11 Energy & Utilities

This chapter examines energy and individual utilities including water, wastewater, watershed management, solid waste, electric services, information technology, and natural gas service.

Introduction

Energy use, supply and conservation are topics of global as well as local concern. This chapter includes an assessment of energy use, evaluates the utilization of renewable energy sources, and describes efforts to conserve energy in the community. The relationship between land use patterns and energy consumption has been widely researched and is a topic of national conversation. As Lincoln and Lancaster County continue to plan for the future, the need to consider the impacts of energy supply and demand is likely to increase in importance.

The provision of other basic services, (such as water, wastewater, and electricity) is also discussed in this chapter. The need to plan for the extension of these services to new growth areas is one of the primary reasons for comprehensive planning. Lincoln has a history and policy of providing utilities only to those areas that have been annexed into the City. Lincoln wastewater collection systems operate on a gravity flow principle and so are planned to extend along the natural drainage of the land, or drainage basins. These growth policies have served Lincoln well in that it has retained a clear differentiation between urban and rural areas and has been able to resist sprawl to a greater degree than

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many other communities. The efficient extension of utilities will continue to be a major factor in land use planning.

Guiding Principles

Overall Guiding Principles

- Continue the City's growth policy of contiguous urban growth; urban development will occur in areas immediately abutting the city that reflect a logical and timely extension of urban infrastructure.
- It is the policy of the City of Lincoln to only provide water and wastewater service to properties located within the corporate limits of the city. This policy provides for contiguous growth, allows for efficient long range planning and cost-effective construction and management of the system.

Energy Guiding Principles

- Promote renewable energy sources.
- Promote the conservation and efficient use of energy in all areas.

Water Guiding Principles

- Development proposals should ensure that there is adequate quantity and quality of water available to serve their project without impacting other customers.

- Development actions should not impact Wellhead Protection areas or the municipal water wells serving towns.
- Water improvements must be in accordance with the Lincoln Water System Facilities Master Plan and LPlan 2040. The *Lincoln Water System Facilities Master Plan* will guide future actions and serve as the basis for facilities planning and improvements.

Wastewater Guiding Principles

- The City's collection system, in general, will continue to be a gravity flow system that is designed to accommodate urbanization of drainage basins and sub-basins. This system encourages orderly growth within the natural drainage basin boundaries. This policy encourages urban growth from the lower portion of the drainage basin and discourages pumping of wastewater across basin boundaries.
- Development proposals should ensure that there is an adequate on-site wastewater system to serve a project without impacting adjacent properties. However, in urban areas, it may be necessary to create assessment districts if a sewer line crosses abutting properties.
- Wastewater improvements must be in accordance with the Lincoln Wastewater Facilities Plan and LPlan 2040. The Lincoln Wastewater Facilities Plan will guide future actions and serve as the basis for facilities planning and improvements.

Watershed Management Guiding Principles

- Watershed planning will continue in order to be proactive and integrate stewardship principles for land conservation, stream and wetland buffers, better site design, *Best Management Practices (BMP)*, and erosion and sediment control. The natural drainage system can serve multiple benefits, including wildlife habitat and recreation.
- The community encourages site designs that are compatible with the natural characteristics of the site, clustering development, minimizing grading and impervious surfaces, and preserving site hydrology to the maximum extent possible. Naturalized or bioengineered

solutions to drainage issues should be used wherever possible.

- In new growth areas, the City of Lincoln and Lancaster County have a policy of No Adverse Impact, with a goal of ensuring that the action of one property owner does not adversely impact the flooding risk for other properties.
- Urban development in new growth areas will be outside of the floodplain and floodway.

Solid Waste Guiding Principles

- No out-of-county waste is accepted for landfill disposal. This policy reserves landfill capacity for city and county residents and allows administration of programs under existing authorities.
- The City policy of privately owned and operated collection of refuse and recyclables coupled with public ownership, operation and financing of disposal and selected integrated solid waste management services will continue during the planning period.

Electrical Guiding Principles

- Lincoln Electric System will be the sole electrical utility within the City of Lincoln.
- Norris Public Power District will be the primary provider of electricity outside the City of Lincoln.
- Norris Public Power and Lincoln Electric System should continue their cooperative effort in regard to future growth areas of Lincoln and changes in service boundaries between the two utilities.

Information Technology Guiding Principles

- Information technology programs and regulations must be flexible enough to adapt to advances in technology.
- The development of a well designed fiber optic network to serve residential, business, education, and public facilities is very important. This network is a priority to ensure a high quality of life, serve as an economic development tool, and provide efficient public services.

Energy

To remain competitive as the global economy expands and puts greater strain on traditional fuel supplies, energy costs rise, and supplies remain unpredictable, Lincoln must develop a comprehensive strategy of fuel diversity and encourage conservation, alternative forms of energy and modern energy technologies.

The City of Lincoln and Lancaster County are making substantial efforts toward sustainable energy reform. The City will soon have an energy strategy for City government and also intends to develop recommendations for residential energy conservation. In addition, through the *Cleaner Greener Lincoln Program*, the City currently funds municipal lighting upgrades, energy saving improvements for residential buildings and non-profit facilities, clean energy production and green building practices. Lincoln Electric System also provides energy rebates for investments in energy-saving devices through their Sustainable Energy Program.

Using energy more effectively through more efficient end-uses or through more productive generation, such as combined

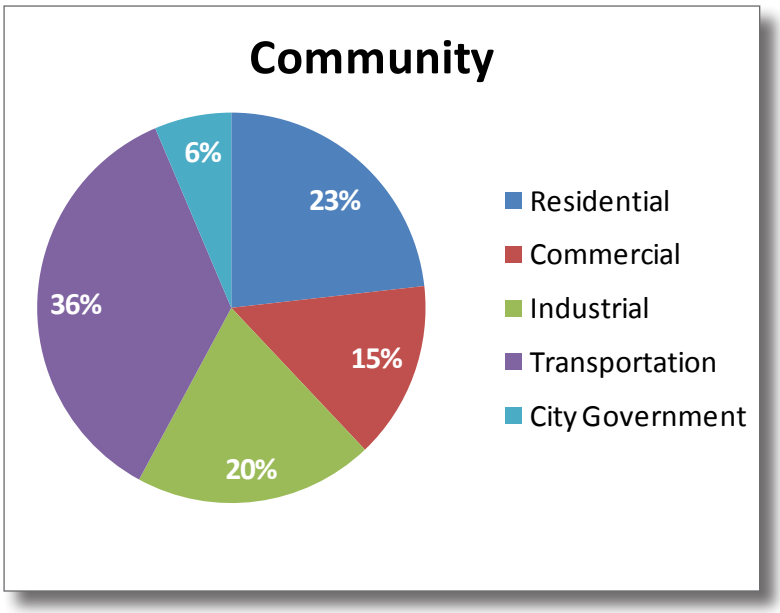
Best Management Practices (BMPs)are defined as measures that remove or prevent pollutants from entering stormwater, streams and lakes. Examples of BMPs include stabilizing all areas disturbed during construction and preserving natural drainageways. It is the City's policy to encourage the use of BMPs in new development and redevelopment.

heat and power, reduces the amount of fuel required to produce a unit of energy output and reduces the corresponding emissions of pollutants and greenhouse gases. Energy from renewable resources such as solar, geothermal, and wind technologies generally does not contribute to climate change or local air pollution and generally conserves nonrenewable natural resources.

Per State Statute Section 15-1102: "The comprehensive plan shall, among other things, show:… an energy element which: assesses energy infrastructure and energy use by sector, including residential, commercial, and industrial sectors; evaluates utilization of renewable energy sources; and promotes energy conservation measures that benefit the community."

Statutory Requirements

In 2010, the Nebraska Legislature passed legislation requiring cities and counties in Nebraska to assess, evaluate and promote renewable energy sources and energy conservation measures as part of their Comprehensive Plan updates. Energy affects many aspects of land use, and as the population continues to increase over the next 30 years, so will energy consumption and the need for renewable resources.



Energy Use

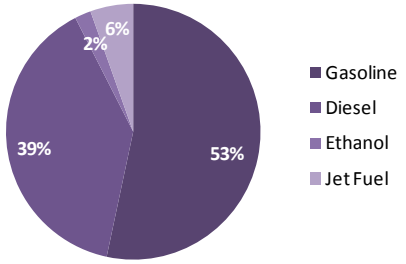
Like many other communities, it is a challenge for the City of Lincoln and Lancaster County to obtain data that can be put into a meaningful model to use in setting goals and comparing our community with others.

The City has assessed energy infrastructure and energy use by sector, including transportation, residential, commercial, city government and industrial sectors. The data does not include lifecycle consumption, or energy that is used to generate the end use energy product. Thus, the following data is a snapshot of energy being consumed at the point of use and does not factor in energy such as coal that is used to produce the electricity that powers our homes and businesses.

As shown in the accompanying chart, the majority of Lincoln's energy consumption is related to how we live and how we get around. (All data is from 2008, except the transportation data which is from 2010).

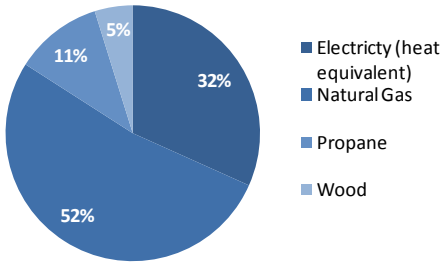
As the chart identifies, Transportation represents 36% of the overall energy use in the community with the Residential sector being second at 23%. The Industrial sector comes in at a close third with 20%, followed by Commercial at 15%. Although the City Government sector has an impact, it is less significant at 6% of the overall energy use. Nevertheless, City Government can have a significant impact on efforts to reduce energy consumption by setting an example for the community through more efficient use of energy and investing in renewable resources.

Transportation



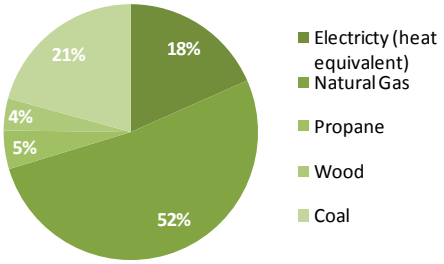
Transportation is the biggest energy user in the City at 36% of total consumption. Within this sector, 53% of that use is gasoline and 39% is diesel. Fleet fuel economy is mandated by Federal requirements and by consumer preferences, much of which is beyond local control. Opportunities on a local scale for using energy more efficiently in this sector would be to provide and promote alternative transportation options such as walking, biking and transit services and improving traffic flow.

Residential



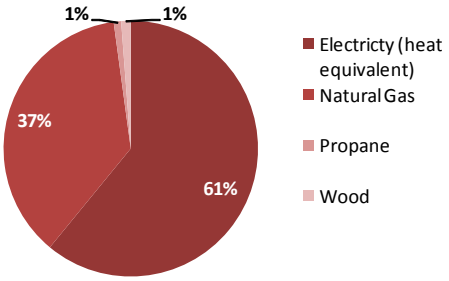
The Residential sector represents 23% of the energy consumption of the City of Lincoln. As shown in the chart, 52% of that use is in natural gas, primarily for heating, water heating and cooking. Electricity, used primarily for lighting, air conditioning and appliances accounts for 32% of energy used. Propane is primarily a rural usage, and kerosene and wood are quite small. The biggest impact on energy usage in the residential sector would be made by increasing the thermal performance of homes, improving heating and cooling equipment, and improving the efficiency of appliances and lighting.

Industrial



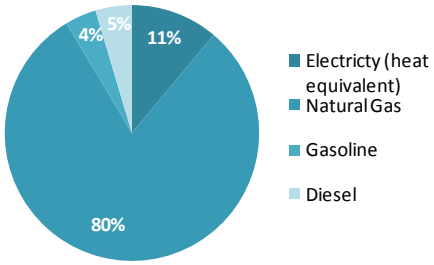
Industrial use represents 20% of the total city energy consumption. Within the Industrial sector, 52% is natural gas, 18% is electricity and 21% is coal. Opportunities for improvement should be determined on a process by process basis in addition to striving for general building efficiencies.

Commerical



Commercial sector energy consumption represents 15% of total energy use of the City. Within this sector, electricity represents 61% as the primary energy use and natural gas is 37%. Natural gas is used for heating businesses and water along with some food preparation and water heating. Electricity is primarily represented by lighting and air conditioning. Opportunities for improving the efficiency within this sector should be directed at building, lighting and heating/air conditioning.

City Government



The majority of City Government energy consumption is in natural gas. The City of Lincoln water and wastewater facilities consume more than half of the energy in this sector.

Renewable Energy

Local government entities, including all local utilities, should strive to increase utilization of renewable energy sources such as wind power, hydropower, solar energy, biomass, and geothermal energy. Energy providers such as Lincoln Electric System, Norris Public Power District and Black Hills Energy should strive to purchase a higher percentage of energy from renewable sources. Today, 6.7% of the energy generated for Lincoln through LES is wind-powered or hydro-powered. The City-owned utility should strive to increase the use of renewable energy sources by the year 2040. Additional information should be collected to better facilitate a more comprehensive energy strategy.

> Today 6.7% of the energy generated for Lincoln through LES is wind-powered or hydro-powered.

Strategies for Renewable Energy

- Continue to encourage and expand wind and solar access to buildings and other land uses.
- Incorporate the use of alternative fuels into local government and institutional operations.
- Incorporate the use of alternative fuels when feasible .

Energy Conservation

Because of the limited amount of nonrenewable energy sources on Earth, it is important to both reduce consumption of resources and substitute non-renewable resources with renewable ones, so that our natural resources will be available for future generations.

Energy conservation is also important because consumption of nonrenewable sources impacts the environment. Specifically, our use of fossil fuels contributes to air and water pollution. For example, carbon dioxide is produced when oil, coal, and gas combust in power stations, heating systems, and car engines. Carbon dioxide in the atmosphere acts as a transparent blanket that contributes to the global warming of the earth, or "greenhouse effect" according to the *Environmental Protection Agency* (EPA). There is consensus of scientific thought that this warming trend is significantly altering our climate. Possible impacts include a threat to human health, environmental impacts such as rising sea levels that can damage coastal areas, and major changes in vegetation growth patterns that could affect agricultural productivity and cause some plant and animal species to become extinct.

At the local level, energy conservation saves money and energy which benefits both homeowners and businesses. Through the *Cleaner Greener Lincoln Program*, the City is setting goals and developing measurable strategies to use energy more efficiently, which will in turn save the City and its residents money.

Strategies for Energy Conservation

Land Use and Development

- Consider prioritizing infrastructure investment based on projects that can show net energy reduction.
- Provide incentives for projects that utilize green building codes or green rating systems.
- Encourage higher density housing in/near large commercial development, redevelopment nodes and corridors and employment centers.
- Encourage energy-efficient compact development and mixed use development.
- Explore options for allowing more home occupations that are compatible with neighborhoods.

- Revise codes to allow for more opportunities to work and live in the same place.

Transportation

- Include provisions for safe and convenient pedestrian and bicycle use.
- Continue traffic signal optimization measures.
- Encourage integration of alternative modes of transportation in new developments.
- Encourage transit-oriented development near transit stops, bicycle pathways and bicycle parking stations.
- Encourage telecommuting to reduce vehicle miles traveled.
- Encourage employers to initiate work schedules that will help alleviate congestion at peak hours.
- Encourage carpooling, car/ bike sharing, and use of transit.

Buildings and Landscaping

- Retrofit and weatherize existing buildings with energy efficient technologies.
- Incorporate energy-efficient design and technology into new buildings.
- Encourage orientation and siting of new buildings to take advantage of solar heating and cooling breezes.
- Use landscaping to provide shade to reduce heating and cooling demands and to act as windbreaks.
- Reduce and reuse construction and demolition waste.

Public and Semi Public

- Conduct an energy audit of all buildings.
- Promote weatherization programs.
- Educate the public on the benefits of energy-efficient buildings and development.
- Improve the City's ability to measure energy use and conservation efforts.
- Continue to provide and promote waste reduction, reuse and recycling options.
- Explore opportunities for using grey water.
- Promote and encourage the use of water conservation systems in City and County codes.

Water Services

Lincoln Water System and County Water Resources

Potable water is provided to Lincoln residents and businesses by the Lincoln Water System (LWS). The System is owned by the City of Lincoln and managed by the City's Department of Public Works and Utilities under the direction of the Mayor and City Council. It is a revenue producing and self-supporting system (i.e., no tax funds are used).

Lincoln's only source of water is groundwater recharged from the Platte River northeast of Lincoln. Lincoln Water System processes groundwater at the treatment facility prior to its transmission to Lincoln for distribution.

The distribution system is divided into six pressure zones. Each zone has a system of storage facilities and pumping stations that keep operating pressures in the 35-100 pounds per square inch (PSI) range. Because pressure for the system relies upon elevation, reservoirs and pump stations are often located outside the respective service area, and in some cases outside of the City.

The existing water system is made up of more than 1,240 miles of water distribution mains. Pipes providing service to customers range in size from 4" to 16" in diameter and total 1,080 miles. There are also 160 miles of transmission and transfer mains which range from 24" to 54" in diameter.

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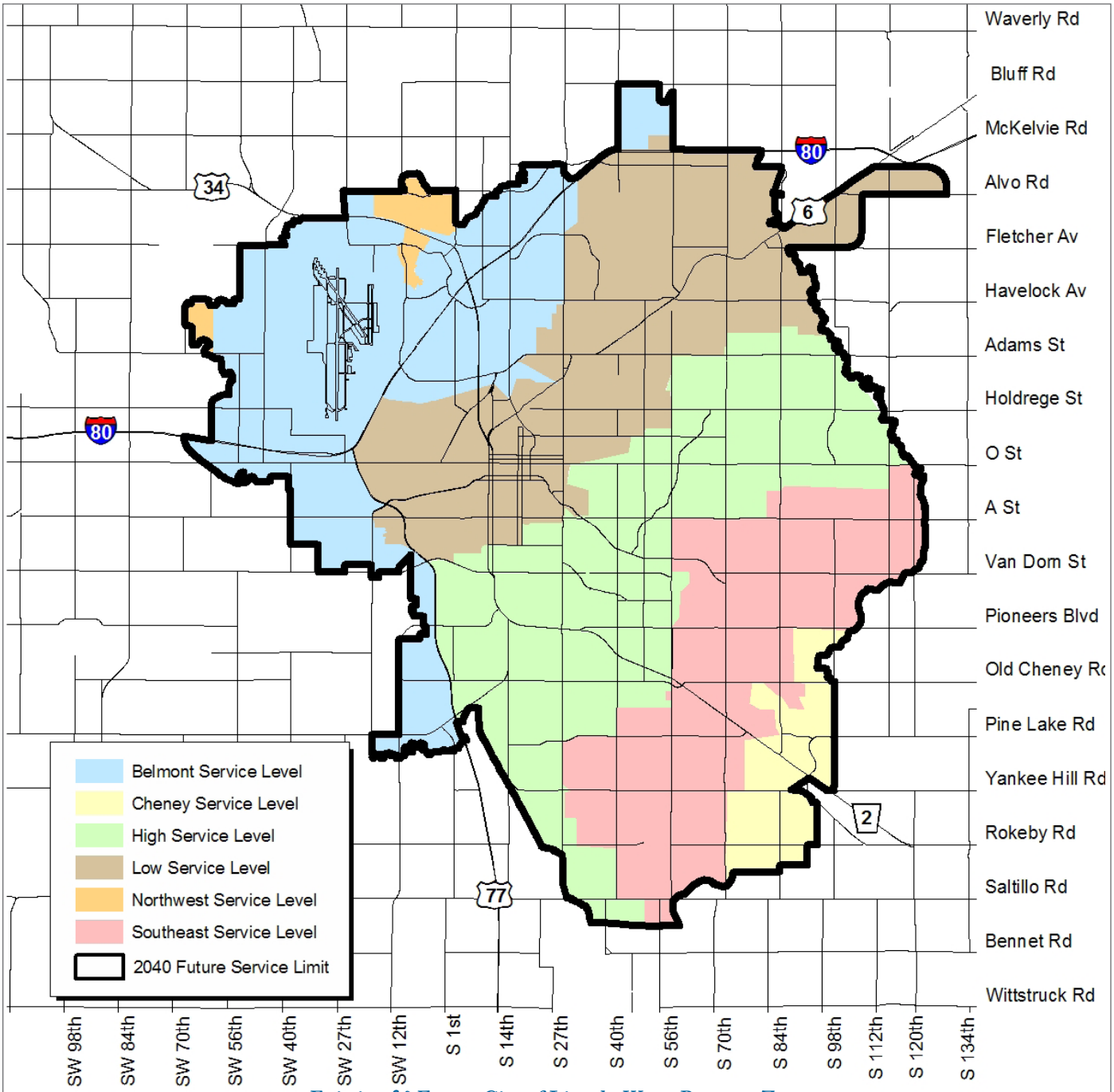


Existing & Future City of Lincoln Water Pressure Zones

The water distribution system contains approximately 25,000 valves for the isolation of water main breaks to minimize the number of customers out of service. Approximately 11,000 hydrants in the distribution system provide for the fire protection needs of the City.

The Public Works and Utilities Department completed the Lincoln Water System Facilities Master Plan in 2007. The plan is a guide for short term and long term improvements to the infrastructure of the Lincoln Water System during the planning period. The Lincoln Water System Facilities Master Plan was adopted as a subarea plan in 2007 (see Plan Realization chapter). The projected maximum day water demand for year 2040 is 141 million gallons per day (MGD), and for 2060 is 205 MGD based on the assumed population growth

rate of 1.2% per year. Additional supply, treatment, and transmission improvements will be necessary to meet these growing demands. The well fields currently owned by the Lincoln Water System have a projected maximum capacity approximately equal to the projected need for the year 2050. Additional well field property and water rights will need to be acquired in the planning period to meet these demands.

Lincoln's drinking water currently meets all of the State and Federal regulations regarding water quality. As new drinking water regulations are implemented, additional treatment may be required. LWS strives for environmental stewardship in all aspects of its operations.

LWS actively promotes water conservation to customers and works to conserve energy in system operations. Operators continually work toward the best balance between system energy needs and the variable rate schedules provided by both Lincoln Electric System and Omaha Public Power District.

Rural and Town Water Services

Water service to rural Lancaster County residents is obtained through private water systems (i.e., private wells), rural water districts, or Sanitary Improvement Districts (SIDs). The Lincoln-Lancaster County Health Department enforces standards on wells within the city limits and three-mile extraterritorial jurisdiction. The Lower Platte South Natural Resources District is maintaining a *Groundwater Management Plan* for the County to ensure the protection of this resource.

Two rural water districts supply potable water to Lancaster County residents; Lancaster Rural Water District No. 1 and Cass County Rural Water District No. 2. These rural associations include property owners adjacent to the City limits. There are three SID's providing water services to area residents: Emerald, Holland, and Walton.

Cities and villages in Lancaster County collect water from municipally owned wells. Some communities are provided water via contract from rural water districts. Limited well source and poor water quality in some areas contribute to reliance on rural water districts.

Strategies for Water Services

- Property owners are responsible for the cost to alter the boundaries of the Rural Water District and have their land removed from the district's service area, prior to annexation. The City of Lincoln will be the sole public water district within the city limits. The City of Lincoln, Lancaster Rural Water District No. 1 and Cass County Rural Water District No. 2 should work toward a cooperative agreement and planning regarding changes in service boundaries between the two utilities.

- Continue to encourage water conservation practices with the development of the City and County.
- Continue to utilize impact fees to recover a portion of the capital costs to build water mains. This includes increasing the capacity of the existing water treatment facilities for future growth.
- Continue to collect utility fees pay for operation, maintenance, debt service, replacement improvements, and fund the majority of water capital improvements, including growth related projects.

> Two-thirds of the energy used by City of Lincoln municipal operations is to move and treat water and wastewater.

- Continue the strategic use of revenue bonds to finance growth and expansion of the system. (Revenue bonds are not a new source of revenue, but rather a means to address the timing of improvements.)

Wastewater Services

Lincoln Wastewater System and County Areas

The City of Lincoln Wastewater System is a publicly owned and operated system. The system is a revenue producing and self-supporting, enterprise fund system (i.e., no tax funds are used). The Department of Public Works and Utilities Wastewater Division manages the operation of the system.

Collection System

In general, the wastewater collection system is a gravity flow system that is designed to accommodate urbanization of drainage basins. The existing system includes 14 lift stations to assist in pumping and conveying the wastewater in the collection system. The collection system currently serves 11 major drainage basins, with more than 1,020 miles of sanitary sewer pipes ranging in size from 8" to 90" in diameter. This system encourages orderly growth within the natural drainage basin boundaries.

Treatment Facilities

There are two treatment facilities in operation: Theresa Street and Northeast Wastewater Treatment Facilities.

The Theresa Street facility is located at 2400 Theresa St., near N. 27th Street and Cornhusker Highway, and currently serves approximately 70% of the City. The Northeast facility is located at 7000 N. 70th Street, near N. 70th and Salt Creek and serves the remaining 30% of the City. By the year 2040, because of strong growth projected to the south and east, the Northeast Wastewater Treatment Facility will have increased to about 40-45% of the service and Theresa Street Wastewater Facility will serve the remaining 55-60% of the City.

The Theresa St. facility also receives liquid wastes from liquid waste haulers providing services to Lincoln and Lancaster County businesses and residents. Treated effluent from both facilities is discharged into Salt Creek. Treated biosolids produced by the treatment plants are spread on croplands through a program operated jointly by the City's Wastewater and Solid Waste System, the University of Nebraska, and the Lancaster County Cooperative Extension Office.

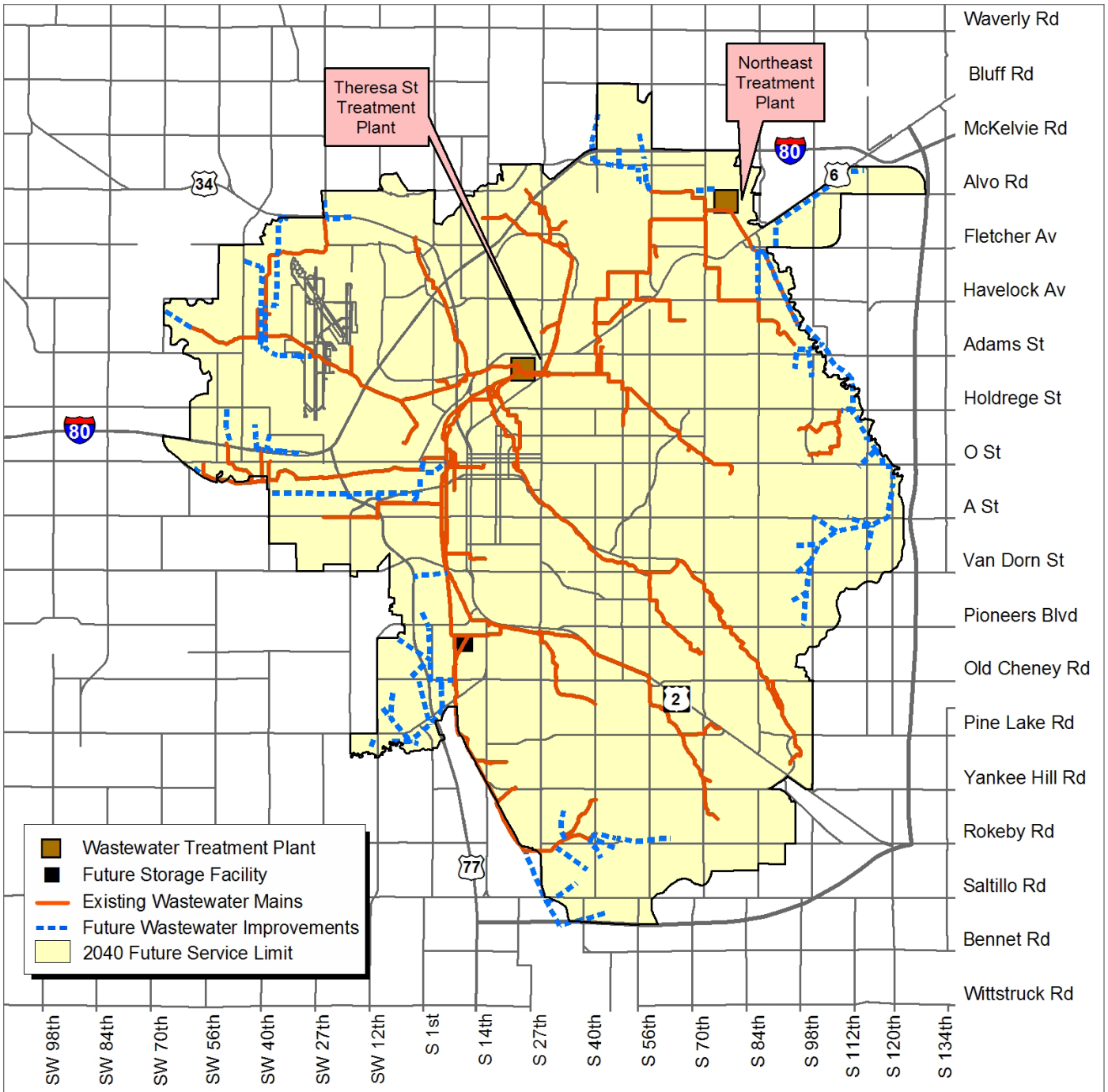
The Public Works and Utilities Department completed the Lincoln Wastewater Facilities Master Plan in 2007. The plan is a guide for short term and long term improvements to the infrastructure of the Lincoln Wastewater System during the planning period, as well as potential service extensions beyond Lincoln's anticipated future service limits. The Lincoln Wastewater Facilities Master Plan was adopted as a subarea plan in 2007 (see *"Plan Realization"* chapter).

Rural and Town Wastewater Services

Residents in unincorporated areas employ on-site septic and/or lagoon treatment systems. Lancaster County has adopted standards for on-site wastewater treatment systems that are enforced by the Lincoln – Lancaster County Health Department.

Each incorporated city and village in the county operates a municipally-owned wastewater collection and treatment facility. In addition, on-site septic treatment systems are permitted within their planning and zoning jurisdictions.

There are a number of subdivision developments in Lancaster County that utilize shared infrastructure systems. These systems are typically for sewer collection and treatment within the development and provide no connections or services to outside development or communities.



Existing & Future City of Lincoln Wastewater Improvements

Three Sanitary Improvement Districts provide sanitary sewer to local residents: Cheney (lagoon), Holland (lagoon), Emerald (lagoon).

These larger point-source and community systems (towns, subdivision systems and SIDs) are reviewed and approved by the Nebraska Department of Environmental Quality.

Groundwater Management Plan

In April 1995, the Lower Platte South Natural Resources District (LPSNRD) adopted a *Groundwater Management Plan*. This Plan describes steps for managing the area's groundwater to protect its future quality and quantity. The Plan has led to the designation by the LPSNRD of a Groundwater Management Area. This designation provides the District with the authority to regulate nonpoint sources in the urban and rural areas that might affect groundwater quality and quantity.

Strategies for Wastewater Services

- Maintain and expand programs to recycle and reuse treated wastewater effluent and bio-solids where appropriate.
- Encourage programs to minimize impacts of treatment facilities on adjacent properties and natural resources.
- Continue to utilize impact fees to recover a portion of the capital costs to build trunk sewer lines. This includes increasing the capacity of the existing wastewater treatment facilities for future growth.
- Continue to collect utility fees pay for operation, maintenance, debt service, replacement improvements, and fund the majority of wastewater capital improvements, including growth related projects.
- Continue the strategic use of revenue bonds as a means to address the timing of improvements.
- Minimize the demand for energy in the collection and treatment of wastewater.
- Explore the use of grey water systems that safely repurpose non-pathogenic sources of wastewater.

"Point" and "non-point" sources of contamination: A point source is one that can be traced to a single origin, such as a manufacturing plant. Non-point source pollution comes from many diffuse sources, often carried in stormwater runoff.

Watershed Management

As discussed in the *"Environmental Resources"* chapter of LPlan 2040, Lancaster County is primarily within the Salt Creek watershed. When it rains in Lincoln, stormwater flows into drainage inlets, gutters and underground pipes before reaching Salt Creek, which drains into the Platte River. Rain that falls on hard surfaces like rooftops, parking lots and other surfaces can carry pollutants into our streams and lakes. Lincoln occasionally gets more rain than the storm drain system or streams can adequately convey, which can lead to flooding.

Floodplain and Stormwater Management

Local floodplain and stormwater management responsibility is shared by the City of Lincoln, which assumes care of the tributaries and storm drain system, and the *Lower Platte South Natural Resources District* (LPSNRD), which maintains the main stream channels. Both the City of Lincoln and Lancaster County participate in the *National Flood Insurance Program* administered by the Federal Emergency Management Agency (FEMA).

Water quality from stormwater is managed under the *Federal Clean Water Act*. The *National Pollutant Discharge Elimination System* (NPDES) program addresses non-agricultural sources of stormwater discharge This program is administered in the State by the *Nebraska Department of Environmental Quality* (NDEQ).

Comprehensive Watershed Management

The City of Lincoln Watershed Management program combines previously separate floodplain and stormwater management initiatives. This approach recognizes that floodplains, tributaries, and upland areas are all part of a comprehensive,

integrated watershed system. A comprehensive approach to watershed planning is crucial as development expands into new basins around the Lincoln city limits and as redevelopment occurs within the existing urban area. A comprehensive watershed management program needs to incorporate a range of strategies including land use planning, conservation efforts, appropriate standards for floodplains and stormwater, flood warning system development/expansion, stream stabilization, stormwater storage basins, and other structural flood control efforts.

As part of the overall watershed management program, the City, in cooperation with the LPSNRD, is developing a unified master watershed management plan. This plan will provide information and computer models to aid in analyzing stormwater management alternatives. Individual *Watershed Master Plans* for six watersheds in Lincoln and the surrounding area have already been completed and are adopted as subarea plans in this document (see *"Plan Realization"* chapter). These plans are formulated in cooperation with other local, state and federal agencies. Ideally, additional watershed master plans are completed and adopted prior to urban development occurring within a new basin. This allows projects and recommendations in the master plan to be considered during the review of specific development proposals.

Master planning and the performance and adequacy of stormwater storage basins and other measures to prevent increases in peak flows will require continued assessment with the growth of the City. Upstream detention facilities are critical to preventing further increases to the floodplain, and if properly designed also help to reduce pollutant loads to downstream waterbodies. Detention facilities should be identified and developed in a manner that incorporates water quality best management practices and causes minimal adverse impact to existing residential, agricultural and other land uses.

Floodplain Management

The overriding policy for the floodplain is a "No Adverse Impact" policy for the City and County, which means that the community has a goal of insuring that the action of one property owner does not adversely impact the flooding risk for other properties. The majority of the strategies below relate back to and support this umbrella concept.

The No Adverse Impact concept is supported by the *"Growth Tiers with Priority Areas"* which designates the majority of floodplain areas outside of the existing urban area as Green Space, Environmental Resources, and Agricultural Stream Corridors. This supports the opportunity to reduce the risk of flood damage to life and property and to preserve the important functions of floodplains. The No Adverse Impact concept is also more explicitly supported by the *Flood Regulations for New Growth Areas* which ensure no rise in flood heights and no loss of flood storage due to development in the floodplain in the areas with the greatest potential for impacts due to new development. While regulations to support the No Adverse Impact concept have not been adopted within the *"Existing Urban Area"* or in the County's jurisdiction, goals and strategies in this plan support minimizing impacts to the floodplain in all circumstances.

Strategies for Watershed Management

- Designate areas for future urban development outside of floodplain and floodway to avoid introducing new development to flood risks and to preserve the important functions of the floodplain.
- Create a stormwater utility, as a division of the Public Works and Utilities Department, to

provide for a steady revenue source as well as an organizational structure to address the growing needs of the stormwater and watershed management system.

- Develop and utilize watershed plans during the review and evaluation of proposed developments and as a guide in the preparation of future capital improvement projects; unify individual plans into a Watershed Management Master Plan for Lincoln and future growth areas.
- Utilize naturalized approaches or bioengineered solutions to drainage issues wherever possible, and use public projects as an opportunity to set positive examples. Seek opportunities for *"Best Management Practices"* (e.g. Rain to Recreation, Rain Gardens, etc) that reduce flood damages, protect water quality and natural areas, while providing for recreational and educational opportunities so as to realize multiple benefits.

- Develop project approaches which view stormwater as an asset, by working with the natural topography and using wetlands, floodplains, and natural drainage corridors as natural ways to manage flood flows and stormwater runoff.
- Preserve and enhance vegetative buffers along stream corridors to slow the flow of stormwater, filter pollutants, protect the biological health of the stream, and conserve other natural functions of the floodplain.
- Develop and implement a floodplain buyout program for the City and County to restore floodplain functions while being sensitive to the need to minimize impacts on neighborhoods and historic districts.
- Seek broad public participation in the location and design of specific watershed management projects, and evaluate the relative benefits as they relate to flood hazard reduction, water quality, channel integrity, natural character, bridges, culverts, and existing public and private structures.
- Continue to develop a comprehensive, watershed approach to floodplain mapping and to improve the accuracy by making it a priority to which specific resources are dedicated.
- Retain City or County property in the floodplain in public ownership, and consider the purchase of easements or land when other publicly-owned property in the floodplain is proposed for surplus. Retain conservation easements to protect floodplain functions where unusual circumstances merit the consideration of surplus floodplain property.
- Continue to implement education efforts to notify floodplain property owners and prospective buyers of flood risks.

Solid Waste

Solid Waste Management

The City of Lincoln has entered into interlocal agreements with Lancaster County and all the villages and cities in Lancaster County, with the exception of Hallam, to serve as the lead agency for solid waste management in the County. The Public Works and Utilities Department, Solid Waste Operations in conjunction with the Lincoln-Lancaster County Health Department Environmental Division oversees the City and County's solid waste management programs. The City will be developing a Solid Waste Management Plan within the early years of the LPlan 2040 planning period.

Collection

The City of Lincoln does not have a mandatory residential waste collection policy. A number of independent private companies are licensed to provide waste collection services to area residents. Residents may also haul their waste to a small vehicle transfer station located at 5101 North 48th Street.

Three villages in the county — Bennet, Davey and Panama – operate solid waste transfer stations. Residents transport their waste to these facilities. All other communities in the county offer residential waste collection.

Disposal

The City of Lincoln's primary solid waste sanitary landfill is located at Nebraska Highway 77 (N. 56th St.) and Bluff Road, just north of I-80. This facility began operating in the late 1980's. It accepts approximately 800 tons of waste each day. The facility is projected to be at capacity near the year 2035 based on current generation rates and the projected population growth rate of 1.2 percent per year. Planning for expansion of the Bluff Road Landfill on City owned property just east of the existing site is anticipated. The City policy of public ownership, operation and financing of integrated solid waste management services is anticipated to continue during the planning period. The expansion into this additional landfill area has not been permitted by the State of Nebraska Department of Environmental Quality. A portion of Lincoln's and Lancaster County's waste is also being exported outside Lancaster County. This is the result of having acquired local waste collection companies and a landfill in Milford, Nebraska.

The City also operates a landfill for construction and demolition debris at 5101 North 48th Street. This facility is located on the site of the County's previous solid waste landfill, and it also hosts the small vehicle transfer station for the general public to bring waste to the landfill. The construction and demolition debris landfill is projected to have capacity through the year 2021. Thus, a new facility for handling construction and demolition debris will need to be sited during the planning period, starting in 2014. While this landfill should be completed and closed, the N. 48th Street transfer station and recycling areas are scheduled to remain.

Environmental Services

Lincoln's Solid Waste Operations and the Lincoln-Lancaster Health Department (Environmental Health Division) provide a wide assortment of integrated solid waste management services. These range from source reduction and pollution prevention to recycling and disposal. Many of these services are voluntary — that is, they are not specifically required by any federal or state regulations.

The City considers these services to be like any other utility, and recycling drop-off sites should be convenient to every resident in the community. Estimates are that the bio-solids, recycling, yard waste composting, and recycling programs, monitored from 1991 through 2001, have extended the life span of the city landfill by three years. If these current recycling programs were eliminated, the remaining life of the landfill would be shortened by an additional five years - closing in 2020 instead of the projected year of 2025.

Composting of lawn and garden debris helps reduce waste in landfills.

Development, maintenance and ultimate closure of the Bluff Road Landfill, as well as daily operations, are funded by a fee collected for disposal of wastes in the landfill. Other solid waste management programs are funded by a combination of user fees and an occupation tax assessed to refuse haulers collecting refuse in the city or in the county and utilizing the Bluff Road Landfill for disposal. These forms of financing for solid waste management are anticipated to continue during the planning period.

Students learn how paper is made with recycled materials at Earthfest.

The City manages 26 recycling drop-off sites in the city and county. Twenty one sites are located in the City of Lincoln, of which 16 are multi-material sites accepting newspapers, cardboard, mixed paper (junk mail, magazines), glass bottles, plastic bottles, tin cans and aluminum cans. All five sites outside of Lincoln are for multi-material collection. They are located in Bennet, Davey, Hickman, Panama and Waverly. Additional multi-material recycling sites should be obtained in each new development area to provide for convenient use by residents in growth areas. The growth of the population in the County will also require additional recycling sites in other towns in the County. Southwest Lancaster County would have the higher priority for new sites.

Other methods for the collection of recyclables, such as a community-wide curbside pick-up program, may become economically feasible during the planning period and will continue to be evaluated on a periodic basis throughout the planning period.

The reduction in greenhouse gas due to the Landfill Gas Collection & Control project is equivalent to removing 30,780 passenger vehicles from our roads.

Landfill Gas Collection and Control

Landfill Gas consists of about 50% methane and 45% carbon dioxide, with other trace gases resulting from biological decomposition of solid waste. Methane is of particular concern as a greenhouse gas since each unit of methane has an effect equivalent to 21 units of carbon dioxide. Construction is underway on the first phase of a Landfill Gas Collection and Control project to collect methane gas from the Bluff Road landfill and use it to generate approximately 27 million kilowatt hours of electricity per year. This is equivalent to the electrical usage of 2,250 households. The reduction in greenhouse gas is equivalent to removing 30,780 passenger vehicles from our roads. Future collection phases will be constructed as landfilling of waste continues until the landfill reaches capacity.

Strategies for Solid Waste Management

- Develop standards for future commercial and industrial development to ensure proper space for separation and handling of recyclables and solid waste. Investigate amending zoning ordinances to encourage new commercial centers to provide space for recycling drop-off facilities.
- Discourage future urban acreage developments in the area around the Bluff Road landfill and LES power generating operations, which are located between N. 56th and N. 84th Streets. Acreage development could impact the current and future landfill and LES operations.
- Develop a 20-year comprehensive integrated Solid Waste Management Plan for Lincoln/ Lancaster County.
- Create a county-wide integrated, efficient, environmentally safe and conservation-oriented recycling and waste management system. Promote and support markets for waste materials and recycled products.

- Minimize the use of energy in Solid Waste Management processes.
- Continue the development of the Landfill Gas Collection and Control Project.

Electric Service

The Lincoln Electric System (LES) is owned by the City of Lincoln. It is operated under the direction of an administrative board appointed by the Mayor and City Council. LES is revenue producing and self-supporting (i.e., no tax funds are used by the system).

LES provides electric service to the City of Lincoln and much of the surrounding area within Lincoln's three-mile planning jurisdiction. The LES service area includes the City of Waverly and the unincorporated villages of Cheney, Walton, Prairie Home, and Emerald.

The balance of Lancaster County, including cities and villages, is served by the Norris Public Power District.

Norris Public Power District (Norris) and Lincoln Electric System (LES) have a formal Joint Planning and Service Area Adjustment Agreement. This agreement establishes a "Joint Use Area" which is primarily east and southeast of Lincoln. LES provides all of the power, but both LES and Norris own facilities in the area. LES and Norris may amend this joint area in the future.

By the year 2040, the LES peak load is projected to increase by about 345 megawatts (MW) to a peak load of 1095 MW. LES will need to build new 115 kilovolt (kV) lines in growth areas in order to serve the new development. In addition, LES will need to build several new substation sites to serve these new growth areas.

Lincoln Electric System is actively involved in efforts to educate homeowners, builders, and businesses about energy conservation including publications, presentations and individual on site assessments.

Wind Energy

Lincoln Electric System currently operates two wind turbines in the county. LES will continue to pursue the development of wind and other renewable generation technologies to the extent they are feasible, economical, and consistent with LES power supply needs.

Strategies for Electric Service

- As LES plans new transmission line routes, it will continue its policy of examining multiple options and conducting public forums on proposed routes in order to minimize the impact of new lines as much as feasible.
- Continue, and amend as necessary, the Norris/LES Agreement which provides for cooperative planning and utility service in Lincoln and Lancaster County.
- Within the City of Lincoln, wherever feasible and affordable, continue a phased program to relocate overhead utility lines underground.
- Continue to encourage energy conservation practices in the City and County.

Renewable Energy Sources

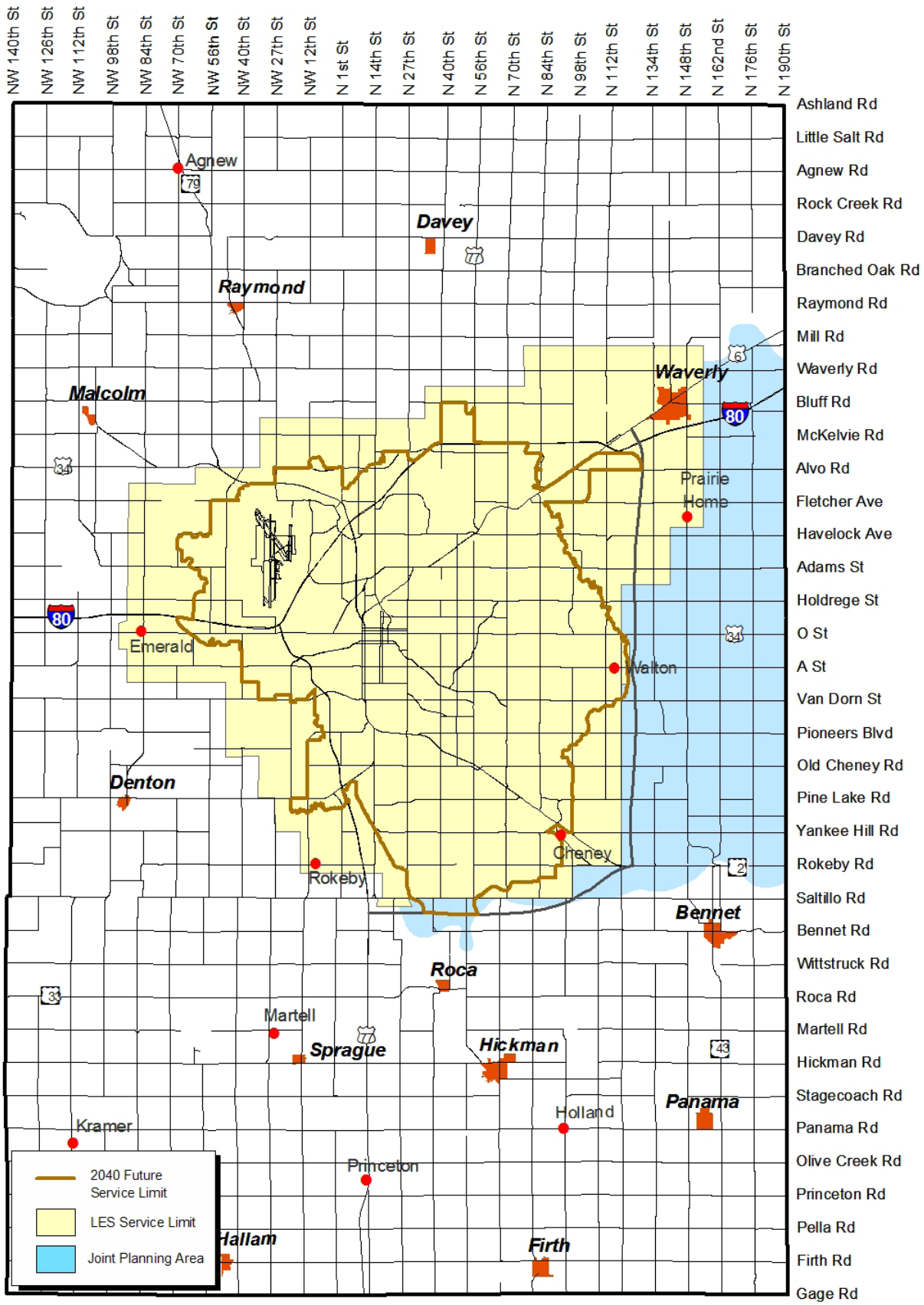
The renewable energy sources used by Lincoln Electric System in 2010 and their energy production quantities (MWh mega-watt-hours) are as follows:

WAPA Hydro Generation: 253,721 MWh

Elkhorn Ridge Wind Plant: 15,122 MWh

LES Salt Valley Wind Turbines: 2,452 MWh

LES is also projecting to receive 33,520 MWh of energy from the Laredo Ridge Wind Plant in 2011. The Laredo Ridge Wind Plant was not in service in 2010.



LES Service & Joint LES/Norris Planning Area

- Continue to purchase efficient equipment (transformers, conductor, etc.) to reduce system energy losses and increase energy efficiency.
- Continue the LES Sustainable Energy Program to assist customers with purchasing efficient equipment (heat pumps, lighting, that will reduce system energy requirements.
- Continue to include, and increase where feasible, renewable sources of energy, such as wind and solar energy, in future planning of LES facilities and partnerships.
- Continue to investigate the development of Smart Grid technology to increase efficiency and allow consumers a higher degree of control over their energy usage.

Natural Gas Service

Blacks Hills Energy owns and operates natural gas and distribution systems in Lincoln and eight other incorporated and unincorporated communities in Lancaster County. The company serves about 94,000 residential, commercial and industrial customers in Lincoln and another 2,200 in Waverly, Walton, Cheney, Bennet, Firth, Panama, Hickman, and Holland.

Black Hills Energy transports natural gas to area customers through two major interstate pipeline systems which traverse the county - Northern Natural and Natural Gas Pipelines of America (NGPLA). Black Hills Energy is the only provider of natural gas services in the county.

Liquefied propane is the other major fuel used in Lancaster County. Several propane distributors serve town and rural customers throughout the county.

As the community and the nation grow, additional pipeline facilities will be required. Most of these lines are proposed and developed by private companies. The Health Department has expressed concerns about the location of current and future pipelines and their potential impact during an accident on adjacent residential land uses. However, pipeline locations are necessary and should be accommodated within the County in locations that will not impact public health.

Strategy for Natural Gas Service

- Residential land uses are discouraged from locating immediately adjacent to existing or planned pipelines.

Information Technology

Information technology is subject to rapid and dramatic change. The nature of the industry continues to push the limits of the technology. Various technologies converge to create new, integrated products and services. The concept of "telecommuting" portends a city where people may be able to work from most any site – including their own home. In the economy of the future, information is likely to become the primary product. This product can be "manufactured" at sites other than traditional factories and offices.

Wireless telecommunication is part of a global information revolution. The need for additional infrastructure to support wireless facilities is expected to increase in response to rising consumer demand and new applications. The City and County understand the importance of these technologies to the world of tomorrow and support the development of the infrastructure needed to further their use. A full range of cellular and wireless services, provided by a variety of carriers, is available in the city and county. See the *"Placemaking"* chapter for information on how wireless facilities should be located.

The City of Lincoln and Lancaster County promote the integration of information technology

throughout the community by their use of technologies in the business of local government. Examples of such activities include:

Public Internet Terminals. These terminals provide public access to the Internet for residents and visitors to Lancaster County. High speed lines and free access terminals have been placed in libraries, community centers, recreation centers, and senior centers.

City and County Websites. The City and County website now offer expanded opportunities to access government in the areas of employment, health and human services, planning and development, and general information assistance. The ability to conduct various government transactions online saves travel time and resources for citizens and government employees.

Advanced Audio and Video Equipment. An array of video equipment is used to broadcast local government meetings over a local cable channel as well as via the Internet.

Geographic Information Systems (GIS) Technology. City and county departments, in partnership with other agencies, have created an extensive system of digital geographic information that includes hundreds of layers of information on features such as natural resources, topographic features, land use, structures, floodplains, jurisdictional boundaries, and infrastructure. A broad assortment of digital imagery — i.e., photographs, permit and property information — is also included in this GIS information base.

Intelligent Transportation Systems. Information technology offers many opportunities for making better use of transportation facilities and services. Intelligent Transportation Systems (ITS) use computers and digital technology to get the most out of the community's investment in roads and other transportation facilities. This approach is described further in the *"Transportation"* chapter of the Plan.

In short, information technology will shape new patterns for how the community works, travels, plays, shops, and communicates. The challenge is to anticipate and adapt this evolving infrastructure in a beneficial way – a way that supports the future described in the LPlan 2040 Vision.

Strategies for Information Technology

- Support efforts to maintain, expand, and upgrade the community's information technology infrastructure.
- Explore efforts to increase access to information technology for all members of Lincoln and Lancaster County, especially within minority, low income, disabled, rural, and aging communities.
- Further the cooperation between the City and County and local universities and colleges in applying information technology throughout the community.
- Encourage the underground placement of existing wired facilities, thus supporting a more reliable information technology infrastructure.
- Promote regional cooperation in the formation of information technologies alliances.
- Endorse the on-going cooperation of City, County, and State governments to integrate information technology in the delivery of their services to the community.
- Investigate means for expanding the maintenance, development, and application of Geographic Information Systems data among public and private sector users.
- Consider ways to maximize use of the public rights-of-way and public easements that support multiple applications including information technology facilities. This can include consideration of right-of-way management for utility separation, coordination of work in the ROW, and compensation for usage.

- The City and County will work with government entities to facilitate access to broadband services including high speed internet, television, interactive television and similar future services. Techniques including, but not limited to, franchise and preferred service contracts should be explored. The City and County will work with legally mandated state and federal agencies in order to achieve these goals.
- Management of wireless facilities should provide flexibility and responsiveness that recognize the rapidly changing and highly competitive nature of the industry. Similarly, the placement and construction of such facilities needs to occur in a way that is compatible with the natural and built environment.