chapter 2

LAND USE, ENVIRONMENTAL RESOURCES, & ENERGY

A basic goal of this comprehensive plan for Cuming County is to develop policies that balance environmental values and reasonable development demands. These policies are designed to permit appropriate development in a way that conserves the county's most important natural resources and assets.

This section examines existing land use characteristics in Cuming County, outside of the municipalities, and identifies and maps vital environmental assets. The analysis of these resources will help determine policies that will ultimately guide land use decisions.

LAND USE, ENVIRONMENTAL RESOURCES, AND ENERGY AND SUSTAINABILITY

Land Use

Cuming County is, first and foremost, a county whose economic lifeblood springs from the economic premise of agricultural production. To this end, the vast majority of land within the county is put to this purpose, whether realized through the production of crops for animal feed or human consumption, small-scale family farming, or larger scale confined animal feeding operations. For the purposes of this plan, land used for agricultural operations is divided into several types: General Agricultural, Wet Agricultural, and Intensive Agricultural.

- General Agricultural. These lands are typically crop land which is not irrigated. Frequently, these areas are used for growing animal feed or other silage.
- Wet Agricultural. These lands are typically either pivot irrigated or exist at a low point without external drainage, which naturally creates an especially wet growing environment.
- Intensive Agricultural. These lands are generally used for confined animal feeding operations of various sizes. These operations generally have significant external effects both environmentally and aesthetically.

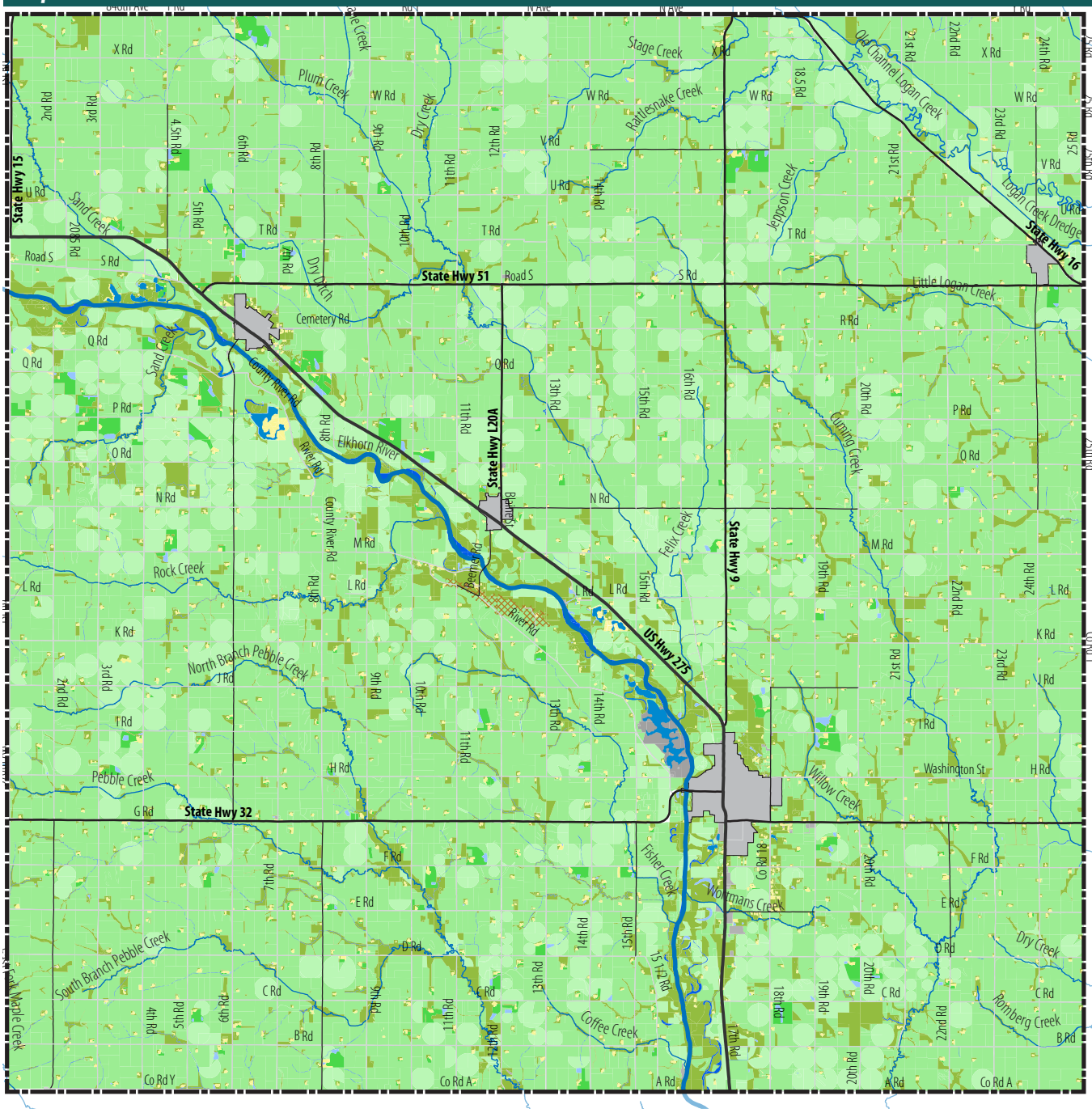
Land uses beyond agricultural production in the areas outside the communities in Cuming County are extremely limited.

- Residential. Naturally, there are some areas used for housing. Areas designated for residential in the rural areas of the county are generally the farmsteads, housing around rural lake developments, and large lot acreage housing developments.
- Commercial. There are, most certainly, commercial operations in Cuming County. However, the vast majority of these land uses are located within the boundaries of one of the cities or villages, and are not part of the countywide land use analysis.
- Industrial. Although there are some industrial facilities within Cuming County, like the commercial land uses, they are predominantly located within the boundaries of one of the cities or villages.
- Greenway. Along streams and other watercourses, and in areas where slopes and soil types make cultivation impractical, areas of land have been overtaken by grassland and stands of trees.
- Quarry/Material Production. Areas of the county are in active use as quarries, both in the mining of sand and stone. These sites generate some external effects, most notably in sound, dust, and heavy truck traffic. As the productive capacity of these sites becomes exhausted, some may be adapted into lake residential developments.
- Roads. Although roads are not typically considered a land use, they do in fact consume land. In the areas outside of the communities, roads actually account for a greater percentage of land use than residential uses.
- Water and Floodplains. Given that it is home to a portion of the Elkhorn River, as well as many of its tributaries, watercourses and water resources are very important to the character and development pattern in Cuming County.

Environmental Attributes and Resources

Cuming County has a diversity of landscapes. Although primarily consisting of gently rolling hills, the county is also home to some marshy lowlands, and bluffs. These landscapes host numerous environmental resources, many of which come to bear when determining the future pattern of land development and which create or curtail opportunities for economic development. These resources include the county's waterways, its landscape topography and soil types, its subterranean material resources, and its supply of groundwater.

Map 2.1: Current Land Use



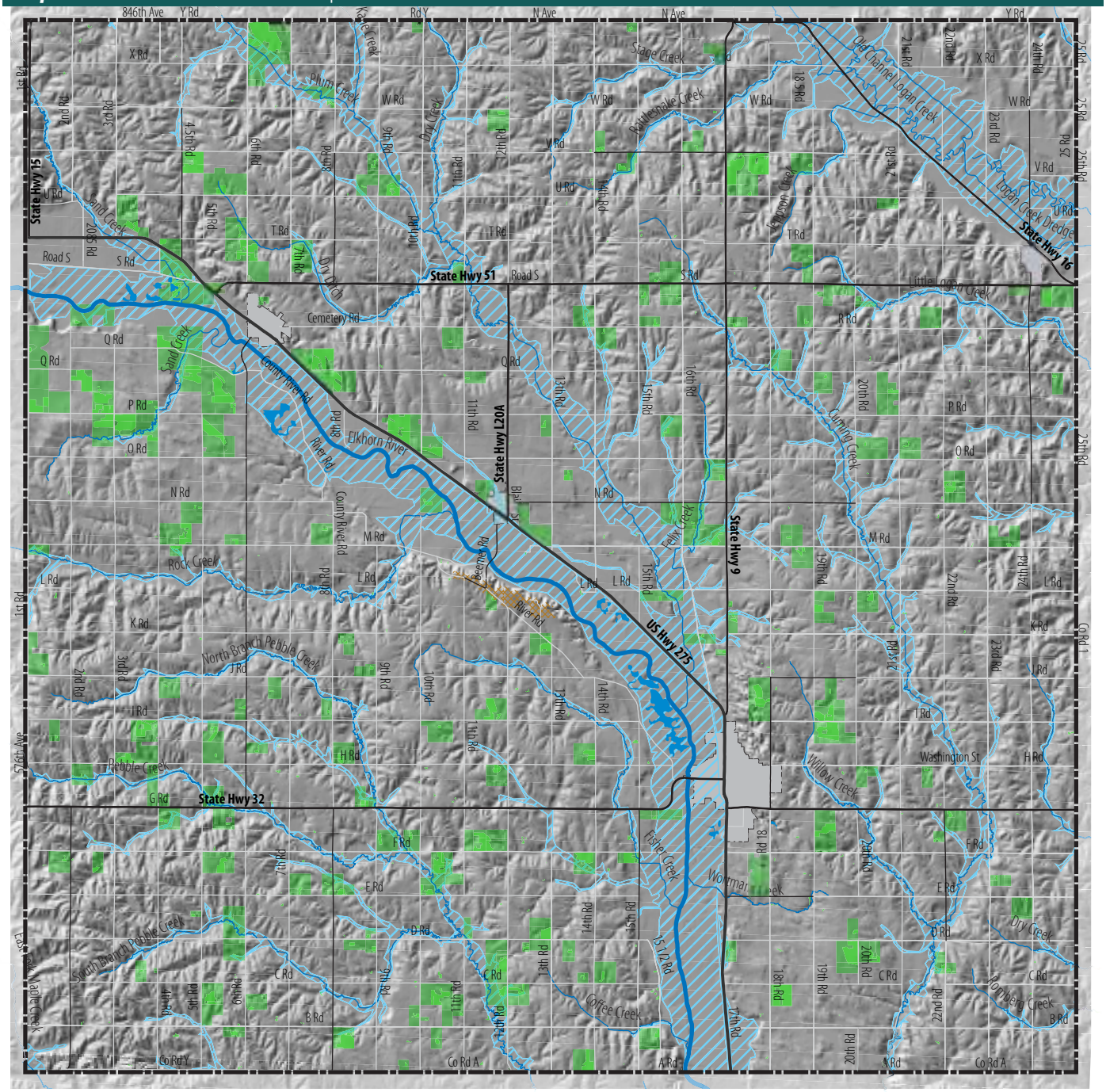
Map X.X

September 2013

Current Land Use

- County Boundary
- Elkhorn River
- Creeks
- Major Lakes
- City Boundaries
- Paved Roads
- Gravel Roads
- Intensive Agriculture
- General Agriculture
- Irrigated & Wet Crops
- Residential
- Gravelpits

Map 2.2: Environmental Composite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State Hwy L20A
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US Hwy 275
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Elkhorn River
Logan Creek
Old Channel Logan Creek
Logan Creek Dredge
Little Logan Creek
Stage Creek
Battlesnake Creek
Plum Creek
Dry Creek
Sand Creek
Cemetery Rd
County River Rd
River Rd
Rock Creek
North Branch Pebble Creek
Pebble Creek
South Branch Pebble Creek
East Branch Maple Creek
Cuming Creek
Willow Creek
Washington St
Estes Creek
Wormans Creek
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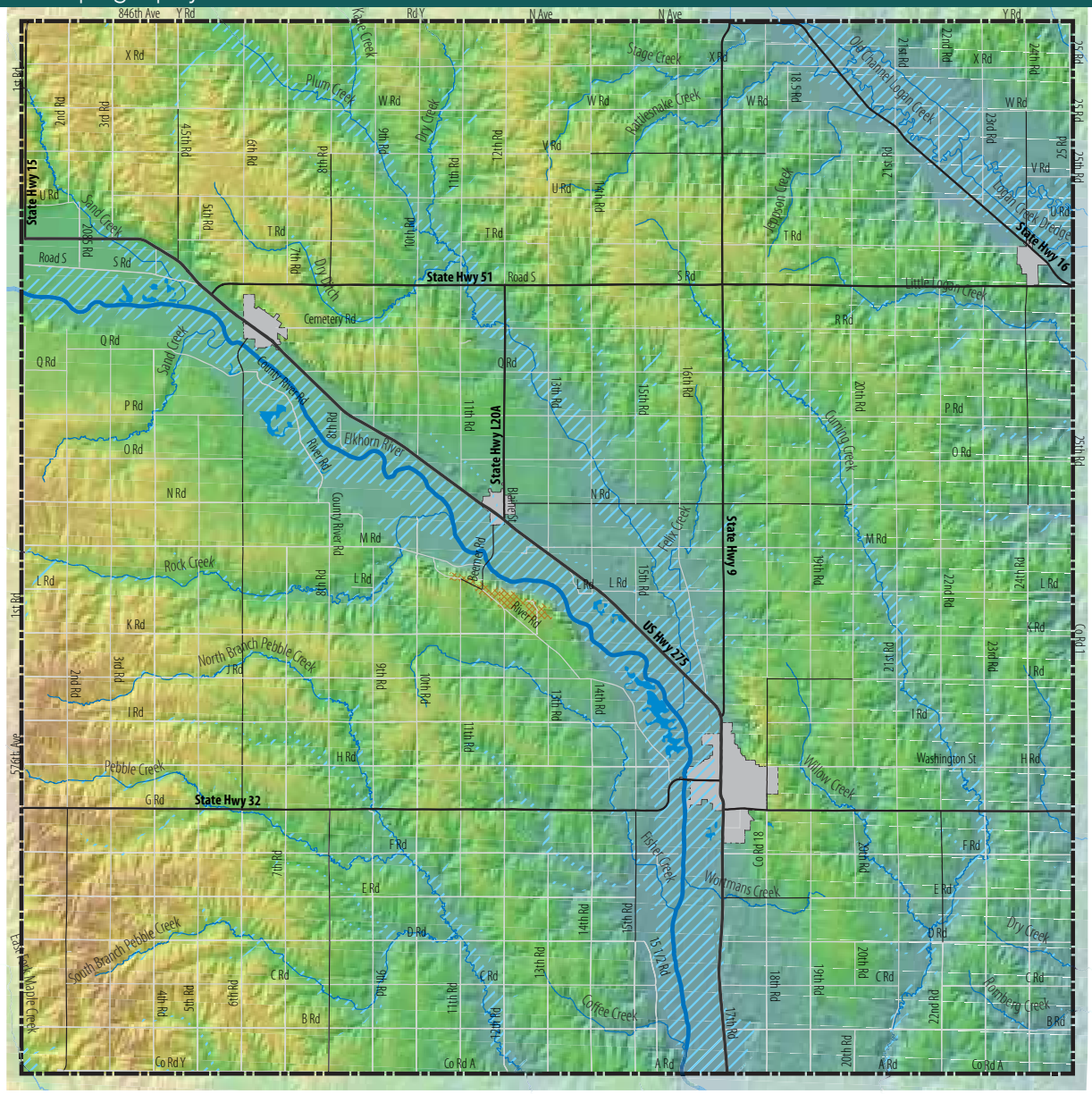
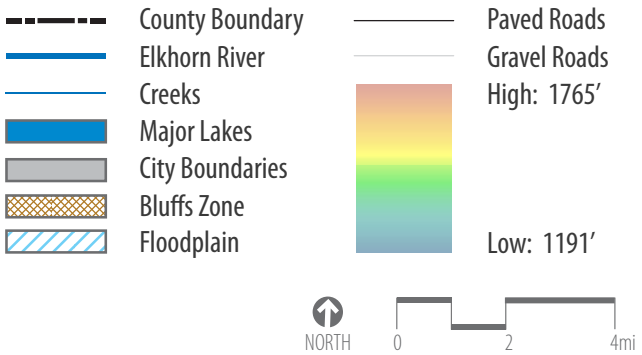
Map 2.3: Topography

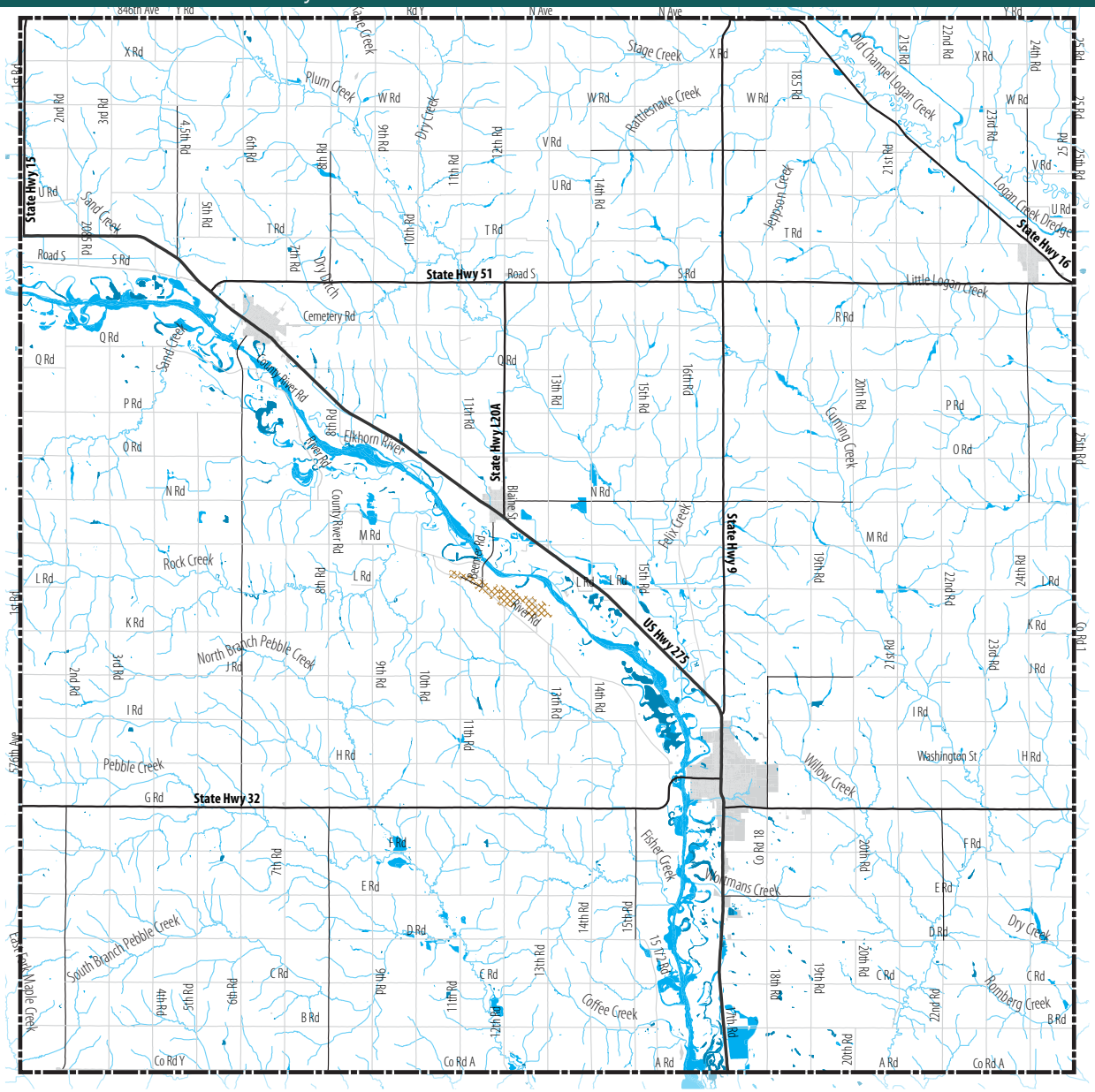


Topography

The topography of Cuming County is composed of rolling hills, sculpted first by ancient glaciers and, more recently, by the erosion and deposition of moving wind and water. This topography creates challenges to both development and agriculture in some places, as slopes can become steep and give way to drainage ways. In some areas, the landscape creates natural basins which tend to trap and retain rainwater. This lends itself to areas that feature soil which, while fertile, frequently flood and remain damp long after a rain event.



Map 2.4: Rivers and Waterways



Water

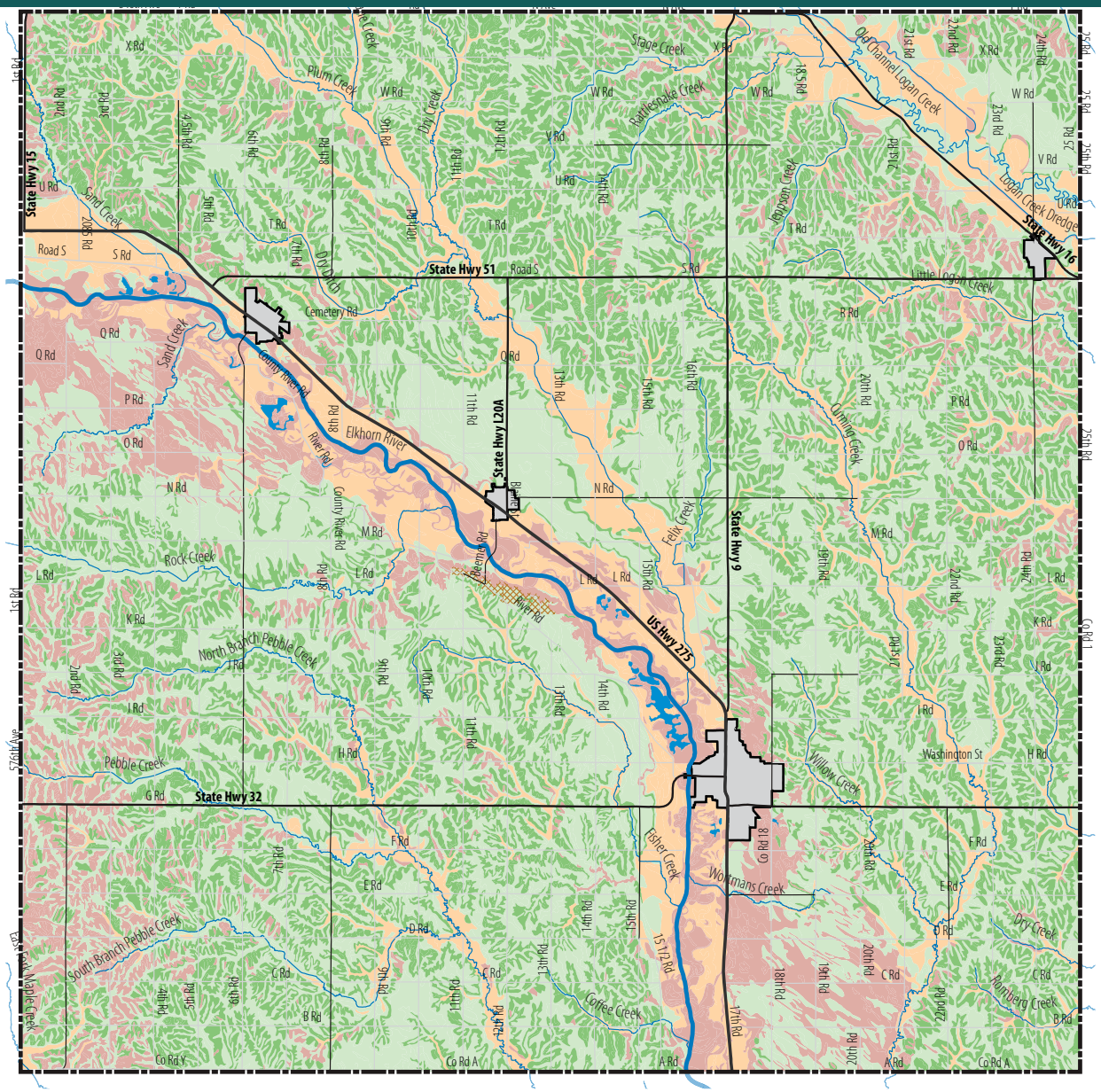
Water is an important natural resource in Cuming County. Fortunately, the county has a strong supply of water both in groundwater and a number of waterways. The Elkhorn River is, by far, the most significant of these waterways and provides the area's primary landscape feature.

The county is also home to a number of creeks and water-courses that serve as tributaries to the Elkhorn River. Some are persistent bodies of water, others are creek beds and drainage ways that fill during significant rain events, but otherwise remain dry beds, buffered by vegetation.

- County Boundary
- River
- Rivers & Streams
- NHD Waterbody
- City Boundaries
- Bluffs Zone
- Paved Roads
- Gravel Roads

NORTH 0 2 4mi

Map 2.5: Soil Resources



Landscape and Soil

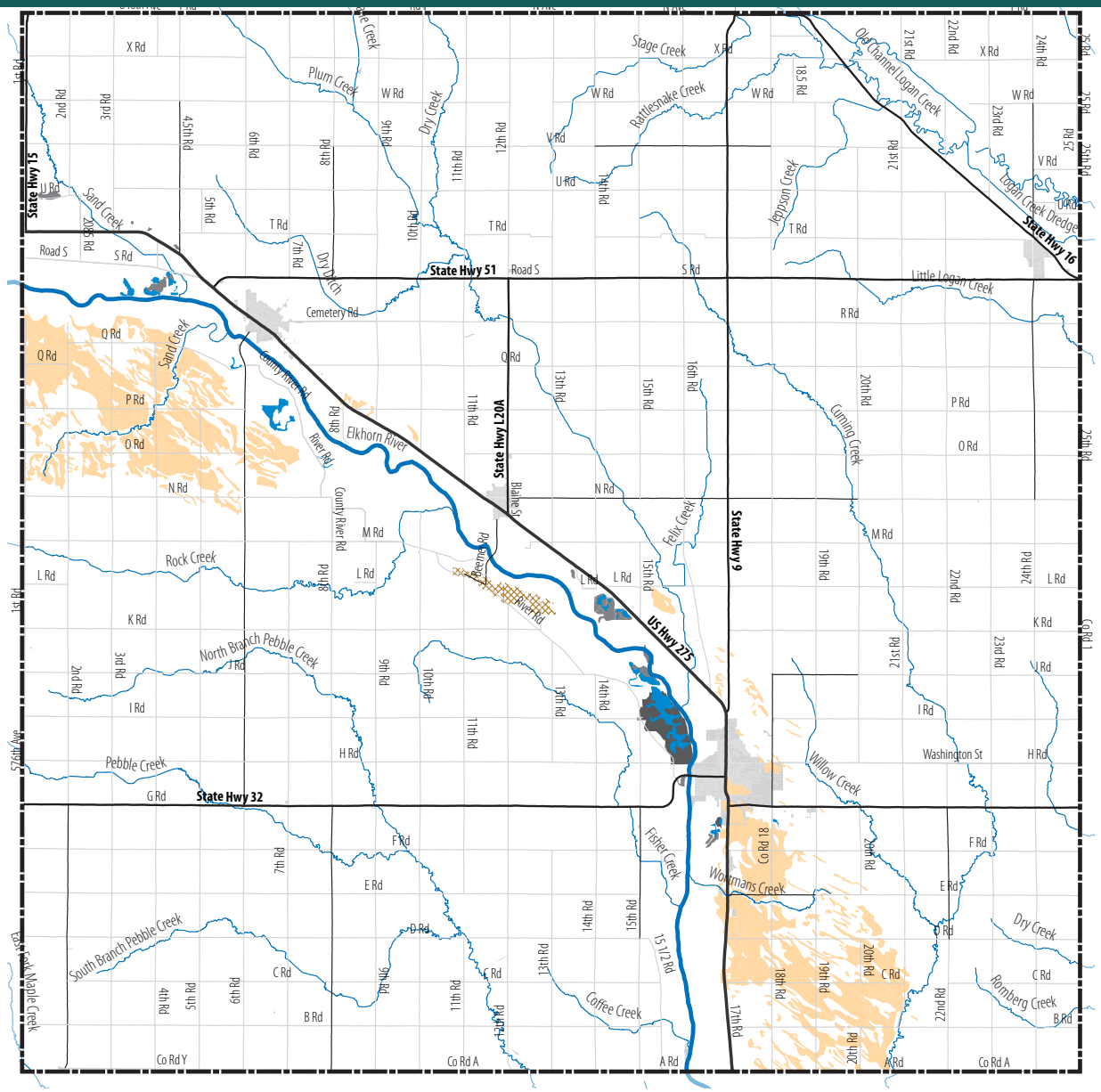
Given its wealth of fertile and arable land, it is not surprising that agriculture has been a dominant industry in Cuming County.

A few areas of the county are notable for having less than ideal soil for agriculture, these areas are immediately south of the Elkhorn River, near the county's western border, and immediately east of the Elkhorn River, near the county's southern border. Often, these lands are put to use for more intensive agricultural uses, such as confined animal feeding operations or for material production.

- County Boundary
- Elkhorn River
- Creeks
- Major Lakes
- City Boundaries
- Bluffs Zone
- Paved Roads
- Gravel Roads
- Farmland of Statewide Importance
- Prime Farmland
- Prime Farmland if Drained
- Not Prime Farmland

NORTH 0 2 4mi

Map 2.6: Sand & Gravel Resources



Subterranean Stone and Sand

Cuming County is also home to sand and gravel mining operations. These operations provide necessary material for construction projects around the region while helping to create diversity in the local economy.

Additionally, once mining is terminated on these sites, many of these areas have potential for residential development as lake-oriented neighborhoods. Although there are some of these mining sites currently in operation, it is not anticipated that the industry will expand significantly in the future.

- County Boundary
- Elkhorn River
- Creeks
- Major Lakes
- City Boundaries
- Bluffs Zone
- Paved Roads
- Gravel Roads
- Gravel Pit
- Gravel Soils
- Sandy Soils

NORTH 0 2 4mi

Energy Use and Conservation

This section evaluates Cuming County's metrics relating to energy consumption relative to communities statewide. Additionally, programs and policies which help to improve energy and resource conservation are addressed.

Nebraska is fortunate to have low-cost access to a wide range of both conventional and renewable energy resources. In part, this is a result of Nebraska's system of public utility districts. Since these districts operate in the public interest rather than under the motivation of profit, they are frequently willing to reinvest in their infrastructure and energy innovation. This also enables the management of a utility to be more responsive to the needs and desires of their customers, since they will, more often than not, be members of the same community.

For the purposes of this section we will consider Cuming County's energy usage in the context of its three primary sectors of land use: the residential, commercial, and industrial sectors. For the residential, commercial, and industrial sectors, a net total or net energy consumption (less electrical system energy losses) is provided to indicate the energy actually consumed by these sectors. In addition, energy consumed in the generation, transmission, and distribution of electricity (electrical system energy losses) is allocated to each sector based on the electricity consumed by the sector. Thus, total energy consumption represents the energy consumed by the sector as well as that used to provide electricity to the sector.

Energy Use by Sector

Given that different parts of Cuming County are served by different utility providers and systems, detailed energy consumption statistics for the area are not available. Statistics provided are statewide data from the Nebraska Energy Office.

Residential:

The residential sector consists of private households. Energy is consumed primarily for space heating, water heating, air conditioning, refrigeration, cooking, clothes drying, and lighting. Fuel used for motor vehicles by household members is included in the transportation sector.

In 2011, 47.0% of the residential sector's energy needs were met by natural gas, 39.7% of the energy consumed in the residential sector was electricity, 9.6% were petroleum products, and 3.8% was renewable energy. According to the 2011 American Community Survey, 64% of Nebraska's households used natural gas for home heating, 25% used electricity, 8% used propane, 1.3% used wood, 0.62% used heating oil, 0.005% used coal, and 0.01% used solar energy.

Commercial:

The commercial sector consists of business establishments. Included are hotels, motels, restaurants, wholesale businesses, retail stores, laundries, and other service enterprises; health, social, and educational institutions; and federal, state, and local governments. Streetlights, pumps, bridges, and public services are also included. Examples of common uses of energy in the commercial sector include space heating, water heating, refrigeration, air conditioning, and cooking. In 2011, almost all (96%) of the commercial sector's energy needs were met by natural gas and electricity. Petroleum products made up 3.2% of the energy consumed in the commercial sector, and 1.1% was renewable energy.

From 2010 to 2011, commercial sector net energy use decreased 2.3% to 66.6 trillion British thermal units (Btu). Total energy use in the sector decreased 3.8% to 135.8 trillion Btu. Petroleum use decreased 6.1% although it comprises only 3.2% of the energy used by the commercial sector. Renewable energy use decreased 40% and electricity use decreased 4.1% from 2010 while natural gas use increased 1.1%.

Industrial:

The industrial sector consists of manufacturing, construction, mining, agriculture, and forestry organizations. Energy used by this sector to transport products to market or inputs to the organizations is included in the transportation sector.

In 2011, almost all of the industrial sector energy needs were met by renewable energy (38.9%), natural gas (30.0%), electricity (12.4%), and petroleum products (12.2%). Six point five (6.5)% of the energy consumed in the industrial sector was coal. The majority of the petroleum products consumed by the industrial sector were diesel fuel (67.4%), asphalt and road oil (14.9%), motor gasoline (9.0%), and propane (7.5%); the rest of the products each comprised less than one percent.

Use of Renewable Energy Resources

Renewable energy resources are naturally replenishable, but flow–limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Some (such as geothermal and biomass) may be limited in that stocks are depleted by use, but on a time scale of decades, or perhaps centuries, can be replenished. Examples of renewable energy resources include: biomass, hydro, geothermal, solar, wind, and wood.

In 2011, Nebraska consumed 915.54 trillion British thermal units (Btu) of primary energy which included 149.18 trillion Btu of energy from renewable energy resources. Renewable resources met 16.29% of Nebraska's energy consumption. Nebraska consumed energy from these renewable resources in 2011:

- Biofuels (12.5% of total)
- Biomass (0.86% of total)
- Geothermal Energy (0.13% of total)
- Hydroelectric Power (1.71% of total)
- Wind Energy (1.12% of total)

Given that different parts of Cuming County are served by different utility providers and systems, detailed sustainable energy consumption statistics for the area are not available. However, the Cuming County Public Power District (PPD) is home to an innovative project that holds promise for expansion across Cuming County.

Alternative Energy Generation

Cuming County should stand ready to embrace a full range of modes of alternative energy production, as they become feasible either through improving technologies or supportive programs from other levels of government.

Biomass Generation. Olean Energy Facility, owned and operated by Danny Kluthe of Dodge, Nebraska, is the state's first methane recovery project that uses animal waste as a renewable energy source to generate electricity. Grants from the Nebraska Environmental Trust and the USDA Rural Development complemented Kluthe's personal investment in the project. The Natural Resources Conservation Service also shared a cost in the facility's construction.

Animal waste from Kluthe's 8,000-head hog operation is pumped daily into a large concrete cylinder-shaped digester. The digester creates methane which is captured and piped into a building where it is used to power an engine. The engine powers an 80-kilowatt generator that distributes electricity into Cuming County PPD's power lines. Nebraska Public Power District (NPPD) assisted in the project's electrical interconnection to Cuming County PPD's distribution system.

The generator produces over 500,000 kilowatt-hours of electricity annually. This provides enough electricity to power over 30 homes for one year based on the state of Nebraska's average consumption.

Solar Generation. The technologies used to generate electricity from the light and warmth of the sun are improving over time and may soon become a feasible means to supply a significant portion of an agricultural operation's electrical needs on-site. Increasingly, there are lending programs available to support this kind of agri-business improvement. The repayment of these loans is aided by the energy cost savings generated by the on-site solar installation. Although Cuming County does have large expanses of land, the mode of agricultural production is not conducive to large-scale solar generation facilities in the foreseeable future.

Wind Generation. A mode of energy production that can function at either the small site-specific scale, or at larger scales, for grid consumption, is wind energy. Although there are not, at present, significant incentives for site-specific generation from wind energy, as the production costs and efficiency of these smaller units improve, they may become a more commonly pursued option in the county. At the larger scale, Cuming County is a good candidate for large-scale wind generation, especially outside the valley created by the Elkhorn River.

Geothermal Generation. There are two distinct approaches to geothermal energy. In the most common, the relatively stable temperature of the ground and bedrock near the earth's surface is harnessed to improve the efficiency of building and manufacturing processes, essentially for heating and cooling. In order to generate meaningful amounts of electricity, a geothermal system must tap into the thermal energy which emanates from the core of the Earth. While Cuming County is not a strong candidate for significant electrical production through geothermal resources, they could serve well for lighter, small-scale process improvements.

Energy Conservation Measures

Nebraska Energy Code

Under Sections 81-1608 through 81-1616, the State of Nebraska has adopted the International Energy Conservation Code as the Nebraska Energy Code. Any city may adopt and enforce the Nebraska Energy Code or an equivalent energy code. If, as is the case in Cuming County, a jurisdiction does not adopt an energy code of equal or greater conservation, the Nebraska Energy Office will enforce the Nebraska Energy Code in the jurisdiction.

The Code applies to all new buildings, or renovations of or additions to existing buildings. Only those renovations that will cost more than 50% of the replacement cost of the building must comply with the Code.

Additional information on the Nebraska Energy Code can be found at http://www.neo.ne.gov/home_const/iecc/iecc_codes.htm

Energy Efficiency in the Public Sector

The government of Cuming County has taken a number of steps to reduce its energy consumption while providing residents with the same, or improved, levels of service.

In 2010, Cuming County adopted a policy addressing approaches to improving the efficiency of operations at the county courthouse. It holds recommendations as to how employees of all levels can contribute to the efficient operation of the county government.

Following an energy audit of the county courthouse, the interior light fixtures were refitted with high-efficiency fluorescent and LED lights, which provide the same amount of working light with drastically reduced energy consumption. These fixtures also last longer than conventional incandescent bulbs.

In addition to improving the efficiency of the lighting, the building's heating and air conditioning were upgraded resulting in improved energy efficiency, especially in the summer and winter months.

Residential Energy Conservation

Cuming County Public Power District, which serves the majority of the county, offers a number of programs to improve residential energy efficiency. These programs include:

- Incentives and low-interest loans for high-efficiency residential heat pumps
- Discounts on cooling system tune-ups
- Rebates on enhanced attic insulation

Commercial/Industrial Energy Conservation

Likewise, the power district offers significant incentive programs to improve the efficiency of commercial or industrial electricity consumers as well. These programs include:

- Lighting improvements
- Irrigation efficiency
- Variable frequency drives
- Industrial process consulting
- HVAC system optimization

A summary of the plan policies that will further reduce overall energy consumption by the county and its residents is summarized in Chapter 7.