5 NATURAL AND CULTURAL RESOURCES

In order to develop policies and strategies to bring about the goals and objectives outlined in the vision statement for St. George, it is important to understand the physical characteristics of the community, both natural and man-made, that provide opportunities and constraints to development.

5.1 CLIMATE

Like other Sun Belt cities, St. George's climate is an attraction in its own right. St. George has become a green oasis in the desert, and the combination of the warm, dry winter climate and natural beauty of the setting draws both new residents and tourists to the area.

St. George is located within the northern extension of the Mojave Desert. This southwestern setting, and its low elevation, provide St. George with a desert climate characterized by low humidity (rapid evaporation), generally clear skies, relatively warm winters and hot summers. The average annual temperature is approximately 61°F. St. George offers a warm retreat from the cold winters of the Wasatch Front (Salt Lake area).

Average annual precipitation is approximately eight inches per year. This dry climate has attracted many who experience physical discomfort due to humidity. At the same time, this arid condition places a high importance on the availability of water. Water has been, and will continue to be, a key factor in St. George's growth.

5.2 SCENIC NATIONAL AND REGIONAL RESOURCES

St. George is located in a region that includes the largest concentration of natural recreation areas in the contiguous states.(See Figure 5-3) The area includes three national parks, two national monuments, two national recreation areas, five state parks, three national forests and four wilderness areas. St. George is within easy reach of Zion National Park, Bryce National Park, Snow Canyon State Park, Lake Powell, Lake Mead, the North Rim of the Grand Canyon, Gunlock Reservoir State Park and Quail Creek Reservoir State Park.

Of these, Zion National Park has the largest patronage and has seen continuous growth in annual visits. Since 1970 it has experienced an average of 4.5% increase per year, reaching 2.4 million visitors in 1992.

Figure 5-1: Snow Canyon State Park, with St. George in the background.

St. George is also located one and a half hours driving distance from the Brian Head ski resort, two hours from Las Vegas, and five hours (one hour by air) from Salt Lake City and numerous northern Utah ski areas.

5.3 CULTURAL, RELIGIOUS AND HISTORIC RESOURCES

The presence of the St. George LDS Temple expands its desirability as a community for devout

members of the Church of Jesus Christ of Latter-day Saints. The Temple serves approximately 27 stakes (congregations of approximately 3,500 members) from Beaver, Utah to Ely, Nevada. Members make regular weekday and Saturday visits to St. George to attend the Temple.

Numerous historic buildings and sites provide opportunities to pursue religious, historical, architectural and/or photographic interests. Historic buildings include:

- LDS Temple
- LDS Tabernacle
- Pioneer Courthouse
- Pioneer Opera House
- Dixie Academy
- Woodward School
- Wooley-Foster Home (Seven Wives Inn)
- Several pioneer homes relocated to Green Gate Village
- Brigham Young Winter Home

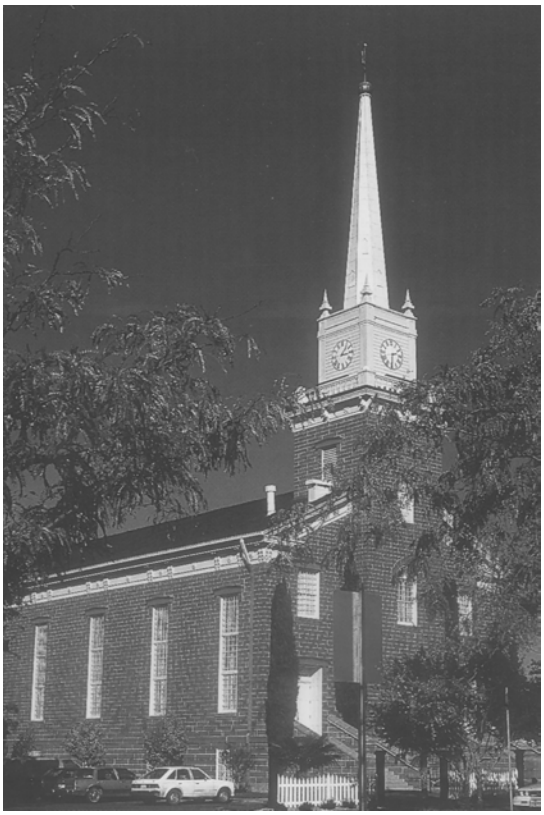


Figure 5-2: The St. George LDS Tabernacle.

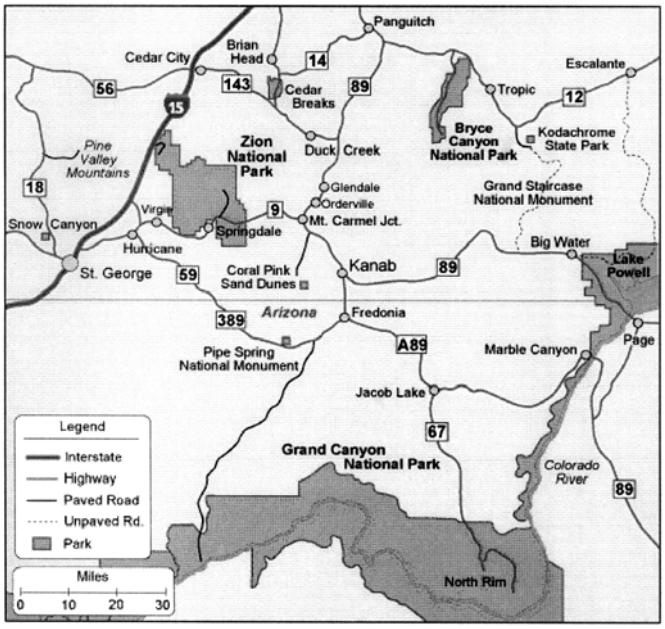
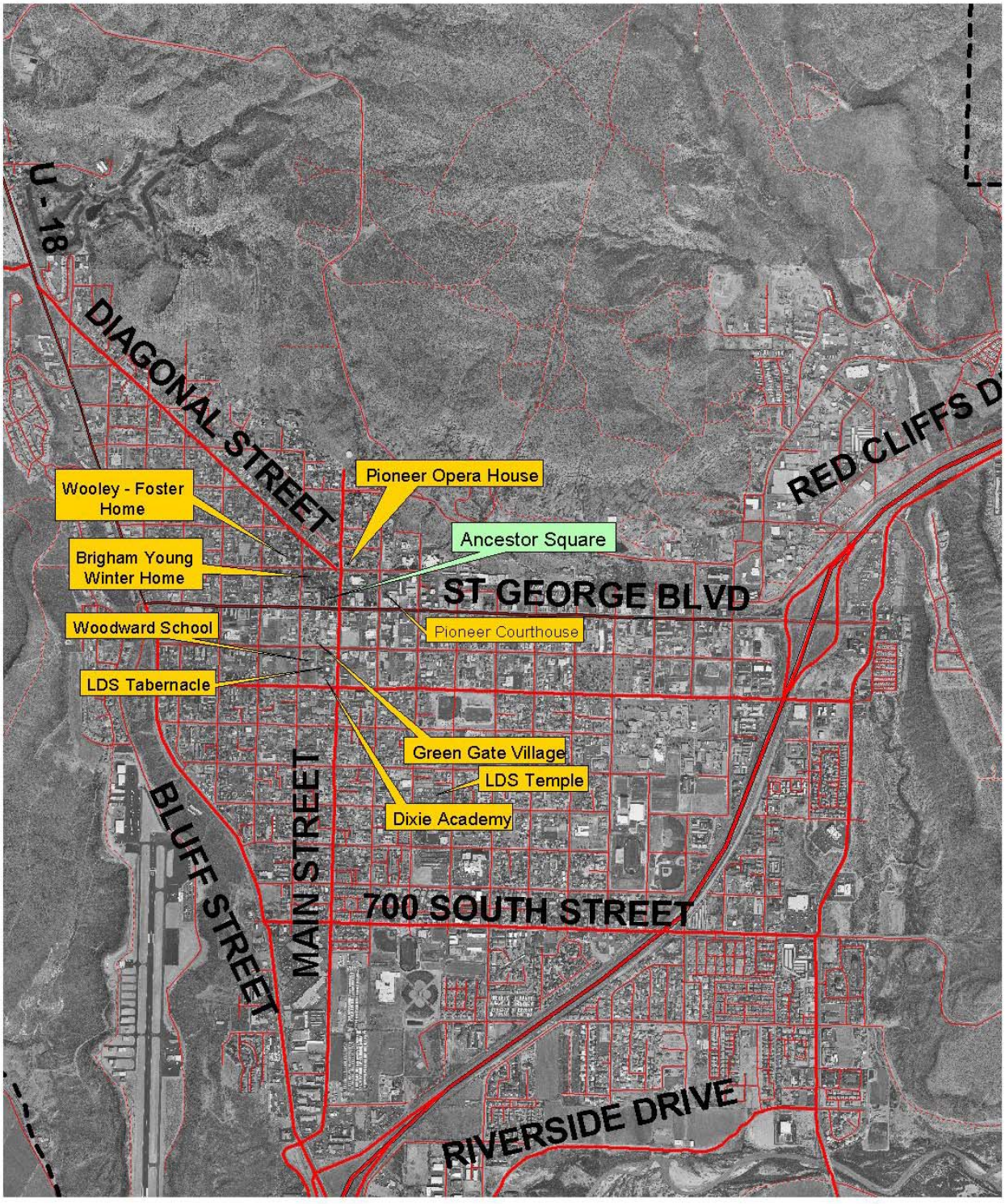


Figure 5-3: Scenic National and Regional Resources near St. George

5.3.1 CULTURAL, RELIGIOUS AND HISTORIC POLICIES

1. St. George's historic buildings and their settings are an important part of the City's unique identity and should be restored and preserved.
2. The City encourages adaptive re-use of historic structures so long as their historic qualities can be preserved.
3. The City encourages making St. George's history and historic buildings accessible to the general public, through such means as historic markers, scenic tours, authentic re-creations and enactments, etc.



CULTURAL RESOURCES

N

5.4 PUBLIC LANDS

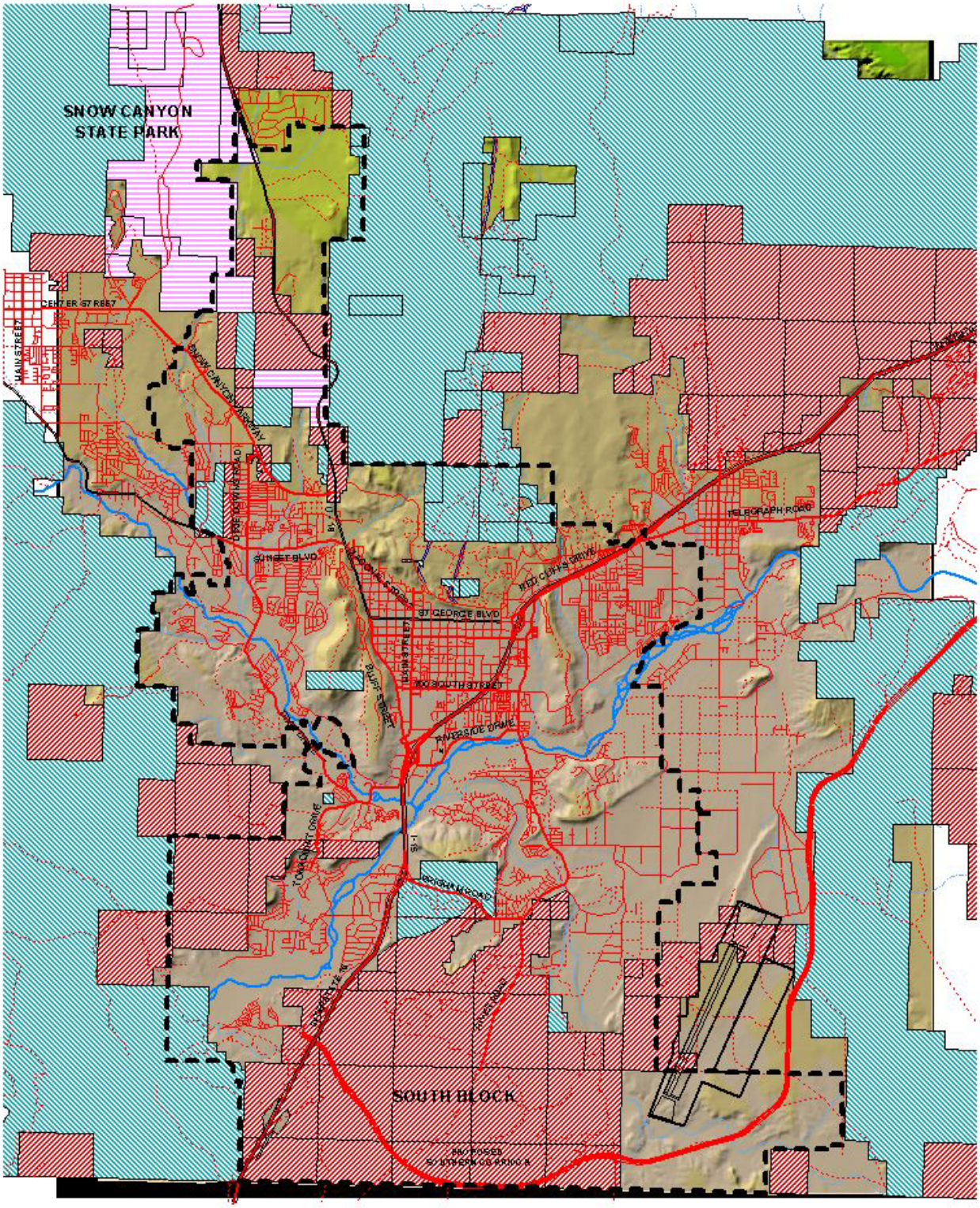
There is much public land surrounding St. George that is managed by either the Utah School and Institutional Trust Lands Administration (SITLA) or the Bureau of Land Management (BLM). For many years it was assumed that these lands would remain undeveloped due to their public ownership. However, several large recent public/private land trades associated with creating the Desert Tortoise habitat (Habitat Conservation Plan, or HCP) north of St. George have demonstrated that any public land may become developable under the right circumstances.

Further, SITLA lands were expressly granted to the western states by the Federal government expressly for the purposes of supporting public education. SITLA has been especially active and creative in creating development value for its land to seek the highest return possible on its school funding stewardship.

SITLA has already processed development approval for Hidden Valley/Fossil Hills Development, a 1,500-unit project east of the Bloomington I-15 interchange. SITLA has also recently begun exploratory planning and a dialogue with the City regarding future development of its very large holding (in excess of 10,000 acres) in the "South Block" south of St. George. This area includes the White Dome, a large, gentle gypsum mountain that is largely undevelopable. However, there is also a large area of developable land that could approach 15,000 residents. If the resulting development is complementary to St. George, the impact could be beneficial. If the development ignores St. George's presence, the impacts will be extremely negative in many different sectors such as traffic, economics, utilities, visual aesthetics, etc.

5.4.1 PUBLIC LAND POLICIES

1. The General Plan should include land use designations for public lands within the City to guide future development, disposal or exchange.
2. The City shall rezone public lands within its jurisdiction consistent with the Land Use element of the General Plan.
3. Lands within the City under the jurisdiction of the Utah School and Institutional Trust Lands Administration (SITLA) and the U.S. Bureau of Land Management (BLM) should be carefully reviewed for development impacts by the City when an exchange or sale of such land is considered.



PUBLIC LANDS

N

BLM Land

State Trust Lands

State Recreation Area

5.5 STEEP HILLSIDES AND GEOLOGIC HAZARD AREAS

The visually striking red sandstone and black lava rock hillsides are significant natural assets to the community. The hillsides and plateaus provide a scenic backdrop to the community and provide the most defining physical characteristics for the area. Many of the hillsides contain steep slopes (i.e. 25%+), which present a number of particularly difficult problems when subject to development: rock fall, scarring, slope failure, erosion, storm water control and traffic access.

Figure 5-5: Steep hillsides- the East Black Ridge

St. George is designated as a Seismic Zone 2 under the Uniform Building Code (Zone 1 being least hazardous and Zone 3 most hazardous). St. George is thus considered an area of moderate seismic hazard. In 1992, a southern Utah earthquake measuring 6.0 on the Richter scale had its epicenter in Hurricane, just east of St. George. The quake caused a landslide in Springdale and minor cracks in older buildings in St. George. The earthquake was a reminder of the potential for significant damage and the importance of developing and following geologic hazard safety regulations, such as the prohibition of development on unstable slopes.

The geologic conditions that exist in the St. George area which are of greatest significance include:

- Potentially unstable slopes, particularly those slopes underlain by the Moenkopi Formation (Shnabkaib Member) and Chinle Formation (Petrified Forest Member).
- Moderate earthquake hazard due to events on the Hurricane and Grand Wash fault systems, local events on the Washington fault, or random events unassociated with known surface faulting.
- High groundwater conditions in lowland areas, chiefly in the floodplains of the Virgin and Santa Clara rivers. These conditions may result in instability during earthquake-induced ground shaking.

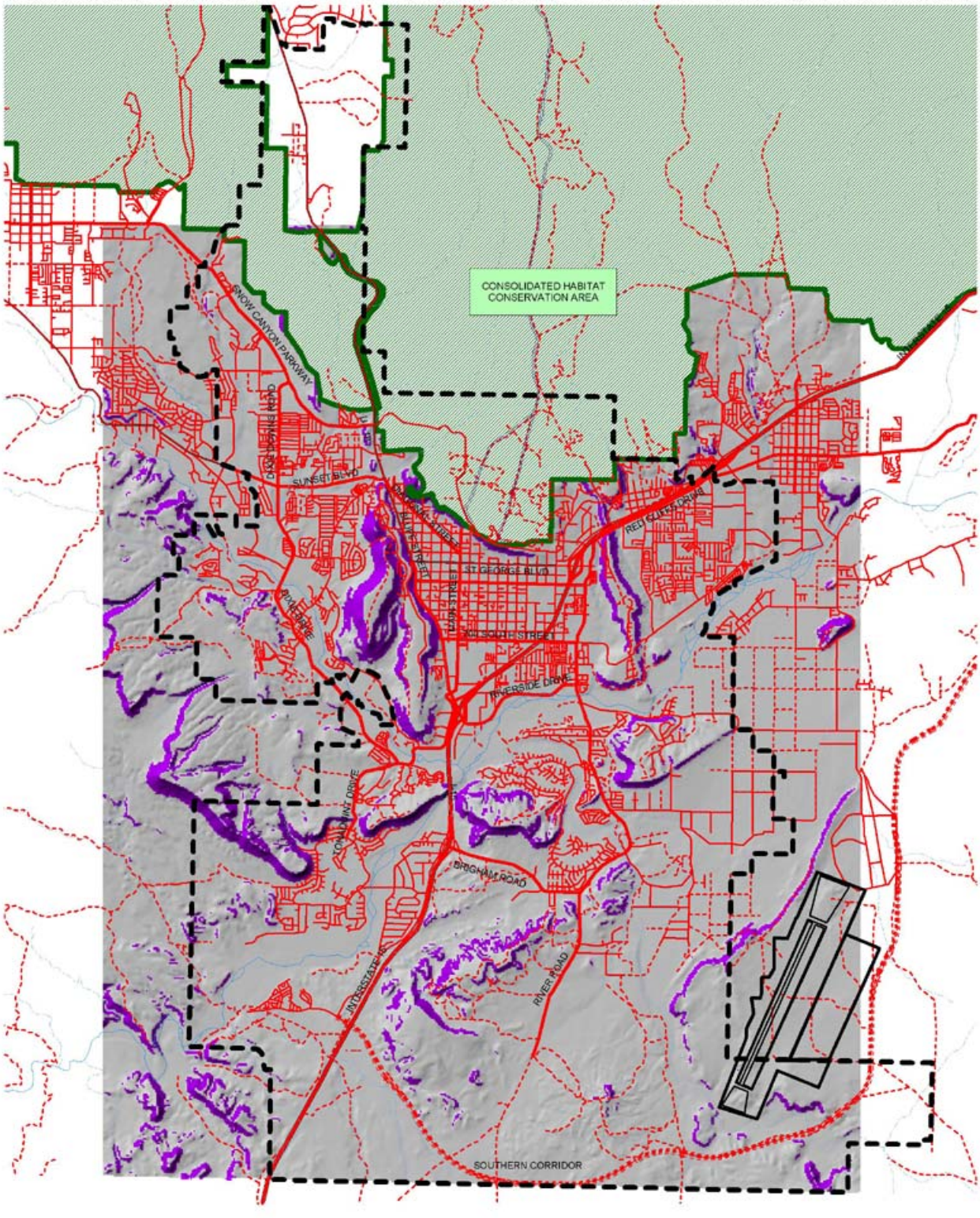
In addition to these public safety concerns, development of hillsides also creates a significant negative impact to the important visual character that defines the community. In 1986, a development project created a large, highly visible scar in one of St. George's most prominent hillsides. This event shocked the community and galvanized public support for preserving the hillsides.

In September 1992, the City Council amended the hillside development regulations to further protect public safety and the visual character of the hillsides. A seven member Hillside Review Board with technical expertise has been established to review proposed development occurring on hillsides with slopes greater than 15%.

Figure 5-6: Rockfall damage to a Rockville home in 2001.

5.5.1 Steep Hillside and Geologic Hazard Policies

1. Where hillsides are in private ownership and development rights exist, the City will reduce the impact of development on steep hillsides through measures such as low-density zoning, clustering or transfer of development rights.
2. Public safety must be preserved by assuring that stability is properly maintained on any development of hillsides and/or slopes and that problem soils are properly mitigated.
3. The aesthetic qualities of the hillsides shall be preserved by minimizing the amount of hillside excavation and requiring that where hillside excavation occurs, cuts are fully reclaimed to a natural appearance through regrading and landscaping, or screening from general view by buildings.
4. The Hillside Review Board will review and recommend measures to mitigate potential concerns and issues related to aesthetics, slope and/or soil stability.
5. Geologic Hazard maps will be maintained by the City to give notice of potential development problems due to known expansive and collapsible soils, and other hazards such as unstable ground due to landslides or similar problems.
6. As a part of the review of development proposals, the City will carefully evaluate potential impacts of irrigation (lawns, golf courses, etc.) that might be applied to mesa tops above the hillsides.
7. Buildings on mesa tops shall be set back to avoid hazardous geologic conditions as well as lessen visual impacts — a minimum 100' setback is recommended. Where appropriate, density incentives may be used to implement this policy.



STEEP SLOPES

Steep Slopes over 25%

5.6 FLOODPLAINS

The Virgin River, Ft. Pearce Wash and Santa Clara River, with a combined drainage areas of over 3,200 square miles, uniquely converge near the center of St. George. Meteorological conditions of the Southwest have the potential to create flash floods with very little warning.

Floodplains are nature's way of dissipating the energy of the *recurrent flooding* of rivers. When floodwaters exceed the capacity of the *primary* channel, the river overflows its banks and spills out onto a broad terrace referred to as the floodplain. As the water spreads out, it slows down and its erosive force is greatly diminished. When floodplains are artificially restricted, such as by filling for development or the construction of levees, the river is not allowed to expand and slow down and it retains and increases its energy, which results in greater downstream flooding and bank erosion (exceeding the armoring capacity of the bank vegetation), a process that is very difficult and expensive to reverse.

In addition to their *natural* flood storage and energy-dissipation function, floodplains provide the community a series of connecting open areas used for passive outdoor recreation and education and wildlife habitat. They also provide a unique opportunity for the community to preserve riparian areas for future generations.

Historic records from 1850 to present demonstrate the erratic, unpredictable and cyclical nature of flooding in the St. George area. Long periods of little or no flooding followed by periods of frequent flooding have occurred. On average a major flood (that overtops the banks) occurs at least once in a ten year period. However, gaps of over thirty years have occurred between major floods. Most flooding in the St. George area is the result of cloudburst storms and early and late winter sudden snow melt triggered by storms.

Floodplain areas subject to the 100-year flood (flood with a one percent change of occurring in any given year) and erosion hazard areas are shown on the map on page 5-11.

Figure 5-7: An aerial view of the Virgin River with visible remnants of previous channel alignments.

Figure 5-8: The Virgin River floodplain /riparian area.

5.6.1 FLOODPLAIN POLICIES

1. The City recognizes the need to minimize losses, both public and private, from flooding and erosion and the natural and fiscal benefits of preserving natural floodplains to convey floodwaters.
2. The City's policy is to discourage any development within the 100 year floodplain. Exceptions can be made for uses compatible with periodic flooding such as trail systems, golf courses and other public or private uses

that will permit the free passage of flood waters.

3. The City will enforce its adopted floodplain regulations and encourage property owners to comply with other state and federal floodplain regulations.
4. To accomplish the above, the City will provide zoning incentives to transfer residential development to land outside of the 100 year floodplain.
5. The city encourages preservation of natural washes, streams and rivers and discourages the channelization of natural drainageways.
6. In the layout and design of new development, adequate access to floodplains and erosion protection should be provided. It is preferred that streets be positioned between floodplains and structures where not possible or feasible additional structural setbacks should be required.

5.7 Dry Washes

Throughout the St. George area, numerous desert washes and irrigation ditches provide a natural storm drainage system carrying storm water to either the Virgin or Santa Clara Rivers. This natural drainage system also provides great value as visual open space, habitat area and recreation corridors. The larger drainage washes, including the Ft. Pierce, Sand Hollow, Halfway, Middleton, Atkinville, Bloomington and Brooks Canyon washes, should be preserved as natural washes for the multiple benefits they provide in their natural state. Other smaller washes should also be maintained in a natural state where feasible.

5.7.1 Dry Wash Policies

1. Washes shall be preserved in their natural state, with the exception that tamarisk removal is permitted and encouraged where drainage is impeded.

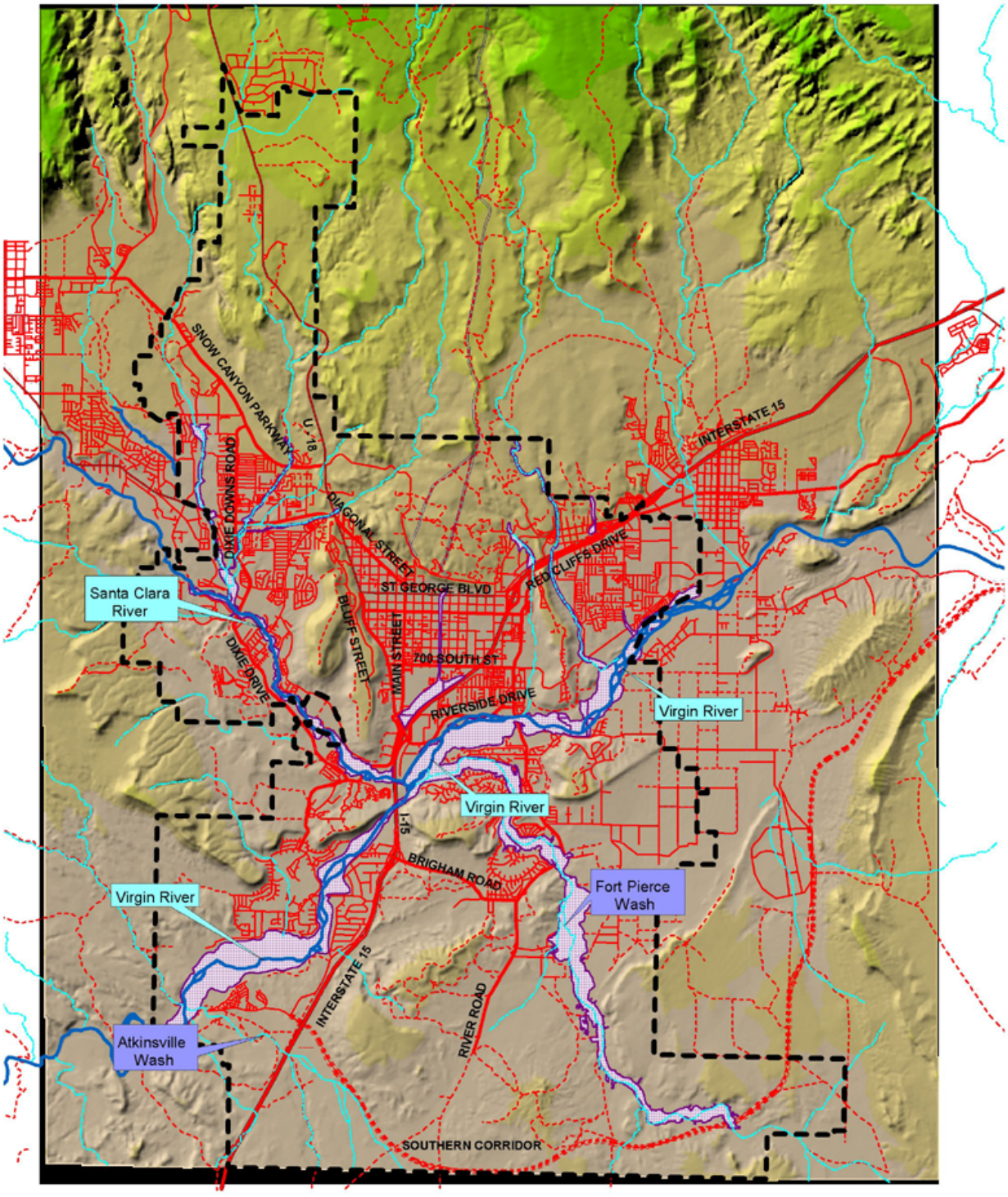
5.8 Wetlands

Wetlands generally include swamps, marshes, bogs and similar areas. They are strictly protected by federal law, which is administered by the US Army Corps of Engineers. Wetlands also receive special planning consideration from the City. Wetlands in the St. George area are generally associated with the floodplains of the Virgin and Santa Clara rivers, or are the result of springs. Wherever they are found, wetlands are areas of special environmental concern. They are groundwater recharge areas. They support a rich variety of plant species, and are an important source of food and habitat for both fish and wildlife. They perform an important function in filtering runoff before it reaches water bodies. Wetlands can also provide unique and pleasant open space opportunities, particularly in a desert environment.

5.8.1 Wetland Policies

1. Land use proposals that could have adverse impacts on significant wetlands shall be modified to eliminate or adequately mitigate such adverse impacts.
2. The City will work with the Corps of Engineers to prevent wetland encroachment by public or private projects.

Figure 5-9: Dry washes are important to management of runoff and to prevent flooding.



FLOODPLAINS AND WASHES

5.9 ENDANGERED SPECIES

Washington County contains habitat for seven species that are listed as *endangered* pursuant to the Endangered Species Act of 1973. These seven federally-listed species in Washington County are:

- Mojave Desert Tortoise
- Peregrine Falcon
- Bald Eagle
- Woundfin Minnow
- Virgin River Chub
- Dwarf Bear-Claw Poppy
- Siler Pincushion Cactus

In addition to the above, another 37 species have been identified as *candidates* for "threatened or endangered" status, such as the Milkvetch (astragalus holmgrenii). It should be noted that while threatened or endangered *animal* species are protected by federal law on both public and private land, endangered or threatened *plant* species are only protected on federal land.The endangered species that has had the most significant impact on land use in the St. George area is the Mojave Desert Tortoise. Desert Tortoise habitat is found in much of Washington County. To preserve the *most important* tortoise habitat, a Habitat Conservation Plan (HCP) has been developed by the US Fish and Wildlife Service, the State, City, County and private land owners. The HCP creates a 61,000 acre Desert Tortoise preserve along the northern edge of St. George.

While the presence of endangered animal and plant species typically creates restrictions on *land* use, the presence of the Woundfin Minnow and Virgin River Chub creates restrictions on *water* use. Their presence requires the maintenance of minimum in-stream flows in the Virgin River.

5.9.1 ENDANGERED SPECIES POLICIES

1. The City will support and assist in the implementation of the Habitat Conservation Plan for the Desert Tortoise as well as other threatened or endangered species in the local area.
2. Land use proposals that could have adverse impacts on critical wildlife or plant habitats shall be modified to eliminate or adequately mitigate such adverse impacts.
3. The City will support regional efforts to prevent the destruction of critical habitats in order to avoid the listing of threatened species.

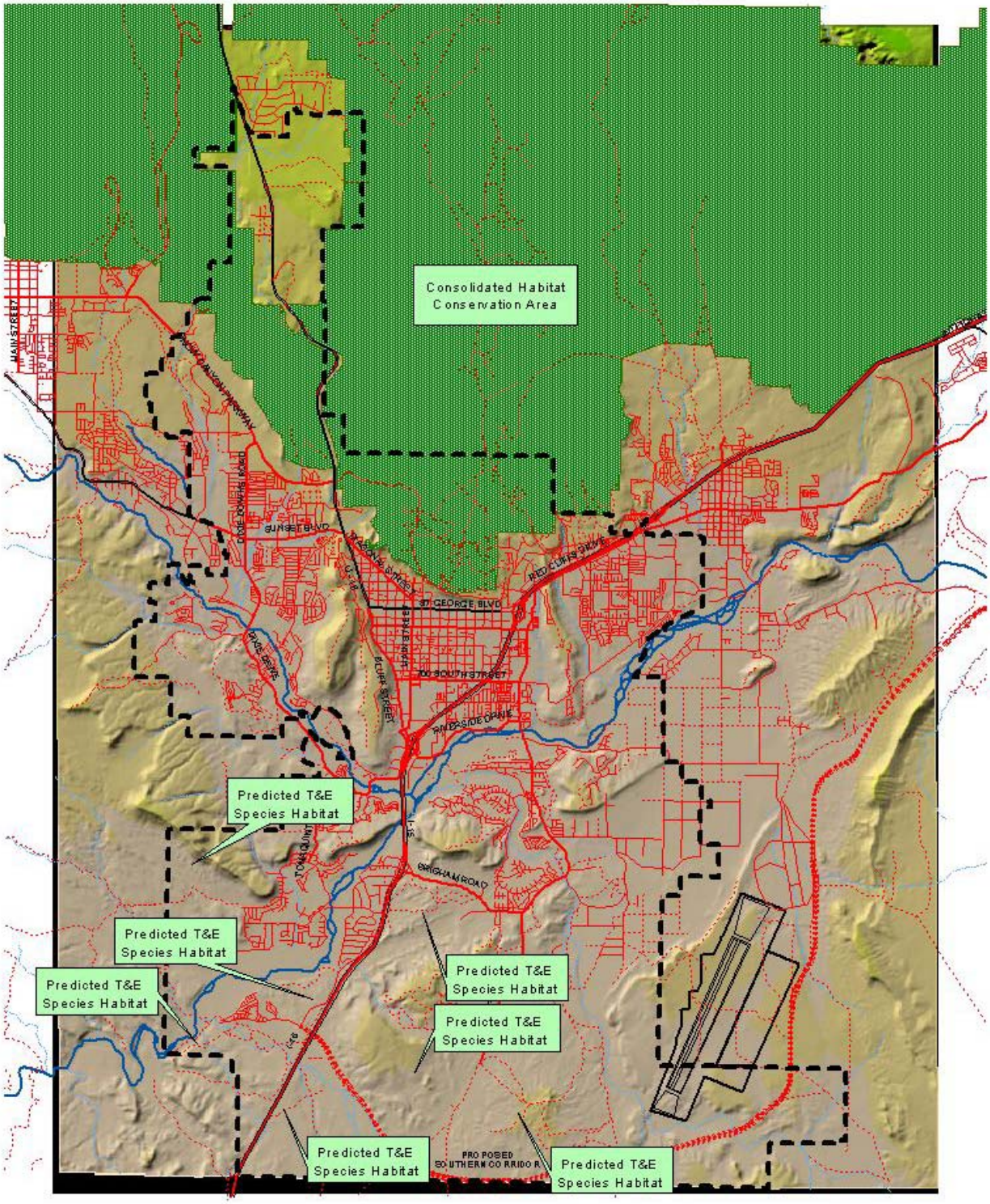
5.10 AIR QUALITY

The relatively pristine air around St. George is another of the community's great natural resources and attractions. Local air quality is excellent and is rated as a Category I under the federal clean air standards.

Principal sources of air pollution in the St. George area are automobile emissions, fireplaces and wood stoves during the winter months, wind-blown dust, and to some extent air pollutants from distant urban areas including Las Vegas and Los Angeles.

5.10.1 AIR QUALITY POLICIES

1. The City will promote the protection of air quality, including the reduction of particulates, through measures such as:
   a. transit, car pooling or other measures to reduce car emissions;
   b. discouraging air-polluting industries from locating in St. George.
2. To reduce man-induced dust, grading shall be minimized and areas that are disturbed shall be re-vegetated within the same season.



ENDANGERED SPECIES