

CHAPTER 7

Physical Development Influences

A community's land use and development activities are affected by and to some extent dependent upon the area's physical features and natural resources. In some cases, these features may encourage the development of particular land uses. They can also sometimes restrict development possibilities and limit directions available for urban growth. Consideration should be given to the physical features in a Planning Area so that developmental policies and guidelines can be established which maximize their advantages and minimize their disadvantages. Such policies are necessary to guide land use development and urban growth in an economically efficient and aesthetically pleasing manner.

The following sections present a brief description of the physical features and their implications for future development in the McPherson Planning Area. This information is graphically summarized in the Development Influences map, Figure 7-A, presented later in this chapter.

Soil Conditions

McPherson County is noted for its rich, fertile soils and their capability for crop production. Although they are good for agricultural uses, the soils in and around the City of McPherson have some distinct limitations for the types of land uses normally associated with urban development.

According to information found in the "*Soil Survey of McPherson County Kansas*" produced by the United States Department of Agriculture, Soil Conservation Service in April of 1983, approximately three-fourths of the land in the McPherson Planning Area is in the Crete (Cr, Cs, or Ct) soil series classification. The remainder of the Planning Area is predominantly of the Ladysmith (La) series. Smaller, localized areas may be comprised of Detroit (De), Goessel (Go), Longford (Ln), Ness (Ns), Smolan (Sm), or Tobin (To) series soils. The major soils are similar, each having a dark silt loam or silty clay loam surface layer, silty clay or clay subsoil, and silty clay loam or silty clay substratum.

Because of low strength and high shrink-swell potential, these soils have severe limitations for the following types of urban development: dwellings with or without basements, small commercial buildings, and local roads and streets. They also have severe limitations for shallow excavations because of their clay content. These limitations are modifiable but must be taken into account when structures or streets are designed.

In terms of sanitary facilities, all of the above noted families of soils have slow percolation rates and, thus, have severe limitations for septic tank absorption. However, both soils have only minimum limitations for sewage lagoons when slopes are less than two percent, and moderate limitations when slopes are greater than two percent.

Water Resources

Water from reliable sources in quantities sufficient to meet the needs of industrial and population growth is vital to the existence and development of any community. There are no major surface water impoundments or rivers in the McPherson Area. However, the city is very fortunate to be located over the Equus Beds, which serve as its source for ground water. These loosely packed deposits of gravel, sand, silt, and clay occupy a wide, deep bedrock valley, known by geologists as the McPherson Valley, which was formed by glacial stream flow several hundred thousand years ago. The Equus Beds are able to store and release large amounts of water with some wells able to pump as much as 1,800 gallons per minute.

Topography and Drainage

Topography and the resulting drainage systems are important factors in determining land capability for both rural and urban land uses. They influence the location and design of many public facilities, including sewage treatment plants, water treatment plants, and storm drainage systems. They also can influence urban growth directions and specific land use patterns, since different types of uses favor different terrains.

The topography of the McPherson Area has a gradual slope to the south, but can be generally described as flat, especially in the western part of the Area. The eastern part has a slightly rolling character, but is still mostly flat. The city itself can also be described as basically having a flat terrain. The bench mark altitude at the Post Office, which is near the center of the city, is 1,504 feet.

Two natural drainage systems pass through the city. Dry Turkey Creek flows in a general southerly direction through the Area and the east central part of the city. It originates about six miles northeast of McPherson and joins with Turkey Creek about eight miles south of the city. It decreases in elevation from 1,550 feet M.S.L. at its beginning to 1,440 feet M.S.L. at its end and serves a total drainage area of 55.5 square miles.

Bull Creek originates about four miles north-northwest of the city, flows through the southwest part of town, then flows into Dry Turkey Creek near the wastewater treatment plant at the south edge of the city. The total length of the creek is about eight miles, and it decreases in elevation from about 1,510 feet M.S.L. at its source to 1,465 feet M.S.L. at its end. Its total drainage area is 19.6 square miles.

The drainage provided by these creeks is sometimes inadequate, therefore parts of the city along both creeks have been designated on the initial "Flood Insurance Rate Map" dated March 16, 1983 (FIRM) as being located within the 100-year regulatory floodplain boundary. The Federal Emergency Management Agency (FEMA) has now completed a "map modernization" project which resulted in an updated FIRM being adopted on January 16, 2009. Mapping technology is rapidly advancing leading to more accurate floodplain delineation than was previously possible.

Flood Hazard Areas

One of the significant physical features for planning in the Area is the extent of potentially floodable areas. Shown in Figure 7-A are "100-year floodplain" areas within the Planning Area as designated by the FIRM. These particular areas were identified on March 15, 1974, as part of the Flood Insurance Study for the city. Detailed flood insurance studies have been made by FEMA for a significant percentage of McPherson County. As depicted on the FIRM, floodplains on all creeks illustrate a flood which may be anticipated on a 100-year frequency, i.e., a one percent chance each year. Bull Creek and the east & west branches of Dry Turkey Creek all experience periodic flooding although a 1% chance flood has not yet been recorded.

McPherson City and McPherson County have joined the National Flood Insurance Program. Both Flood Insurance Rate Maps and Flood Boundary and Floodway maps have been prepared by FEMA for the city and county and were used as the basis for their respective floodplain zoning districts. This commits the city to restrict construction by way of a building/zoning permit system in a "floodway" and limits building in the "flood fringe area" unless filling is proposed that would not raise the level of the flood waters more than one foot on either side of the floodplain at that point. This would also mean that areas not served by public sewers, and using on-site septic tank systems and/or wastewater lagoons would need to be protected from the effects of flooding on such systems. As the city expands, it will continue to be involved in administering the floodplain management program. Due to the adoption of extraterritorial subdivision regulations, the city needs to cooperate with the county in administering various portions of the floodplain. From a jurisdiction standpoint, the city currently has floodplain enforcement duties well beyond the current city limits.

Since the creation of the original FIRM maps, which were based on the earliest detailed study performed by the Corps of Engineers, many small studies of specific areas within the floodplain jurisdiction have been performed. Many of these smaller studies resulted in FEMA issuing a Letter of Map Amendment (LOMA), Letter of Map Revision (LOMR), or Letter of Map Revision based on new fill placement (LOMR-F). Thus the FIRM is a dynamic and constantly changing planning tool. Copies of all of the approved modifications are available from FEMA but are also maintained locally and are available to property owners, developers, Realtors, and loan agencies through the office of the local Floodplain Administrator.

Some idea of the amount of water falling on the Planning Area might be gained from this statistic. An inch of water falling as rain on one square mile is a quantity of nearly 17 million gallons. With the average annual precipitation of McPherson County at 29.0 inches, this means that rainfall in a year would amount to some 493.0 million gallons of water per square mile. Major rainfall occurs in this part of the country during May and June.

Woodland

Although the city has many trees and an active street tree program, there is very little natural woodland in the McPherson Area. Stream areas and shelter belts constitute the only significant woodland in the Planning Area. The value of this woodland is not necessarily economic, but more aesthetic. Left in its natural state, it provides visual relief from contiguous urban development or

contiguous cropland and rangeland. It provides a wind break to reduce loss of soil and a haven for wildlife. Sometimes such woody areas provide a buffer between different types of land uses. Future development efforts in and around the city should be encouraged to preserve these woodland areas. Subdivision regulations can be used to protect such areas when development does occur by requiring permanent, wide drainage easements and establishing open space reserves. Developers of subdivisions can also be required to install street trees.

When individual trees at the sites of houses, parks and other areas as well as along the street rights-of-way within a city are considered collectively, they create an urban or community forest. This "forest" is an important resource affecting the livability of the community. The benefits of urban trees and associated landscaping are well documented and include providing shade, reducing noise levels and air and water pollution, screening undesirable views, providing habitat for birds and other animal life, serving as a "buffer" between mixed land uses, and raising property values. Additionally, a well-maintained and well-planned urban forest enhances the community's character.

Cities are authorized under K.S.A. 12-3201 et seq. to regulate the planting, maintenance, treatment, and removal of trees and shrubbery upon all street and alley rights-of-way. Abutting property owners hold "title to" such trees and shrubbery which are located between their property line and the curb line, sometimes called the parking or planting strip. Property owners can recover damages to such trees and initiate actions to prevent their destruction. Cities can designate acceptable street trees for planting in such areas. Such a list has been produced by the McPherson Tree Board.

Statewide, interest in urban tree plantings and beautification has shown a strong increase due to heightened public awareness of the benefits to a community. Also, the decline and loss of urban trees due to storms, tornados and diseases such as the Dutch Elm disease has affected most cities in Kansas. This has created, and for many years will continue to create, a need for urban tree plantings.

Most often, the initiative for tree planting and beautification begins with concerned citizens or a local group. Local groups often associated with these efforts include a City Tree Board. The City of McPherson formed the McPherson Tree Board by ordinance of the City Commission on October 30, 1974. This ordinance also created the office of City Forester who functions directly under the Director of Public Facilities. The Tree Board consists of 8 members of the general public who are appointed by the City Commission. The City Forester provides staff support and is an ex-officio member of the Tree Board. Together the Tree Board and the City Forester administer and enforce the McPherson Tree Ordinance. The Board advises the governing body, prepares a comprehensive tree plan, initiates tree planting and maintenance projects, and works to educate the public on the benefits of trees.

Creation of a Tree Board is one of the steps for a community to receive the Tree City USA Award. Other requirements include spending \$2 per capita towards tree planting and maintenance each year and observance of an Arbor Day tree planting ceremony. The City of McPherson has received the Tree City USA Award every year beginning in 1978 and continuing to the present. Kansas typically has 100 plus cities which maintain Tree City USA status. It is one of the most successful states in the number of cities which have received this award.

One downside to urban forestry has historically been the disposing of large quantities of limbs, branches and tree stumps. The traditional method of disposal has been to either create large burn piles or to landfill the debris. With the rising costs of landfilling and atmospheric pollution, these methods have fallen into disfavor in many locations. McPherson County, along with the City of McPherson and the other cities within the county, have addressed this through the creation of a large composting facility associated with the McPherson Area Solid Waste Utility. Citizens of the county may dispose of their tree debris, as well as all other types of vegetative waste at the composting site where the material is chopped, windrowed, and allowed to decompose naturally. The finished product may then be picked up by citizens at no additional cost for personal use. The product is widely used as a mulching material or as a soil additive.

Preserves

In addition to floodable areas which have been designated as city parks, two other sites have been set aside as natural areas of preservation.

The first is a small section of The Cedars property located northwest of the intersection of First and Maxwell Streets. This site is approximately 12 acres in size and is on the east side of a pond which was constructed in the channel of Dry Turkey Creek. The site has been seeded to natural Kansas prairie grasses and is maintained as a natural grassland.

The second site is located along the Bull Creek channel on the south Side of Avenue A between Roth Court and the McPherson County Public Works facility. This site is approximately 6.5 acres in size and is maintained as the U.S.D. 418 Nature Research Center. Predominate in this site is natural Kansas prairie grassland and marshland.

Both of these sites are home to various plants and wildlife that are not normally found within or close to the average city. Deer, fox, muskrats, and occasionally, beaver have been observed in these locations as well as a large variety of other wildlife of both dry and wetland varieties.

Climate

McPherson has a sub-humid continental climate characterized by a wide range of temperatures, moderate precipitation, relatively high wind velocity, and rapid rates of evaporation. The average daily temperature is about 56 degrees Fahrenheit, with extremes ranging from a January mean of 30.1 degrees to a July mean of 80.7 degrees. The growing season (freeze-free period) is about 185 days from the third week in April to the third week in October.

About 73% of the annual precipitation comes as rain during the six-month period between the first of April and the last of September. May and June are usually the wettest months with each averaging more than four inches of rainfall, while January is the driest month with an average of less than one inch. Average annual rainfall is about 29 inches, but yearly rainfall and precipitation distribution within a year are highly variable.

Surface wind velocities are relatively high and are strongest in March and April. Prevailing winds during the warmer seasons originate from a south-southwest direction, but northerly winds are common in the winters.

Man-Made Physical Features

In addition to the growth influencing factors imposed by nature, many “man-made” physical features are also capable of providing either avenues or barriers for different types of development. Of course, existing land use patterns, as described earlier in this chapter, are probably the most obvious of such influencing factors. For example, a new residential development would more likely be attracted to a location next to other residential uses than it would be to a location next to industrial or commercial uses.

The refinery located south of the city is one existing land use feature with especially significant potential for influencing future development. The heavy industrial nature of the refining processes and activities may serve to discourage other less intense types of urban development in that general area. A large land buffer area around the refinery has been maintained for years, although that buffer has eroded somewhat with the refinery’s recent expansion activities.

Other man-made features often influential to development are transportation facilities. Highways serve as avenues for many types of commercial and industrial development, but as barriers for some other types of urban development. I-135 Highway has in recent years been the most influential highway on the city’s development. However, because of the controlled access to this highway and lack of a frontage road, the development influence is not actually exerted along I-135 but instead along those access routes to the highway. This has been, and probably will continue to be, most notable in the form of commercial development along East Kansas Avenue (U.S. 56 Highway). There is some space for further commercial development along the north and south sides of U.S. 56 near the I-135 interchange. There is a high potential for new development along U.S. 56 on the east side of the interchange with that development now starting to occur.

At present, planning is underway for the development of a second interchange to I-135 with construction set to begin in 2016. The location for this interchange is at Mohawk Road which is one mile north of Northview Road. Once constructed, a substantial increase in traffic would be anticipated west to County Road 1961 (old highway 81 bypass) which could have a revitalizing effect on the commercial areas on the west side of the city. However, improvements to Mohawk Road to the West of the new interchange is not planned as an immediate project. Other factors which will work to this same end are the relatively recent widening and rebuilding of old 81 bypass from U.S. 56 Highway north to First Street, the continuing widening and resurfacing of county road 1961 from First Street north to Lindsborg, the widening of the west end of Kansas Avenue, the rebuilding and widening of U.S. 56 highway from the old highway 81 bypass intersection west to the county line, and the major improvements to U.S. 61 highway between McPherson and Hutchinson.

Airports are another type of transportation facility with special features affecting the development potential of the surrounding area. The McPherson City-County Airport, which has considerable vacant land around it, should serve as an attraction for future industrial development. However, any development to the north or south of the Airport must recognize the limitations imposed by the runway clear zones, which are shown graphically in Figure 7-A. Recent runway improvements and relatively stable, reasonably priced fuel availability make McPherson Airport an attractive service area for commercial users.

Railroads, like highways, often provide avenues for certain types of development, especially industrial. However, they can also sometimes serve as definite growth barriers. Most of the land along the railroads in McPherson has already been developed, but the Union Pacific Railroad along the city's southeastern edge has been and will probably continue to be somewhat of a barrier to growth in that direction, particularly due to the frequency and speed of the trains along this route. The cemetery and the wastewater treatment plant, both located on the southeast side of this railroad line, create other barriers to certain types of development.

Summary of Growth Influences

From the previous descriptions of the physical characteristics of the McPherson Planning Area, some general conclusions concerning the city's future growth directions can be reached. Growth to the south and southeast is likely to be somewhat limited due to the presence of the Union Pacific Railroad, the CHS refinery, large areas of floodplain, and limited access to K-61 highway. Some of the newer residential growth areas may be found along South Maxwell Street and East Avenue A but useable space to expand in this direction is severely limited.

Growth to the southwest is limited somewhat by the Bull Creek floodplain, but beyond the floodplain is considerable developable land. The presence of the Airport and K-153 Highway (old highway 81 Bypass) makes this area especially attractive for industrial development. The old highway 81 Bypass continues to serve as an avenue for industrial and possibly some types of commercial development to the northwest. It appears, however, that the highway may also serve as a limit for contiguous residential growth in that direction.

The north and northeast appear to provide the main directions for the city's future growth particularly in the residential category. The main inhibiting factor in these directions is the Dry Turkey Creek floodplain, but this affects only a relatively small strip of land extending north from the city. This strip itself offers some possibilities for future open space, park development, or floodplain control structures. A new sanitary sewer trunk line is in place in this area which should make this general area more attractive to developers and less expensive for the provision of needed infrastructure than most other available sites.