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12.0 Natural Resources

12.1 Key Findings

The City of Santa Fe's open spaces, mountains, and environmental resources are major assets to the City, benefiting its residents by providing clean air and water, tourism and economic opportunities, and an overall high quality of life. Preservation and restoration of these spaces are vital to maintaining Santa Fe's character and community feel.

Vegetation and habitat types in Santa Fe and the surrounding Sangre de Cristo Mountains and Rio Grande Valley support a variety of animal and plant species, including those requiring riparian, piñon-juniper woodland, desert, grassland, and higher-elevation mixed conifer forest habitats. Several species are listed as threatened, endangered, or of conservation concern. These areas of open space and habitat connectivity also provide many valued recreational opportunities and visually pleasing landscapes. Natural resources within and outside of the planning area additionally provide necessary usable resources for the city, including minerals, clean water and air, dark skies, fertile soils, and character and sense of place.

Existing natural resources management policies and planning measures emphasize the value of maintaining and preserving the natural environment in the Santa Fe area. This chapter details the current state of these key natural resources, the policies that impact them, and opportunities for improvement and sustainability. Key findings related to two subsections – natural resources and management of those resources – appear below.

12.1.1 Natural Resources Findings

Findings related to the current state of key natural resources include:

Riparian Areas

- The most sensitive and important Santa Fe biotic communities is the riparian areas, which provide prime food, water, and nesting habitat for migrant species, as well as resident wildlife species. In Santa Fe, the critical riparian area surrounds the Santa Fe River. The arroyos that contribute to the Santa Fe watershed also support intermittent surface flows and riparian vegetation establishment. Several endangered species and species of concern rely on high-quality riparian or moist woodland habitats.
- Healthy riparian areas can function as vital habitat corridors, serving as pathways for wildlife, water, seeds, and more to move between different habitat areas.
- In 2012, the City of Santa Fe announced it would allow as much as 1,000 acre-feet per year to bypass McClure and Nichols Reservoirs and flow uninterrupted through the Santa Fe River corridor, pursuant to the Living River Ordinance. The Living River supports a healthy plant community and wildlife habitat, recharges groundwater, adds the beauty of free-flowing water to the parklands along the Santa Fe River, and provides shading and cooling to the urban environment.

Open Spaces

- Santa Fe's open space parcels vary from large natural areas in the Sangre de Cristo foothills to smaller properties along arroyos within and adjacent to neighborhoods. City open space and parks

play a key role in maintaining ecological systems within the Santa Fe area. Open space creates space for floodwaters, aquifer infiltration, and migrating wildlife.

Hillsides and Erosion

- The majority of the city of Santa Fe is located on sites that have constraints on development due to the nature of the soils. High soil runoff in the mountains and foothills frequently leads to erosion hazards, necessitating management to mitigate erosion risk. Maintaining maximum plant cover and minimizing stormwater runoff help to mitigate wind and water erosion.
- The City's Escarpment Overlay Zoning District limits development in the areas with steep slopes that are particularly susceptible to erosional and drainage hazards. This zoning district also contains landscaping requirements that include vegetation density and heights, vegetation types, storm drainage, and grading.
- The escarpment zone, where the foothills and ridgelines climb from the valley towards the mountains, is considered a "distinctive and historic visual asset." Preserving these vistas through measures like the Escarpment Overlay Zoning District and building height limits, fosters a sense of the city as a connected and close-knit community.
- Atalaya Peak, Sun Mountain, Sallie's Hill, and Cerro Gordo are a few of the areas marked as critical by the Santa Fe Conservation Trust to maintain the natural setting and feeling of Santa Fe.

Environmental Protection

- The City of Santa Fe's water and air meet all requirements set by the Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED).
- The 1999 City of Santa Fe General Plan recommended a community noise survey to record and analyze noise exposure and monitor noise levels across different land uses and noise types. No such study has yet been conducted.

12.1.2 Natural Resources Management Findings

The following recommendations include opportunities for the City to address gaps in natural resources management:

12.1.2.1 Open Space Conservation and Wildlife Corridors

As discussed in this chapter, open spaces provide many immeasurable benefits to a community beyond just natural resource extraction. Conservation of open space provides a single solution to multiple resource concerns. Open space in Santa Fe preserves pleasing natural vistas and landmarks; habitat for animal and plant species; allows for river and aquifer recharge; and, when maintained strategically, maintains wildlife corridors.

Communities can protect open space through regulatory measures, conservation easements, purchase of land, and other mechanisms. All open space conservation requires community and stakeholder coordination, especially to preserve large areas of connectivity in a rapidly growing and changing urban area. Regulatory measures, such as zoning for agriculture or conservation, can be effective, especially in a mixed-use environment but are vulnerable to changes based on political or developer will. For example, the Ecological Resource Protection Overlay Zoning District was created by Ordinance 2008-12. This overlay district allows land to be rezoned in order to protect the ecological resources of Santa Fe,

including trail access, water quality, contiguity of wildlife habitat, and protection from noise pollution. This overlay district was created in 2008; however, it does not appear on any current city zoning maps or other city documentation. This presents an opportunity for additional protections for the ecological resources within the city. Purchase of land outright is very effective but can be an expensive and laborious process. Another option is conservation easements, which are a highly flexible and customizable way to allow for protection of areas identified as particularly vulnerable (e.g., floodplains, endangered species habitat) or valuable (e.g., high-quality recreation, viewsheds).

The City, along with several partners and citizen input, had success with a mix of mechanisms to protect access to Sun Mountain. Land purchase and conservation easements were used, in coordination with Santa Fe Conservation Trust, The Trust for Public Land, and the Trails Alliance of Santa Fe. In 2010, a \$3.2 million purchase of land was completed by the City, and the other half of the area remains in private hands, with conservation easements granted to maintain access. This success story provides an example of how creative, multi-partner solutions will be vital to protecting open space in tandem with a growing urban environment and population growth.

12.1.2.2 Polyfluorinated Substances

While the City of Santa Fe's water and air both meet standards set by the EPA and NMED, there are gaps in the standards set by these entities. There has been a rise in recent years of the use of polyfluorinated substances (PFAS) in manufacturing processed foods and other consumer goods. The EPA enacted the first legally enforceable levels of PFAS in 2024. The standard of 4.0 parts per trillion (ppt) applies to perfluorooctanoic acid and perfluorooctane sulfonate, just two out of a group of more than 15,000 compounds. PFAS were found in groundwater samples collected in Santa Fe in 2024 and in the Rio Grande above the Buckman Diversion near Santa Fe in 2020. The source of the contamination is unknown. The EPA's new standards for PFAS require that initial monitoring for PFAS occurs by 2027 and gives until 2029 to comply with the new standards. Therefore, it is recommended that the City continue its monitoring efforts for water and expand its monitoring to air quality.

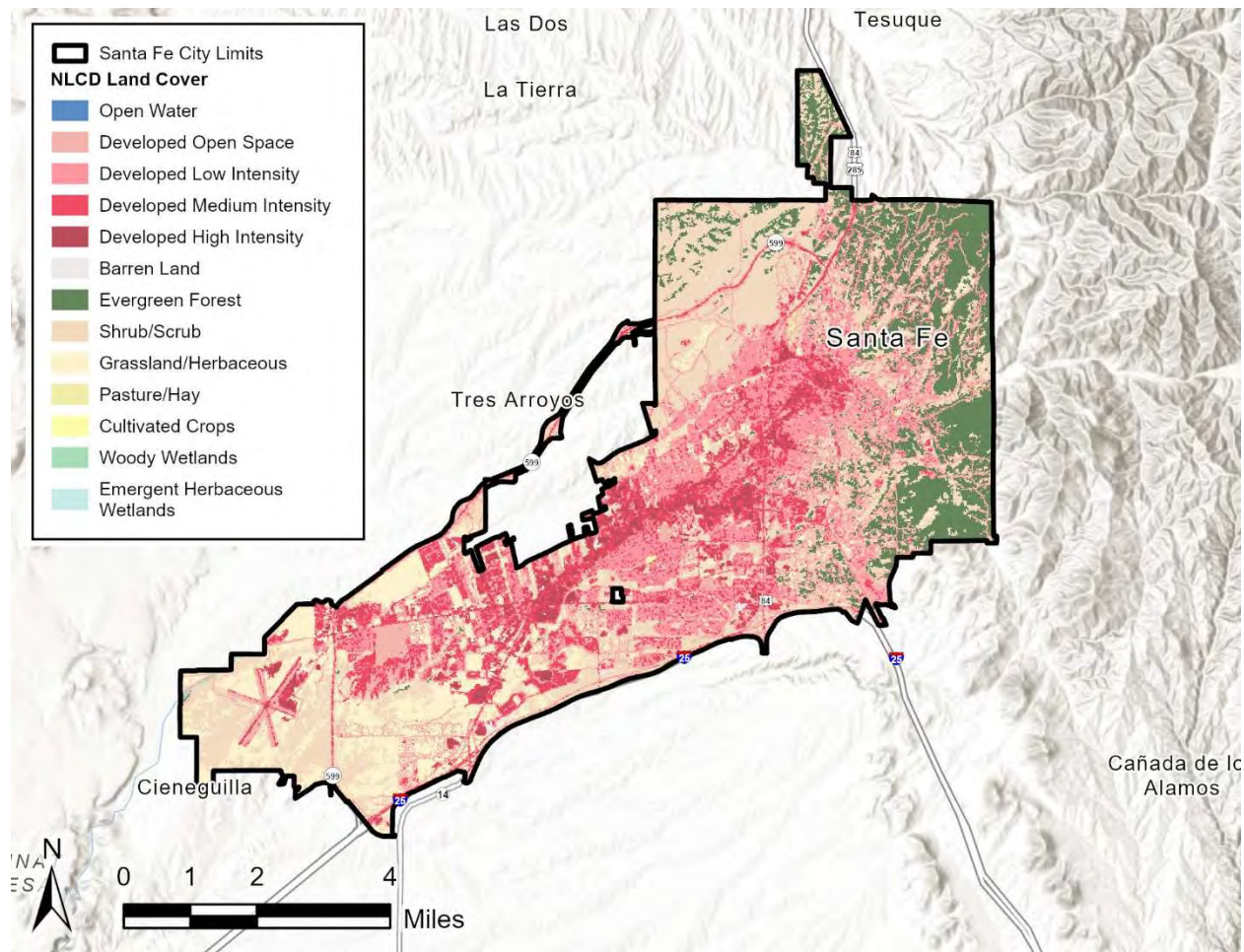
12.2 Biological Resources and Habitat Conservation

12.2.1 Vegetation Communities and Critical Habitat

The city of Santa Fe is located in the northern Rio Grande Valley of New Mexico, at the base of the Sangre de Cristo Mountains, which are the southernmost subrange of the Rocky Mountains. The city is approximately 7,000 feet above sea level, with elevations ranging from 8,700 feet in the foothills of the Sangre de Cristo Mountains east of the City, to 5,500 feet in the Rio Grande Valley in the southwest of the greater Santa Fe area. The western part of the greater Santa Fe area is mesa-desert grassland with the Rio Grande forming the boundary to the west. Continuing east, the elevation increases, and one-seed juniper (*Juniperus monosperma*) appears in the grasslands, forming a savanna-like community. Near the urban portions of Santa Fe, piñon pine (*Pinus edulis*) begins to occur, intermixed with one-seed juniper and other grassland species. Near the center of Santa Fe, the dominant plant community is piñon-juniper woodlands. Proceeding east into the foothills of the Sangre de Cristo Mountains, ponderosa pine (*Pinus ponderosa*) begins to occur, intermixed with piñon pine. At the easternmost edge of the city, ponderosa pine woodlands are the dominant canopy cover with quaking aspen (*Populus tremuloides*) and cottonwood (*Populus* spp.) establishing in the drainages and low-lying areas. The most

sensitive and important of these biotic communities is the riparian areas, which provide prime food, water, and nesting habitat for migrant species, as well as resident wildlife species. In Santa Fe, the critical riparian area surrounds the Santa Fe River, which flows from west to east from its headwaters in the Sangre de Cristo Mountains into the Rio Grande. The arroyos that contribute to the Santa Fe watershed also support intermittent surface flows and riparian vegetation establishment. Several of the species mentioned below rely on high-quality riparian or moist woodland habitats. General types of habitats in Santa Fe can be seen in Figure 12-1 below.

Figure 12-1. Land Cover within the Study Area. Source: National Land Cover Database (NLCD 2025)



The range of vegetation communities and habitat surrounding the city provides suitable environments for animal and plant species that are listed as threatened or endangered under the federal Endangered Species Act or New Mexico Wildlife Conservation Act, or considered species of greatest conservation need (SGCN) by New Mexico Department of Game and Fish (NMDGF). Threatened, endangered, and species of concern with the potential to occur in the area are included in Table 12-1.

Table 12-1. Threatened, Endangered, and Species of Concern Potentially within Santa Fe County

Animals	Federal Status	State Status
American Bittern (<i>Botaurus lentiginosus</i>)		SGCN
American Pika (<i>Ochotona princeps incana</i>)		SGCN
Baird's Sparrow (<i>Centronyx bairdii</i>)		Threatened
Bald Eagle (<i>Haliaeetus leucocephalus</i>)		Threatened
Bank Swallow (<i>Riparia riparia</i>)		SGCN
Bendire's Thrasher (<i>Toxostoma bendirei</i>)		SGCN
Black Swift (<i>Cypseloides niger</i>)		SGCN
Black-chinned Sparrow (<i>Spizella atrogularis</i>)		SGCN
Black-tailed Prairie Dog (<i>Cynomys ludovicianus ludovicianus</i>)		SGCN
Black-throated Gray Warbler (<i>Setophaga nigrescens</i>)		SGCN
Boreal Chorus Frog (<i>Pseudacris maculata</i>)		SGCN
Boreal Owl (<i>Aegolius funereus</i>)		Threatened
Broad-billed Hummingbird (<i>Cynanthus latirostris</i>)		Threatened
Brown-capped Rosy-Finch (<i>Leucosticte australis</i>)		SGCN
Burrowing Owl (<i>Athene cunicularia</i>)		SGCN
Cassin's Finch (<i>Haemorhous cassinii</i>)		SGCN
Cassin's Sparrow (<i>Peucaea cassinii</i>)		SGCN
Chestnut-collared Longspur (<i>Calcarius ornatus</i>)		SGCN
Clark's Grebe (<i>Aechmophorus clarkii</i>)		SGCN
Clark's Nutcracker (<i>Nucifraga columbiana</i>)		SGCN
Common Nighthawk (<i>Chordeiles minor</i>)		SGCN
Eared Grebe (<i>Podiceps nigricollis</i>)		SGCN
Evening Grosbeak (<i>Coccothraustes vespertinus</i>)		SGCN
Flammulated Owl (<i>Psiloscops flammeolus</i>)		SGCN
Grace's Warbler (<i>Setophaga graciae</i>)		SGCN
Gray Vireo (<i>Vireo vicinior</i>)		Threatened
Gunnison's Prairie Dog (<i>Cynomys gunnisoni</i>)		SGCN
Juniper Titmouse (<i>Baeolophus ridgwayi</i>)		SGCN

Animals	Federal Status	State Status
Least Tern (<i>Sternula antillarum</i>)		Endangered
Lewis's Woodpecker (<i>Melanerpes lewis</i>)		SGCN
Lilljeborg's Peaclam (<i>Pisidium lilljeborgi</i>)		Threatened
Loggerhead Shrike (<i>Lanius ludovicianus</i>)		SGCN
Long-billed Curlew (<i>Numenius americanus</i>)		SGCN
Mexican Clam Shrimp (<i>Cyzicus mexicanus</i>)		SGCN
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)	Threatened	SGCN
Mexican Whip-poor-will (<i>Antrostomus arizonae</i>)		SGCN
Monarch Butterfly (<i>Danaus plexippus</i>)	Proposed Threatened	SGCN
Mountain Bluebird (<i>Sialia currucoides</i>)		SGCN
Mountain Plover (<i>Charadrius montanus</i>)		SGCN
New Mexico Jumping Mouse (<i>Zapus hudsonius leteus</i>)	Endangered	Endangered
North American River Otter (<i>Lontra canadensis</i>)		SGCN
Northern Leopard Frog (<i>Lithobates pipiens</i>)		SGCN
Olive-sided Flycatcher (<i>Contopus cooperi</i>)		SGCN
Pacific Marten (<i>Martes caurina</i>)		Threatened
Pale Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)		SGCN
Peregrine Falcon (<i>Falco peregrinus</i>)		Threatened
Pinyon Jay (<i>Gymnorhinus cyanocephalus</i>)		SGCN
Pygmy Nuthatch (<i>Sitta pygmaea</i>)		SGCN
Red-faced Warbler (<i>Cardellina rubrifrons</i>)		SGCN
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)		SGCN
Rio Grande Chub (<i>Gila pandora</i>)		SGCN
Rio Grande Sucker (<i>Catostomus plebeius</i>)		SGCN
Sagebrush Sparrow (<i>Artemisiospiza nevadensis</i>)		SGCN
Sangre de Cristo Woodlandsnail (<i>Ashmunella thomsoniana</i>)		SGCN
Snowy Plover (<i>Charadrius nivosus</i>)		SGCN
Sonoran Mud Turtle (<i>Kinosternon sonoriense sonoriense</i>)		SGCN
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	Endangered	Endangered

Animals	Federal Status	State Status
Spotted Bat (<i>Euderma maculatum</i>)		Threatened
Suckley's Cuckoo Bumble Bee (<i>Bombus suckleyi</i>)	Proposed Endangered	
Vesper Sparrow (<i>Pooecetes gramineus</i>)		SGCN
Violet-crowned Hummingbird (<i>Leucolia violiceps</i>)		Threatened
Virginia's Warbler (<i>Leiothlypis virginiae</i>)		SGCN
Western Bluebird (<i>Sialia mexicana</i>)		SGCN
Western Massasauga (<i>Sistrurus tergeminus</i>)		SGCN
White-tailed Ptarmigan (<i>Lagopus leucura</i>)		Endangered
Williamson's Sapsucker (<i>Sphyrapicus thyroideus</i>)		SGCN
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Threatened	SGCN
Plants	Federal Status	State Status
Great Plains Lady's Tresses (<i>Spiranthes magnicamporum</i>)		Endangered
Mountain Lily (<i>Lilium philadelphicum</i> var. <i>andinum</i>)		Endangered
Santa Fe Cholla (<i>Cylindropuntia viridiflora</i>)		Endangered

The New Mexico jumping mouse (*Zapus hudsonius luteus*), yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and southwestern willow flycatcher (*Empidonax traillii extimus*) use healthy riparian corridors in the area. U.S. Fish and Wildlife Service (USFWS)-designated critical habitat for yellow-billed cuckoo and southwestern willow flycatcher is located in patches along the Rio Grande. Mexican spotted owl (*Strix occidentalis lucida*) uses mountainous and canyon environments. USFWS-designated critical habitat for Mexican spotted owls is located approximately 9 miles east of Santa Fe in the Sangre de Cristos Mountains and approximately 19 miles west in the Jemez Mountains. USFWS critical habitat designations only affect actions conducted, permitted, or funded by a federal agency and do not affect activities or development by private landowners. Important raptors, including bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), use many different habitat types in the greater Santa Fe area, including riparian areas for foraging and forested and mountainous areas for nesting. Plant species of conservation concern include the Santa Fe cholla (*Cylindropuntia viridiflora*), mountain lily (*Lilium philadelphicum andinum*), and Great Plains lady's tresses (*Spiranthes magnicamporum*). Santa Fe cholla is endemic to the area and is only known from three locations between Santa Fe and Chimayo.

The Rio Grande riparian area supports critical habitat designated by USFWS for the federally endangered southwestern willow flycatcher and the federally threatened yellow-billed cuckoo within approximately 20 miles of the city of Santa Fe. This critical habitat is described in more detail in the Rio Grande section below.

12.2.2 Habitat Connectivity/Corridors

Habitat fragmentation occurs when pieces of a natural habitat are destroyed, leaving behind a patchwork of smaller, disconnected habitat areas. A lack of habitat connectivity is one of many major threats to biodiversity limiting wildlife mobility and degrading the quality of the remaining habitat. Roads, fences, fires, and human development are all examples of barriers that separate habitats. Santa Fe's population has grown approximately 36 percent since 2000 and development within the city has followed. More development has led to fewer open spaces and decreased suitable habitat for wildlife. Thus, habitat corridors are more crucial than ever for species migration and dispersal. Healthy riparian areas can function as vital habitat corridors, serving as pathways for wildlife, water, seeds, and more to move between different habitat areas.

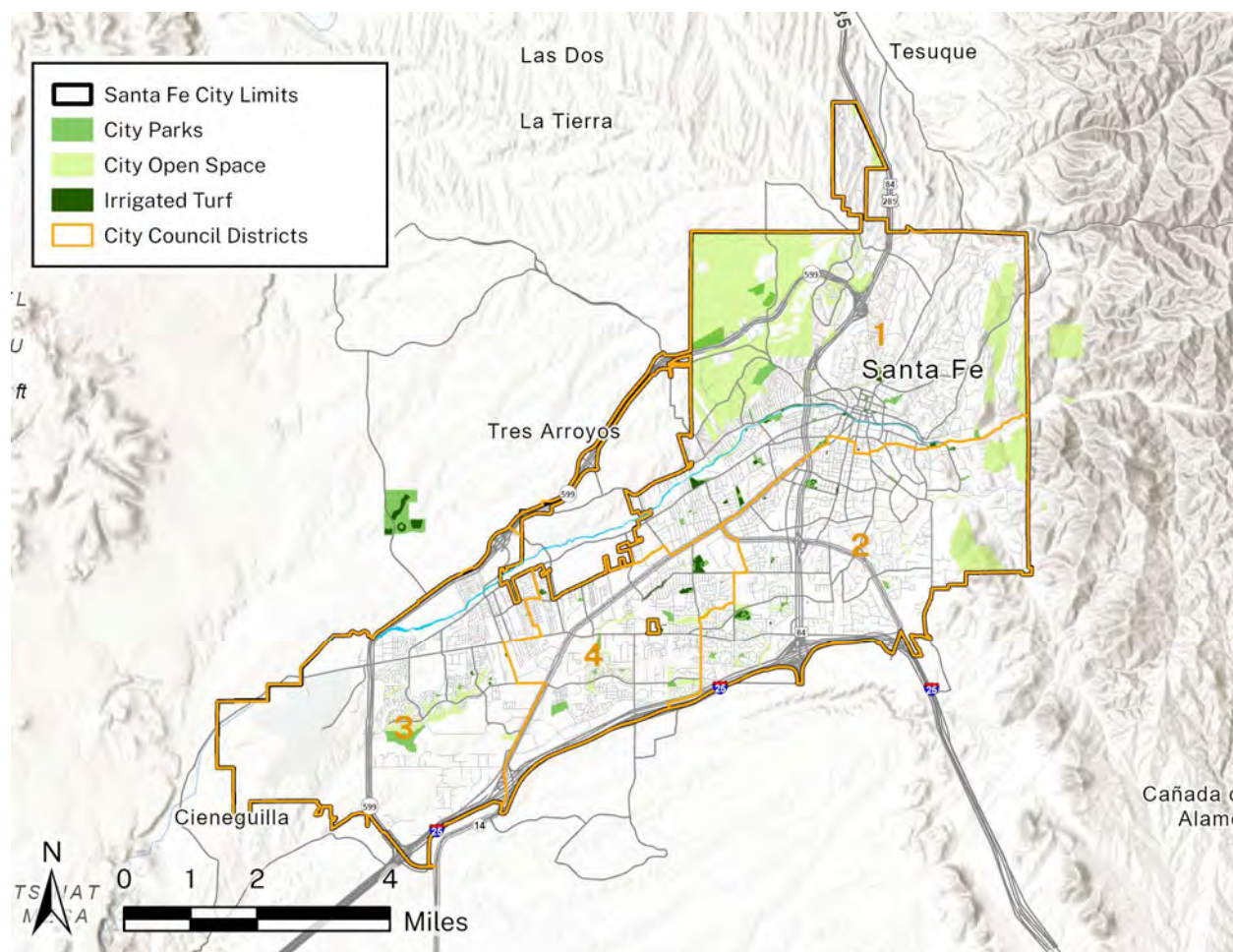
The NMDGF and the New Mexico Department of Transportation (NMDOT) finalized the New Mexico Wildlife Corridors Action Plan in 2022. The action plan identifies wildlife-vehicle collision hotspots and wildlife corridors that bisect NMDOT roads. A list of priority projects to improve habitat connectivity and corridors is identified in the action plan. Implementation of mitigation measures along 5 miles of Interstate 25 at Glorieta Pass, located in the Santa Fe National Forest, is on the list of priority projects. The project, which intends to lower the incidence of wildlife-vehicle collisions and allow for greater habitat connectivity, includes installation of wildlife exclusion fencing, one overpass, three arch culverts, and one bridge.

12.2.3 Open Space Conservation

Open space lands refer to undeveloped areas preserved for conservation purposes and/or public recreation. Deliberately preserved open spaces can offer beautiful views, wildlife habitats, aquifer recharge zones, drainage corridors, and natural buffers. Santa Fe's open space parcels vary from large natural areas in the Sangre de Cristo foothills to smaller properties along arroyos within and adjacent to neighborhoods. Subsection 14-8.15(A)(4) of the city code regulates that land dedicated for regional parks, community parks, open space, and trails should be based upon a rate of 12 acres per one thousand residents, or 500 housing units. The City of Santa Fe currently manages over 3,100 acres of undeveloped open space lands within city limits alone; Santa Fe County has over 6,610 acres of public open space in the surrounding areas.

City open space and parks play a key role in maintaining ecological systems within the Santa Fe area. Open space creates space for floodwaters, aquifer infiltration, and migrating wildlife. It also provides space for outdoor recreation. There are hundreds of miles of trails within Santa Fe and the surrounding areas. The city's network of parks, open spaces, trails, and recreational centers (Figure 12-2 below), enhances quality of life, boosts property values, and serves as an economic catalyst through tourism opportunities.

Figure 12-2. City Parks and Open Space



12.2.4 Rio Grande

The city of Santa Fe is located within the Santa Fe River watershed, which encompasses 285 square miles. The Santa Fe River watershed sits within the middle of the Rio Grande Basin, the most densely populated region in New Mexico. The Rio Grande originates in the San Juan Mountains in southwest Colorado and flows south into New Mexico, where it acts as a major source of water for irrigation, recreation, and residential use.

As mentioned above, the Rio Grande riparian areas support USFWS-designated critical habitat for the federally endangered southwestern willow flycatcher and federally threatened yellow-billed cuckoo within the region. Yellow-billed cuckoo requires extensive patches of native riparian vegetation, generally at least 50 acres in size, with some large overstory trees, such as eastern cottonwood (*Populus deltoides*). The understory layer typically consists of willow species (*Salix* spp.) but can also include screwbean mesquite (*Prosopis pubescens*) and honey mesquite (*Neltuma glandulosa*) of suitable stature. Yellow-billed cuckoo typically will not nest in monotypic stands of tamarisk (*Tamarix* spp.), which is a highly invasive tree that dominates many riparian habitats in the arid west.

Southwestern willow flycatcher requires lowland riparian habitats typically supporting dense stands of intermediate-sized trees or shrubs, including willow species, boxelder (*Acer negundo*), and tamarisk, usually with standing water or moist soil present below the canopy or nearby.

Areas designated by USFWS as critical habitat suggests that these are areas of high-quality riparian habitat, which may support many other important species, including bald eagles and large mammals, as well as native riparian plants that help prevent escalated bank erosion and noxious weed establishment.

12.2.5 Santa Fe River

The Santa Fe River originates in the Sangre de Cristo Mountains east of the city and flows southwest for approximately 46 miles before flowing into the Rio Grande. The city of Santa Fe originated due to the existence of the Santa Fe River, which provided a year-round water supply and supported the city's subsequent development. Historically, the Santa Fe River has supported year-round flows (or nearly year-round). Since then, much of the river's water has been diverted into city reservoirs and water supply treatment and distribution facilities. Due to changing climate and increased water use, the Santa Fe River now often runs dry for much of a typical year.

The 285-square-mile Santa Fe River watershed is made up of the main course of the Santa Fe River, along with all the streams, arroyos, and water courses that flow into it. Several arroyos and acequias drain to the river, creating a system of connected riparian corridors, supporting vital riparian habitat dominated by cottonwoods, willows, buffaloberry (*Shepherdia* spp.), and a number of other small native shrubs, grasses, and forbs. As the river flows through the city, the watershed collects runoff from the city's urban infrastructure, including streets, parking lots, buildings, and residential areas.

In an effort to improve important riparian habitat, as well as improve the health of the broader Santa Fe River watershed, the City passed the Living River Ordinance in 2012, which aims to increase water within the riparian corridor. The 'Living River' is the middle portion of the Santa Fe River that flows from east to west through the city, just south of Santa Fe Plaza. In 2012, the City of Santa Fe announced it would allow as much as 1,000 acre-feet per year to bypass McClure and Nichols Reservoirs and flow uninterrupted through the Santa Fe River corridor, pursuant to the Living River Ordinance. The amount of water released each year depends on the amount of water held in upstream reservoirs, as well as spring runoff forecasts. The Living River supports a healthy plant community and wildlife habitat, recharges groundwater, and adds the beauty of free-flowing water to the parklands along the Santa Fe River. Other benefits of a green river corridor include shading and cooling to the urban environment, supporting native flora and fauna, helping to clean stormwater runoff, and preventing erosion.

12.3 Soils

There are a total of 101 types of soil present in the Santa Fe area. The soils fall into three distinct groups:

- **Recent Alluvial Valleys:** Alluvial soils are those deposited by surface water and are found along rivers, in floodplains, and along stream terraces and alluvial fans. Nearly all of the soils that are in recent alluvial valleys are suitable for irrigated crops.
- **Piedmont Slopes:** Soils of the dissected piedmont plains extend throughout most of the Santa Fe area. These soils are generally formed from reworked material in the Santa Fe group. In the northern part of the Santa Fe area, the land is generally rough and broken and is dissected by many drainageways. The southern region of the Santa Fe area transitions into gently rolling terrain, with

nearly all soils suitable for range production. The Panky, Pojoaque, Las Lucas, Witt-Harvey, and Harvey-Dean-Tapia are some of the most common soil associations in the dissected piedmont plains. The Panky-Pojoaque-Harvey association consists of level to hilly, deep, loamy to clayey soils, and is found on old alluvial fans and dissected, eroded terraces, south and southeast of the city, roughly coincident with the Santa Fe plateau, and is used for range and water supply. Runoff is largely from the Pojoaque soils.

- **Mountains and Foothills:** The soils of the Sangre de Cristo Mountains and foothills are formed mostly from weathered granite, gneiss, and schist. These soils often form on steep slopes on rocky land. The most common soil groups in the area include the Chimayo, Mirabal, and Supervisor soils. The Chimayo-Mirabal-Supervisor association consists of moderately sloping to very steep, shallow to moderately deep, loamy and very gravelly or very stony soils. This association is used for timber production, range, water supply, and recreation.

Soils play a critical role in the hydrologic cycle. Soils absorb rainfall and snowmelt, allowing water to infiltrate and recharge groundwater supplies. Soils store water that plants can use during dry periods and supports microbial activity and other soil processes. As water moves through the soil, it is filtered, removing impurities and pollutants. This process helps maintain water quality in aquifers and surface water bodies. Soils help regulate surface runoff by absorbing water and reducing the speed and volume of water flowing over the land, reducing the risk of flooding and erosion. Soils also facilitate nutrient cycling, which is an essential process for maintaining ecosystem productivity.

12.3.1 Erosion

The majority of the city of Santa Fe is located on sites that have constraints on development due to the nature of the soils discussed above. These constraints include:

- **Wind Erosion:** Many of the soils in Santa Fe have a moderate to severe erosion rating. Once vegetation is removed from these soils, they are often highly vulnerable to wind erosion.
- **Water Erosion:** Some portions of the city contain soils that have been designated as having moderate to severe potential for water erosion. Stormwater erosion and sediment transport can be a major problem in areas of high growth due to increased impervious surfaces and lack of water infiltration.

High soil runoff in the mountains and foothills frequently leads to erosion hazards, necessitating management to mitigate erosion risk. Maintaining maximum plant cover and minimizing stormwater runoff helps to mitigate wind and water erosion. The City's Escarpment Overlay Zoning District limits development in the areas with steep slopes that are particularly susceptible to erosional and drainage hazards. This zoning district also contains landscaping requirements that include vegetation density and heights, vegetation types, storm drainage, and grading.

12.4 Hillsides

The hills to the north and southeast and the Sangre de Cristo Mountains play a major role in defining Santa Fe's regional setting. In addition, the Sangre de Cristo Mountains have long been sacred to Native Americans. Hills and mountains are visible from most locations in the city, providing natural landmarks that help orient people. Many hillsides are prone to erosion and ground failure, partly due to the arid

climate and insensitive development practices. The hillsides are also home to many sensitive biological resources, and alteration of topography can impact water drainage and increase runoff.

12.4.1 Minerals

Santa Fe County has a vast mining history, with hundreds of mines and quarries dating from Native American miners around 900 AD to the present day. Native Americans are known to have extensively mined turquoise, obsidian, chert, jet, malachite, hematite, salt, stone, sand, and gravel in the Santa Fe region, and continue to do so today. The Cerrillos mining district, located south of Santa Fe in the Cerrillos Hills, is best known for turquoise deposits, but also contains copper, lead, and zinc. Spanish settlers began mining lead and silver in Cerrillos in the early 1600s; however, the first European - American mining claim was issued in 1879, marking the beginning of the Cerrillos mining rush. The La Bajada area produced copper, silver, and uranium. The southern area of the Sangre de Cristo Mountains contains pegmatite, sedimentary copper, sedimentary iron, coal and placer gold deposits, and have been periodically mined. The area around Glorieta Pass contains copper deposits in several small sandstone deposits.

In recent history, sand and gravel were the most heavily mined materials in the county. Sand and gravel deposits are commonly formed by fluvial processes, such as those associated with the Rio Grande. Sand and gravel are commonly used in construction for many uses, including concrete and asphalt. Of the 62 active mines in Santa Fe County, 39 produce gold and 30 produce silver.

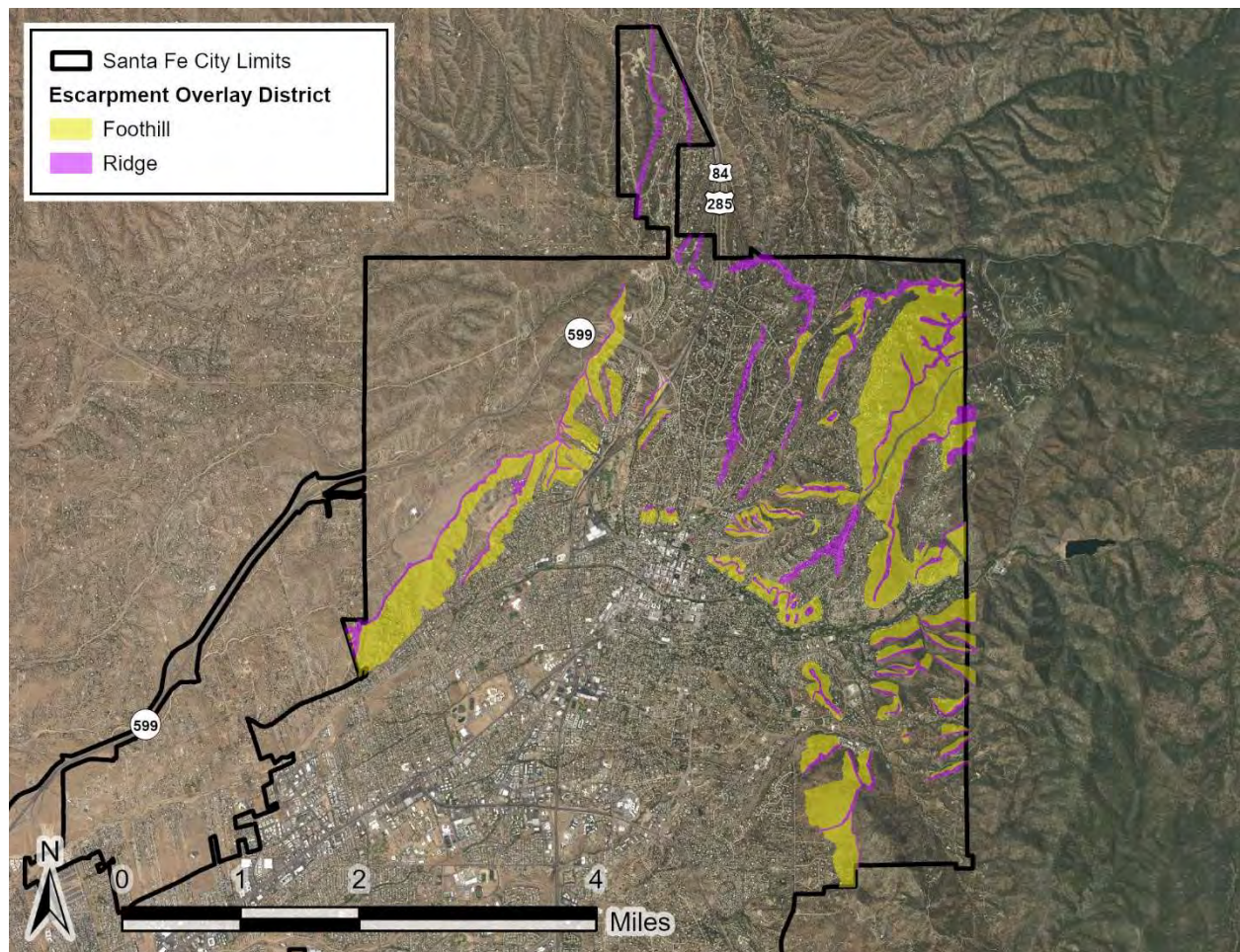
12.4.2 Escarpment Zone and Ridgelines

The City's escarpment includes the area where the foothills climb sharply into the neighboring plateaus. Land within the escarpment is environmentally sensitive due to the presence of steep slopes, erosion issues, drainage problems, and other environmental qualities.

The Escarpment Overlay Zoning District was established to ensure intentional and efficient growth within the city, simultaneously recognizing the fragile nature of these areas and their value as a major community asset. The overlay district protects viewsheds along the ridgetops and foothills along the escarpment, reduces wildfire risk, and protects the valuable watershed by limiting development. The escarpment zone covers approximately 500 acres within the city and contains most of the high wildfire risk areas. The Escarpment Overlay District generally follows the foothills directly to the east and west of downtown Santa Fe. Some undeveloped ridgelines north of downtown are also included in the overlay district.

The Escarpment Overlay District is divided into foothills and ridgeline subdistricts. The ridgelines define the crests of the foothills rising towards the Sangre de Cristo Mountains. Development is highly visible on ridgelines and detracts from the overall beauty of the natural environment and adversely impacts the aesthetics of the mountain and foothill vistas as seen from the rest of the city. Development is restricted in the ridgeline subdistricts to protect these valuable vistas. The foothills subdistrict environment is maintained by regulating the size and density of structures, removal of vegetation, revegetation requirements, and non-invasive lighting requirements. The Escarpment Overlay District is reflected in Figure 12-3 below.

Figure 12-3. Escarpment Overlay District, Ridgelines and Foothills Subdistricts



12.5 Natural Landscapes and Landmarks

12.5.1 Vistas

The Sangre de Cristo Mountains, immediately to the east of the city limits, dominate the horizon and are easily accessed for many recreational opportunities, as well as providing a constant backdrop for the city. The escarpment zone, where the foothills and ridgelines climb from the valley towards the mountains, is considered a “distinctive and historic visual asset.” Preserving these vistas through measures like the Escarpment Overlay Zoning District and building height limits, fosters a sense of the city as a connected and close-knit community.

12.5.2 Natural Landmarks

Santa Fe is sited on the western edge of the Sangre de Cristo Mountains, at approximately 7,000 feet above sea level. The Sangre de Cristo Mountains are the southernmost subrange of the Rocky Mountains and provide a dramatic relief from the Rio Grande Valley at around 5,500 feet, to over 13,000 feet at Truchas Peak. Visible both within Santa Fe and from miles away, this mountain range is part of the distinctive series that defines the city's eastern skyline and greatly enhances the natural beauty of the community. Santa Fe was originally settled by Native Americans due to the abundance of water provided by the Santa Fe River, and the river remains central to the community today. The same

views that the native peoples would have used to orient themselves are a consistent backdrop to the city. Atalaya Peak, Sun Mountain, Sallie's Hill, and Cerro Gordo are a few of the areas marked as critical by the Santa Fe Conservation Trust to maintain the natural setting and feeling of Santa Fe. The Santa Fe River has also been vital to the settlement and development of the community. Conservation of the river corridor through the Living River Ordinance, tree and native plant preservation, and other efforts, not only protects this vital ecosystem, but also preserves this natural landmark that is central to the city of Santa Fe.

12.5.3 Tree Preservation

Santa Fe has been designated as a Tree City within the list of Tree Cities USA by the National Arbor Day Foundation and the National Association of State Foresters. This certification requires a community to have a tree board or department, a community ordinance for tree care, a forestry program with an annual budget of at least \$2 per capita, and an Arbor Day observance and proclamation. City Ordinance 2014-31 specifies the requirements for the preservation of existing vegetation in landscape and site design, including significant trees (i.e., a deciduous tree 6 inches in caliper or an evergreen tree 8 feet or greater in height), with a particular emphasis on piñon pine. Additionally, city open space is required to have a minimum of one tree and two shrubs for every 500 square feet of space.

A healthy canopy of trees within the urban area can cool air temperatures, conserve water, improve air quality, and support native wildlife. Additionally, trees in Santa Fe increase property values, enhance the economic vitality of business areas, and beautify the community. The City of Santa Fe has completed an inventory of all trees in public spaces (Santa Fe Public Spaces Tree Inventory). Data has been collected on 7,962 trees, including tree species, diameter, condition, and location. This data allows the City to better address tree health and maintenance in the city, as well as inform future decision-making. Results of the tree inventory indicate that the most common tree species in the city include one seed juniper, Siberian elm (*Ulmus pumila*), piñon pine, honey locust (*Gleditsia triacanthos*), lance leaf cottonwood (*Populus acuminata*), and green ash (*Fraxinus pennsylvanica*). Siberian elm is an invasive species, and the City has had an active program attempting to eradicate them for over a decade. However, the species thrives in the increasingly hotter and drier climate and provides valuable tree cover throughout the city. Public spaces with the highest number of individual trees include Santa Fe River Park, Railyard Park, and Southwest Area Node (SWAN) Park. An analysis of the complete tree inventory has not yet been published; however, a 2019 analysis of 1,791 trees in the Santa Fe Public Spaces Tree Inventory estimated the following ecosystem services:

- Pollution Removal: 572.4 pounds per year
- Carbon Storage: 482.6 tons
- Carbon Sequestration: 7.925 tons
- Oxygen Production: 21.13 tons per year
- Avoided Runoff: 11.6 thousand cubic feet per year
- Structural Values: \$3.47 million

12.6 Environmental Protection

12.6.1 Air Quality

The NMED Air Quality Bureau (AQB) regulates air quality to protect public health and the environment in the state of New Mexico. Air monitoring data are required by regulation and are used to determine

compliance with both federal and state standards for monitored pollutants. NMED AQB monitors ozone and fine particulate matter concentration levels in Santa Fe. NMED does not monitor other federal criteria pollutants in Santa Fe, such as sulfur dioxide, nitrogen dioxide, carbon dioxide, and lead because NMED does not expect values to approach federal thresholds for dangerous pollutant levels.

The air monitoring site for Santa Fe is located just northeast of the terminal at the Santa Fe Regional Airport (SAF). The health-based federal standard for ozone is 0.070 parts per million (ppm). The average of all samples for the SAF site in 2024 was 0.04 ppm with a high of 2.483 ppm on November 7, 2024.

The health-based federal standard for fine particulate matter over a 24-hour period is 35 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The average of all samples for the SAF site in 2024 was 3.3 $\mu\text{g}/\text{m}^3$ with a high of 65.5 $\mu\text{g}/\text{m}^3$ on March 4, 2024.

Ozone is the main ingredient in smog in urban areas. Ozone is created by chemical reactions that occur when nitrogen oxides and volatile organic compounds interact with heat and sunlight. Dust from dirt roads and cleared land are heavy contributors of particulate matter in the air. The burning of coal and oil (including motor vehicle emissions), natural gas, and wood all contribute to the creation of ozone in the urban area. Smoke from wildfires can also contribute to both high levels of ozone and particulate matter in the air. As wildfires become more frequent and intense in New Mexico and across the western United States, the likelihood of poor air quality throughout the year rises.

12.6.2 Light Pollution and Dark Skies

Light pollution is the general sky glow caused by artificial lights that results in a decreased ability to see the natural night sky. Light pollution in urban areas can stem from various sources, such as streetlights, illuminated signs, and household outdoor lighting. Beyond limiting views of stars and the night sky, light pollution can create unsafe glare for drivers and others working at night, confuse and harm wildlife, and waste energy.

In 1999, New Mexico enacted the Night Sky Protection Act with the purpose of regulating outdoor night lighting fixtures to preserve and enhance the state's dark sky while promoting safety, conserving energy, and preserving the environment for astronomy. The act prompted statewide standards for outdoor lighting to be shielded downward to prevent upward or lateral light to pollute the dark sky. The act also allows local communities to enact more stringent local ordinances, and the City of Santa Fe adopted an ordinance providing local guidance in 2013. Santa Fe's Outdoor Lighting Ordinance provides guidance for installing outdoor lights that reduce or prevent light pollution and ensures that outdoor lighting aesthetically aligns with the character of Santa Fe. This includes strategies, such as shielding lights and pointing them downwards, as well as maximum illumination standards.

The Bortle dark-sky scale is a measure of the night sky's brightness on a 9-level scale, with 1 being the darkest sky with most visible stars and 9 being a highly lit sky with faint or invisible stars (i.e., an inner city sky). The city of Santa Fe falls within Level 6 on the Bortle scale, and the foothills of the Sangre de Cristos east of downtown are Levels 4 and 5. The mountains east of the foothills in Santa Fe National Forest are a Level 3. For context, Albuquerque falls within Levels 7, 8, and 9.

12.6.3 Noise

Noise, as an unwanted sound, is known to have several adverse effects on people, including hearing loss, communication disruption, sleep disturbances, negative physiological responses, and general

annoyance. Noise-sensitive land uses identified in Santa Fe include residences of all types, including nursing homes, daycare centers, hospitals, schools, parks, and places of religious assembly. Outside the city limits, areas, such as wildlife corridors and conservation districts, are noise sensitive.

Existing Noise

The 1999 City of Santa Fe General Plan recommended a community noise survey to record and analyze noise exposure and monitor noise levels across different land uses and noise types. No such study has yet been conducted. Typical types of noise include:

- **Traffic Noise:** Most roadways generate noise, and traffic noise is likely the largest consistent emitter of noise in the city. Many of the built areas along travel corridors have very narrow setbacks, and residents or employees within these noise impact areas may be subject to significant noise levels. Loud muffler noise is the most consistent complaint received by City Council from residents across the city. City Council overhauled noise ordinance violations in 2023 and increased first time violation fines.
- **Airport Noise:** Around SAF, some residential areas are subject to airport noises. These are located at either end of the runways, beyond airport property. SAF submitted a noise exposure map to the Federal Aviation Administration in 2008, which identifies an airport's present and future noise patterns, as well as nearby land uses and their sensitivity to noise. SAF's Voluntary Noise Abatement Program was updated in 2009, including voluntary quiet hours from 10 p.m. to 6:30 a.m., and mapped noise-sensitive areas.
- **Stationary Noise Sources:** Stationary noise sources include industrial and commercial facilities. Noise exposure within industrial facilities is controlled by employee health and safety regulations, but exterior noise levels are not regulated by the federal or state governments. Noise generated from fixed sources may vary based on open doors and windows, climatic conditions, time of day, and existing noise levels.

Noise Compatibility Standards

From the known effects of noise, criteria have been established to help protect public health and safety and prevent disruption of certain human activities. For planning purposes, an A-weighted scale is recommended to describe environmental noise at any one particular time. However, community noise levels vary continuously. In order to account for the time-varying characteristics of noise, all individual noise readings must be averaged over a 24-hour period. Suggested noise compatibility standards for Santa Fe were presented in the 1999 City of Santa Fe General Plan. The tables below present the current noise compatibility standards for zone districts (Table 12-2) and motor vehicles (Table 12-3) in the city as laid out in Subsections 10-2.5 and 10-2.9 of the city code.

Table 12-2. Noise Compatibility Standards for Zone Districts

Zone District	9:00 p.m. to 7:00 a.m.	7:00 a.m. to 9:00 p.m.
Residential	50 dBA	55 dBA
Commercial	55 dBA	60 dBA
Industrial-Agricultural	70 dBA	75 dBA

Note: dBA=decibels A-weighted

Table 12-3. Noise Compatibility Standards for Motor Vehicles

Noise Type	Sound Pressure Level, dBA	
	Speed Limit 45 mph or less	Speed Limit over 45 mph
Vehicles with GVWR of >10,000 lbs. (vans, buses, large trucks)	90	94
GVWR of <10,000 lbs. (light-duty passenger vehicles)	77	81

Note: dBA=decibels A-weighted; mph=miles per hour; GVWR=gross vehicle weight rating

12.6.4 Water

As discussed above, the Santa Fe watershed covers over 285 square miles and extends from the Santa Fe River's headwaters, located east of the city in the Sangre de Cristo Mountains, west to the Rio Grande, and south to the Cerrillos Hills. The city relied solely on Santa Fe River water until rapid population growth began in the mid-twentieth century. Today, the city of Santa Fe receives potable water from three sources: the Santa Fe River, the Colorado River (via the San Juan – Chama Project), and groundwater from approximately 20 wells located in the Buckman and City well fields.

The City well field was drilled during the 1950s to access groundwater when several years of drought led to decreased surface water supply. The Buckman well field was accessed during the 1970s, and both well fields were excessively pumped for the following 20 years, coinciding with rapid population growth and a lack of water conservation efforts. The aquifers holding this groundwater were heavily impacted, and the City began strategically planning for future water availability and use. Today, the City emphasizes relying on surface water, in order to allow the aquifers to recharge for use during periods of drought. City and Buckman well fields now contribute approximately 6 percent of Santa Fe's water each year.

Approximately one-third of Santa Fe's water is retained in two reservoirs (McClure and Nichols) in the Sangre de Cristo Mountains, the headwaters of the Santa Fe River. Depending on water availability each year, the City now allows as much as 1,000 acre-feet per year to bypass McClure and Nichols Reservoirs and flow uninterrupted through the Santa Fe River corridor.

The San Juan – Chama Project provides a crucial infrastructure system that allows for transmountain movement of water from the San Juan Basin to the Rio Grande Basin. The San Juan – Chama Project aims to supply water to the middle Rio Grande Valley for municipal, domestic, and industrial uses and aims to address the potential for increased variability due to climate change, which makes the middle Rio Grande area vulnerable to water shortages under drought conditions. The project is also authorized to provide supplemental irrigation water and incidental recreation and fish and wildlife benefits. From 1991 to 2020, the San Juan – Chama Project provided an average annual diversion of about 89,800 acre-feet of water to the Rio Grande Basin. The City of Santa Fe began receiving water from the San Juan when the Buckman Diversion was completed in 2011, and the City now receives up to 5,230 acre-feet of water per year.

12.6.5 Additional Pollutants/Contamination

The City of Santa Fe's water and air meet all requirements set by EPA and NMED. However, there are additional pollutants that are either not regulated by these agencies or could be of concern due to increasing prevalence or longevity in the environment and people.

PFAS are a group of 15,000 or more manufactured chemicals that are used in industry and consumer products, including food packaging, clothing, industrial manufacturing, and non-stick cookware. PFAS are known as “forever chemicals,” as they break down very slowly and are long lasting once in the environment, such as in the air, water, and soil. PFAS have been linked to many health issues, including cancer, hormone disruption, liver problems, and reproductive harm. PFAS were found in groundwater samples collected in Santa Fe in 2024, and in the Rio Grande above the Buckman Diversion near Santa Fe in 2020. The levels were relatively low (2.3 ppt in the Rio Grande); however, the persistent nature of the chemicals necessitates continued monitoring. In 2024, the EPA established legally enforceable levels for six PFAS in drinking water, which range from 4.0 to 10 ppt. Under New Mexico's Hazardous Waste Act and Water Quality Act, it is illegal to release PFAS into the environment; however, due to the persistence of the chemicals, it can be difficult to pinpoint a source. The source of the contamination detected near Santa Fe is currently unknown, and testing and monitoring are ongoing.

Electronic waste includes any discarded electronics, including computers, televisions, mobile phones, and refrigerators. These devices can contain metals hazardous to human health and the environment, including lead, cadmium, beryllium, and brominated flame retardants. Buildup of these metals in the body can interfere with organ function and lead to organ failure. Electronic waste is not accepted at any landfills in the city, as these harmful substances can leach into soils and the water supply.