

## Assessment of Infrastructure Condition and Needs

### Introduction

Infrastructure is the basic physical systems of a community's or state's population, including power and water supplies, roads, bridges, dams, dikes and levees. Infrastructure needs in Kansas pertaining to the state's water resources, primarily water supply and flood protection, are discussed in this section. These facilities are necessary for public health, safety and welfare and support the economic activity of the state.

Like the rest of the nation, Kansas' infrastructure is aging. Aging water mains and treatment plants are subject to more frequent breaks and other failures that can threaten public health and safety. Buried infrastructure failures may impose significant damages, are costly to repair, disrupt businesses and residential communities and waste precious water resources. Water supply reservoirs are filling with sediment, reducing their capacity to store water, and excess nutrients are accumulating in them, costing utilities more to provide potable water for water supply. Failure of dams and levees that provide flood protection can potentially impact large populations.

Needed resources for infrastructure maintenance and development are considerable. Development and maintenance of public infrastructure is shared among all levels of government. The federal government role is largely technical and provision of financial assistance; state government provides standards for design, prioritization of need, financial leverage and management of available federal funds and local government is largely responsible for planning, financing and implementation of projects.

### Water and Wastewater Treatment and Distribution

Like many of the roads, bridges, and other public assets on which the state and its population relies, most of our drinking and wastewater infrastructure was built 50 or more years ago, in the post-World War II era of rapid demographic change and economic growth. Much of it is below ground and out of sight. While concrete, iron, steel and other materials are strong and long lived much of it is wearing out at about the same time.

The American Society of Civil Engineers (ASCE) in their 2013 national *Infrastructure Report Card* found that Kansas' drinking

water infrastructure (pipes, treatment plants, storage towers, etc.) has a financial need of \$4 billion over the next 20 years. An additional \$3.2 billion in wastewater infrastructure needs is also reported. The EPA's 2013 report, based on a 2011 Drinking Water Infrastructure Needs survey and assessment, indicates Kansas has \$4.2 billion in drinking water infrastructure needs primarily towards transmission and distribution, and the majority of it for medium (3,301 to 100,000 persons) and small (3,300 or fewer persons) water systems. The American Water Works Association (AWWA) has estimated aggregate needs in the Midwest region that includes Kansas for solely drinking water mains replacement and growth in the next two decades. The financial need for the Midwest is estimated to be greater than \$170 billion increasing to almost \$280 billion by 2050.

As long ago as 2002, EPA reported a potential gap in funding to meeting nationwide needs over the next 20 years of \$122 billion for wastewater capital costs and \$102 billion for drinking water capital costs. They also found a funding gap for operation and maintenance to be \$148 billion for wastewater and \$161 billion for drinking water. Financial needs for water and wastewater infrastructure of this level are staggering. On top of these needs, communities are also facing other needs, for streets, schools and other infrastructure vital to the state's economic health and welfare.

Three main sources of funding for water supply development and maintenance are the Community Development Block Grants (CDBG) administered by the Kansas Department of Commerce (KDOC); the Drinking Water State Revolving Loan Fund (DWSRF) administered by the KDHE and United States Department of Agriculture

Table WS-01				
Funding for Water Infrastructure				
Agency	Program Name	Annual Amount Funded (Millions)	Annual Number of Projects	Repayment Period
KS Dept. of Health & Environment*	Drinking Water State Revolving Loan Fund	\$23-\$36 (2009-2011)	15-20	20 years
	KS Water Pollution Control Revolving Loan Fund	\$17-\$130 (2009-2011) Includes ARRA Funding	14-26	20 years
Kansas Dept. of Commerce	Community Development Block Grants**	\$4-\$8 (2009-2013)	12-21	None
U.S. Dept. of Agriculture	Rural Development***	31 in loans - 17 grants (2009-2010)	9	40 years
* Capitalized by EPA				
** Capitalized by US Housing & Urban Development; Water & Wastewater				
***Grants & Loans; water & wastewater				

(USDA) Rural Development (RD) loans and grants. Wastewater funding comes from the same sources, but the revolving fund through KDHE is called the Kansas Water Pollution Control Revolving Loan Fund. For any project, a variety of programs are available to assist communities with funding water and wastewater projects and a mix of federal, state and local funds is generally utilized.

In 2009 and 2010, Congress passed the American Recovery and Reinvestment Act (ARRA). Funding from this act temporarily infused the national economy with billions of dollars that was spent on infrastructure and other projects throughout the country. In Kansas, \$475 million was spent on projects categorized as infrastructure. ARRA funding was discontinued in 2011.

While ARRA funding helped to fill some of the gap, the funding trend for water infrastructure is decreasing, while the needs are increasing. Over the last five years, the CDBG program had applications for over \$51 million; almost \$21 million of requests went unfunded. Those that were funded also used over \$64 million of local or other sources of funding. USDA RD typically carries a backlog of 10-20 projects totaling \$18-\$44 million. While the KDHE Revolving Loan Funds for water and wastewater are generally able to fund everything requested in a given year, the need is no doubt much larger. These are loans that are paid back over a 20 year period; so the entities must have the financial ability to repay.

### **Federal Drinking Water Supply Reservoir Infrastructure Needs**

The importance of federal reservoirs in meeting water supply needs was discussed in the water supply section.

The ability of a reservoir to store water over time is diminished as the capacity is reduced through sedimentation. In some cases reservoirs are filling with sediment faster than anticipated. Whether sediment is filling the reservoir on or ahead of schedule, maintenance of this infrastructure through efforts to reduce sedimentation and extend the life of the reservoir is critical.

Early in the 2009 Legislative Session, several Kansas natural resource agencies had the opportunity to present a [Reservoir Sustainability Initiative](#) (RSI) to the newly created Vision 2020 committee. Presentations were made to the committee to highlight the existing condition of our reservoirs, actions currently underway to address sedimentation and the need for a long-term commitment to our public water supply infrastructure. As requested by the committee, the Kansas Water Authority (KWA) prepared

a comprehensive report for the 2010 Legislature called the [Reservoir Roadmap](#). The *Reservoir Roadmap* discusses the need to insure an adequate future water supply for areas currently or potentially served by federal, state or municipal reservoirs. It describes the current condition of water supply contained within federal reservoirs and outlines recommended actions to secure, protect and restore this supply.

### **Dams and Levees**

There are many dams and levees in Kansas. The failure of these structures could result in loss of life, injuries, property, environmental and economic damage. While levees are built solely for flood protection, dams often serve multiple purposes, one of which may be flood control. Severe flooding and other storms can lead to damage and ultimately failure of dams and levees as a result of the physical force of the flood waters or overtopping.

Small dams and levees are usually engineered to withstand a flood with a computed risk of occurrence. If a larger flood occurs, then that structure will likely be overtopped. A probably maximum flood (PMF) and the computed risk of PMF occurrence is used in the design of large dams to include the use of massive spillways which will pass large flows before a large dam will actually overtop. If during an overtopping event the dam or levee fails or is washed out, the water behind it is released. Failed dams and levees can create floods that are catastrophic to life and property because of the tremendous energy of the released water. Many locally funded levees in Kansas were largely constructed to protect agricultural land and not built to design standards established to protect people and property. However, development has occurred outside of, adjacent to and within many locally built levees changing the risk associated with the structure.

Reservoirs, dams and levees constructed by federal, state and local governments, as well as other entities, also provide critical infrastructure and services important to the citizens of Kansas. While these structures are clearly visible on the landscape, and may seem to be low maintenance once constructed, they also require monitoring, assessment and maintenance to ensure their long term beneficial functions.

### **Federal Dams and Levees Structures**

Levees have been constructed to manage the risk of flooding throughout Kansas over many decades, beginning around the early 1900s. No single entity (federal, state, or other) has authority over all levees within the

state. Instead, levees are covered under various programs administered by various agencies at the federal, state, and local levels.

A number of federal programs address levees. Most levees that are constructed to exclude at least the 10-year flood are enrolled in the Corps' Rehabilitation and Inspection Program (RIP) which provides federal assistance when levees are damaged by flooding. Many levees are accredited through the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP).

After Hurricane Katrina, Congress directed the Corps to catalog federally overseen levees, many of which are managed and maintained by municipalities. As a result, the Corps has established a [National Levee Database](#) (NLD) to track pertinent information on levees around the country. Generally only the levees enrolled in the Corps' RIP program and U.S. Department of Interior Bureau of Reclamation (Bureau) levees are included. The NLD is the best source of aggregated major levee information for Kansas.

The most widespread issues associated with levees are:

- Design or construction flaws. Some levees have inadequate "freeboard"-extra height to prevent overflow, which can weaken the landward slope of the levee.
- Inadequate or crumbling infrastructure. Many pipes built into levees to drain storm water are made of metal that has rusted. Pumping systems are compromised.
- Failure to control vegetation and invasive animals. Corps specifications require that levee slopes be kept clear of plants and burrowing animals such as ground

squirrels and gophers.

- Building encroachment. The Corps requires a 15-foot buffer between levees and man-made structures such as houses, fences and parking lots.

### Information on Problems and Challenges with Major Levees in Kansas.

The following are major Kansas levees (Table WS-02) constructed by the Corps in which shortfalls or issues have been identified. The Corps and the respective levee sponsors are addressing these issues with ongoing priority actions. This is not an all-inclusive list of levee improvement efforts but represents a significant cross-section of issues.

### General Information Regarding Dams in Kansas.

Seventeen dams forming major federal reservoirs are maintained and operated by two Corps districts in Kansas. Together, these dams and their associated lakes represent an estimated \$4 billion in current infrastructure investment value. The water storage and releases from the lakes serve a variety of important beneficial purposes to Kansas and downstream states including flood risk management, municipal and industrial water supply, planned and scheduled by the Corps in close coordination with KWO -- only after considering other authorized purposes at each lake and across the lake and river systems involved.

Table WS-02

Levee Name	Location Owner/Sponsor	Location	Protected Assets	Issue	Proposed Solution/Action
Missouri River Levee System	Elwood-Gladden Drainage District	Elwood/Wathena	MO Air National Guard and Rosecrans Airport	100 yr flood not controlled	Raise levee 3 ft.
Topeka KS Levee System	City of Topeka	Kansas River, Soldier and Shunganunga Creeks	Residential, Commercial, Industrial Areas. Public utilities and transportation	Design protection not provided	Construction improvements. Design initiated 2009.
Manhattan Levee Unit	City of Manhattan	NW of Big Blue and KS River confluence	1,700 homes, 600 commercial and public facilities	Design protection not provided	Levee raise and modifications
Wichita Levee Project	City of Wichita	Arkansas River in Wichita	49,000 acres urban area in Wichita and Valley Center	Not accredited by FEMA	Levee modernization underway
Iola Levee System	City of Iola	Neosho River	City of Iola	Levee failure	Temporary repair; comprehensive engineering study

**Problems and Challenges for Dams located in or affecting Kansas.**

The eight Corps dams located within the Tulsa District are structurally sound and well maintained with no problems requiring immediate action. The common risk posed by these dams is outlet works capacity exceeds the downstream channel capacity. The extent of flooding during a maximum release is shown in the Emergency Action Plan (EAP) documents for each lake. These EAP documents are kept at each lake office and in the Tulsa District Office.

The following two Corps dams (Table WS-03) within the Kansas City District have demonstrated shortfalls or problems. This is not an all-inclusive list of dam improvement efforts but represents those of significant interest to Kansas. The Corps is addressing these issues with ongoing priority actions a funding is made available.

<b>Dam Name</b>	<b>Location</b>	<b>Protected Area</b>	<b>Issue</b>	<b>Proposed Solution/Action</b>
Harlan County Lake	Republican River, Nebraska	Lower Republican River Basin	Mechanical/Structural deficiencies	Interim operations plan/Tainter gate repair
Kanopolis Lake	Smoky Hill River	Lower Kansas River Basin	Spillway exceeds channel capacity	Emergency Action Plan updated. Re-evaluate 2016.

**State and Local Dams and Levees**

According to the state’s dam inventory, Kansas has 6,096 state-regulated dams of varying size, purpose and vulnerability to failure (as of May 2010). Much like federal dams, these dams have been constructed to provide flood control, public water supply, recreation and other benefits, but at a smaller scale. Many were built by local watershed districts using federal or state cost-share assistance and local funds. Others have been constructed by municipalities, private organizations, individuals and the state. The average age of the 4,146 dams with completion dates in the state’s inventory database is 38 years old, and some of them are exhibiting structural deficiencies.

In November 2005, the Kansas Water Authority adopted a Kansas Water Plan policy section for small dam safety and rehabilitation and provided recommendations for future activities.

Nationally, there is growing concern that many small flood control dams that were built by local watershed districts with USDA technical and financial assistance are at or near the end of their 50-year planned design life. There are 776 watershed dams in Kansas built with this support that

now qualify for rehabilitation assistance, along with 55 other watershed dams built with state and local funding. There are also 38 dams in Kansas that are maintained and operated by the federal government, primarily the Corps and the Bureau. Other operators are the U.S. Fish and Wildlife Service, U.S. Department of Defense, and the U.S. Army.

The state requires emergency action plans for all high and significant hazard dams. Of the 209 high hazard dams, 158 have emergency action plans, and of the 213 significant hazard dams 28 have emergency action plans. Based on the distribution of high and significant hazard dams, the eastern half of the state is potentially more vulnerable to a dam failure event. In general, larger dams are designed to high standards, but also have higher consequences if they fail, potentially resulting in constant risk independent of dam size. Overall, the risk from dam failures is not considered high by the state. However, there are a large number

of dams in the state, and a wide variability in impact should there be a failure.

The largest numbers of

dams also coincide with some of the more heavily populated counties. Some counties and watershed districts have initiated inundation mapping to describe the extent of impacts should a dam failure occur. County governments can then use this information for land use planning decisions downstream of dams.