8. Environmental Overview

Introduction

Environmental stewardship of the natural, social, and cultural environment is a priority for the Lincoln MPO. This chapter provides an overview of the potential environmental, social, and cultural resources that could prompt further analyses for the proposed transportation system improvements considered for the LRTP. The following sections provide a general description of the resources, potential project overlap indicating future assessment needs, and recommended mitigation measures associated with proposed multimodal alternatives. This overview is broad in scope and meant to assist in the prioritization of future projects; specific improvement projects would still require separate resource reviews, as needed, for environmental compliance. **Appendix H** includes references for the environmental overview.

Federal Requirements

The FAST Act states that the MPO will communicate with state and local agencies concerning land use management, natural resources, environmental protection, conservation, and historic preservation during the LRTP planning process. Discussions are to include the identification of potential mitigation measures, in consultation with federal, state, and tribal wildlife agencies, as well as land management and regulatory agencies. This chapter documents assessments conducted to comply with these requirements. The assessments were used to identify additional planning needs or mitigation measures associated with proposed projects.

Location of Projects

Lancaster County, located in southeast Nebraska, encompasses an area of 847 square miles or 542,080 acres. Lincoln is the largest city in Lancaster County, with an estimated population of 265,811 (US Census Bureau 2014a). Twelve other cities and villages are located in the county. Most of the proposed projects occur within the future service limit of the City of Lincoln.

Environmental Study Area (ESA)

Each roadway project under consideration in the LRTP was assigned a 120-foot (ft) ROW regardless of its hierarchy, such as two-lane or four-lane. In addition, a 100-ft buffer was established on both sides of the ROW to represent an area of potential disturbance to natural, social, and cultural environmental resources (for a total buffer width of 320 ft). For trail projects, a 100-ft buffer was used (for a total buffer width of 200 ft). The ESA was defined as the area within the buffer boundaries. **Appendix F** contains the maps showing the overlays of the environmental resources with the roadway and trail projects.

Resource Assessment Methodology

For most environmental, social, and cultural resources, maps created in ESRI's ArcMap (GIS software) identify potential areas of concern associated with future projects. A few resources required other inventory methods. The ESA boundary for each roadway and trail project was overlaid onto the resource maps to determine potential concerns requiring further investigation.

Air Quality

The projects and decisions contained within the Lincoln MPO 2040 LRTP can influence local air quality. Estimated vehicle emissions of select air pollutants that are typically related to mobile transportation sources were assessed for the LRTP.

Because the Lincoln area is currently in attainment or unclassifiable for the National Ambient Air Quality Standards (NAAQS) under the Clean Air Act, the evaluation was primarily for informational, planning, and stewardship purposes. The evaluation was based on traffic data developed through the MPO's regional travel models and from pollutant emission data developed for this project using US Environmental Protection Agency Motor Vehicle Emission Simulator software (i.e., MOVES2014).

Evaluation Overview

The evaluation for air pollution emissions included three traffic situations covering the MPO area: 2015 existing conditions and two future fiscally constrained road networks planned by the MPO (years 2026 and 2040). Air pollutant emissions data for these situations were calculated using MOVES2014.

The evaluation examined five air pollutants of concern commonly associated with motor vehicles: carbon monoxide (CO), particulate matter less than 2.5 microns in diameter (PM2.5), two ozone precursor pollutants (volatile organic compounds [VOCs] and oxides of nitrogen [NOx]), and greenhouse gases (GHGs) expressed as carbon dioxide (CO2) equivalents. These pollutants are of concern for several reasons:

- ***Carbon Monoxide:*** CO, an odorless, colorless gas, is most commonly formed by incomplete combustion of fuel. CO is dangerous because it interferes with the body's ability to absorb oxygen. High concentrations of CO can cause dizziness, headaches, loss of vision, impaired dexterity, and even death if the concentration is high enough. Major sources of CO include vehicle exhaust, coal burning, and forest fires. CO is most commonly a concern in localized areas around the CO sources, such as near congested road intersections. CO can be a regional concern if concentrations are high enough and disperse into the surrounding area. CO tends to be highest in winter.
- ***Particulate Matter:*** PM2.5, a complex mix of very small solid particles and liquid droplets, is a concern because it can be inhaled deeply into the lungs and can interfere with lung function or lead to other health effects. PM2.5 can aggravate asthma, diminish lung capacity, and cause lung or heart problems. Particulate matter can also cause haze. Sources of particulate matter include smoke, and diesel engine exhaust. Particulate matter can be a localized concern near the sources or can cause regional concerns through dispersion.
- ***Ozone and Precursors:*** A strong oxidizing agent, ozone can damage cells in lungs and plants and can cause eye irritation and coughing. Ozone is not emitted directly; rather, it is formed by chemical reactions between other precursor pollutants in the atmosphere. VOCs and NOx in the presence of sunlight and certain weather conditions can form ozone. So, ozone concentrations can be affected through the concentrations of the precursor pollutants. Automotive sources of ozone precursors include vehicle exhaust, fuel evaporation, and vehicle refueling. Ozone is a regional concern because it takes time for ozone to form and the pollutants can drift a considerable distance in that time. Ozone generally is most problematic in summer.
- ***Greenhouse Gases***: CO2 is the largest component of vehicle GHG emissions. Other prominent transportation-related GHGs include methane and nitrous oxide. Water vapor is the most abundant GHG and makes up approximately two-thirds of the natural greenhouse effect. GHGs are a concern in terms of global climate change. Human-generated GHG emissions can contribute to climate change through the burning of fossil fuels and other activities. For this evaluation, overall GHG emissions have been quantified in terms of an equivalent amount of CO2 emissions.

MOVES2014 Modeling

MOVES2014a was the software version used to develop two groups of vehicle emission results for the air pollutants described above. For each of the three evaluation years, the MPO developed a

representative set of average pollutant emission rates in grams per mile traveled for various vehicle speeds. Then, the MPO calculated the cumulative daily total of emissions (in tons) for a weekday for January and July of the three evaluation years.

MOVES2014 requires a considerable amount of technical data for input to generate these results. Some of the needed data can be difficult and costly to develop specifically for a region/locality, so it is not readily available. The MPO has developed data for vehicle miles of travel (VMT) for the road networks through the traffic models, which were used in MOVES2014 modeling. However, other detailed, local data were not available because these inputs were derived from the MOVES2014 default dataset. A "national level" MOVES2014 model for Lancaster County was run to provide input data for the vehicle mix and the VMT distribution. MOVES2014 default data were also used for inputs such as fuel types and weather conditions. Changes to any of the inputs (e.g., temperature) will affect the emission results to some extent, so this air quality evaluation is intended to illustrate general trends for the MPO region.

Pollutant Emissions Results

For the first group of emission results, graphs of tailpipe emission rates versus vehicle speeds were developed for the air pollutants of interest (**Figure 42)** to illustrate how emissions can vary with changes in traffic congestion levels and time. Note that **Figure 42** represents averaged results for the entire vehicle fleet, but for a single set of weather conditions—summer, 60 degrees, 60 percent humidity, etc. Other conditions may provide different results. The graphs illustrate that traffic flow improvements (higher speeds) generally reduce emissions until relatively high speeds are reached. For a higher-level look at these emission rates, average weekdays in winter (January) and summer (July) were merged to calculate composite average rates for all street types and vehicle types for the MPO area (**Table 28**). **Table 28** results are from many weather conditions and are not for a single condition like in **Figure 42**.

Table 28. Composite LRTP-Wide Vehicle Pollutant Emission Rates

Pollutant	2015 (g/mi)	2026 (g/mi)	2040 (g/mi)
CO	7.33	3.35	1.82
PM2.5	0.0256	0.0095	0.0066
NOx	1.28	0.37	0.24
VOC	0.759	0.261	0.167
GHGs as CO2	499	368	305

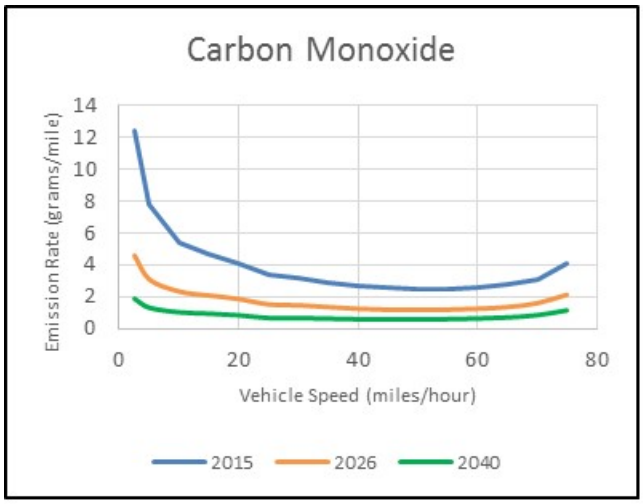
Future years are expected to see progressively lower emission rates due to federal emission regulations and improvements in vehicle technologies. As older vehicles are replaced with newer ones, lower emissions are expected. Some reductions will be substantial; on the order of 80 percent. Therefore, future vehicle emission levels may be lower even with more vehicles or VMT.

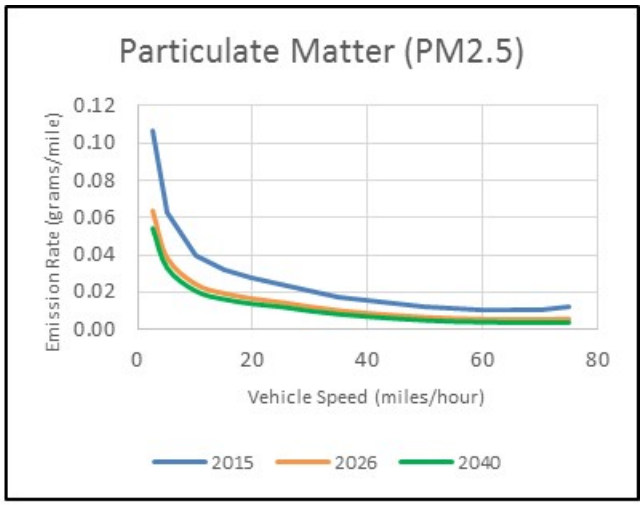
For the second group of emission results, total daily emissions from the MPO road network for average weekdays in winter and summer were calculated **(Figure 43**). The levels will vary due to several factors—time of year, temperature, day of week, VMT, level of congestion, etc.—which complicates evaluation. To simplify and illustrate general trends, the seasonal results were merged to calculate composite daily emission totals (**Table 29**).

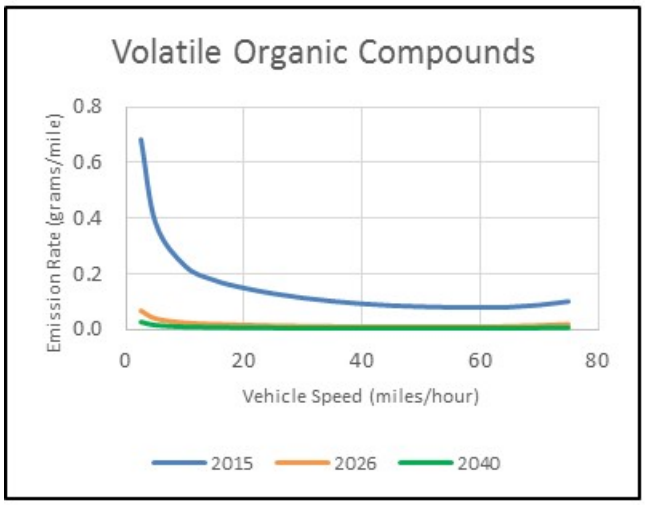
Table 29. Composite Daily Pollutant Total Emissions

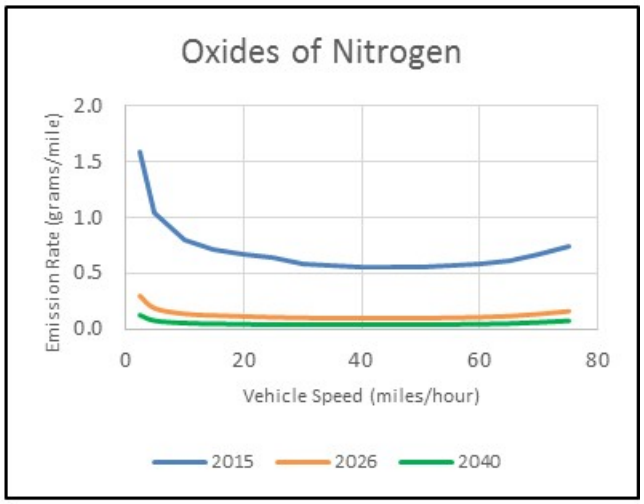
Pollutant	2015	2026	2040
CO (tons)	47.3	26.6	17.6
PM2.5 (tons)	0.165	0.075	0.064
NOx (tons)	8.26	2.96	2.28
VOC (tons)	4.89	2.07	1.62
GHGs as CO2 (tons)	3,215	2,918	2,952
VMT (miles)*	5,847,249	7,191,600	8,785,431

*FROM MOVES2014; THIS VALUE IS CALCULATED INTERNALLY AND MAY DIFFER FROM TRAFFIC MODEL VALUE









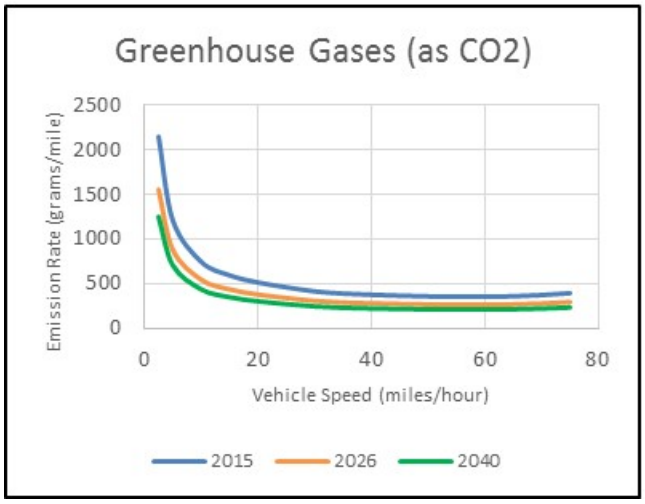


Figure 42. Example Pollutant Emission Rates for Lincoln Arterial Streets in Summer

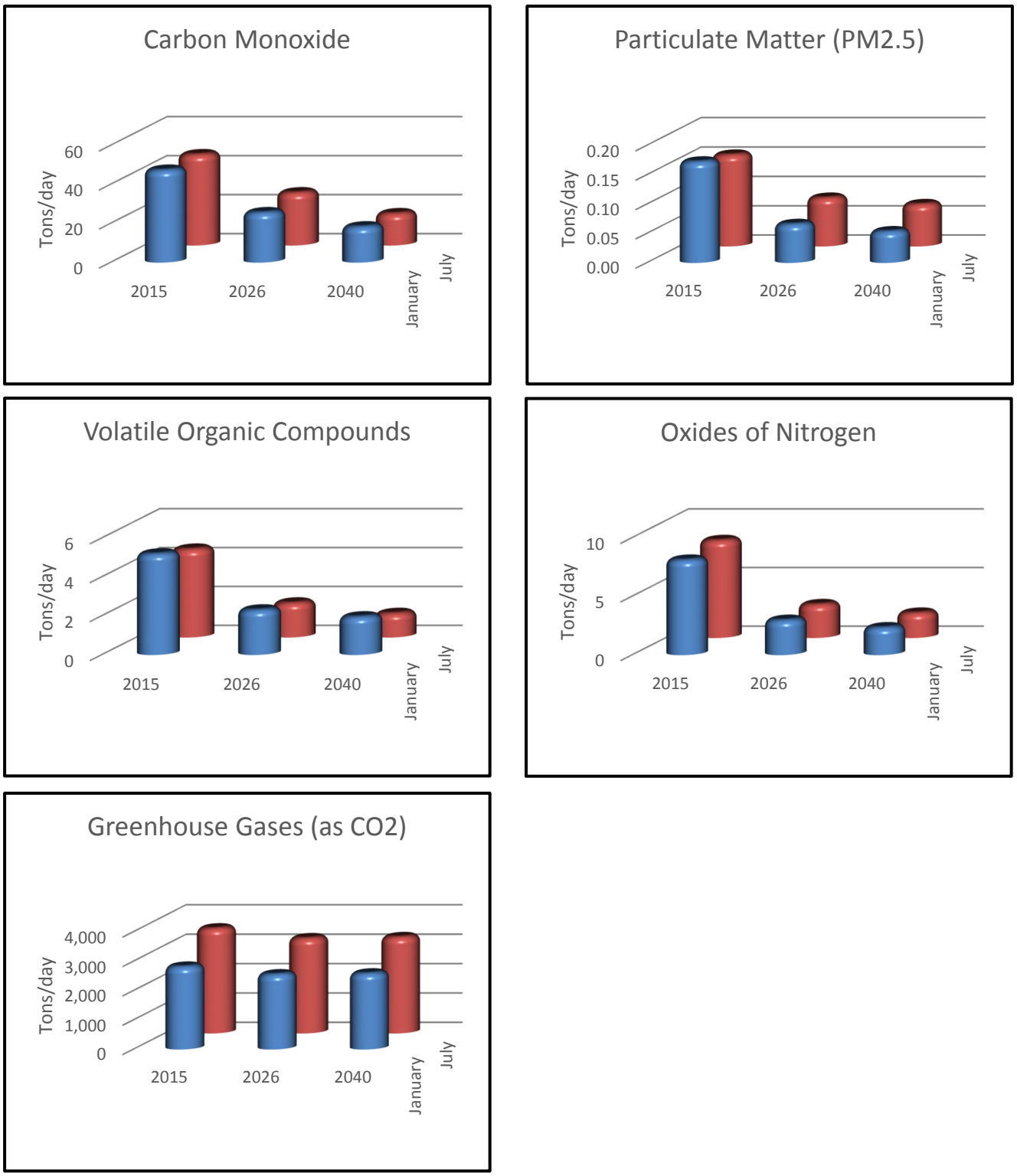


Figure 43. Typical Weekday Pollutant Emission Totals for Fiscally Constrained Road Network

Table 29 and **Figure 43** present total daily City of Lincoln and Lancaster County vehicle emissions for 2015, 2026, and 2040. **Table 29** also includes the forecast VMT for comparison. These results show substantial decreases in pollutant emissions from 2015 to 2040 while VMT will increase by approximately 25 percent by 2026 and by 50 percent by 2040.

The future year emissions for the City of Lincoln and Lancaster County—averaged for vehicle types and travel speeds—will have lower emissions per VMT than current conditions. The emissions results suggest that improved vehicle efficiency and more efficient travel speeds have more effect on reducing VOC, NOx, CO, and PM2.5, which are reduced by about 70 to 80 percent, than on GHGs, which are reduced by about 40 percent (**Table 28**).

As shown in the GHG graph in **Figure 43**, these average daily emissions will not decrease as much as is predicted for the other pollutants and appear to level off from 2026 to 2040. CO2 is a byproduct of burning fossil fuels, so reducing fuel consumption is one strategy to minimize CO2 emissions—gas mileage improvements and reductions in VMT can contribute to this. The City of Lincoln and Lancaster County Comprehensive and LRTP include elements to help reduce the growth in VMT by promoting more walkable, mixed-use activity centers, implementation of the Green Light Lincoln initiative, and providing alternative transportation choices (including through efforts of the Complete Streets initiative).

Vehicles are getting cleaner, but more miles are being driven each year. Which of these two trends will dominate in terms of pollutant emissions? Based on the traffic forecasts of the LRTP coupled with the pollutant emission forecasts from MOVES2014, air quality is expected to improve for the air pollutants examined due to improving vehicle emission and fuel technologies, even with increased VMT through 2040. These controls have resulted in significant improvements in air quality over the past few decades and will continue to provide reductions in emissions with the vehicle mandates scheduled for the future.

Natural Environment

Topography

Lancaster County is located in the Rolling Hills, Valleys, and Plains topographic regions. The general topography of the county consists of hilly land with moderate to steep slopes and rounded ridge crests composed mostly of glacial till that has been eroded and mantled by loess. The hills slope toward the Valley regions and gradually flatten near the historic floodplains of creek channels. At the southwest edge of the county, the topography transitions from the Rolling Hills to Plains region, the flat land that lies above the valley. Elevations range from a high of 1,520 feet above sea level in the northwest and southwest part of the county to a low of 1,080 feet above sea level in the northeast.

Hydrology

Surface water flows in more than 400 miles of warm water streams that meander through Lancaster County. Most notably Salt Creek flows from across the county southwest to northeast toward the Platte River. Major Salt Creek tributaries include Middle Creek, Oak Creek, Haines Branch, Beal Slough, and Stevens Creek. Several tributaries of the Nemaha River drain to the southeast in the southeast corner of the county. Many streams and their adjoining corridors consist of a variety of floodplain and riparian habitats. The floodplains for these streams account for 13.8 percent of the land area of the county.

Vegetation

Historically, tallgrass prairie dominated the landscape of Lancaster County; however, only approximately 8,640 acres of native prairie remain, mostly concentrated in the west-central portion of the county. Forested areas generally occur along stream corridors, within recreational areas, and on

city/state properties. Planted trees are also common along residential streets.

The Nebraska Natural Legacy Project's State Wildlife Action Plan designates the Salt Creek basin as a Saline Wetlands biologically unique landscape (Schneider et al. 2011). Freshwater wetlands occur throughout the county within floodplain depressions, closed depressions, ditch depressions, and stream or riparian corridors.

Agricultural land uses surround the City of Lincoln and other urban areas and consist of row crops, pasture, hay land, and other farming operations.

Parks and Natural Areas

The County contains 10 state wildlife management areas with reservoirs, including Branched Oak, Pawnee, Conestoga Lake, Bluestem, Olive Creek, and Stagecoach. The City of Lincoln, Lower Platte South Natural Resources District (LPSNRD), Nebraska Game and Parks Commission (NGPC), and other organizations manage several major park and natural areas, including Pioneers Park, Arbor Lake, Shoemaker Marsh, and Nine-Mile Prairie.

Natural Resource Assessments

The following resource assessments create a framework for environmental reviews for future LRTP projects. These resource assessments are based on data from the City of Lincoln Planning Department using their Natural Resource Geographic Information Systems (NRGIS) dataset (Lincoln-Lancaster County Planning Department 2001).

Stream Corridors

Stream corridors consist of the waterway, its floodplain, and the transitional upland fringe. Corridors generally include diverse habitat types supported by a close connection to the hydrology of the waterway. These ecosystems can be important to wildlife because they provide water, shelter, a source of food, and connections to other habitat areas, especially in the areas surrounding Little Salt Creek, where the federally endangered Salt Creek tiger beetle (SCTB) (*Cicindela nevadica lincolniana*) and state endangered saltwort (*Salicornia rubra*) occur. Stream corridors also provide floodwater attenuation and improve water quality by filtering runoff and collecting sediment before it enters the waterway.

A City of Lincoln building code regulation limits the placement of buildings or fill within a 60-ft buffer surrounding drainageways (i.e., streams or creeks) and is referred to as the "minimum flood corridor" (LMC Ordinance 26.07.126). Stream channels are also protected under the Clean Water Act, which requires compliance with Section 404 regulations for excavation or fill activities.

Stream corridors were identified and mapped on **Figure 44** using the National Hydrography Dataset, which is available online (USGS 2016). A 60-ft buffer area was delineated along all streams within the future service area of the City of Lincoln to identify the "minimum flood corridor." Based on the resource assessment, 55 roadway and 27 trail projects cross streams and/or occur within the minimum flood corridor.

Project constraints or resource impacts associated with stream corridors would be reduced through avoidance, minimization, and mitigation measures. Project designs would be developed to avoid or minimize fill within the "minimum flood corridor" and to lessen disturbance within the natural habitat. If impacts cannot be avoided or minimized, then mitigation would be developed. Mitigation may consist of on-site solutions to restore the flood corridor and habitat or off-site solutions to attenuate flood levels or preserve, restore, or establish similar habitat. Impacts to stream channels or wetlands within the corridor would require Section 404 permitting. Nebraska Department of Environmental Quality (NDEQ) guidelines may require that a 30-ft vegetated buffer be set aside along impacted channels and be planted with perennial native species.

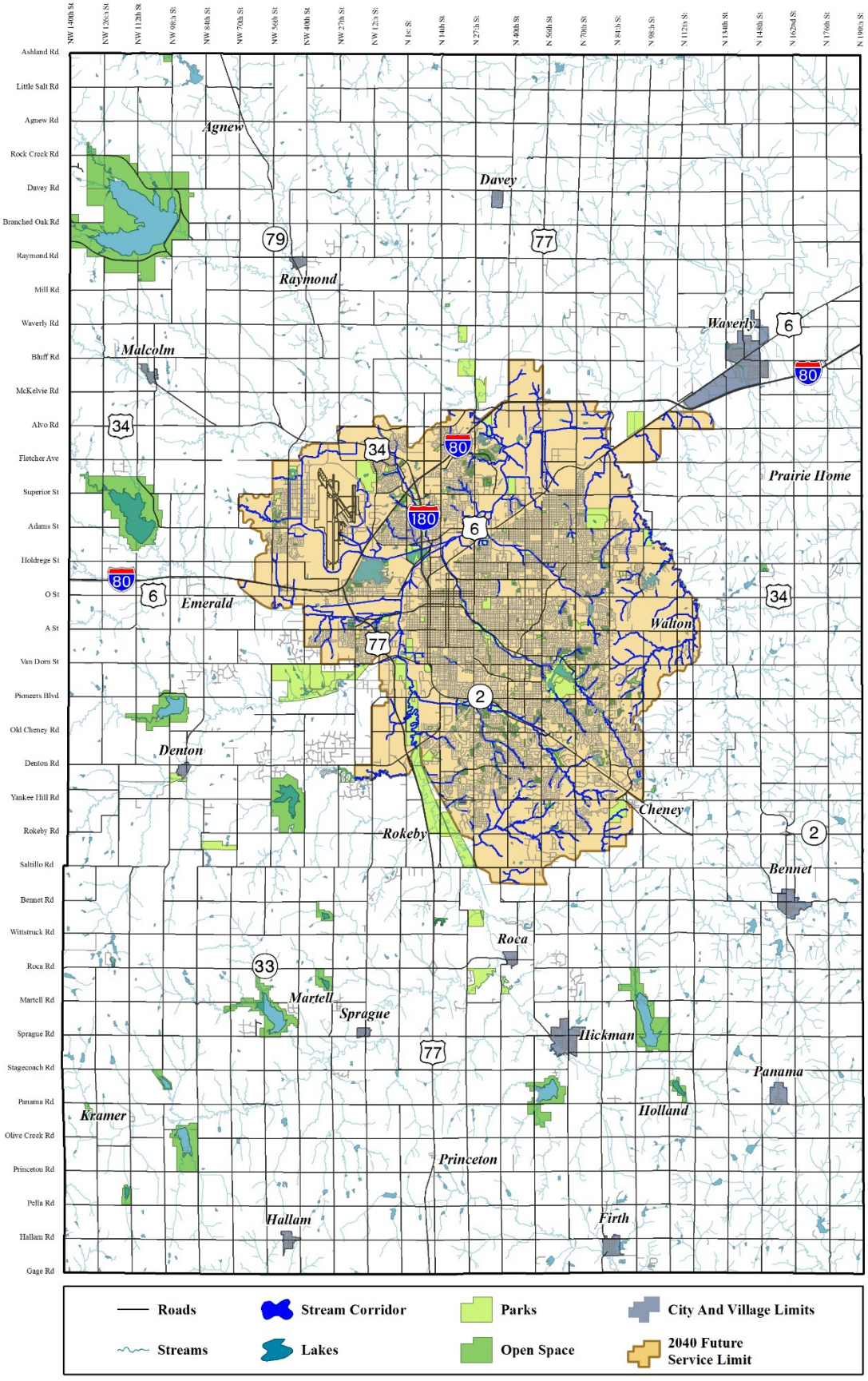


Figure 44. Stream Corridors

Floodplains

Floodplains are defined as the land area adjacent to a stream, river, or other waterbody that is subject to periodic inundation by regular flooding. The floodplain includes the floodway, which consists of the channel and overbank areas, and the flood fringe, which begins at the edge of the floodway and continues outward to the transitional upland fringe. The surface hydrology of floodplains is important because it affects the risk of flooding, and flooding can create erosion or sedimentation problems.

To reduce the risk of flooding and flood damage, floodplains are protected by city ordinances, which require a floodplain development permit for construction in the floodplain. NDEQ requires a National Pollutant Discharge Elimination System (NPDES) permit for any construction sites greater than 1.0 acre.

Floodplains were identified using Flood Insurance Rate Maps (FIRMs) provided by the Federal Emergency Management Agency (FEMA) (FEMA 2010–2013), as depicted on **Figure 45**. These maps identify the base floodplain, which is the area subject to a 1 percent or greater chance of flooding in any given year (also known as the 100-year flood). Based on the resource assessment, 72 roadway and 37 trail projects are located within the base floodplain. These projects may require a floodplain development permit and may be subject to restrictions concerning raises in floodplain surface elevations. Similar to stream corridors, project designs can be developed to avoid or minimize impacts to the base floodplain. Changes in floodplain surface elevations within the base floodplain may require submittal of a conditional letter of map revision (CLOMR) to FEMA.

Freshwater and Saline Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328). Wetlands and riparian areas are important because they provide habitat for plants, fish, and wildlife; serve as groundwater recharge areas; provide storage areas for storm and flood waters; serve as natural water filtration areas; and provide protection from wave action, erosion, and storm damage.

Eastern Nebraska saline wetlands are found only in Lancaster and southern Saunders counties and are categorized as a measure of their functionality and restoration potential (**Table 30**).

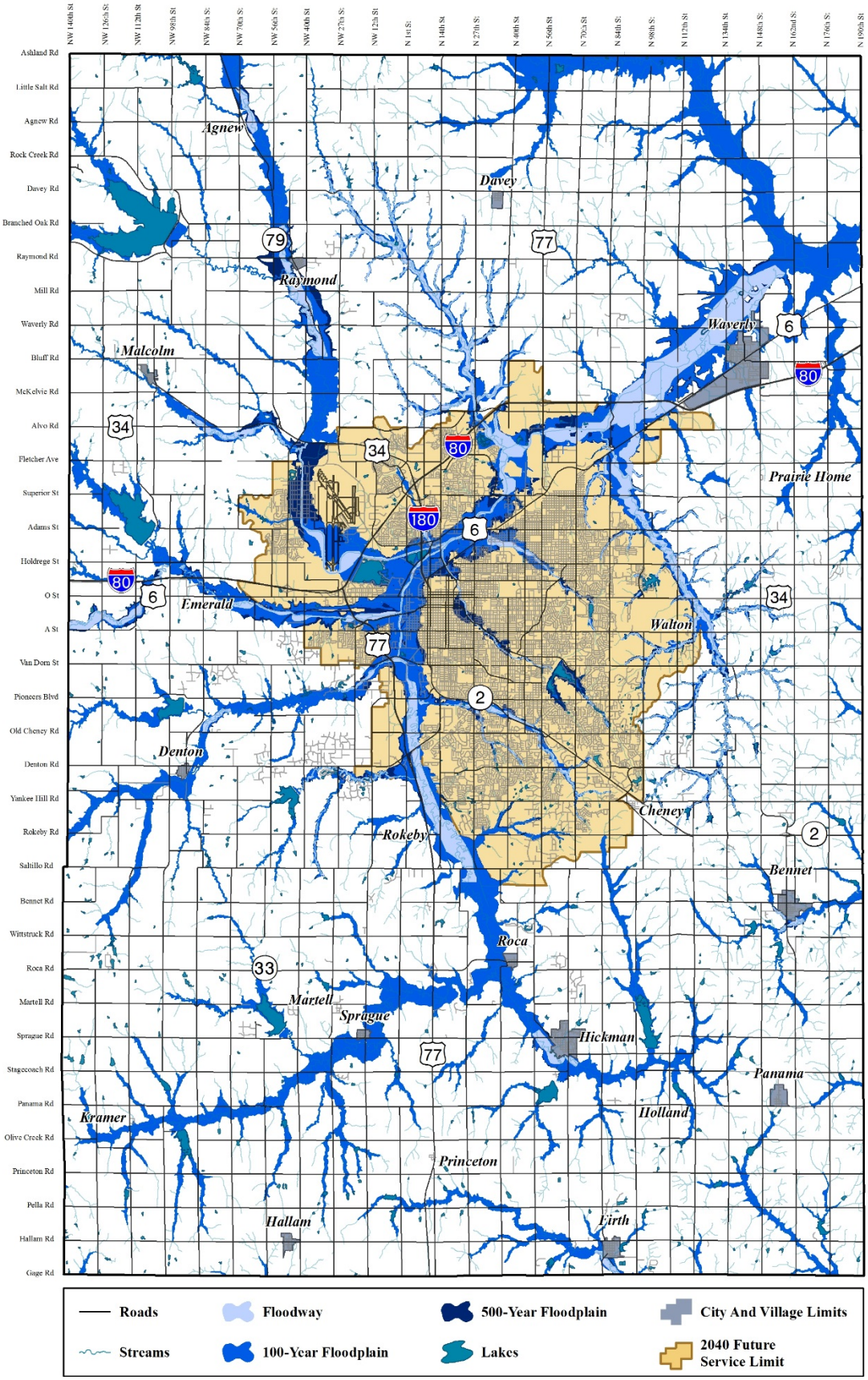


Figure 45. Floodplains

Table 30. Saline Wetland Categorization

Category	Description
I	These wetlands support salt-loving plants, occur on saline soils, and have high value saline wetland functions or the potential to provide high values following restoration or enhancement measures.
II	These wetlands occur on saline soils but are significantly disturbed or degraded by adjacent land use or altered hydrology. Salt-loving plants may occur as part of the site's flora, but the degree of degradation would not allow restoration to a higher quality saline character.
III	These wetlands occur on saline soils but support freshwater vegetation. These sites represent former saline wetlands that had an influx of freshwater runoff due to urban or agricultural modifications within the watershed, thus diluting soil salt concentrations.
IV	These freshwater wetlands on non-saline soils occur within the saline wetland study area boundary (additional freshwater wetlands are mapped separately).

Saline wetlands are unique in that they support salt-adapted plant communities and provide habitat for the federally endangered SCTB and state endangered saltwort. Saline wetlands were historically present along the terraces of Salt Creek and its tributaries but have been greatly reduced due to urban development, agriculture, and flood control projects along Salt Creek and its tributaries.

All wetlands are protected under Section 404 of the Clean Water Act by the US Army Corps of Engineers (USACE) and under Title 117 of the Nebraska Administrative Code and implemented by NDEQ. These regulations require a permit and possible mitigation for impacts to wetlands and waters.

Wetlands were identified using the National Wetland Inventory (NWI) (USFWS 2016c), supplemented by NRGIS dataset. Freshwater (**Figure 46**) and saline (**Figure 47**) wetlands were mapped separately because mitigation requirements are often greater for saline wetlands. Based on the resource assessment, 27 roadway and 16 trail projects would cross freshwater wetlands. Seventeen roadway and 10 trail projects would cross saline wetlands. These projects may require a Section 404 permit and may be subject to restrictions concerning temporary and permanent wetland impacts. Similar to stream corridors and floodplains, project designs would be developed to avoid or minimize wetland impacts.

If permanent impacts to wetlands are unavoidable and greater than 0.1 acre, then compensatory mitigation would be required. Wetland impacts would be offset by one of the following methods:

- Use of mitigation bank credits
- Construction of permittee-responsible mitigation consisting of either on-site or off-site wetland restoration, enhancement, establishment, or preservation, in addition to yearly monitoring (as set by USACE)

Compensatory mitigation may be required at a 1:1 or higher ratio depending on the type and quality of wetland impacted. Impacts to saline wetlands (especially Category I) would require higher mitigation ratios (Taylor and Krueger 1997).

Native Prairie

Native prairie is a grassland ecosystem lacking trees and dominated by native grasses, such as big bluestem, little bluestem, and Indian grass in the eastern Nebraska tallgrass prairie. Prairie grasslands are an important natural resource for wildlife and plant species and provide ecological benefits, such as protecting water quality through sediment retention, forming and protecting soil, maintaining biodiversity, and providing seasonal habitat for migratory birds. Administered by the NGPC and US Fish and Wildlife Service (USFWS), the Fish and Wildlife Coordination Act protects native prairies.

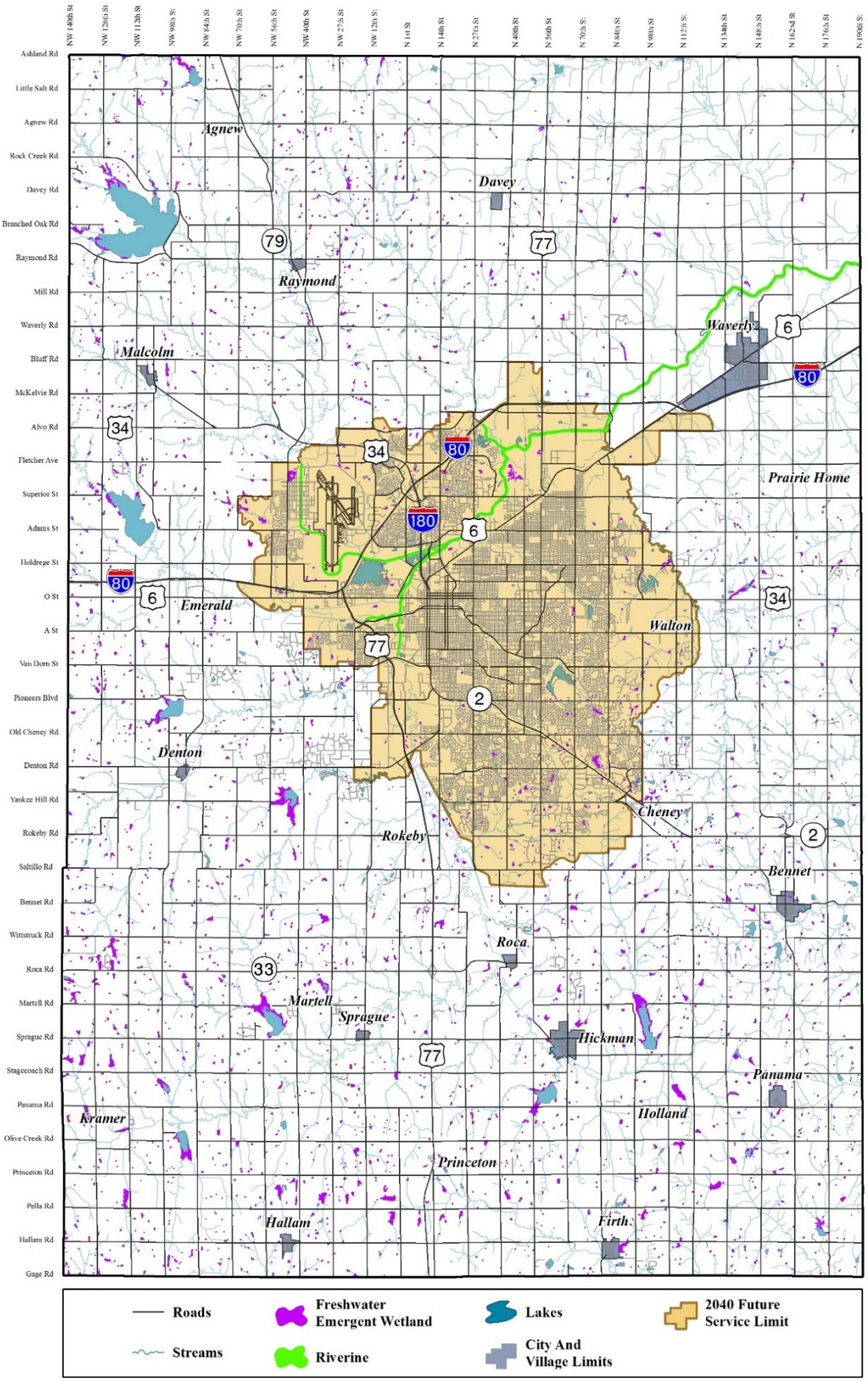


Figure 46. Freshwater Wetlands

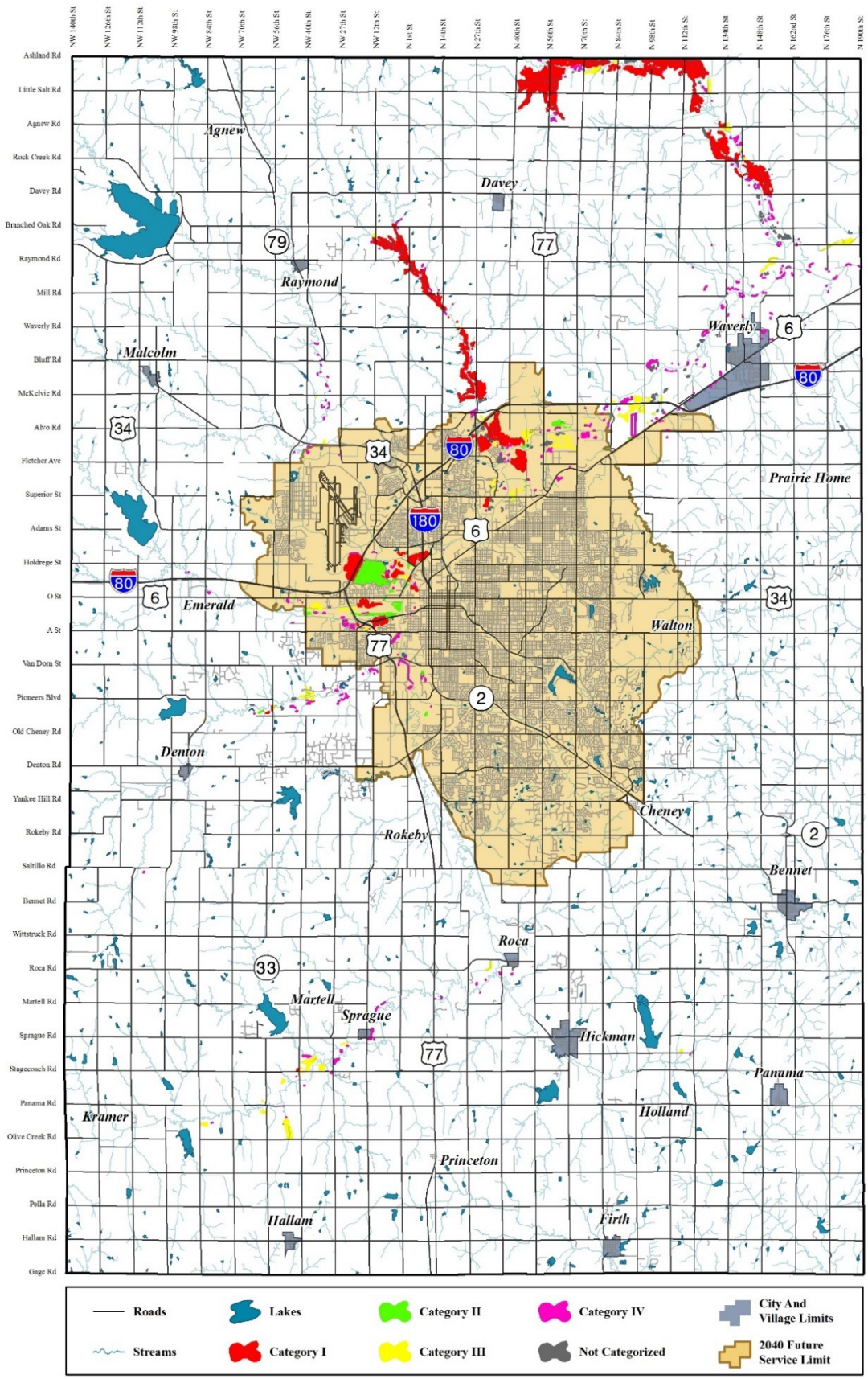


Figure 47. Saline Wetlands

The evaluation identified native prairies (**Figure 48**) using the NRGIS dataset, which used information from prairie inventories conducted in 1990 and 1997 (Lincoln-Lancaster County Planning Department 2001). Based on the resource assessment, 12 roadway and 3 trail projects would cross native prairies. Similar to other resources, impacts to prairies would be minimized through planning and design and could be mitigated through prairie restoration efforts.

Tree Mass

Tree masses are defined as various wooded areas, which are mostly located in the periphery of Lincoln, in public parks, or in rural areas. Trees are important because they provide habitat for wildlife, sustain soil stabilization, attenuate wind disturbance, and provide shade. Since 1976, the Arbor Day Foundation has designated the City of Lincoln as a "Tree City USA" (Lincoln Parks and Recreation 2016). Hickman and Waverly also hold the distinction of a "Tree City USA" (Arbor Day Website 2016).

The Lincoln Parks and Recreation Department Community Forestry Section is responsible for all trees on public property. Natural wooded areas are protected by the Fish and Wildlife Coordination Act and in some cases the Endangered Species Act, which are administered by USFWS and NGPC.

The evaluation identified tree mass areas (**Figure 49**) using the NRGIS dataset, which used information from updates in 2004 and 2007 (Lincoln-Lancaster County Planning Department 2001). The dataset primarily maps tree masses in rural, riparian, and park settings. Although many residential areas have tree-lined streets, these data were not available for the resource assessment. Based on the resource assessment, 52 roadway and 26 trail projects would cross tree mass areas.

Project construction could indirectly impact tree masses by altering the area hydrology through grade changes or by damaging roots through compaction. Where possible, tree removals would be minimized during planning and design. The use of retaining walls may minimize the effects of extensive grade changes. If tree removal is unavoidable, then replacement tree planting would be a suitable mitigation measure; however, special consideration should be given to the location and variety of re-planted trees. For example, the Lincoln Parks and Recreation Department Community Forestry Section provides several alternatives to replace ash trees (*Fraxinus* spp.) (Lincoln Parks and Recreation 2015) to minimize the spread and adverse impacts of the emerald ash borer (*Agrilus planipennis*) (Nebraska Emerald Ash Borer Working Group 2009).

Threatened and Endangered Species

Endangered species are plants or animals that are in danger of extinction throughout all or a significant portion of their range; threatened species are likely to become endangered within the foreseeable future. Conservation of threatened and endangered (T & E) species and their habitats help maintain the diversity and functioning of natural areas.

T & E species are protected by the Endangered Species Act and the Nebraska Nongame and Endangered Species Conservation Act, administered by USFWS and NGPC, respectively.

The evaluation used county lists from NGPC (2015) and the Information for Planning and Conservation (IPaC) website (USFWS 2016a) to collect information on the potential presence of T & E species and their habitat. Species ranges were obtained from mapping provided by NGPC. **Table 31** identifies the eight species listed as potentially occurring in Lancaster County.

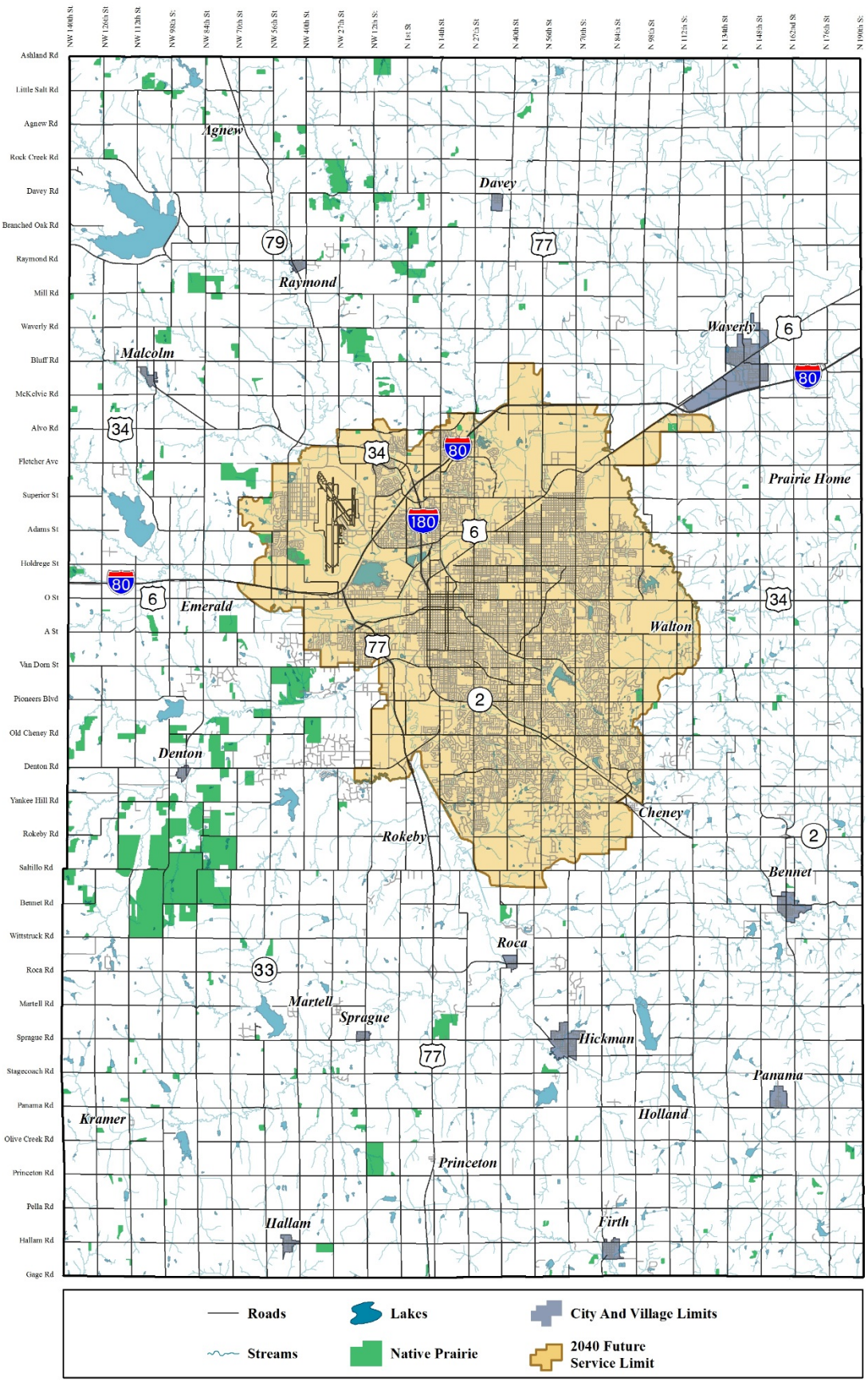


Figure 48. Native Prairie

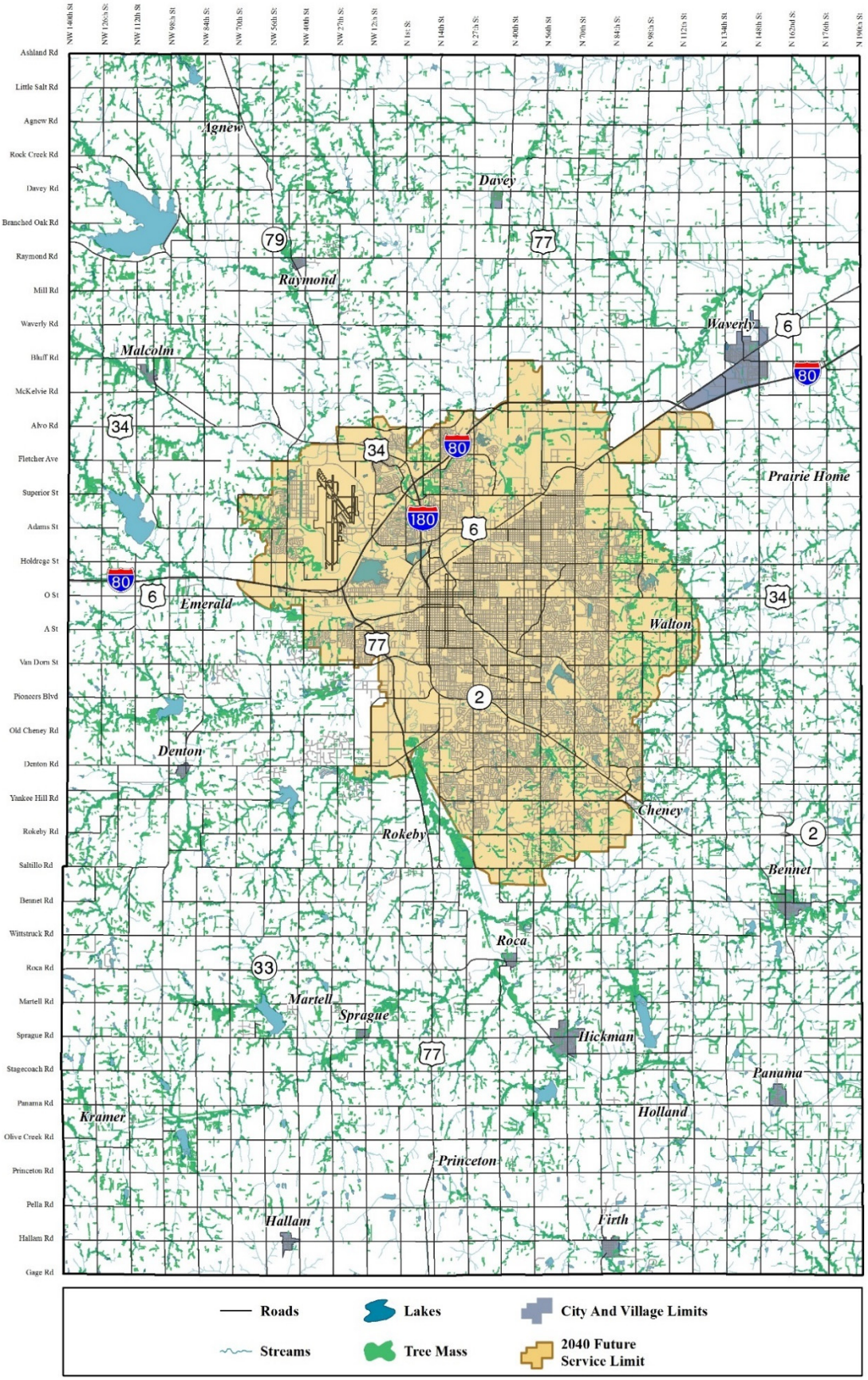


Figure 49. Tree Mass

Table 31. Threatened and Endangered Species Listed in Lancaster County

Common Name (Scientific Name)	Status[1]	Range within Lancaster County[2]
Birds		
Interior least tern (*Sternula antillarum athalassos)*	FE, SE	No
Piping plover (*Charadrius melodus*)	FT, ST	No
Whooping crane (*Grus americana*)	FE, SE	No
Fishes		
Pallid sturgeon (*Scaphirhynchus albus*)	FE, SE	No
Invertebrates		
Salt Creek tiger beetle (*Cicindela nevadica lincolniana*)	FE, SE	Yes
Mammals		
Northern long-eared bat (*Myotis septentrionalis*)	FT, ST	Yes
Plants		
Saltwort (*Salicornia rubra*)	SE	Yes
Western prairie fringed orchid (*Platanthera praeclara*)	FT, ST	Yes

[1]FE = Federally Endangered, FT = Federally Threatened, SE = State Endangered, ST = State Threatened

[2]Ranges provided by Nebraska Game and Parks Commission (NGPC 2015).

Only four of the species listed in **Table 31** have mapped ranges extending into Lancaster County. Although mapping indicates the extent of a species range, suitable habitat within that range may be limited. For example, the ranges of the northern long-eared bat and western prairie fringed orchid cover most of Lancaster County; therefore, the resource assessment indicated that all of the roadway and trail projects would occur within the ranges of those two species. However, the northern long-eared bat would likely occur only in areas with tree masses and low urban development (**Figure 50**) whereas the western prairie fringed orchid would likely occur in only rural areas with native prairie or wet meadows (**Figure 51**). Based on the resource assessment, 10 roadway and 7 trail projects would occur within the range of the saltwort (**Figure 52**), and 1 roadway and 2 trail projects occur within the range of the SCTB (**Figure 53**). As such, most of the Lincoln Future Service Limit Area does not contain suitable habitat for most of the species.

Each project would be evaluated for potential T & E presence using the Nebraska Biological Evaluation Process (NDOR 2013) to ensure that proper conservation measures are incorporated into the project planning and design to avoid and minimize impacts to T & E species or their habitat. If impacts are not sufficiently mitigated with the use of conservation measures, then further consultation with NGPC and USFWS would be required.

When possible, trails would be located outside sensitive habitats to avoid impacting T & E species. If design and planning considerations involve T & E conservation, then trails can provide educational signage and increase awareness.

T & E Critical Habitat

USFWS designation of critical habitat provides special protection to areas that are considered essential to species conservation. The SCTB is the only T & E species in **Table 31** with critical habitat occurring in Lancaster County. The SCTB is a sub-species that is endemic (i.e., not found in any other part of the world) to the remnant saline wetland ecosystems within the county. These beetles are an insect predator on saline mudflats and along the muddy stream banks of Salt Creek and its tributaries.

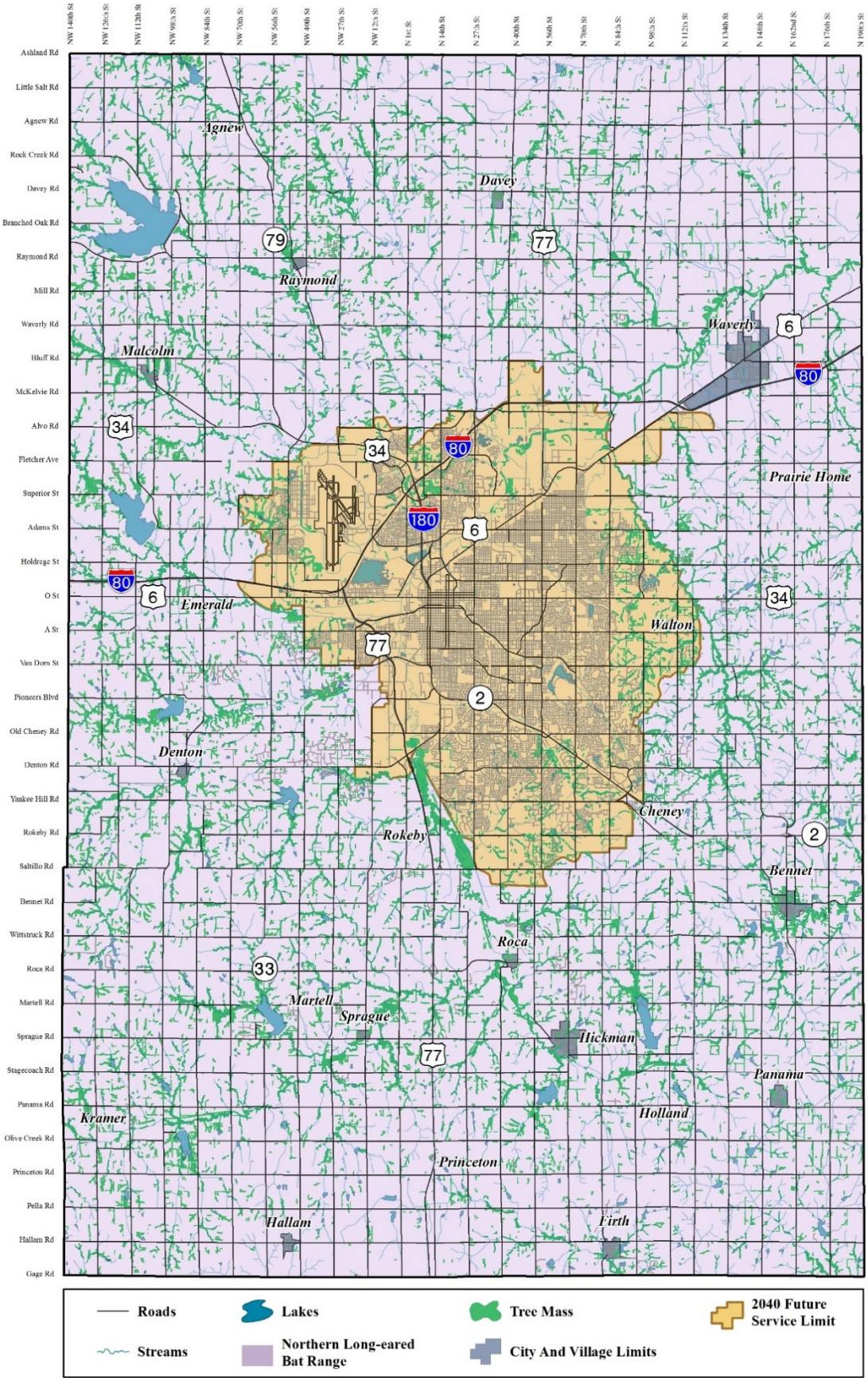


Figure 50. Threatened & Endangered Species: Northern Long-Eared Bat

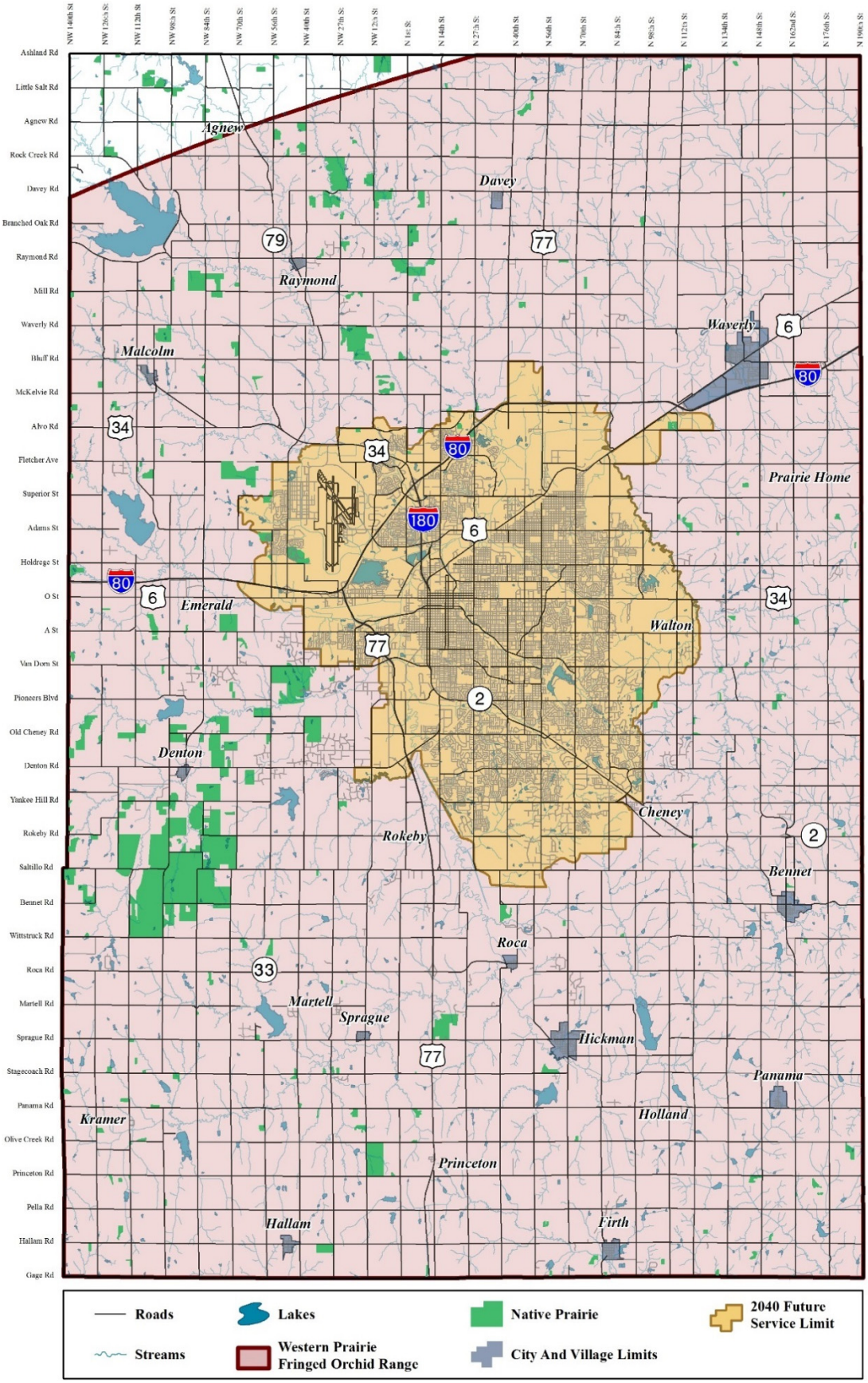


Figure 51. Threatened & Endangered Species: Western Prairie Fringed Orchid

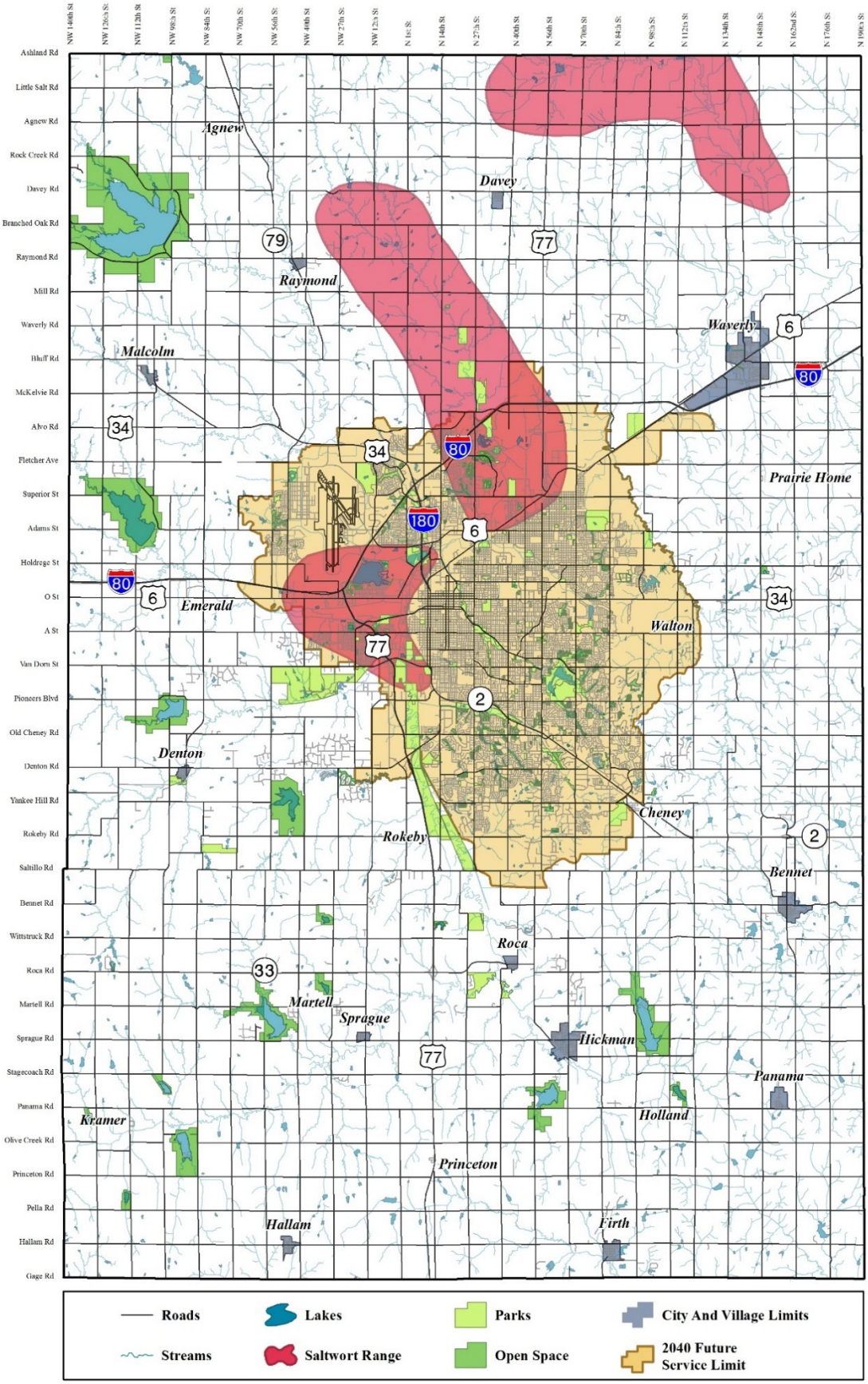


Figure 52. Threatened & Endangered Species: Saltwort

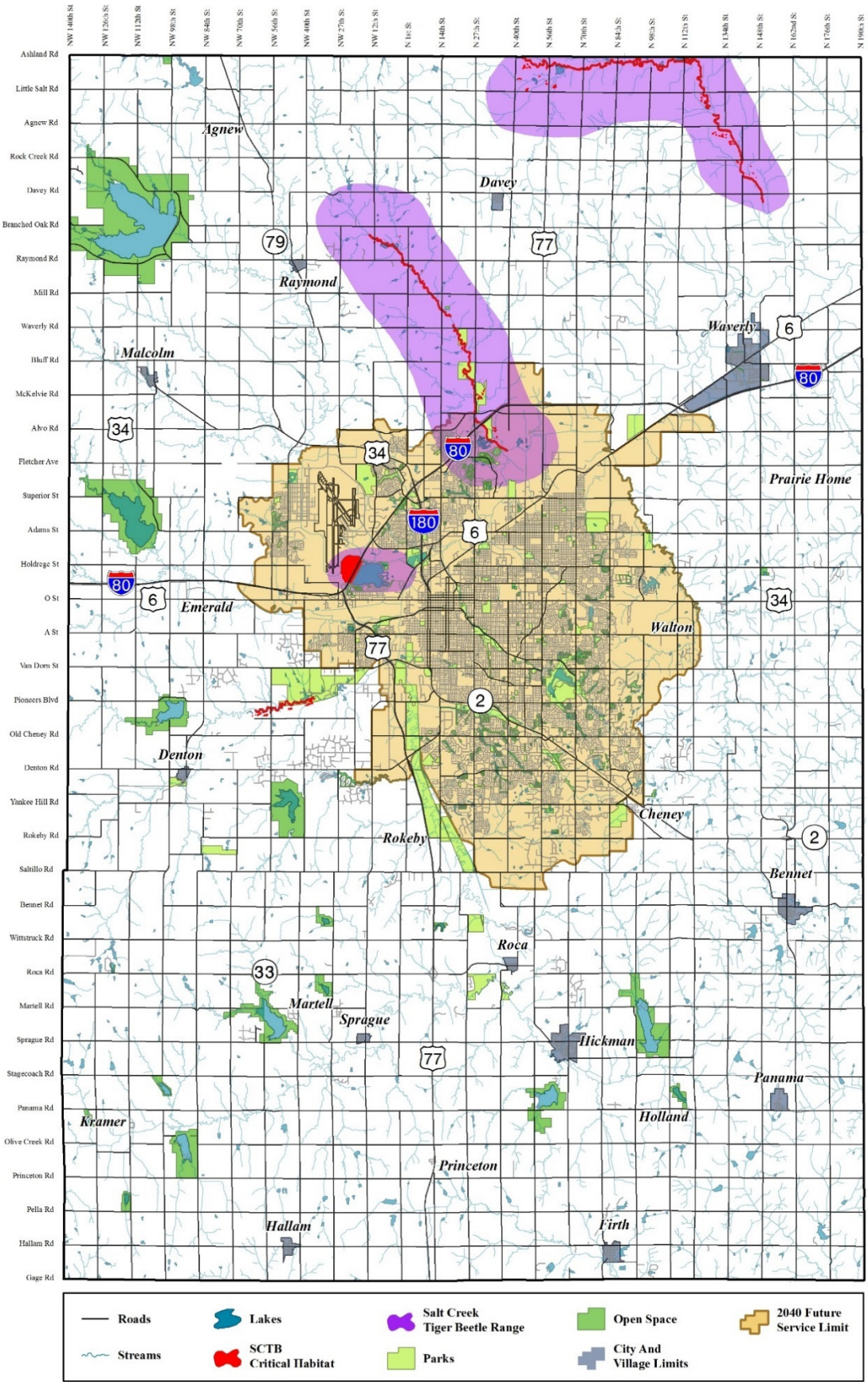


Figure 53. Threatened & Endangered Species: Salt Creek Tiger Beetle

Federal agencies are required to avoid destruction or adverse modification of designated critical habitat (USFWS 2015). Critical habitat for SCTB is protected by the Endangered Species Act, which is administered by USFWS.

Critical habitat was identified using data provided by USFWS (2016b). Based on the resource assessment, only 1 trail project would cross critical habitat for SCTB. To avoid, minimize, or mitigate impacts to SCTB critical habitat, coordination with USFWS would be initiated as early as possible during project planning.

Bald and Golden Eagles

Bald eagles use mature, forested riparian areas along large rivers and lakes throughout the state. There are several areas within Lancaster County with suitable habitat for bald eagles, such as at Branched Oak Lake and along Salt Creek. Golden eagles use shortgrass and mixed-grass prairie habitat in western Nebraska; therefore, no golden eagle habitat is present in Lancaster County.

Bald and golden eagles have specific protection under the Bald and Golden Eagle Protection Act (BGEPA), which is administered by the USFWS. This act prohibits the "taking" or possession of bald or golden eagles or their parts, feathers, nests, or eggs. The BGEPA also protects bald eagles from disturbances that may interfere with their normal behavior or cause abandonment of nests.

Specific habitat and ranges were not available for the roadway and trail project resource assessments; however, it is likely that much of the Lincoln City Future Service Limit Area does not contain suitable habitat for bald eagles because of the urban setting.

If bald eagles, bald eagle nests, or suitable habitat are found in a project area, then certain conservation measures, such as presence/absence surveys, would be implemented to help avoid impacts. A qualified biologist would conduct a survey prior to construction to determine the presence or absence of nesting/roosting eagles or bald eagle nests. The implementation of surveys ensures that no bald eagles nesting within the project area would be directly displaced from their active nest by construction activities. NDOR has developed an Avian Protection Plan (APP) to help avoid and minimize project impacts to bald eagles. The APP includes standard evaluation procedures and protocols for compliance with BGEPA (NDOR 2014).

Migratory Birds

Migratory birds are species that travel from one habitat to another at specific times of the year and often over long distances. These birds are important components of the ecosystems they migrate to and from because they help balance the food web, disperse seeds, and function in plant pollination. According to the USFWS IPaC website (USFWS 2016a), more than 24 species of migratory birds could use trees, shrub-scrub, wetland, stream, and grassland habitats within Lancaster County for breeding and nesting. Bridges and large culverts also provide habitat for various swallow species.

The Migratory Bird Treaty Act (MBTA) provides protection to most migratory birds in Nebraska. Under MBTA, construction activities that would otherwise result in the "taking" of migratory birds, eggs, young, and/or active nests should be avoided. Although the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Nebraska is from April 1 to September 1 and from February 1 to July 15 for raptors.

While specific habitat and species ranges have not been evaluated, general considerations can be applied to all roadway and trail projects in the LRTP to avoid or minimize impacts to migratory birds.

To avoid impacts to these species, construction activities would include certain conservation measures. Removal of vegetation in suitable nesting areas would occur outside the primary nesting season (i.e., April 1 to September 1) and when no

birds are actively nesting. (Note: Some may be ground nesting birds.) Work on bridges or culverts would also occur outside the primary nesting season. If removal of potential nesting habitat cannot be avoided during the primary nesting season, then a qualified biologist would survey prior to construction to determine the presence or absence of breeding birds and active nests. The NDOR APP includes standard evaluation procedures and protocols for compliance with MBTA, as well as BGEPA (NDOR 2014).

Water Quality and Watershed Master Plans

The protection of water quality is important because of the need for a reliable drinking water supply, for swimming and recreating, for fish and shellfish consumption, for adequate agricultural production, for fish and wildlife habitat, and for other beneficial uses. Clean water is pivotal in the protection of human health and the environment.

Watershed master plans are created to provide long-term planning tools and guidance to address water quality, flood management, and stream stability for sustainable urban growth in each major Lancaster County watershed. An important component of water quality management involves monitoring and managing pollutants in stormwater runoff. Stormwater runoff can carry sediment, nutrients, road salts, heavy metals, bacteria, oil, and other pollutants that deteriorate water quality within a watershed or adjacent wetlands.

City of Lincoln regulations are in place to address water quality, including post-construction stormwater management, stormwater best management practices, and Stormwater Pollution Prevention Plans (SWPPP) for erosion and sediment control. These regulations were developed to minimize adverse effects of pollutants entering waterways from stormwater runoff associated with the continued development of hard surfaces, such as roads, parking lots, sidewalks, and trails.

The Lincoln City Planning Department provided watershed master plans (**Figure 54**). Based on the resource assessment, 16 roadway and 10 trail projects would extend across areas with multiple completed watershed master plans. Additional coordination may be needed to adhere to each watershed master plan for those projects. Only 13 roadway and 6 trail projects would occur in areas without watershed master plans. In addition to using the watershed master plans, all future projects would need to develop SWPPP documents for erosion and sediment management.

Socioeconomic Environment

Public Use Properties

Parks and recreation resources are important community facilities that warrant consideration in the planning process. These public use areas include parks, open space areas, trails, and some school playgrounds that offer opportunities for recreation.

The Department of Transportation Act (DOT Act) of 1966 includes a special provision, Section 4(f), which stipulates that the Federal Highway Administration (FHWA) and other DOT agencies cannot approve the use of land from publicly owned parks, recreation areas, wildlife and waterfowl refuges, and public or private historical sites unless the following conditions apply:

- There is no feasible and prudent avoidance alternative to the use of land; and
- The action includes all possible planning to minimize harm to the property resulting from such use;

OR

- The Administration determines that the use of the property will have a *de minimis* impact.

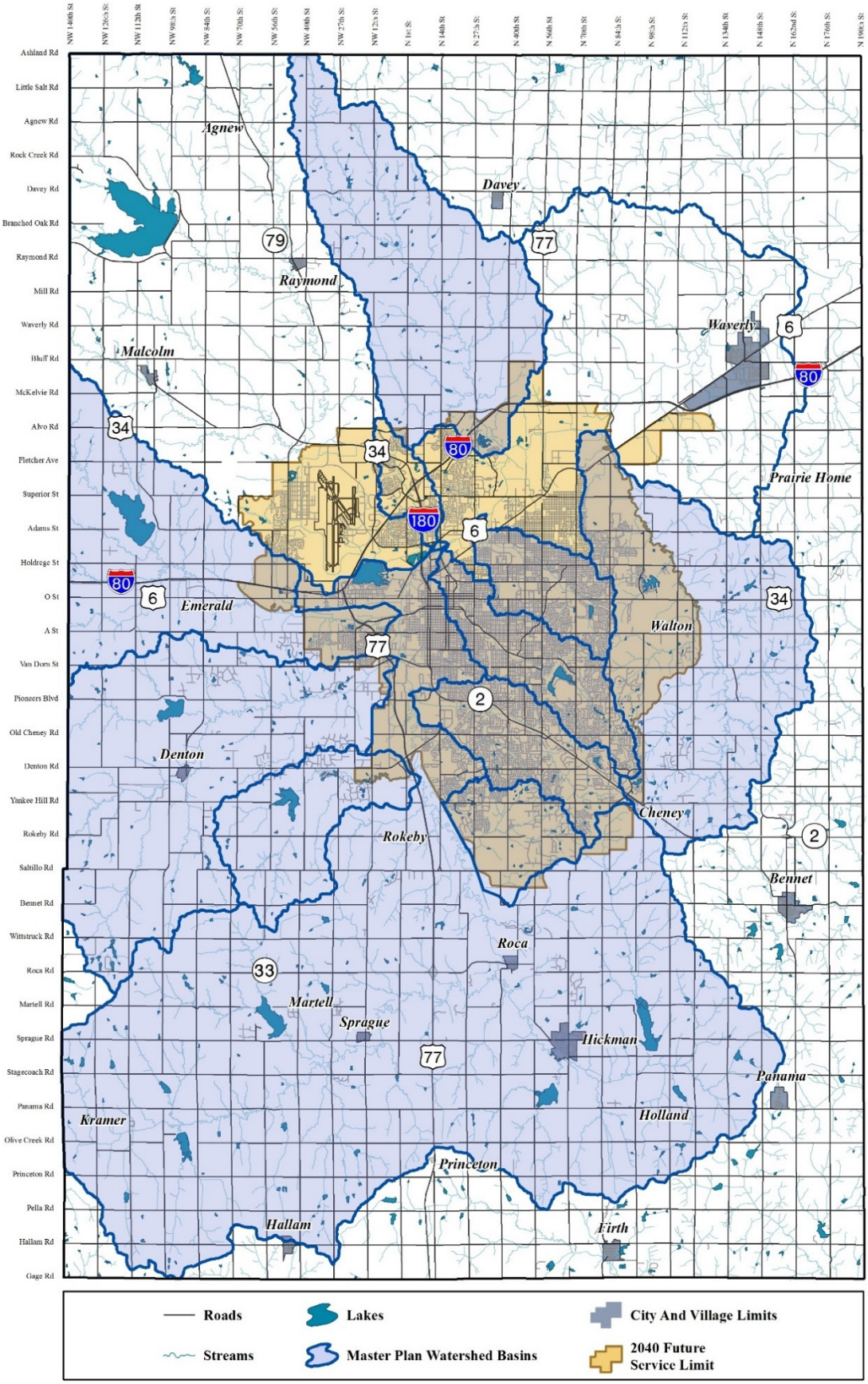


Figure 54. Master Plan Watershed Basins

In certain cases, school playgrounds may be considered Section 4(f) properties. Project activities that restrict access may also be considered a "use" under Section 4(f).

Recreation resources developed with federal funding through the Land and Water Conservation Fund (LWCF) are also protected under Section 6(f) of the LWCF Act, which prohibits the conversion of these properties to anything other than public outdoor recreation uses.

Parks, Open Space, and Trails

Parks, open space areas, and bike trail locations were identified using GIS data provided by the Lincoln-Lancaster County Planning Department (**Figure 55**). Each resource was evaluated as a potential Section 4(f) property. Based on the resource assessment, 43 roadway and 29 trail projects would potentially cross Section 4(f) properties.

Projects would require assessment of impacts on the activities, features, and attributes of the 4(f) resource. Depending on the type and size of the impact, as well as the type and size of the 4(f) resource, a number of options may be available to minimize harm to the property and resolve the impact, including programmatic evaluations, *de minimis* determinations, exceptions, and 4(f) statements.

School Playgrounds

While some school properties may not meet Section 4(f) criteria, the resource assessment identified all school locations using GIS data provided by the Lincoln-Lancaster County Planning Department. Based on the resource assessment, no roadway or trail projects cross school properties.

Environmental Justice

Title VI of the Civil Rights Act of 1964 (Title VI) ensures that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving Federal financial assistance on the basis of race, color, or national origin (42 United States Code [USC] 2000d et seq.). Executive Order 12898 on environmental justice directs that programs, policies, and activities not have a disproportionately high and adverse human health or environmental effect on minority and low-income populations (59 FR 7629).

On June 14, 2012, FHWA issued Order 6640.23A, Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which established policies and procedures for FHWA and state transportation agencies to use in complying with Executive Order 12898. The Order provided definitions for terms and concepts applicable to this type of analysis (**Table 32**).

To comply with Title VI and Executive Order 12898, the demographic characteristics within the City of Lincoln Future Service Limits were examined to determine if any of the proposed projects would disproportionately affect minority or low-income populations. The demographic and economic character of each Census Block Group was compared with that of Lancaster County and the City of Lincoln using the EPA's Environmental Justice Screening and Mapping Tool (EPA 2016), which uses data from the 2010 Census of Population and Housing (US Census Bureau 2010), or the 2014 Community Survey (US Census Bureau 2014b).

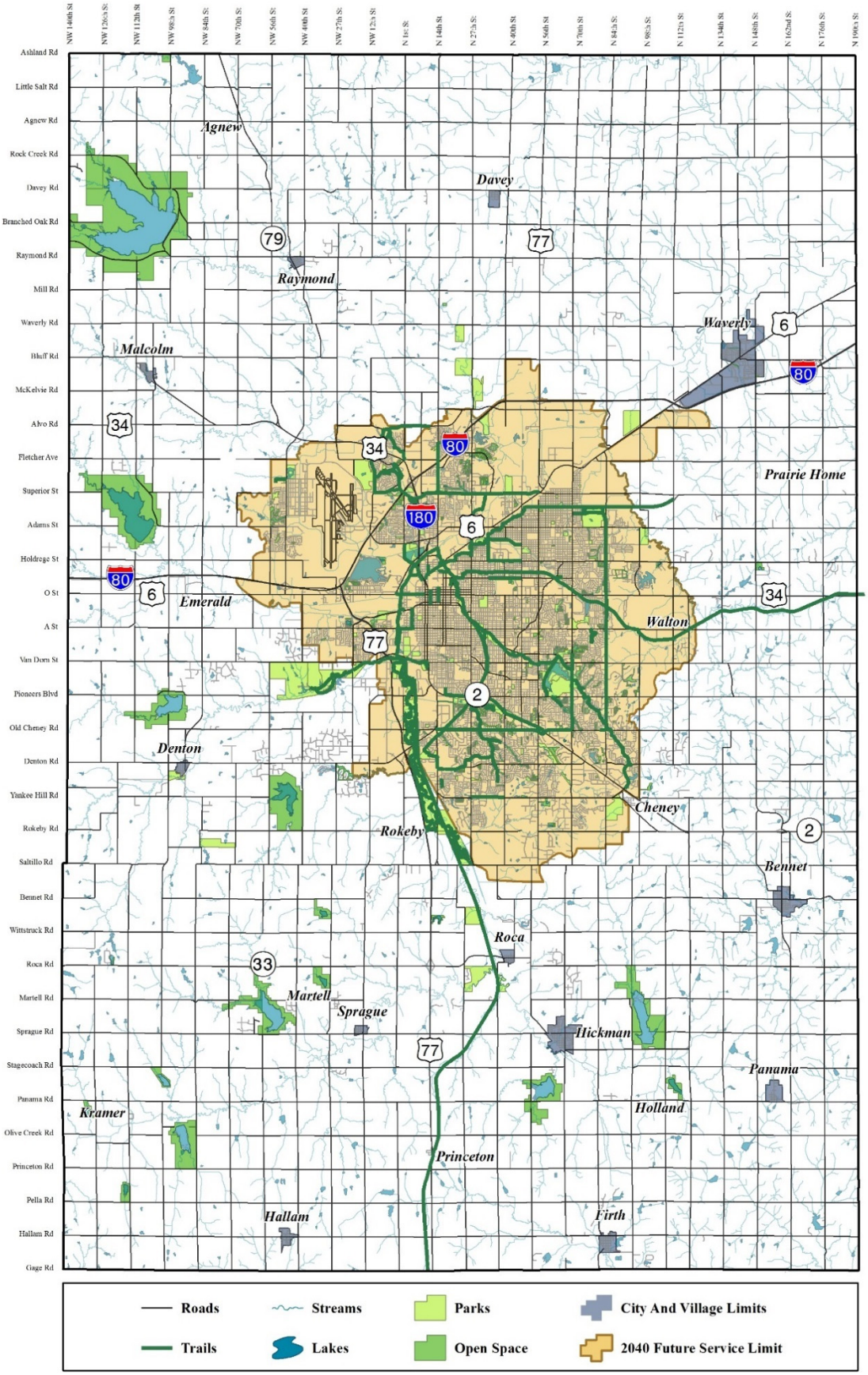


Figure 55. Parks, Trails, and Open Space

Table 32. Social Environment Definitions

Term	FHWA Definition
Adverse Effects	The totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to, bodily impairment, infirmity, illness or death; air, noise, and water pollution and soil contamination; destruction or disruption of human-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion, isolation, exclusion or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of, benefits of FHWA programs, policies, or activities.
Disproportionately High and Adverse Effect to Low-Income and Minority Populations	An adverse effect that: 1. is predominately borne by a minority population and/or a low-income population; OR 2. will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population.
Minority	A person who is: 1. Black: a person having origins in any of the black racial groups of Africa; 2. Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race; 3. Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia or the Indian subcontinent; 4. American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; OR 5. Native Hawaiian and Other Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa or other Pacific Islands.
Low-Income Person	A person whose median household income is at or below the Department of Health and Human Services poverty guidelines. (Note: The US Department of Health and Human Services does not publish tabulations of the number of people below the DHHS poverty guidelines, which are a simplified version of the federal poverty thresholds. The federal poverty thresholds are used to calculate all official poverty population statistics and are updated annually by the Census Bureau. The best approximation for the number of people below the DHHS poverty guidelines in a particular area is the number of persons below the Census Bureau poverty thresholds in that area.)
Minority Population	Any readily identifiable group of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy, or activity.
Low-Income Population	Any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy, or activity.

Census Block Group data were used to determine whether or not roadway or trail projects would occur within low-income or minority population areas. A threshold to identify both the minority populations and low-income populations was established by determining the City and County average and using the lower percentage of the two measures. For example, the minority population threshold was determined to be 17.2 percent for Lancaster County and 16.9 percent for the City of Lincoln; therefore, the assessment threshold was 16.9 percent. The low-income population threshold was determined to be 14.0 percent for Lancaster County and 16.2 percent for the City of Lincoln; therefore, the assessment threshold was 14.0 percent. Low-income and minority populations are shown on **Figure 56** and **Figure 57**, respectively.

Based on the resource assessment, 24 roadway and 12 trail projects would occur within a block group above the minority population threshold. Forty-seven roadway and 28 trail projects would occur within a block group above the low-income population threshold.

Projects located in areas that exceed the threshold would likely need additional project-specific coordination during project planning and implementation. Requirements would vary based on funding for the projects (e.g., federal-aid or local funds).

Cultural Environment

The cultural environment consists of historic resources, including historic standing structures, historic districts, and archeological sites. These resources are important because they add value to a community's sense of culture and provide a tangible link with the past.

Historic resources encompass man-made features and physical remains of past human activity. These resources are generally at least 45 years old (properties constructed in 1970 or earlier), and include buildings, bridges, railroads, roads, other structures, landmarks, and archeological sites. Section 106 of the National Historic Preservation Act of 1966 requires evaluation of project effects on historic properties that are on, or eligible for, the National Register of Historic Places (NRHP). Criteria for determinations of eligibility are set forth in 36 CFR Part 60.4 (70) and are described in National Register Bulletin How to Apply the National Register Criteria for Evaluation (36 CFR Part 60). For a property to be determined eligible, it must meet at least one of the NRHP criteria for historic significance and retain a high degree of historic integrity.

- Historic significance may be present in one of four categories: (1) important historic events; (2) significant people in history; (3) significant architecture, design, or property type; and (4) potential to yield important historic information.
- Historic integrity is characterized by one of seven aspects defined by the NRHP: (1) location, (2) design, (3) setting, (4) materials, (5) workmanship, (6) feeling, and (7) association. In general, a property will always possess several, and usually most, of these aspects.

Records searches were conducted with the City of Lincoln, Nebraska State Historic Preservation Office (SHPO), and Nebraska State Historical Society Highway Archeology Division to identify known historic sites, historic districts, and archeological sites previously surveyed, recommended NRHP eligible, listed in the NRHP, or listed as local landmarks.

Historic Sites

The records search identified 146 historic sites located within Lancaster County. Based on the resource assessment, 2 roadway and no trail projects would cross historic sites. These sites would also be considered Section 4(f) properties.

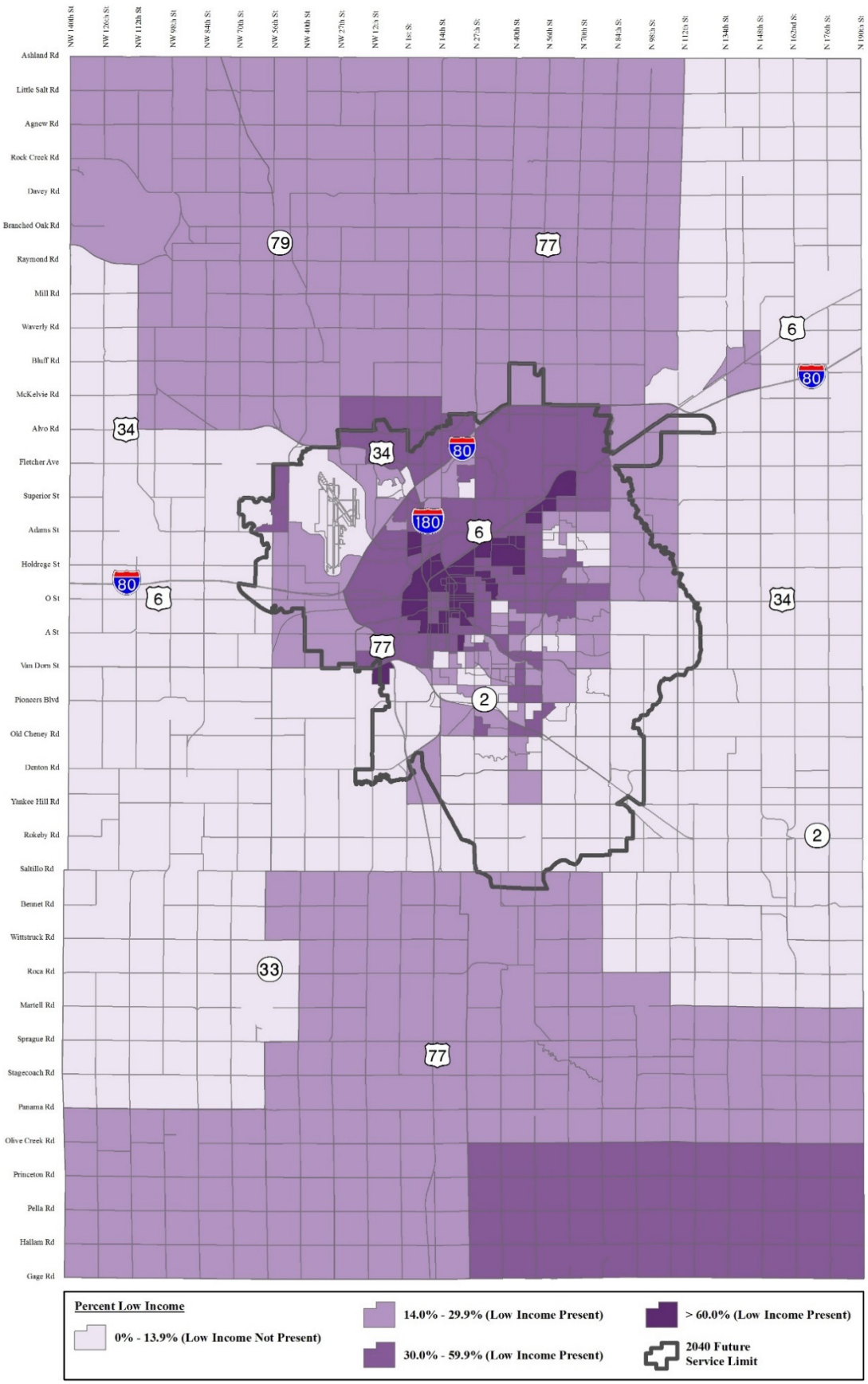


Figure 56. Low-Income Population

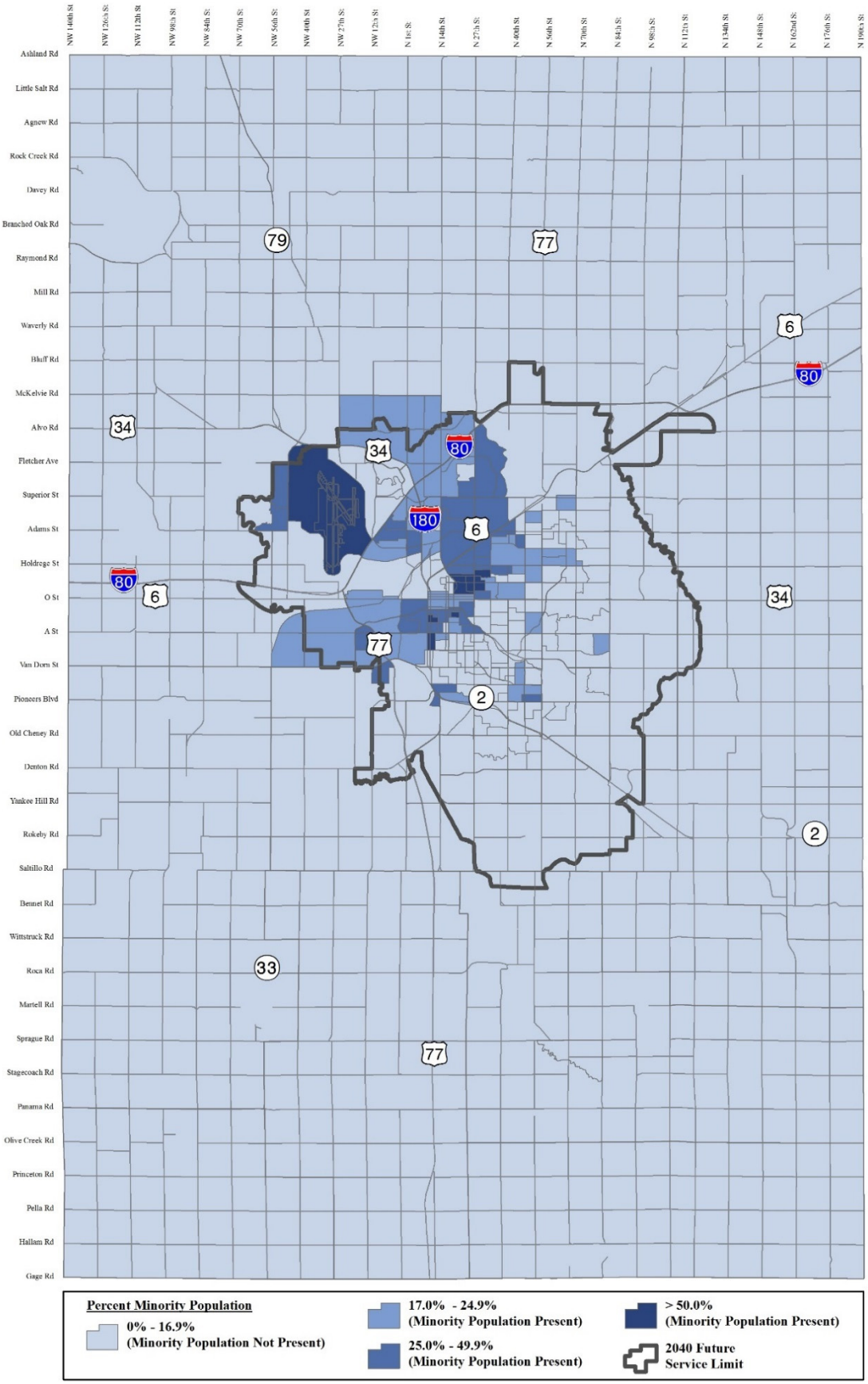


Figure 57. Minority Population

Historic Districts

The records search identified 18 historic districts located within the Lincoln future service limit. Based on the resource assessment, no roadway or trail projects would cross historic district areas.

Archeological Sites

The locations of archeological sites are not readily available to the public and would be addressed when a specific project moves forward.

Each project would require consultation with Nebraska SHPO during planning, including possible surveys for historic standing structures and archeological sites, and assessment of eligibility. Avoidance and minimization of impacts, and mitigation if needed, would be situational and likely different for each project but could consist of vibration restrictions or modifications to design plans to avoid specific structures or areas.

Agency Coordination

This document has been provided to the following environmental, socioeconomic, and cultural agencies for review and comment to comply with FAST Act requirements.

Environmental Agencies

1. Lower Platte South NRD
2. Lincoln Parks and Recreation
3. Sustainability Coordinator for City of Lincoln
4. Lincoln Watershed Management Division of Public Works and Utilities
5. Nebraska Game and Parks Commission
6. Nebraska Department of Environmental Quality
7. US Army Corps of Engineers
8. Nebraska Department of Natural Resources
9. US Fish and Wildlife Service
10. Natural Resource Conservation Service
11. Mayor's Environmental Task Force
12. County Ecological Advisory Committee
13. Nebraska Land Trust
14. The Nature Conservancy Nebraska Field Office
15. University of Nebraska Foundation (Nine-Mile Prairie Director)
16. Lower Platte River Corridor Alliance
17. Nebraska Environmental Trust
18. Wachiska Audubon Society
19. Nebraska Audubon
20. Nebraska Chapter Sierra Club
21. Nebraska Chapter Bluestem Group
22. Nebraska League of Conservation Voters
23. Friends of Wilderness Park
24. Great Plains Trails Network
25. Joslyn Castle Institute

Socioeconomic and Cultural Agencies

1. Human Services Federation
2. Lincoln Housing Authority
3. NE Commission for the Blind and Visually Impaired
4. Lancaster County Health Board
5. Lancaster County Human Services
6. NeighborWorks Lincoln
7. Malone Center
8. The Indian Center
9. The Mexican American Commission
10. The Asian Cultural and Community Center
11. El Centro de las Americas
12. Nebraska Commission on Indian Affairs
13. People's City Mission
14. Community Action Partnership
15. Center for People in Need
16. NAF Multicultural Human Development Corporation
17. Nebraska State Historical Society
18. Historic Preservation Planner, Lincoln-Lancaster County Planning Department

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