

Environment

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CHAPTER SIXTEEN - ENVIRONMENT

"The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired, in value."
—Theodore Roosevelt, 1907

OVERVIEW

Douglas County has a rich and valuable heritage that is characterized by a variety of environmental and natural conditions. Prairies, rivers, forests, wetlands, agricultural soils, and other natural features provide scenic beauty, recreation, natural habitats, flood protection, and opportunities for interpretation, appreciation, and education.

Protecting and enhancing Douglas County's environment, including its built environment, is the focus of this chapter. The recommendations are intended to foster a healthy environment that contributes to a growing economy and a livable community. This concept is in line with an overall goal of Horizon 2020 (see Chapter 1) regarding sustainability that states: *"We will strive to ensure the sustainability of our physical environment, both natural and built, the health of our economy and the efficient and effective functioning of our community."*

Environmental quality and appropriate use of natural resources are essential elements of an area's livability and greatly enhance the quality of life for Douglas County residents. Protection of natural resources is an important component in planning for growth and development in Douglas County since all development activities create some level of impact on the air, water and land resources mentioned in this chapter. While land development is important to economic vitality, natural resources and climate protection are increasingly recognized as equally important to the health and vitality of the community and must be protected for future generations. The responsible way to achieve the mutual goals of environmental protection and planned growth is to develop in a sustainable manner, one that is capable of being continued with minimal long term effects on the environment.

There are already a few programs in place that aim to achieve some of the sustainability goals of this chapter, such as the county-wide ECO² program which is a tool used to promote the dual goal of open space preservation and economic development. The program uses a concept of net equity that states an amount equal to a portion of the investment of public funds for industrial development be

used for open space preservation. In addition, the City of Lawrence adopted a Land Development Code in 2006 which addresses some recommendations of this chapter, including standards for impervious surface coverage, open space requirements, and landscaping. The City and Douglas County also have recently revised the subdivision regulations which include provisions for land divisions which contain environmentally sensitive features. The City of Lawrence also has multiple efforts currently underway with similar goals as presented in this chapter, including work by the Sustainability Advisory Board, the Mayor's Climate Protection Task Force, and the Peak Oil Task Force. These advisory boards review issues and make recommendations to the Lawrence City Commission. Douglas County has recently established a Local Food Policy Council to work with stakeholders in creating and maintaining a healthy local food system. This chapter takes into account recommendations that have been made by all advisory boards related to topics discussed. It is important that work on these programs be ongoing in order to further the goals of this chapter. Also, the City and County are committing to internalizing sustainability principles within their operations in order to take the lead in creating a sustainable and livable community.

A variety of management practices are recommended in this chapter, including education of the public and government officials, development of incentives and regulations, and incorporation of green infrastructure strategies. "Green infrastructure strategies actively seek to understand, leverage, and value the different ecological, social, and economic functions provided by natural systems in order to guide more efficient and sustainable land use and development patterns as well as protect ecosystems."¹

The recommendations in this chapter focus on integrating the natural and built environments in order to create a healthy, sustainable community for current and future generations to live, work and play. The City of Lawrence and Douglas County are committed to protecting and enhancing the environment while meeting other community, economic development, housing and infrastructure goals.

Strategies:

Strategies provide a direction or approach to accomplish specific goals or policies of this chapter:

- Identify and protect important environmental features in a manner that also:
 - Accommodates planned urban and rural growth,

¹ *Towards a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century, May 1999 (The President's Council on Sustainable Development.)*

- Discourages urban sprawl,
 - Provides for efficient transportation systems,
 - Partners with economic development activities,
 - Considers private property rights,
 - Allows adequate open space for preservation and recreation,
 - Establishes a contiguous network of open space, and
 - Creates a sustainable community.
- Consider the impact upon environmental and natural resources in planning and development efforts.
 - Establish effective incentives and regulations that promote sustainable and efficient management of environmental resources.
 - Develop educational programs to foster community awareness of and support for the protection and enhancement of natural areas, efficient use of natural resources and appropriate waste management.
 - Encourage environmental policies and programs to secure the community's future economic, ecological, animal, plant and human health.

Chapter Organization:

This chapter covers a wide range of subjects and is divided into sections for different environmental categories, such as Water or Land Resources. Each section contains:

- 1) **Introduction:** *Presents a broad overview of each category.*
- 2) **Summary of Issues:** *Provides brief discussion of topics.*
- 3) **Goals and Policies:** *Presents long-range goals of the community and identifies specific courses of action to achieve those goals.*

Chapter Utilization

This chapter presents a comprehensive overview of environmental issues as they relate to land use. Action steps are contained in many of the goals and policies presented in this chapter. Those action steps may involve other agencies or may take time to complete. Development proposals shall be evaluated using the goals and policies contained in this chapter to promote sustainable development that is aligned with the strategies above. Doing so will ensure that there is a balance between environmental and developmental concerns.

- This chapter is meant as a guide that will supplement goals and policies discussed in other chapters in Horizon 2020. This chapter

is meant to integrate with other chapters in the comprehensive plan.

- Code regulations shall be developed to achieve the policies discussed in this chapter.
- Goals and policies discussed in this chapter shall be used in the long-range planning process, as well as long range plans for other city and county departments, such as Parks and Recreation, Utilities, Public Works, etc.
- Development proposals will be reviewed for general conformance with the goals and policies in this chapter to promote sustainable development.

WATER RESOURCES AND MANAGEMENT

This section discusses the variety of water resources in Douglas County, which includes creeks, rivers, streams, lakes, wetlands and groundwater. Each type of water resource can be viewed individually or as a comprehensive, interconnected network to understand their importance and function in the natural environment. They can also be evaluated to determine how actions taken as part of the planning and development process may impact or influence their ability to provide good water quality for human consumption and aquatic habitat, reduce flooding, and provide recreational opportunities.

Summary of Issues:

- 1) **Water quality.** *Protection of watersheds, particularly those above public water supply reservoirs, is critical to ensuring that public water quality is maintained at its highest level. Minimizing pollutants that can contaminate ground and surface water and controlling erosion will also help to protect the water quality and help provide high quality aquatic habitats. Minimizing soil erosion helps protect water supply reservoirs from premature siltation, thereby protecting water quantity as well.*
- 2) **Flooding.** *Protecting floodplain areas maintains the carrying capacity of the floodplain, improves water quality, provides wildlife habitat, reduces threats to human life, and minimizes damage to property. In the past, Douglas County has experienced flooding, most notably with the 1951 and 1993 floods. The 1951 flood caused an excess of \$3 million in damage to the City of Lawrence alone, compared with only \$1.2 million in damage after the 1993 flood. The damage in 1993 in the City of Lawrence was significantly lower than the damage in 1951 because the local levee system was completed in 1980, before the 1993 flood. It is important to note that the majority of the damage from the 1993 flood occurred in unprotected areas of Douglas County therefore causing more than \$5.8 million in damage county-wide. Efforts associated with the National Flood Insurance Program (NFIP), including compliance with regulatory standards and the City of Lawrence's participation in the Community Rating System (CRS) program, also led to a decreased vulnerability to flood damage as a result of the 1993 flood. Flooding is considered a serious public hazard and approximately 16% of all of the land in Douglas County is located in the 100-year floodplain.*
- 3) **Recreation.** Douglas County contains numerous water resources that provide recreational benefits, such as fishing, boating, and swimming. Clinton Lake, the Kansas River and the Wakarusa River are just a few of

the water bodies that contribute to the healthy outdoor lifestyle of residents.

Goals and Policies:

Goal 1: Properly manage all water resources, including Drainage Areas, Surface Watercourses, Wetlands, Sub-surface Waterways, Floodplain areas, and Stormwater runoff, in order to protect natural habitats, mitigate hazards, and ensure water quality.

Policy 1.1 Planning at the watershed level should be implemented to mitigate development impacts on a large scale. This could include development of a county wide drainage area plan that would identify the drainage areas and set out goals and policies specific to each area.

Policy 1.2 Preserve and protect natural surface watercourses.

- a. Develop stream setback regulations for both the City of Lawrence and Douglas County to establish stream corridors which provide a buffer that stabilizes stream banks, reduces erosion, preserves riparian areas, mitigates flood hazards, and ensures water quality.
- b. Encourage uses of riparian areas that are low-impact, which may include recreational uses and also serve as connectors to other non-water recreational areas.
- c. Water structures, including dams, shall be permitted and maintained in accordance with applicable Federal, State and local regulations.
- d. Encourage continued alignment with the Kansas Water Plan, which lists the following measures:
 - d.1 Use native plants in yards and gardens; they need fewer chemicals and water.
 - d.2 Use fewer chemicals on lawn, gardens, fields and forests to protect water quality.
 - d.3 Separate livestock operations from streams with a vegetated filter and adequate distance.

Policy 1.3 Improve and maintain water quality, particularly sources of public drinking water, through watershed protection measures.

- a. The City and County shall participate in applicable Watershed Restoration and Protection Strategy (WRAPS) programs, focusing on the protection of the Upper Wakarusa and Lower Kansas Watersheds.
- b. The City and County shall identify and map priority wetlands, surface water buffer areas, and riparian areas within each watershed.
- c. Develop regulations and incentives for the protection of the inventoried features discussed above with emphasis on protection of public drinking water supply, habitat preservation, stream stability and erosion control.

Policy 1.4 Preserve and protect wetlands and the various functions they serve.

- a. Inventory and map wetlands in the county; identifying them based on the priority criteria listed in The Wetland Federal Regulations 33 CFR Part 320.4, as amended.
- b. Develop a wetland policy which promotes protection, enhancement and restoration of existing high priority wetlands and effective mitigation of wetlands when disturbed.
- c. Develop regulations and incentives for the retention and protection of the wetlands identified through the inventory focusing on impacts from both on-site and off-site development activity that affects the wetlands in question.
- d. Provide education and outreach programs to inform citizens and government employees of the function and values of wetlands and the measures that protect them.

Policy 1.5 Protect sub-surface water resources.

- a. Conduct an inventory of Douglas County and identify any significant areas of groundwater recharge to maximize opportunities for protection of water quality.
- b. Develop programs and regulations, such as pesticide-free park programs and further stormwater regulations, to minimize pollutants

leaching into underlying groundwater systems to help ensure the quality of our groundwater resources.

- c. If important areas of groundwater recharge are identified through the inventory, prepare a wellhead protection plan.
- d. Provide education and outreach programs to inform citizens and government employees of the function and values of sub-surface water resources and the measures that protect them.

Policy 1.6 Protect floodplain areas to maintain the carrying capacity of the floodplain and mitigate potential hazards to human life.

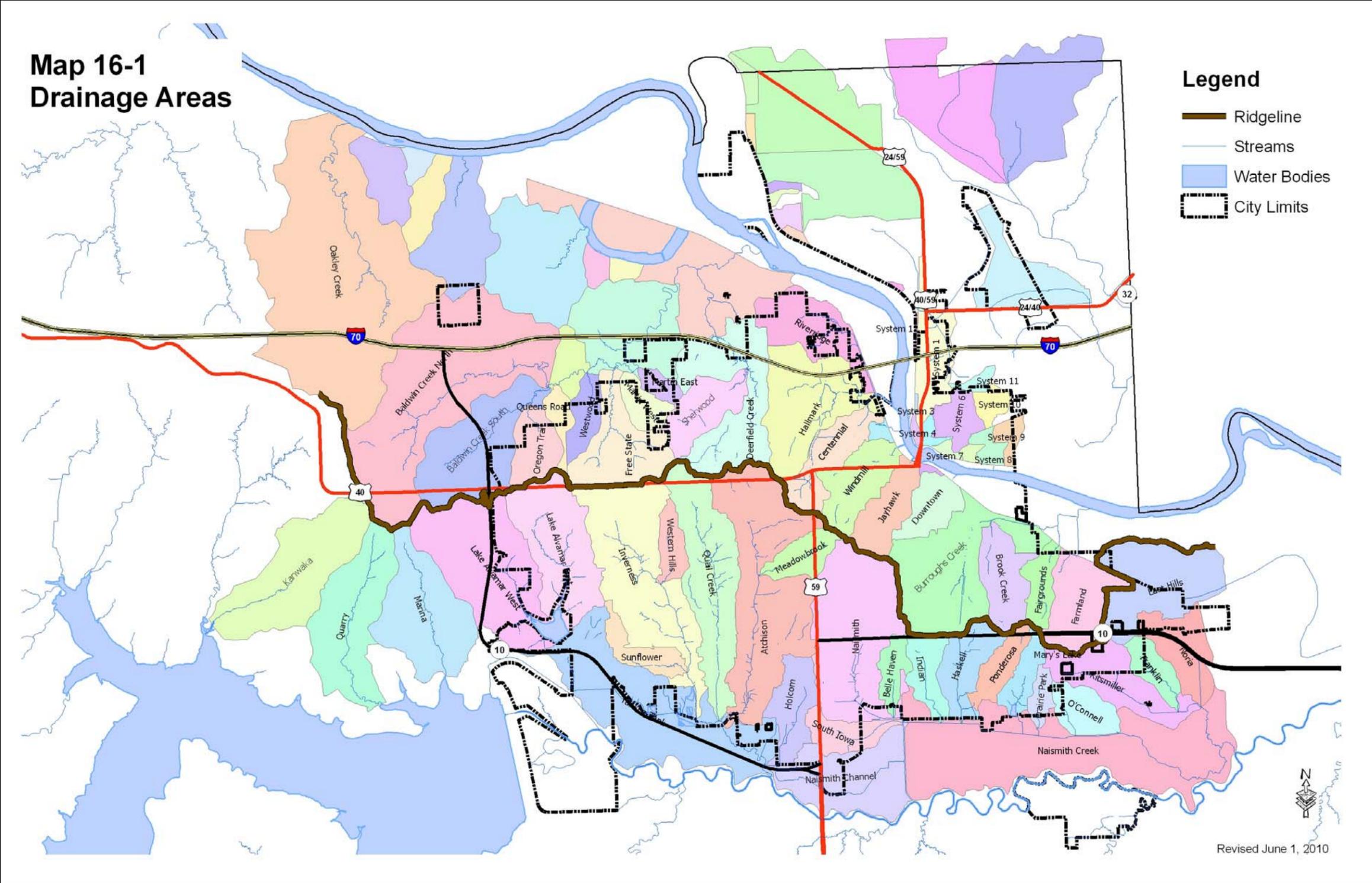
- a. The City and County shall maintain floodplain regulations that meet or exceed National and State regulations. Exceeding National and State regulations benefits the community by reducing the threat to human life, reducing property loss and ensuring water quality. Consider further limiting new development from encroaching into the regulatory floodplain by adopting regulations that promote no adverse impact in flood hazard areas.
- b. Communities shall continue participation in the National Flood Insurance Program (NFIP).
- c. The City of Lawrence should continue participation in the Community Rating System (CRS) program and increase their level of participation in order to achieve a greater discount to citizens on their flood insurance rates. Douglas County should investigate participating in the program as well.
- d. Encourage all property owners living in flood prone areas to purchase flood insurance.
- e. Continue to educate citizens on flood related hazards, floodplain regulations, and other flood related topics to comply with national programs and reduce the flood hazard.

Policy 1.7 Develop stormwater management policies and programs in a manner that ensures water quality and properly controls runoff.

- a. Encourage minimal and appropriate use of fertilizers, pesticides and other chemicals to reduce stormwater pollutants.

- b. Develop strong erosion and sediment control policies on construction sites that include consistent and effective enforcement to improve stormwater quality.
- c. As part of the City of Lawrence's overall stormwater management strategy, maintain regulations and policies that are consistent with the provisions and goals of the Clean Water Act, including its National Pollutant Discharge Elimination System (NPDES) Program, and other federal, state and local requirements for water quality and environmental preservation.
- d. Maintain an inventory of stormwater structures for ongoing inspection, compliance and maintenance procedures. Establish an inspection and maintenance plan with property owners as part of Best Management Practices (BMPs).
- e. Use nonstructural or natural approaches to stormwater system design and management. Encourage stormwater management that uses natural features, rain barrels, rain gardens, bio-retention swales, pervious paving materials, and limits the use of impervious surfaces, etc.
- f. Provide educational opportunities regarding natural stormwater management features, Best Management Practices (BMPs) for stormwater structures and pollutant discharge, erosion and sediment control, and water quality.
- g. Encourage environmentally sensitive farming methods, such as terracing, buffering, the use of no-till farming practices, etc., near surface watercourses to reduce pollution, stabilize streambanks and prevent erosion.
- h. Douglas County shall adopt stormwater regulations that include submittal of drainage plans and regulations for on-site detention, particularly for properties located in Urban Growth Area's (UGAs) throughout the County.

Map 16-1 Drainage Areas

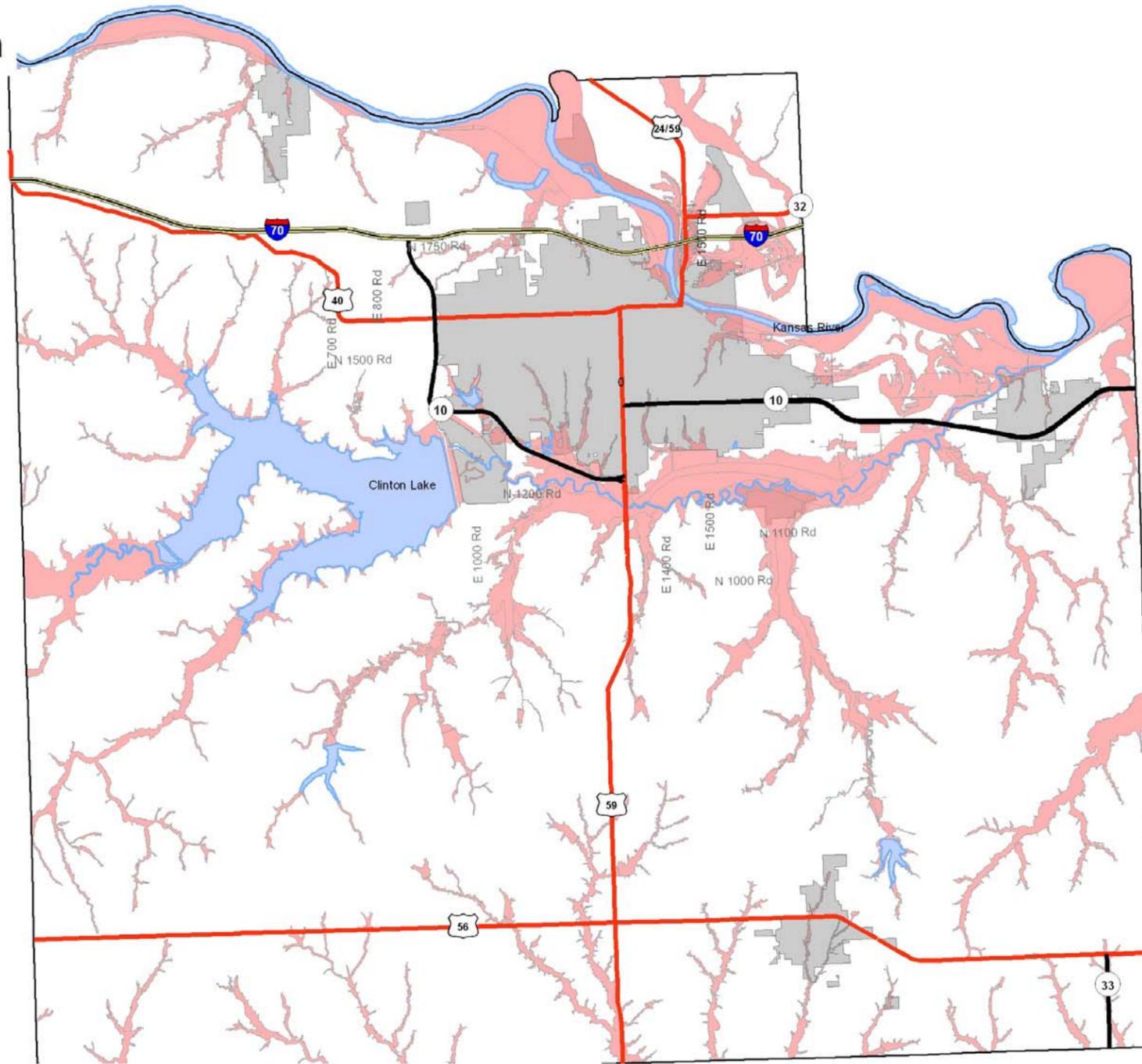


- Legend**
- Ridgeline
 - Streams
 - Water Bodies
 - City Limits



Revised June 1, 2010

Map 16-2 Floodplain



Legend

- County Limits
- City Limits
- Water Bodies
- 100-year Floodplain



Revised July 30, 2010

LAND RESOURCES AND MANAGEMENT

This section discusses Douglas County's various land resources, which consist of rural woodlands and urban forests, native prairies, and agricultural soils. These resources provide wildlife habitats, viewsheds, and open spaces, as well as, serving as 'Green Infrastructure', as they provide benefits to the natural and built environments. Like many other parts of the country, land resources within Douglas County are being impacted by development pressures and agricultural practices. Benefits of preserving and managing land resources include growth management, flood control, improved water quality, protection of wildlife habitat, and economic advantages to the community, such as a lower cost to the community for development.

Summary of Issues:

- 1) Open space network.** *The creation of an open space network or green infrastructure system minimizes the fragmentation of natural areas and benefits the community by protecting natural habitats, providing appropriate stormwater management, providing open-air recreation areas and promoting sustainable development practices. Open space networks can include:*

***Topography:** Developing on steep slopes can be costly and permanently alters the natural slope of the land which may have detrimental effects on other natural features, stormwater runoff and habitats.*

***Rural Woodlands and Urban Forests:** The trees in rural woodlands and urban forests provide many valuable benefits ranging from:*

- ***Ecological** (improving air and water quality),*
- ***Biological** (providing wildlife habitat),*
- ***Physical** (serving as 'green infrastructure' by providing shade and screening),*
- ***Social** (providing areas of scenic beauty and areas for recreation), and*
- ***Cultural** (establishing and maintaining the character of the area).*

***Native Prairies:** The tallgrass prairie has an intrinsic value as an endangered ecosystem which is a feature of our national heritage. The prairies provide recreational and educational opportunities, as well as providing habitats for wildlife and plant species. In addition, native prairies play a valuable role*

in controlling sedimentation, aiding groundwater recharge, and absorbing stormwater runoff.

Endangered Species and Wildlife Habitats: *The protection of critical habitats is a principal means of protecting rare and endangered species and also serves to protect other species that use the same habitat. Because development has resulted in fragmentation of wildlife habitats, corridors connecting them should be maintained. The Kansas Wildlife Conservation Plan² includes protection measures for rare and endangered species and is geared toward practices and policies that would help keep common species from becoming endangered.*

- 2) Agricultural soils.** *High Quality Agricultural Land is recognized as having exceptional quality and fertility, and in Douglas County is generally described as having Capability Class (non-irrigated) I and II soils as defined by the National Resources Conservation Service. This High Quality Agricultural Land is a finite resource that is important to the regional economy. This land requires less intervention to produce high yields of crops with high nutrition and should be protected, preferably for food production.*

Goals and Policies:

Goal 2: Properly manage all land resources, including soils, woodlands, native prairies, wildlife habitats, viewsheds and open spaces, to maintain the functions they provide, ensure the sustainability of the resources, and improve the environmental quality of the City of Lawrence and unincorporated Douglas County.

Policy 2.1 Development should maintain the natural benefits of existing topography. Development on steep slopes (above 15%) should be done in a manner that encourages the use of the existing topography with minimal grading to minimize adverse effects.

Policy 2.2 Preserve and sustain woodlands within Douglas County.

² <http://www.kdwp.state.ks.us/news/Other-Services/Wildlife-Conservation-Plan>

- a. The City and County shall partner with other agencies and institutions to inventory and map woodlands within the county. The inventory and map should identify the different types of woodlands ('high quality natural areas', woodlands which form, or could form, corridors or greenways and riparian woodlands) and provide a ranking system in priority order for protection.
 - a.1 Develop regulations and incentives that provide different levels of protection for the different types of woodlands.
 - a.2 Encourage environmentally sensitive site design practices which minimize the unnecessary physical and visual impacts upon the surrounding landscape caused by removal of woodlands.
 - a.3 Develop regulations and incentives for the protection, maintenance, and improvement of riparian woodlands which include an ordinance defining the stream setbacks and the activity which may occur in the riparian area.
 - a.4 Develop public outreach and educational programs to increase public awareness concerning the importance of woodlands.
- b. Protect and increase the urban forest in Lawrence.
 - b.1 The City shall conduct an inventory of the Urban Forest.
 - b.2 Adopt an Urban Forestry Master Plan and associated policies, programs, and incentives for the preservation and enhancement of Lawrence's urban forest on both public and private property, through development and zoning codes, emphasizing the use of trees appropriate to the climate of this region.
 - b.3 Adopt standards for tree care activities and the regulation of tree maintenance contractors that will prevent the serious damage that inappropriate pruning practices cause to Lawrence's trees. Partner with utility agencies regarding appropriate tree location and pruning practices.
 - b.4 Establish educational programs to foster public/community awareness of, support for, and contribution to Lawrence's urban forestry initiatives, which are directed at establishing the

maximum urban tree canopy, maintaining it in a healthy condition and promoting its conservation.

Policy 2.3 Preserve and protect native prairie.

- a. Partner with the Kansas Biological Survey, other agencies, and individuals to inventory and map the remaining native prairie remnants within Douglas County.
- b. Develop regulations, planning guidelines, management techniques, and incentives for preserving native prairies. The native prairie should be preserved and used as parks and/or open space either through purchase or the use of conservation easements.

Policy 2.4 Preserve and protect natural habitats.

- a. Identify and map areas of 'critical habitat', key habitats, and wildlife corridors, including areas that could link together to increase connectivity throughout the City and County.
- b. Develop incentives to encourage on-site and off-site habitat connections and/or enhancement of natural areas as part of development projects.
- c. Develop regulations that permit only low-impact development with environmentally sensitive design in areas of 'critical habitat'.
- d. Increase awareness of the species and loss of habitat through educational and outreach programs.
- e. Treat areas identified as key habitats as high priority areas for preservation and protection in the development of regulations, protection standards, and incentives.
- f. Develop regulations and incentive programs for the protection and maintenance of wildlife corridors and key habitat areas.
- g. Regulate the placement of roads, trails and utilities with development or infrastructure projects to minimize creation of fragmented natural areas.

- h. Develop a program to encourage and incentivize the connectivity of natural areas whether they are on a particular development site or off-site.
- i. Develop a combination of educational programs, incentives, and development standards that recognize and promote sound management practices by private land owners to maintain the health of natural habitats on private property.

Policy 2.5 Along with community members in Douglas County, identify and define important features that contribute to viewsheds, as well as establish possible protections for viewsheds. At such time, further policies relating to viewsheds may need to be addressed.

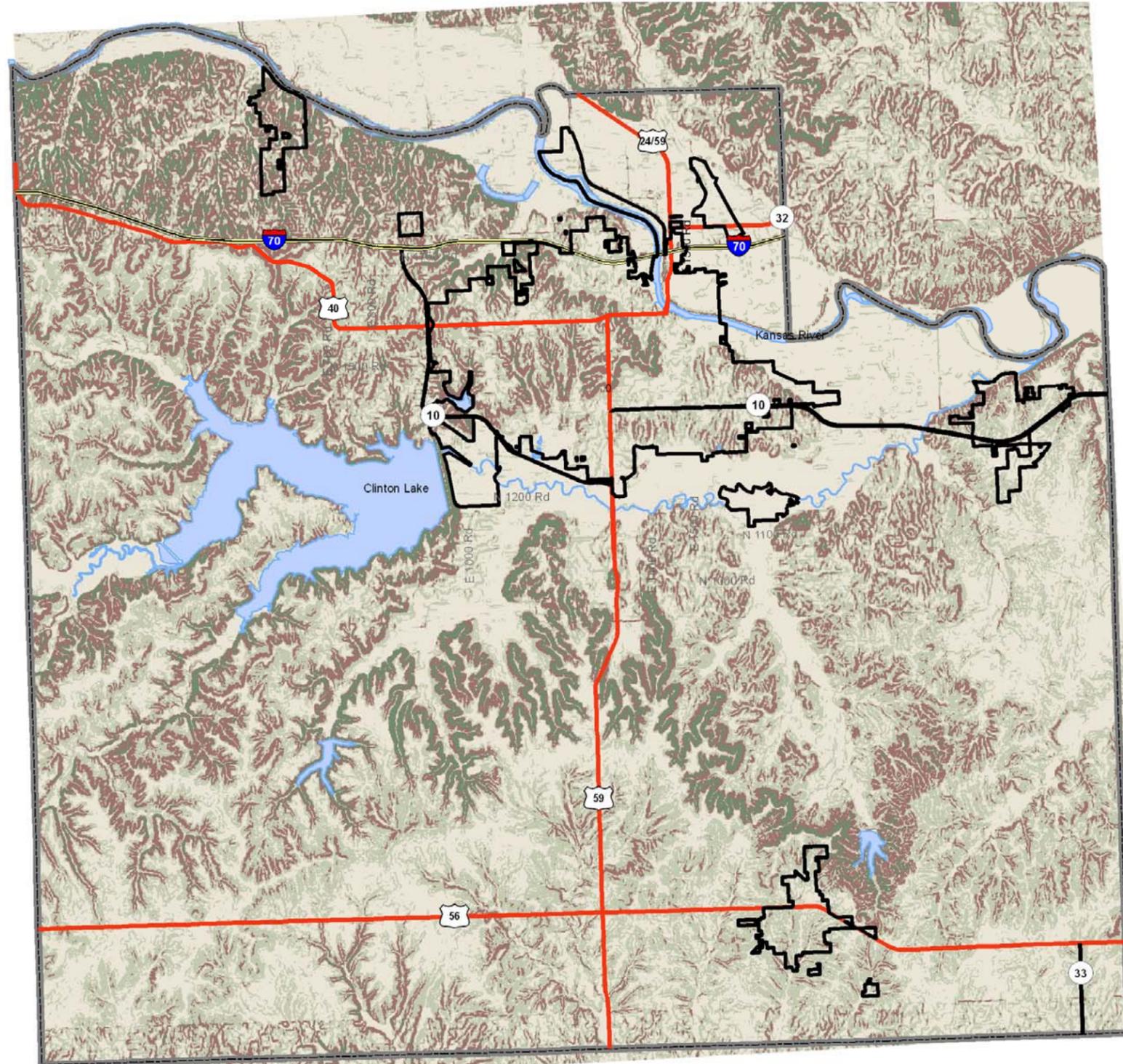
Policy 2.6 Preserve existing open space and create new open space areas to preserve and expand a sustainable green infrastructure system.

- a. To maximize the advantages to the community that the natural and built environments provide, open space preservation shall remain a goal especially as it relates to protecting and preserving natural features discussed in the comprehensive plan. This should be done through:
 - a.1 Maintaining and enhancing existing open space.
 - a.2 Creating new designated open space areas.
 - a.3 Creating a large interconnected network of open space.
- b. Incorporate open space evaluation into long range plans to determine in advance of development proposals what areas are suitable for development and what areas would serve better as open space.
- c. The acquisition and continued maintenance of open space that is publicly accessible shall be strongly encouraged.
- d. Promote and encourage eco-tourism to sustain open space and natural areas.

Policy 2.7 Encourage the protection of High Quality Agricultural Land in Douglas County for current and future agricultural use.

- a. The protection of High Quality Agricultural Land shall be used as a key assumption in the sector planning process.
- b. Establish tools to protect High Quality Agricultural Land for farming and make its protection economically feasible for the land owner, such as an agricultural easement program, development incentives that encourage the protection of this resource, public/private partnerships, or other funding mechanisms.
- c. Maintain an inventory of High Quality Agricultural Land in Douglas County and track the amount lost to urbanization.
- d. Encourage and develop policies that support agri- and eco-tourism, as well as a sustainable local/regional food system.

Map 16-3
Slopes



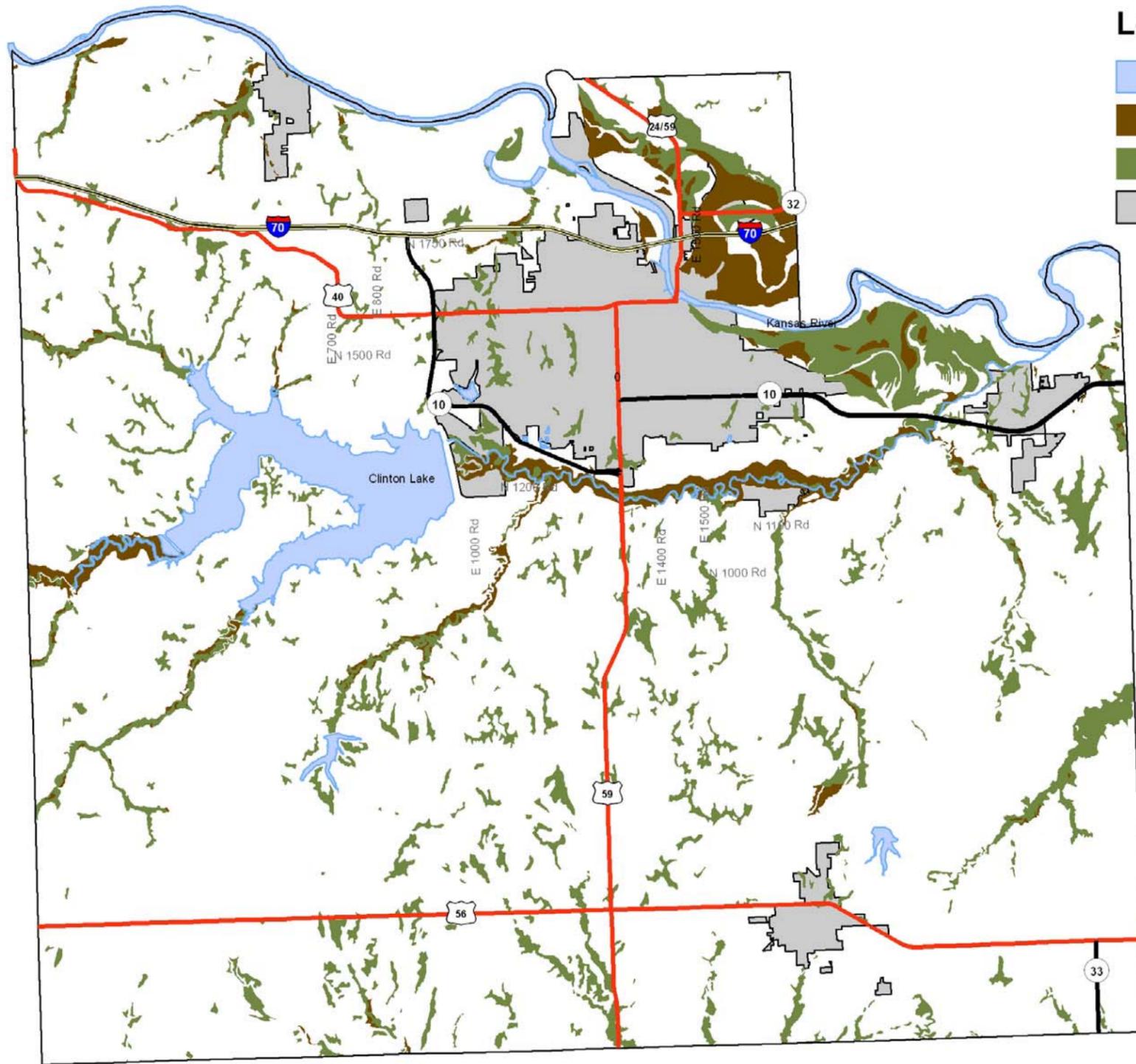
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-  City Limits
-  County Limits
-  Water Bodies
-  0 - 3%
-  3 - 7%
-  7 - 15%
-  15% & above



Revised June 1, 2010

Map 16-4 High Quality Agricultural Land



Legend

- Water Bodies
- Capability Class I
- Capability Class II
- City Limits



Revised August 30, 2010

AIR RESOURCES AND MANAGEMENT

This section focuses on air quality, which is impacted by the amounts of pollutants present, such as sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, radon, particulate matter, mercury and lead. Air pollution has a profound impact on the environment and can lead to water contamination, soil contamination and impact the health of humans, animals and plants.

Excess greenhouse gases, such as carbon dioxide, methane, nitrous oxide, and fluorinated gases, are a form of air pollution that may lead to global warming. The *Climate Protection Plan: Climate Protection Task Force Report* to the Lawrence City Commission provides recommendations for the reduction of greenhouse gas emissions in the community.

Summary of Issues:

- 1) **Air quality.** *The quality of air impacts human, plant and animal health.*
 - a. **Outdoor air pollution.** *Minimizing pollutants is critical to maintaining outdoor air quality. Outdoor air pollution can lead to negative health impacts.*
 - b. **Excessive greenhouse gases.** *Reducing greenhouse gases is necessary to limit their negative impacts on the climate.*
 - c. **Indoor air pollution.** *Pollutants, such as radon, second-hand smoke, carbon monoxide and VOCs (volatile organic compounds) affect indoor air quality and have a negative impact on human health.*

Goals and Policies:

Goal 3: Improve indoor and outdoor air quality in order to mitigate impacts to human, animal and plant life in Douglas County.

Policy 3.1 Improve air quality through reduction in emissions from vehicle exhaust by reducing the number of vehicle miles traveled.

- a. Recommend land use and transportation design standards that encourage the use of alternative forms of transportation (other than private vehicle), encourage development in areas that are served or could be served by transit facilities, and provide efficient connections from one mode of transportation to another.

- b. Encourage and provide incentives for mixed use districts which provide live/work/shop opportunities within walkable distance.
- c. Encourage redevelopment and infill where adequate infrastructure currently exists.
- d. Encourage and provide incentives for carpooling or use of mass transit and alternative forms of transportation.
- e. The City and County Governments, in addition to other employers within Douglas County, should develop and implement incentive programs to promote and increase public transit use or forms of alternative transportation (non-vehicular) among their employees.
- f. Provide education to the general public, businesses and government officials regarding the cause and effects of air pollution, focusing on steps everyone can take to reduce air pollution and the intended benefits of local regulations designed to reduce air pollution.
- g. Develop a walkable, complete street program stressing connectivity and street design that safely accommodates all users including non-motorized vehicular traffic.

Policy 3.2 Reduce emissions from vehicle exhaust and encourage the use of more energy efficient vehicles.

- a. Provide education to the general public, businesses and government officials regarding the cause and effects of air pollution focusing on steps everyone can take to reduce air pollution.
- b. The City and County should take a leadership role in reducing emissions from the city/county vehicles and public transit vehicles, purchasing more energy efficient vehicles, and reducing the number of miles traveled when possible.

Policy 3.3 Reduce emissions of non-vehicular air toxics as listed by the EPA.

- a. The City and County should strive to minimize power usage, promote alternate fuel sources, and use environmentally friendly building design and mechanical systems (often referred to as 'green building') in their government buildings to serve as a model to the community.

- b. Encourage education and outreach programs which explain the need for improvement and provide information on steps individuals, businesses, institutions, the City and the County can take to reduce their contribution to emissions in Douglas County.

Policy 3.4 Adopt and implement the standards in the Federal Clean Air Mercury Rule to reduce the mercury emissions in the area.

Policy 3.5 Develop Land Use Planning regulations and incentives to reduce greenhouse gas emissions to acceptable levels.

- a. Develop and implement policies to inventory and increase the amount of urban forest that will help reduce the amount of CO2 in the air.
- b. Develop a Douglas County inventory of greenhouse gas emissions using the guidance materials available from the EPA and use this inventory to monitor success of implemented programs.
- c. Develop a program to accommodate and encourage the increased use of bicycling as a form of transportation. The program should include the following features:
 - c.1 Bicycle/pedestrian level of service standards and guidelines for new developments.
 - c.2 Incentives for provision of additional bicycle parking at existing facilities.
 - c.3 Plans for the retrofit of existing streets where bicycle facilities are needed.
 - c.4 The implementation of a comprehensive network of bicycle facilities identified in the bikeway system map.
- d. Encourage and incentivize energy efficient building design.
- e. Encourage and incentivize transit and forms of non-motorized transportation.
- f. City and County governments should serve as a model for the community by setting goals for reduction of greenhouse gas emissions from construction and operation of government buildings.

Policy 3.6 Improve indoor air quality to maintain and improve the health of our community.

- a. Inform and educate the public to the causes and effects of indoor air pollution as well as the measures to reduce the pollution.
- b. Maintain current building codes aimed at reducing indoor pollutants and consider codes to further improve indoor air quality.

Policy 3.7 Work with agencies to implement the above policies in order to keep Douglas County from becoming a non-attainment area as defined by the Environmental Protection Agency.

RESOURCE MANAGEMENT

This section encourages the responsible use of marketable natural resources within Douglas County through proper extraction and reclamation methods. They are essential to sustainable development activity, primarily in the form of low cost raw materials, such as sand, gravel, timber, oil, gas, and stone, etc.

Summary of Issues:

- 1) **Resources.** *The improper extraction of marketable natural resources can create environmental problems such as erosion, negative impacts on water quality, and degradation of wildlife habitats.*

Goals and Policies:

Goal 4: Properly manage marketable resources to ensure the sustainability of the resources and improve the environmental quality of the City of Lawrence and unincorporated Douglas County.

Policy 4.1 Identify and properly manage marketable natural resources.

- a. To minimize negative environmental impacts, the City and County shall work with applicable state agencies to develop appropriate operation standards for harvesting, collecting, recovery and extraction of marketable natural resources, and provide for effective reclamation of land.
- b. Document and map all operating and non-operating quarries. Document any quarries and sand/gravel operations which were in operation prior to the establishment of zoning regulations and work with the operators to minimize negative impacts of operations.
- c. Identify and map marketable mineral deposits to assist in future land use/planning decisions.

WASTE MANAGEMENT

This section provides a general discussion of the proper disposal methods of waste, including solid waste and hazardous waste. In addition, the section also addresses ways to reduce waste production through reuse and recycling. Proper disposal of waste reduces pollution of land, water, air and other natural resources.

Summary of Issues:

- 1) **Waste management.** *As part of our daily lives, significant amounts of solid waste are generated and the majority of that solid waste is then diverted to landfills. Disposing of waste in this manner is costly, and can create water, air and land pollution, as well as wasting resources that might otherwise be reused. It is important to reduce, reuse, and recycle waste material.*

Goals and Policies:

Goal 5: Properly manage all waste, including solid and hazardous waste, in order to reduce, reuse and recycle the majority of the waste that is produced in Douglas County .

Policy 5.1 Manage solid waste through a program that emphasizes the principles of Reduce, Reuse, and Recycle.

- a. Encourage recycling efforts, both existing and new, in Douglas County in order to reduce the amount of material being disposed of in landfills.
- b. Encourage waste reduction, reuse and recycling through educational outreach efforts to residents and businesses.
- c. Encourage the recycling of construction and demolition debris.
- d. Encourage and expand the yard waste collection programs to divert more material from landfills and to provide mulch and compost from sustainable sources.
- e. Establish standards for provision of recycling receptacles on multi-family residential and non-residential development proposals.

Policy 5.2 **Maintain support for and improve the Lawrence-Douglas County Household Hazardous Waste Program to ensure that household hazardous waste is disposed of properly.**

HUMAN AND BUILT ENVIRONMENT

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development integrates the three pillars of environmental protection, economic development, and social development in decision making. It is not the tradeoff between these pillars, but the synergy between them."³

The majority of this chapter discusses protection of certain environmental and natural features in order to preserve them for the future. This final section of the chapter takes those ideas a step further by identifying how those environmental protection efforts impact the human and built environment to create a sustainable and livable community.

Summary of Issues:

- 1) Sustainability.** *Creating a sustainable community protects and preserves the environment, natural and built, for future generations. This can include minimizing negative impacts from development on the environment and promoting sustainable building and land use practices.*
- 2) Healthy and active lifestyles.** *How the physical environment of Douglas County is built has a direct impact on the lifestyles and health of its residents. Making cities and neighborhoods pedestrian and bicycle friendly, creating a system of interconnecting greenspaces, reducing air and water pollution, creating appropriately designed transportation systems, and providing recreation spaces help enhance the health of our citizens. As an example, the Safe Routes to Schools program, sponsored by the State of Kansas Department of Transportation, provides safe zones which make it safer for children to bike or walk to schools.*
- 3) Local/Regional Food.** *Local and regional food programs provide health benefits by encouraging healthy diets made up of adequate amounts of locally grown fresh food and may produce air quality benefits by reducing fossil fuel emissions associated with food-related transportation. In Douglas County, there are approximately 98,000 harvested acres of active farmland. A report, "Eastern Kaw River Region's Local Farm and Food Economy", studied seven counties in eastern Kansas and found that the region loses \$2.1 billion of potential revenue by buying food supplies from*

³ A portion of this definition is taken from Brundtland Report: World Commission on Environment and Development (WCED). *Our common future*. Oxford: Oxford University Press, 1987 p. 43.

outside of the region. This money can be potentially recaptured by implementing a local food program and the Douglas County Local Food Policy Council is developing strategies to achieve this. Not only does a local and regional food program encourage the preservation of agricultural lands, but it also encourages diverse forms of food production, such as community gardens and other urban forms of food production, and provides economic benefits to the community.

Goals and Policies:

Goal 6: Mitigate negative impacts to the human and built environment caused by noise pollution, light pollution and development activities in order to promote a sustainable, healthy, and active lifestyle for the residents of Douglas County.

Policy 6.1 Mitigate noise pollution by using appropriate land use buffers, limits on noise levels, and limits on operating hours.

Policy 6.2 Continue to develop and implement standards that will limit light trespass, glare and sky glow, by establishing design guidelines for the type and placement of industrial, commercial and residential lighting.

Policy 6.3 The City of Lawrence and Douglas County should encourage the promotion of healthy and active lifestyles for its residents through the use of standards regarding transit options, pedestrian connectivity, multi-use recreational paths, increased open space preservation, etc. Those standards should also include tools, such as Health Impact Assessment, that measure the long-term health effects of projects.

Policy 6.4 Develop a sustainable transportation system.

- a. Encourage land development patterns that utilize transit options and provide for connectivity of pedestrian walkways, bicycle routes, and multi-use recreational paths while providing for appropriate vehicular access options.

- b. In a fiscally responsible manner, the City and County shall use the most environmentally friendly (i.e. fuel efficient) vehicles available on the market for government vehicles, including the publicly-owned transit fleet.
- c. Encourage Travel Demand Management techniques, such as carpooling, vanpooling, signal coordination, etc. to reduce vehicular travel and energy consumption.
- d. Encourage alternative transportation options, such as bus service, van pools, bike paths, etc., for regional commutes.

Policy 6.5 Promote sustainable building practices.

- a. The City of Lawrence and Douglas County should lead the way by requiring that all new public facilities and substantial remodels of existing public facilities be built according to sustainable or “green” industry accepted standards and programs.
- b. Development and building codes should permit and encourage “green” industry accepted standards and programs.

Policy 6.6 Promote the responsible use and conservation of energy, water and other natural resources.

- a. Encourage the use of drought-tolerant native species in public and private landscaping.
- b. Encourage water conservation through the use of alternative irrigation methods such as the use of rain barrels and rain gardens.
- c. Provide education on the use of mulch, drip irrigation, and other features which would reduce water consumption for landscaping.
- d. Provide incentives for building and facility design which minimizes water usage such as water efficient plumbing fixtures, and reuse of gray water for irrigation.
- e. Develop an education and outreach program to inform the public and government officials on the various means to reduce energy consumption.

- f. The City and County governments shall take the lead and set an example of reducing energy consumption for the community in a fiscally responsible manner, and examples may include:
 - f.1 Providing incentive programs for employees to use mass transit or alternative forms of transportation,
 - f.2 Considering travel miles when locating new facilities,
 - f.3 Making energy consumption a major factor when purchasing new vehicles and equipment,
 - f.4 Taking steps to reduce energy consumption in governmental buildings (using an energy audit system), and
 - f.5 Utilizing energy efficient building materials and designs on new facilities.
- g. Develop regulations and incentives for the use of renewable energy sources.
- h. Encourage land use patterns that result in reduced energy usage, such as mixed use development.
- i. The City shall adopt a Complete Street Policy so all road rights-of-way are developed in a manner to ensure the safety and accommodation of all users.

Policy 6.7 As the community develops a local/regional food program, the City of Lawrence and Douglas County should work with stakeholders (local merchants, farmers, landowners, institutions, consumers, etc.) to assist in developing that program.

- a. As a local food program is developed, further policies relating to land use may need to be addressed in this chapter, as well as Chapter 12 – Economic Development.
- b. Encourage zoning laws to permit community gardens, farmer's markets and other uses to promote growing and marketing local food in an urban setting.
- c. The City and County governments should consider establishing local food programs in their operations.

GLOSSARY:

Complete Streets	<i>Streets that are designed and operated to safely accommodate all users, including but not limited to: motorists, pedestrians, bicyclists, transit, and people of all ages and abilities. The entire right-of-way is designed to encompass users of all types and enable users to safely move along and across the road.</i>
Critical Habitats	<i>Habitat that has been designated as essential for the conservation of species that are listed as threatened or endangered.</i>
Drainage Areas	<i>Land areas that contribute surface water to a given location delineated by surface topography. They vary in size and are made up of five interconnected sub-features: Basins, Subbasins, Watersheds, Subwatersheds, and Catchment areas.</i>
Endangered Species	<i>Any species of wildlife whose continued existence as a viable component of the state's wild fauna is determined to be in jeopardy. That term shall also include any species of wildlife determined to be an endangered species pursuant to Pub. L. No. 93-205 (December 28, 1973), the Endangered Species Act of 1973, and amendments thereto.</i>
Energy audit system	<i>An energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output(s).</i>
Floodplain	<i>The land inundated by a flood of a given magnitude as determined by the FEMA Flood Insurance Study or by an approved Hydrologic and Hydraulic Study.</i>
Glare	<i>The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility.</i>
Green Infrastructure	<i>A strategically planned and managed network of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations.⁴</i>
Greenhouse Gases	<i>Gases that trap heat in the atmosphere are often called greenhouse gases. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human</i>

⁴ Green Infrastructure: Smart Conservation for the 21st Century, www.sprawlwatch.org

	<i>activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are: Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), and Fluorinated Gases such as hydrofluorocarbons or perfluorocarbons which are usually emitted from a variety of industrial processes.</i>
Groundwater Recharge	<i>Water that infiltrates the land surface and percolates downward to the underlying groundwater system.</i>
Health Impact Assessment	<i>A combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.⁵</i>
High Quality Agricultural Land	<i>Land with good soil quality that is rated as Capability Class (non-irrigated) I and II as defined by the National Resources Conservation Service.</i>
Key Habitat	<i>Habitat for wildlife that are not listed as endangered or threatened, but that have declined over the last 50 years to the point that they are in danger of being listed as such.</i>
Level of service standards	<i>A qualitative rating of the effectiveness of a highway or highway facility in serving traffic, in terms of operating conditions (speed, travel time, comfort, convenience, traffic interruptions, freedom to maneuver). The Highway Capacity Manual identifies operating conditions ranging from A, for best operations (low volume, high speed) to F, for worst conditions.</i>
Light Pollution	<i>The adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.</i>
Light Trespass	<i>When light is directed outside of the given property.</i>
Native Prairies	<i>A prairie is an ecosystem native to central North America, with fire as its primary periodic disturbance. Prairie areas that have remained relatively untouched on undeveloped, untilled portions of properties are 'native prairies'. Native prairies have remained primarily a mixture of native grasses interspersed with native flowering plants. (These areas have not been planted, but are original prairies.)</i>
Open Space Area	<i>An area which provide visual & psychological relief from the built environment; public access via trails & walkways to these areas is important to provide passive recreational</i>

⁵ <http://www.cdc.gov/healthyplaces/hia.htm>

	<i>opportunities where it is compatible with resource protection & environmental regulations; open space areas may or may not be improved, but can include playfields, trails, greenbelts/greenways, community gardens, farmed areas, buffers between land uses of differing intensities, such as residential & commercial or industrial activity, areas within community or neighborhood parks which are left in their natural state, & other environmentally sensitive areas.⁶</i>
Riparian Areas	<i>The part of the watershed that flanks surface watercourses. These areas provide benefits, such as storage of flood waters, storm water conveyance, pollutant filtration, wildlife habitat, shaded areas, recreational areas, and aesthetic amenities.</i>
Sky Glow	<i>An artificial brightening of the night sky.</i>
Slope	<i>Slope is the rate of change in elevation between two points in a given area and is one of the main components of the topography or surface features of a given site.</i>
Steep Slopes	<i>Slopes that are 15% or above.⁷</i>
Stormwater	<i>Water runoff from precipitation events.</i>
Stream Corridor	<i>A strip of land which is centered on the centerline of the stream; including intermittent, perennial and ephemeral streams. The width of the stream corridor is dependent upon various factors including: vegetation, topography, drainage area, soil type and streambed slope.</i>
Stream Setback	<i>An area within the stream corridor in which activity is limited. There may be various types of setbacks which permit differing degrees of activity.</i>
Sub-surface Watercourses	<i>Water that occurs below the surface of the Earth, that moves slowly, and ultimately discharges to streams, lakes, wetlands, and the oceans.</i>
Surface Watercourses	<i>Above ground waterways such as rivers, lakes and streams.</i>
Sustainability	<i>Meeting needs of present generation without compromising the ability of future generations to meet their needs.</i>
Sustainable Development	<i>Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development integrates the three pillars of environmental protection, economic development, and social development in decision making.</i>

⁶ From Horizon 2020, Chapter 9: Parks, Recreation, and Open Space

⁷ Marsh, William M., Landscape Planning: Environmental Applications, 2005.

	<i>It is not the tradeoff between these pillars, but the synergy between them.⁸</i>
Tallgrass Prairies	<i>Prairies are distinguished by the types of grasses they contain. Tallgrass prairies flourish in areas with rich soils and moderate rainfall of around 30 to 35 inches per year. The major grasses of the tallgrass prairie are the big bluestem, the little bluestem, indiagrass and switchgrass.</i>
Threatened Species	<i>Any species of wildlife which appears likely, within the foreseeable future, to become an endangered species. That term shall also include any species of wildlife determined to be a threatened species pursuant to Pub. L. No. 93-205 (December 28, 1973), the Endangered Species Act of 1973, and amendments thereto.</i>
Tree Canopy	<i>The layer of leaves, branches, and stems of trees that cover the ground when viewed from above.</i>
Urban Forest	<i>Trees in the urban and near-urban areas including, but not limited to, street trees, park trees, residential trees, natural riparian habitats, and trees on other private and public properties.</i>
Viewsheds	<i>Viewsheds are areas visible from certain locations that are scenic vistas that are important to a given community. They are generally correlated with other environmental features and can include views of water bodies, significant topography, structures, vegetation or other physical things.</i>
Watershed	<i>Typically between ten and a hundred square miles in area, and defined as areas that drain to a particular watercourse or body of water or the total area above a given point on a stream that contributes water to that flow at that point. The top of each watershed is delineated by ridgelines that naturally control the direction of water.</i>
Wetlands	<i>Any area of predominantly hydric soils where standing water or wet soil conditions exists for a significant part of the growing season of most years.⁹</i>
Wildlife corridor	<i>Habitat pathways or linkages that connect areas of natural open space otherwise separated or fragmented. A wildlife corridor allows wildlife to move between separated habitats, providing an escape route from fire,</i>

⁸ A portion of this definition is taken from Brundtland Report: World Commission on Environment and Development (WCED). *Our common future*. Oxford: Oxford University Press, 1987 p. 43.

⁹ Kansas Water Plan

	<i>predators, and human disturbances, and serving as a travel path for individual animals as they wander throughout their home ranges in search of food, water, mates, and other needs.</i>
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