southwestern willow flycatchers and yellow-billed cuckoos within the Virgin River confluence area by deterring these species from using the area during construction.</p> <p><b>Invasive Species</b><br/>The potential exists for invasive species to be introduced or propagated in the project area due to construction activities that disturb the existing ground cover.</p> <p><b>Archaeological and Architectural Resources</b><br/>There is the possibility to impact undiscovered archaeological sites during construction of the Preferred Alternative.</p> | <p><b>Ecosystems</b><br/>A SWPPP will be developed for this project and will identify BMPs to be implemented during construction.</p> <p>In-water work will be conducted in the dry behind isolation structures. All fish salvage operations will be performed by qualified fish biologists. Work below the OHWM will be done using BMPs. Any in-water work associated with removing the I-15 bridge piers or Tonaquint Bridge abutments will take place during periods of extreme low flow to reduce sedimentation downstream.</p> <p>All new concrete used during construction that could come in contact with the Santa Clara River will be properly cured so that no hazardous materials from the concrete could leach into the surface waters.</p> <p>Mitigation measures for impacts to the Santa Clara River will include a de-watering plan for the bridge piers and BMPs in place to minimize impacts to water quality during construction. Any impacted vegetation will need to be revegetated with a native seed mix.</p> <p><b>Invasive Species</b><br/>To minimize the movement of invasive species, the Contractor will be required to comply with UDOT's Special Provision 02926S - Invasive Weed Control to minimize the spread and introduction of invasive species.</p> <p><b>Archaeological and Architectural Resources</b><br/>The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Protection, Part 1.13, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, Human Remains, or Migratory Avian Species.</p> |

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| Environmental Issue  | No-action Alternative | Preferred Alternative  | Summary of Mitigation  |
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| <p><b>Construction Impacts (continued)</b></p>  | <p>No impact.</p>     | <p><b>Paleontology</b><br/>There is the possibility to impact undiscovered paleontological sites during construction of the Preferred Alternative.</p> <p><b>Hazardous Waste Sites</b><br/>Could disturb and expose asbestos under the pavement at the intersection of Blackridge Drive and Hilton Drive. Disturbing asbestos during construction could present health risks to construction workers and the community.</p> <p><b>Visual Conditions</b><br/>There would be some temporary visual impacts to the project area with the addition of construction signs, barricades, exposed earth, and construction equipment during construction.</p> <p><b>Soil Settlement</b><br/>May result is some soil settlement due to the weight of the roadway overpass structures over I-15 and the Santa Clara River. No structures are expected to be impacted by settlement as a result of construction.</p> | <p><b>Paleontology</b><br/>The contractor will be required to abide by UDOT Standard Specification 01355 - Environmental Protection, Part 1.13, Discovery of Historical, Archaeological, or Paleontological Objects, Features, Sites, Human Remains, or Migratory Avian Species.</p> <p><b>Hazardous Waste Sites</b><br/>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 Specifications, and the contractor will consult with UDOT and UDEQ to determine the appropriate remedial measures. Hazardous wastes will be handled according to UDOT Standard Specifications and state and federal regulations.</p> <p>If disturbance of the Black Ridge asbestos site is required, asbestos will be handled, removed, and disposed of according to the regulations of UDEQ and the EPA and any local requirements. The selected construction contractor will be made aware of the site and will be responsible for the asbestos remediation and disposal.</p> <p><b>Visual Conditions</b><br/>No mitigation is required.</p> |

