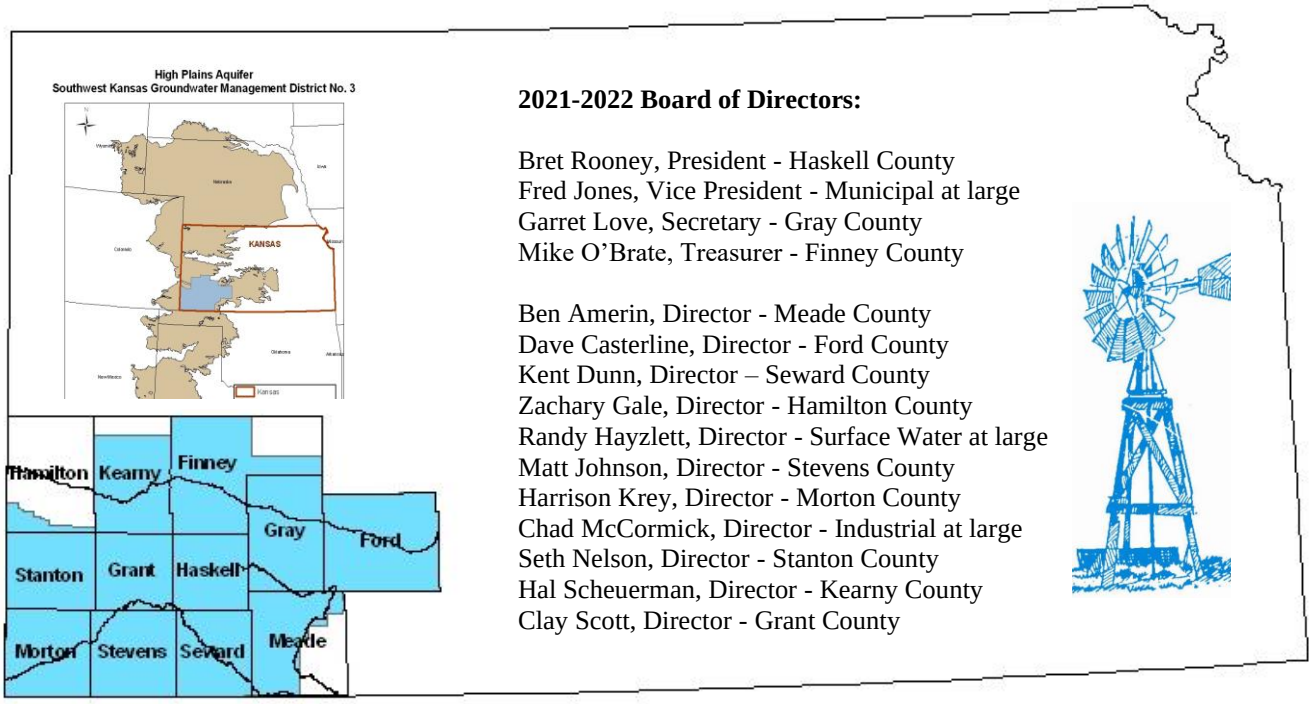
Official Management Program
Southwest Kansas Groundwater Management District Number 3 (GMD3)

2009 E. Spruce Street, Garden City, Kansas 67846 (620) 275-7147
URL: HTTP://www.gmd3.org

DRAFT (2021 negotiation v3)
These activities add to the success of all stakeholders. All policy and methods expressed herein are to be adopted for the Southwest Kansas GMD3 management program to advise and assist all in the management of water resources. Other supporting GMD3 program implementation documents will be posted on the website.



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Southwest Kansas Working Water – Conserving Every Day Since 1976

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INTRODUCTION

Groundwater Management Districts (GMDs) are part of our system of government in Kansas. The official local thinking for logical water policy and behavior is a public right of a GMD established in Kansas law. The through line of this official Management Program document for protecting the public health and welfare is to conserve and develop water supply resiliency using the activities and interdependent roles with water management partners in fulfilling the mission of the governing body. GMD3 seeks to protect and enhance the instrumental and intrinsic values of water that are enjoyed by all. This document outlines six program activity areas: 1) Water Rights Administration Assistance; 2) Water Conservation; 3) Models, Research and Development; 4) Water Quality Protection; 5) Ark River Management; and 6) Outreach, Advocacy and Education.

PURPOSE FOR LOCAL GROUNDWATER MANAGEMENT

The GMD Act and "the right" to manage groundwater use. In K.S.A. 82a-1020, the legislature set two elements of policy in law for groundwater management: *"…to preserve basic water use doctrine and to establish the right of local water users to determine their destiny with respect to the use of the groundwater insofar as it does not conflict with the basic laws and policies of the state of Kansas."* These activities assure that each person is enabled to do their part in keeping our communities healthy and economy strong regarding water supply and use.

Objectives of the legislature for GMDs:

1. Proper management of the groundwater resources of the state.
2. Conservation of groundwater resources.
3. Prevention of economic deterioration.
4. Associated endeavors within the state of Kansas through the stabilization of agriculture.
5. To secure for Kansas the benefit of its fertile soils and favorable location with respect to national and world markets.

Purposes for which GMD3 was organized in 1976:

1. Organize and develop the efforts of the entire Groundwater Management District for the proper management and conservation of its groundwater resources.
2. Provide local input into the use and management of groundwater.
3. Provide for the greatest total social and economic benefits from the development, use, and management of groundwater.
4. Support research and education concerning proper water management.
5. Work cooperatively with all federal, state, and local units of government to accomplish the objectives of the district and the GMD Act and amendments thereto.

Public Interest. Under the declarations of the GMD Act (82a-1020 et seq.), the management program document and activities of the elected volunteer governing body of GMD3 (Board) are considered the local expression of public interest relative to groundwater management issues and associated endeavors. This program update must be submitted to the chief engineer for approval, and the chief engineer must approve it if it is compatible with the provisions of the Kansas Water Appropriation (KWA) Act and other basic laws and policies of the state.

MISSION, MEMBERS & POWERS

> **MISSION**: *Act on a shared commitment to conserve and develop water supply to grow the social, economic, and natural resources well-being of the district for current members and future generations in the public interest.*

Water use in GMD3. In the driest part of the state, water use in the district occurs directly from precipitation or diverted from *waters of the state* according to water rights owned by members of GMD3 and administered according to the KWA Act. Generally, groundwater use is declining with time as stored supplies are mined under state issued legal water rights and underground reservoir conditions where pumping rates exceed groundwater replenishment rates. For established legal purposes other than produced water associated with oil and gas exploration, water use is supervised under the prescribed duties and powers of the state Chief Engineer and Division of Water Resources (KDA/DWR) staff, who are advised and assisted in the district by GMD3 to implement the public interest of the management program. With supply and demand out of balance across the state, the future economy of Kansas depends on planning and brave actions from servant leaders at all levels, including the members and governing body of GMD3. Groundwater management can be difficult for many reasons that include:

1. Groundwater is a shared resource.
2. Groundwater inflows and outflows are difficult to observe and cannot be measured directly.
3. Surface water and groundwater are interconnected.
4. Aquifer boundaries and characteristics may be locally unknown or poorly defined.
5. Groundwater management requires specialized model tools.
6. Groundwater conditions can vary on multiple time scales.
7. Groundwater use can pit present needs against future needs.
8. Diverse local, state, and federal interests, institutions and authorities require significant coordination and outreach activity to secure the necessary productive partnerships.

GMD3 Members. A GMD3 member is an eligible voter described in the GMD Act (K.S.A. 82a-1021(a)(5)). Basically, any water user of an acre-foot or more annually or an owner of 40 or more contiguous acres of land in the district is a member. Most domestic well users in the district annually use at least one acre-foot (325,851 gallons) of groundwater to be considered eligible voters of the district. A person must be a member of the District to be eligible to serve on the GMD3 governing body. Members find ways to tie their work and life to four **core values** in their water management and balance between them in no particular order (See S Lauer, Social Aspects of Groundwater Conservation, 2020): **Individual Responsibility** - Members desire the ability to make their own water project decisions based on what they believe is best for their operations and families. **Fairness** - Members desire that the benefits and sacrifices involved in water management are equitably distributed. **Community** - Members desire to have good relationships with their neighbors and to have functioning towns with schools, hospitals, churches, and businesses. **Stewardship** - Members desire to preserve the benefits of groundwater for future generations. Individual members emphasize some values more heavily than others. The same cultural incentives for water conservation may also become cultural barriers when incentives are viewed as insufficient, conflicting, or inconsistently applied.

District Powers. To carry out the public right and purposes, GMD3 is granted an enumerated set of powers in K.S.A. 82a-1028 and amendments. In addition, other powers have been provided by the legislature or by state officials that include to initiate IGUCA and LEMA proceedings, and approve state required water conservation plans, described without limit as follows:

- **K.S.A. 82a-1020** declaring the purposes of the GMD Act and establishing the public right of water users and land owners to determine their destiny regarding water use;
- **K.S.A. 82a-1028(g)** to construct, operate and maintain such works as may be determined necessary for drainage, recharge, storage, distribution or importation of water, and all other appropriate facilities of concern to the district;
- **K.S.A. 82a-1028(i)** to contract with persons, firms, associations, partnerships, corporations or agencies of the federal government, and enter into cooperative agreements ...
- **K.S.A. 82a-1028 (m)** provide advice and assistance in the management of drainage problems, storage, groundwater recharge, surface water management, and all matters of district concern;
- **K.S.A. 82a-1028 (n)** adopt administrative standards and policies relating to the management of the district which are not inconsistent with the provisions of the GMD Act or KWA Act;
- **K.S.A. 82a-1028(o), (p) & (q)** to recommend rules & enforce them by suitable action.
- **K.S.A. 82a-1028(r)** to enter upon private property within the district for inspection purposes, to determine conformance of the use of water with established rules and regulations, including measurements of flow, depth of water, water wastage and for such other purposes as are necessary and not inconsistent with the purposes of the GMD Act;
- **K.S.A. 82a-1028(u)** recommend to the chief engineer the initiation of IGUCA proceedings.
- **K.S.A. 82a-1029** adopt the official management program for the district; and
- **K.S.A. 82a-1041** to recommend adopted LEMA plans for implementation.
- **K.S.A.82a-1042** provide formal response to any rules or GMD management program changes proposed from the Sec. of Agriculture or Chief Engineer that may alter an adopted local groundwater management program or impact water use in the district.
- **K.S.A.82a-733(g)** jointly approve conservation plans required by the chief engineer.
- **K.S.A.82a-745(d),(h) & (m)** to advise in acceptable management plans for WCA's; and
- **K.S.A.82a-1906(b)** notification to water users of certain applications under review by DWR.

FORMATION AND OPERATION OF GMD3

Lead from local need. In the 1960s, good, creative, local problem-solving people insisted on the adoption of mandatory standards, registration of groundwater water rights, supply and use limits, minimum well spacing, and special groundwater management area authority to protect local interests. Use limits began with policy to manage the groundwater depletion rate, and good state and local action followed. A public vote to form the district was held on February 24, 1976, following approval of the petition and the issuance of a report of public interest by the Chief Engineer. The vote resulted in 1,155 voters in favor and 230 opposed. Now all annual meetings are held on the second Wednesday of March unless changed with notice. GMD3 is governed by a 15-member volunteer Board of Directors that is elected by a general constituency of qualified voters who attend the annual meeting. Members may be elected to serve as one of the 12 county positions and there are also 3 "at-large" Board positions designated to represent Municipal, Surface water, and Industrial use respectively. GMD3 activity is financed by an annual land assessment and groundwater user fee levied against the landowners and water users in the district

based in an annual budgeting process. A public hearing of the proposed budget and level of assessments needed to finance the budget is conducted usually in July. For 2017 through 2021, the land assessment has been $0.05 per acre and the water withdrawal or "user" fee has been $0.14 per acre-foot.

Table 1. Eligible land for assessment and appropriations for a water user fee (2018).

County	Total Assessable Acres	Assessed Acres	Excluded Acres	Wells	Authorized Acre Feet
Finney	625,637.27	624,438.81	1,198.46	1,085	581,233.00
Ford	662,719.10	662,006.70	712.40	660	200,531.00
Grant	357,715.95	357,570.35	145.60	642	328,266.00
Gray	536,554.15	536,063.78	490.37	1,303	420,880.00
Hamilton	71,209.95	71,209.95	0.00	73	40,871.00
Haskell	359,790.37	359,696.36	94.01	907	461,581.00
Kearny	449,230.77	448,767.60	463.17	494	233,298.00
Meade	399,646.59	399,449.21	197.38	553	278,636.00
Morton	481,659.65	481,414.11	245.54	307	129,058.00
Seward	381,891.63	381,566.10	325.53	501	281,904.00
Stanton	439,975.96	439,848.76	127.20	625	333,354.00
Stevens	467,219.07	467,018.89	200.18	705	383,949.00
GMD3 totals	**5,233,250.46**	**5,229,050.62**	**4,199.84**	**7,855**	**3,673,561.00**

GMD3 Office. The District is managed from an office located at 2009 E Spruce Street, Garden City, Kansas, and is operated by the board of directors who is responsible for setting policy and objectives for the District and employing the professional staff needed to carry out GMD3 program activities. As much local input as possible is directed at new and improved methods of managing the District water supply. The board of directors generally meets the second Wednesday of each month and all meetings of the governing body are open to the public in compliance with K.S.A. 75-4319.

DESCRIPTION OF THE GMD3 AREA

General Area Characteristics. The GMD3 area is approximately 5,338,334 acres, or about 8,341 square miles of land. This includes all of Morton, Stevens, Seward, Stanton, Grant, Haskell, Gray, and Ford Counties as well as parts of Meade, Finney, Kearny, and Hamilton Counties in the southwest part of Kansas and the west central part of the Great Plains region of the United States. The district is closed to most new appropriations from the Ogallala/High Plains (OHP) Aquifer. New projects must utilize or change existing water rights where there is sufficient water supply to meet water use needs.

Surface Water. Precipitation is generally the lowest in the state with average annual measurements of 15 to 18 inches and as little as 4 inches (2011 drought - Morton County). There is very little native surface water supply. There is only one surface water reservoir in the district not sustained from groundwater pumping, which is the privately owned Lake McKinney on the Great Eastern Ditch Irrigation System near the Arkansas River in Kearny County. Now, deliveries of Arkansas River flows from Colorado and rain runoff events that create flow in the

intermittent streams of the district supply a small fraction of the water used annually. The district water supply has changes since GMD3 was formed and flows have nearly ceased across the District with only nominal annual aquifer recharge from runoff event pulse surface flows. More management is needed to protect vital aquifer recharging flow sources.

Table 2. General water budget for GMD3.

Number of counties served by GMD3	12
Number of non-domestic water rights	12,500
Authorized annual groundwater use	3.6 million acre-feet
Average annual groundwater use	1.8 million acre-feet
Average annual recharge from precipitation	210,000 acre-feet
Average net annual lateral groundwater reservoir inflow/outflow balance	+6,000 acre-feet gain
Average annual return flow recharge (13%)	234,000 acre-feet returned
Irrigation-enhanced precipitation recharge, inflows from Dakota, streamflow capture.	622,000 acre-feet gained or returned from non-consumptive uses
Average annual net reduction in storage	**776,000 acre-feet**

See *KGS Water Level Change image* and *Isolating High Plains Aquifer Change* in Appendix. Values are GMD3 gross estimates from KGS models. Model updates will improve estimates and will be referenced as they become available. Local data will vary significantly from averages.

Groundwater. Groundwater is water below the surface of the earth in storage as the primary source of water supply. The most abundant local source for about 8000 wells is the Ogallala/ High Plains (OHP) Aquifer system. Generally, one inch of water fills about 6 to 12 inches of OHP geological formation to saturation, depending on the size and connectivity of sediment pore space. Older, less permeable, finer grained Oligocene deposits and an unconfined hydraulically connected sub-cropping Dakota Aquifer System of Dakota sandstone, Kiowa shale, and Cheyanne sandstone formations, which are commonly referred together as the Dakota Aquifer System or "Dakota Aquifer," rests below the Ogallala Formation. A key marker bed adopted for the GMD3 management program is the Cretaceous age black marine shale bed known as the Graneros shale. It is about 20 feet or less thick and readily identifiable in drillers' logs where it exists stratigraphically atop the Dakota Aquifer system except where the black shale sub-crops along a meandering line roughly east west across the district and generally along the south edge of the tan mapped area where the Dakota Aquifer system sub-crops along the south side of the line directly into, and considered a part of, the OHP Aquifer (See KGS Open file report 98-37, Plat A HERE). North of the sub-crop line, the Dakota Aquifer is considered under confined aquifer conditions and therefore a separate groundwater reservoir source from the OHP aquifer system and open to new appropriations of water by rules. In comparison to the thousands of wells completed in the OHP Aquifer system, less than 100 non-domestic wells are authorized to tap into the confined Dakota Aquifer groundwater reservoir capped by the black Graneros shale formation. The characteristics of these groundwater reservoirs can vary dramatically, and recharge areas extend west of the district at higher elevations in southeast Colorado. Development of additional source water for transfer and import into the District is an important part of the management program to replenish and recharge the needed storage to carry out the mission of GMD3.

Water supply decline. When combined with low groundwater recharge from rainfall and inflow from outside the district, the gap between consumption demand and replenishment supply has created a deficit of about 776,000 acre-feet (KGS). Data from the 2008 GMD3 area groundwater model indicate an overall decline in supply exceeding 30% since pre-development (50 years) conditions. The district area is generally blessed with available high-quality groundwater and has some of the highest-intensity groundwater use areas in the country. Total annual use in GMD3 nears half of all annual groundwater use in Kansas. Large declines in water storage will not recover nor sustain present use levels without new sources of water to replenish supply. Though declining, the OHP groundwater reservoir continues to supply the most productive agriculture region of Kansas. Technology improvements adopted for use efficiency add value to the water used and maintain the economy.

Water quality. The quality (or usability) of the groundwater in the OHP and Dakota Aquifer groundwater reservoir is generally fresh. Some areas are experiencing deteriorated water quality such as high concentrations of chloride and sulfate salts that result in lowered land productivity, lowered crop yields, and degraded topsoil. Electrical conductivity (EC) data is used as a general measure of the chemical quality of irrigation water (see below for brief definition). Low EC measurement is generally desirable in the natural capitol of water supply for agricultural irrigation use because it indicates a low salt content and greater usability of the water. In some locations, mineralization, including radionuclide levels, exceed recommended limits or maximum contaminant levels (MCLs) for drinking water established by the US Environmental Protection Agency (EPA). Poor quality sources can deplete usability of stored water supplies.

OGALLALA/HIGH PLAINS (OHP) AQUIFER CHARACTERISTICS

Generally, the OHP Aquifer is a series of groundwater reservoirs consisting mainly of a widely varying assortment of sand, gravel, silt, and clay of Tertiary and Quaternary age eroded off the Rocky Mountains that were deposited by sluggish streams that flowed eastward across what became the High Plains region of the central US. Maps can be found in the Kansas Geological Survey (KGS) High Plains Aquifer Atlas available online HERE. Water filling the pore spaces of the rock formations provides the reservoir storage. The dewatered OHP groundwater reservoir space provides available storage capacity for additional inflows of more than 60 million acre-feet (KGS model for the GMD3 area). The present GMD3 groundwater model has been found to overestimate practical supply in storage for the district, and a model update project is planned for 2021. The OHP groundwater reservoir in the district varies widely in type of material, thickness, and layer continuity. Even beneath a single section of land, well yields can range from tens of gallons per minute to thousands of gallons per minate. The remaining saturated thickness of the principle OHP groundwater reservoir system ranges from 20 feet to 600 feet within the district, with significant variability in the productive portions. Thus, well capacities range from a few gallons per minute (gpm) to 3,000 gpm. Historic depletion of saturated thickness locally also varies spatially across the district.

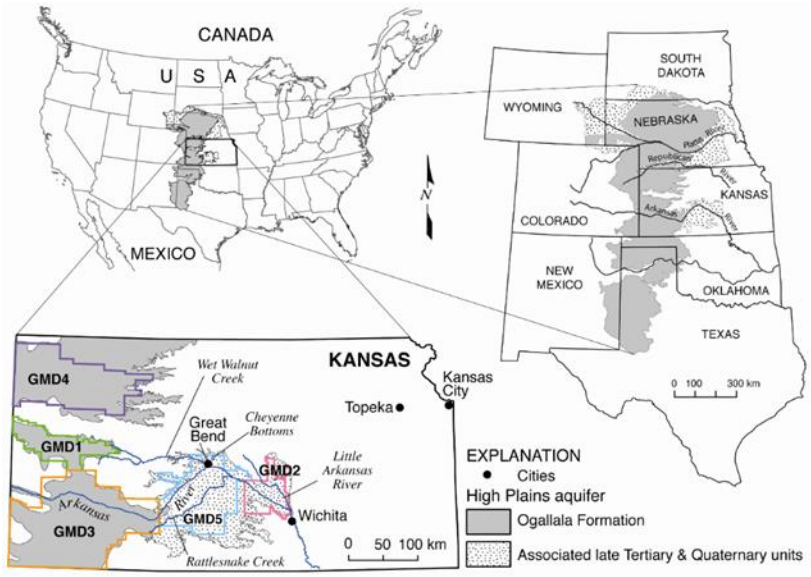

Figure 1. Extent of the High Plains Aquifer, KGS.

Groundwater flow. In GMD3 across southwest Kansas, regional lateral flow of groundwater is generally from west to east-southeast across the district at an average rate of about 1 foot per day or less under the normal regional tilt in the static water table (KGS). Early recharge rate studies found a similar vertical rate of descent to the water table. Locally, a higher rate of groundwater flow can be estimated where there is a greater slope in the water table, especially during local well pumping drawdown effects. Groundwater travel rates can be significantly affected where water level gradient is increased near a pumping well and flow can exceed 300 feet per day (KGS) where sufficient conditions allow. Reduction of aquifer saturated thickness over time reduces pumping capacity as saturated thickness is reduced by groundwater reservoir depletion. Depth to static water elevation from the land surface is highly variable and may exceed 400 feet.

BEDROCK AQUIFERS

Bedrock aquifer formations are part of the OHP Aquifer where they are hydraulically connected to younger formations. They are considered separate aquifers where there is little hydrologic connection and the porosity and permeability are generally low, yielding small amounts of water to wells. This creates a user and supply administrative challenge to know where the bottom of the OHP Aquifer may be, which is key in supply calculations and well pumping effects.

Dakota. The Dakota Aquifer system is comprised of sandstones and shale that typically yield much smaller amounts than the yield of wells in the Ogallala Aquifer. KGS Dakota Aquifer information is available online HERE.

Confined Aquifers. In the northern part of the district, low permeability shale and chalk overlie and hydraulically isolate the Dakota groundwater reservoir from the overlying OHP groundwater reservoir. Some wells in northern Finney County may be completed in geologic voids in the Niobrara Chalk formation and may be referred to as "crack wells" that typically produce a high volume of water until the crack or void is dewatered. More KGS information on groundwater above the Dakota is available online HERE. In the southernmost part of the district, Cretaceous

Age formations may be absent where Permian bedrock formations directly underlie the Ogallala and associated formations. For groundwater management purposes, OHP Aquifer formations include all hydrologically connected formations where hydrostatic pressures are similar and demonstrate connectivity.

Permian. The Upper Permian age red beds may contain sandstones with some usable groundwater locally and may also have water quality concerns that require careful water sample evaluation, monitoring and supervision to prevent water usability depletion of the fresher groundwater supplies. Further investigation of potential uses of Permian age groundwater reservoir water for irrigation can be expensive at depth, and some geological testing and completion of deep wells for irrigation have occurred as the shallower sources become depleted. Efforts to evaluate the usability, reliability, and feasibility of these potential sources together with newer technologies to treat poor quality water from marginal sources to usable standards are part of the GMD3 efforts to develop and manage additional water supplies.

Deep brackish bedrock aquifers. KWA Act requires poor quality appropriation first, where feasible. Kansas regulations require the petroleum industry to protect fresh and usable groundwater reservoirs from contamination by confirming minimum depths for surface casing in a petroleum exploration borehole. Kansas law requires the state to put a priority on use of poor-quality water where feasible before authorizing fresh water sources. The successful implementation of this policy may require adoption of additional management criteria.

GMD3 Ark River. The Arkansas (Ark) River is the principal surface water source into the District and Aquifer storage and now one of the most saline rivers in the U.S when flows are not sourced from Colorado reservoir release deliveries under interstate agreements. There are six surface water irrigation ditch systems today that have historically diverted water from the Arkansas (Ark) River between the Colorado-Kansas Stateline and Garden City. These irrigation ditch companies are owned by farmer-shareholders who control approximately 140,000 acre-feet of senior surface water rights to available Arkansas River flows that are governed by a federal court decree, pre-1945 vested rights, and an interstate river basin compact. Significant transit loss groundwater storage benefits occur from reservoir deliveries and other sources of river flow across the District. Surface water rights developed below Garden City have lost nearly all historical supply flows and now rarely receive any river flow for use. A significant amount of aquifer recharge benefits has also been lost. Lands below Garden City historically irrigated by surface water now rely entirely on groundwater. The GMD3 Management Program relies on historical management practices that use measured flows at the Garden City and Dodge City river gages for management program strategies both above and below Garden City, dividing the GMD3 Upper and Lower Ark River GMA's respectively for Managed Aquifer Recharge (MAR) activity. Additional KGS information on the river area is posted online HERE.

Colorado and Kansas Arkansas River Compact. See Ark River Management activities.

Cimarron River Basin. Natural pulse flows from precipitation runoff events are identified historically in the hydrologic record and literature. These pulse flows have been a key aquifer recharge source that has declined significantly over time. These supply sources require protection and management to assure continued groundwater recharge as an important renewable supply to GMD3 member water rights. The exception to intermittent stream flow conditions is an

approximately 20-mile reach of the Cimarron River below Highway 54 east of Liberal, Kansas, where the river normally has base flow from upper Permian natural salt springs as flow leaves the district and the state after crossing southeast Seward and Meade counties. KGS information on the Cimarron basin can be found HERE.

Kansas and Oklahoma Arkansas River Compact. The 1966 Kansas and Oklahoma Arkansas River Compact limits new conservation storage capacity or water transfer amounts for each state in six major topographic sub-basins tributary to the Arkansas River basin that together span the entire southern border of Kansas. The Cimarron River sub-basin, that includes Crooked Creek drainage, directly relates to the district as both an upstream and downstream area. The compact regulates only the amount of storage that can be constructed by sub-basin, the amount of water that can be transferred, and how such transfers relate to allowable storage. In addition, the compact is a forum to "encourage the maintenance of an active pollution-abatement program in each of the two states and to seek the further reduction of both natural and man-made pollution in the waters of the Arkansas river basin." The Kansas – Oklahoma Arkansas River Commission is the interstate administrative agency that operates this compact. It provides a forum to promote interstate comity between the states of Kansas and Oklahoma regarding the equitable apportioning and orderly development of shared basin water. More Kansas information is available online HERE.

ECONOMY

Agriculture - The Economic Engine. To grow the Kansas economy, the agriculture industry must grow sustainably in southwest Kansas. Significant communication and coordination must occur on wise policies to support this activity. The state wide KDA strategy is available online HERE. In an area of the country where there is little surface water and high evaporation rate, groundwater management preserves water supply and assures a strong economy. GMD3 member farmers and ranchers not only manage the soils for sustainable production, but they also work to economically improve source water management and conservation. Kansas ranked third nationally in numbers of cattle and calves on ranches and in feed yards in 2015 with 6 million head and second in the fed cattle market in 2014 (USDA, 2016). Animal agriculture in the district provides a significant portion of these state numbers, due to reliability of irrigated grains and forage. The district is one of the fastest growing regions for dairy production in the United States with the advantages of open spaces, favorable climate, irrigation for consistent high-quality forage, and abundant groundwater at a safe depth that separates nutrient management activity from water stocks. GMD3 is home to the largest milk drying plant in North America, located in Garden City.

Value of water use in GMD3. Value drives management. All values and costs should be considered when valuing water because they exist in every water transaction for use, usability or refraining from use. GMD3 acted to advise 1999 session SB 287 work and commissioned an economic study by the Docking Institute of Public Affairs in 2000 to examine through 2020 "The economic impact of an acre-foot of water on the economy of Southwest Kansas (2001)" and is available online HERE. This work explored management policy scenarios and cost

benefits. GMD3 will work with partners to develop and solicit proposals to update estimated water values to inform management program implementation.

Table 3. District USDA 2017 Farm Facts, available online HERE.

County	No. of Farms	Farm Acres	Crop Acres	Irrigated Acres	Crop Mkt Value ($1000)	LVSTK Value ($1000)
Finney	450	790,500	679,472	186,357	181,137	641,954
Ford	505	669,832	529,171	67,068	108,771	406,481
Grant	315	358,649	304,628	82,239	80,280	733,861
Gray	422	556,070	439,359	116,874	119,343	871,310
Hamilton	353	544,086	435,412	20,481	41,273	294,387
Haskell	207	363,751	320,883	116,962	106,168	1,052,929
Kearny	299	516,230	415,995	53,209	76,465	204,513
Meade	407	587,924	331,600	93,775	90,381	143,004
Morton	323	401,305	330,988	31,969	40,054	94,760
Seward	282	360,711	263,690	95,497	80,237	344,461
Stanton	220	435,254	396,108	54,305	72,702	60,791
Stevens	377	455,494	369,963	138,437	109,942	230,624
Total	4,160	6,039,806	4,817,269	1,057,173	1,106,753	5,079,075

Natural Capitol. The value of GMD3 groundwater in storage is natural capitol to be recognized in activities to restore it when completing the mission of the Management Program. Valuing natural capital is fundamental to measuring sustainability. Economists have long argued, with recent acceptance from the science and policy community, that natural resources, including rivers and aquifers, are area capital assets. Pricing of natural capital has remained elusive, with the result that its value is often ignored, and expenditures on conservation are treated as costs rather than investments. For some experts, this neglect stems from a lack of a valuation framework to enable apples to apples comparisons with traditional forms of capital. Between 1996 and 2005, groundwater withdrawal reduced Kansas' wealth approximately $110 million per year. Wealth lost through groundwater depletion in Kansas is large, but in a range where offsetting investments may be feasible. Measuring the value of groundwater and other forms of natural capital is reference work available online HERE.

Land Market Valuation of Groundwater. Research at K-State has provided estimated irrigation premiums and implicit marginal valuations of water in-storage using parcel-level transaction data for land sales in the Kansas portion of the OHP Aquifer that includes GMD3. They found that agricultural land values were 53% higher for irrigated parcels than non-irrigated parcels on average and that the irrigation premium has increased at an average rate of 1.0 percentage points per year over the sample period (1988–2015). Spatial heterogeneity in irrigation premiums is explained by differences in saturated thickness of the aquifer. Differences in well yield potential across the aquifer also play a role in irrigation premiums. Water in-storage is capitalized into land prices at average marginal values ranging from $3.42/acre-ft to $15.86/acre-ft. This work is available online HERE.

Water economic analysis. Cost/benefit analysis evaluates the economic justification of water use plans and can assist in plan formulation and choice of alternatives. Opportunity cost is a key concept in economics expressing "the basic relationship between scarcity and choice". The notion of opportunity cost plays a crucial part in attempts to ensure that scarce water resources of

the District and Kansas are used and conserved for later use. Both private and public water conservation activities have a cost that is in addition to what can be monetized in future use value. There is opportunity cost in lost benefits when choosing a less profitable activity over another more profitable and beneficial alternative. There is also public cost in lower land valuation from lower profit opportunity. A water supply must remain usable to preserve value, but economic models rarely apply adequate assumptions to address water quality decline over time; what is referred to here as "water usability depletion." A water usability factor is needed and should be employed in each water risk evaluation where water quality affects use value.

PROGRAM ACTIVITIES – NATURE AND METHODS

GMD3 conducts groundwater use and supply evaluations, collects data, addresses waste of water, conducts policy development and water planning, advises and assists member water managers and partners, supports economic development activities and represents district water user and landowner constituents in matters concerning official Management Program implementation. In more than 500 monthly meetings, the 15-member volunteer elected Board has identified district water use and supply problems and considered the nature and orderliness of thought and behavior needed to address them. The Board is assisted by professional staff, consultants, state officials and other important partners in water management. There are areas that offer hope for stable water supply and economic growth through a balanced approach to conserve native supply and develop additional sources of water to conserve and restore the underground reservoirs.

Water business. The business of water requires an understanding of public and private infrastructure investments and how they play a role in developing economy. GMD3 will continue work to protect river and groundwater supply for our agribusiness jobs, municipal water, and other area water benefits. For business to thrive, members need predictable water risks associated with their real property. All private and public institutions in GMD3 face four forms of water-related risk: 1) declining water supply storage; 2) insufficient replenishment to storage; 3) regulations or lack of regulatory confidence; and 4) reputation in how their water use is viewed by the broader communities and markets. Water value at risk from those four water risk dimensions drive the development of coping strategies as land valuation declines with supply.

Water places. A thriving water-based economy should include public benefits from public water places that elevate water awareness and provide education on water values. The management program advises activities for regional supply systems to manage the conjunctive use of both natural and constructed water infrastructure. Activities will seek to encourage people to cross traditional collaborative boundaries so areas in the District may add flowing rivers, seek distributive water storage and include public water places that enhance water awareness and wise water decisions.

ACTIVITY 1 – GMD3 WATER RIGHTS ASSISTANCE

The Kansas Water Appropriations (KWA) Act is the foundation of water resource management in Kansas. Authority for GMD3 to conduct Water Rights Assistance activity is included in the District Powers section on page 5. The chief engineer has a statutory mandate to "enforce and administer" the provisions of the KWA Act (K.S.A. 82a-706). Therefore, the decision whether to approve or disapprove a new or change application ultimately rests with that state official. Accordingly, the Chief Engineer was granted authority to become involved in the mechanics of creating a GMD as prescribed in the GMD Act and to coordinate GMD3 activities with his/her own administration of the KWA Act. The GMD3 Board is the governing body of the district that works to fulfill its role to represent constituents in their granted public right of determination with respect to groundwater management interests in legal and administrative proceedings or before political bodies. Reasonable policy tools have been adopted locally and implemented collaboratively with the chief engineer in regular meetings of the governing body since 1976.

GMD3 advice and assistance. The interests of the GMD3 governing body and Management Program include careful review of the best information available for the best decisions in fulfilling the purposes of state water laws and policies for GMD3 members. The area water supply is used by members according to their water rights, making state water officials like the Chief Engineer and agency staff of KDA/DWR key partners in the implementation of the public interest of the official Management Program for southwest Kansas. A water right is not a guarantee of a water supply. Its lawful exercise depends on available water and the demands of members who own prior or senior water rights to use the same water. The success of water conservation in water rights administration depends on a consistent use of a locally informed approach that avoids extending or increasing local depletion rates while preserving the benefits of member water conservation efforts. Avoiding hardship or injury to member conservation efforts from water rights administration decisions has been a necessary purpose in the operation and reform of the management program.

Waste of water and overpumping. Kansas water law prohibits water use amounts in excess of what is authorized or considered reasonable need for a use practice. GMD3 staff investigate complaints and provide information to reduce water loss from wasteful activities or management negligence. This includes reducing preventable runoff from water projects and losses of usable supply from undeveloped floodwater sources. Activity that may unreasonably reduce water value is inconsistent with the public interest of the official management program.

MOU conditional water right services. Improved land and water value occurs by annual contract agreement with a member who may file a request to KDA/DWR to increase the land authorized to be irrigated. State rules prohibit this activity unless monitored by the GMD. A compliance report service is provided by GMD3 to implement a Memorandum Of Understanding (MOU) with the Chief Engineer for change applications that may be approved under K.A.R. 5-5-9(a)(2), K.A.R. 5-5-11(b)(2) or K.A.R. 5-5-11(b)(3). These are generally irrigation water right changes to add land authorized to receive irrigation water with conditional terms of the water right to limit increased consumptive use. These services provide the required annual acreage and use verification for a fee, with an annual report to the irrigator and to the state. This activity

allows members to incorporate dryland and limited irrigation conservation practices into their water project plan to improve water and land values.

Well Yields and Flowmeters. Use measurement empowers and demonstrates good water stewardship. Measurement data helps identify opportunities for water project improvement, showcase examples of efficient use, tie use to water level response, and create other valued data uses. GMD3 staff provide advice and assistance to meet data requirements of members and partners on groundwater flow in the District. This helps managers for all types of uses make good decisions that meet their water project goals in a manner consistent with the methods of the management program. The governing body of GMD3 has required water flowmeters on all non-domestic wells since the early 1990s and district staff continue to visit about 2,500 flowmeters each year to gather data and provide members with feedback on flowmeter operations and for other supply questions or concerns. Rules for flowmeter installation and operation have been adopted by GMD3 and by the state for all non-domestic water rights in the District that incorporate manufacturer recommended instillation criteria and best practices. Aquifer conditions and diversion equipment inefficiencies can complicate water measurement by introducing air and hydraulic conditions to be managed. A manufacture seal is required on most installed flowmeters to assure accurate devices from the manufacturer. Where durable seals are not provided by the manufacturer, GMD3 provides a service where hefty seals are installed while the manufacturer seal is in place to assist members against the hazards of field conditions. GMD3 staff also conduct water level measurements and flow verification tests for members seeking data to improve their management of water risks. A GMD3 inspection video is available online HERE. Pressurized sanitary systems for animal agriculture and municipal diversions generally require significant planning and coordination with project managers to meet the needs of both biosecurity and flowmeter data collection purposes. Measurement technology and other factors affecting well yield are considered openly by GMD3 staff with project operators to advise the Chief Engineer and member decision makers.

Appropriations of water. The Chief Engineer has the ultimate responsibility under state law to approve an application, and when necessary, for a smaller amount of water than requested and to otherwise act in the public interest. The rules and standards employed to make those decisions more appropriately specific to the GMD3 area is a fundamental interest of GMD3 to fulfill the public interest of the GMD Act and Management Program. Some level of agreement in the orderliness of thought and behavior at the state and local level is necessary to successfully implement a groundwater management program.

Available groundwater. A public interest of Kansas water appropriation is that the highest public benefit and maximum economical development may result from the use of Kansas water (K.S.A. 82a-711). But more management was needed beyond approving all requests. The first attempts to conserve groundwater addressed by GMD3 concerned the state implementation of the KWA Act which over appropriated the OHP Aquifer. GMD3 adopted a standard for determining groundwater availability over time. The first method for evaluating available groundwater was adopted by GMD3 on July 12, 1978, immediately after the Kansas legislature made applications to appropriate water mandatory. This water right/ water conservation tool involved calculating the potential depletion rate if all new appropriations of groundwater are used in the section of land containing the proposed well and the eight adjacent sections

commonly described as within a 9-square-mile area. This technique was later changed to a two-mile radius circle around the well of new use and was relied on in conducting state duties to move resource development from unmanaged to managed development that essentially placed a clock on the water supply. Rules were then adopted for determining when to close whole townships and for other townships to be governed by safe yield. In recent years, the governing body of GMD3 requested and received an order from the Chief Engineer closing the district OHP aquifer to most new appropriation. Improved management tools, data, and information are available to identify critical well conditions that advise members and state officials of potential water right impairment and water risk. A challenge we face is defining limits for water improvements that are relaxed enough to avoid unnecessary economic constraints yet restrictive enough to avoid complete loss of supply long term. GMD3 provides transparent hydrologic evaluations to advise and assist all in a transparent and informative application review process so that members have the information they need to manage their water risk and make the best decisions they can for their business livelihoods under the management program.

Paper water. "Paper water" is considered a legitimate water right on paper but lacking divertible supply from the authorized local source of supply. "Paper water" on wells in a depleted local source of supply must remain unused and not be allowed to move to another location in the absence of adequate demonstration that impairment of existing water rights is not already occurring or will not occur within a reasonable timeframe. Moving "paper water" to better yielding well locations is a member water management activity that will deny supply longevity to other member wells with prior rights to a depleting supply. This is only appropriate if the effect is very small long term. Even so, a risk exists that impairment of a prior right to the same water may be claimed and investigated by KDA/DWR and assisted by GMD3. In rare cases, the result can be a prohibition on the nearby well operations and a complete loss of water supply for those projects. It is important to review local conditions and evaluate them under the GMD3 well drawdown evaluation guidelines to inform decision makers and members.

Preparation of state applications. GMD3 staff assists in completing an application for a state permit or for other such water-rights related member project planning and paperwork. It shall be the responsibility of the applicant to review all such information and to submit it to the Chief Engineer or other appropriate official as required by law and as advised by their own independent legal counsel and/or technical experts.

GMD3 water right review assistance. Addressing the question of whether a proposed use or water right change will impair existing water rights is "advice and assistance in the management" of groundwater in "storage" and "all other appropriate matters of concern to the district." Analytical and numerical tool results will be calculated and reviewed when considering effects of water use proposals or plans. The estimated effect on supply to member prior rights will follow good scientific technique for consistent, explainable and defendable results in harmony with basic water use doctrine and the management program. There is also uncertainty in groundwater yield estimates to be managed (see KGS uncertainty considerations posted HERE). Where sufficient local aquifer information is unavailable, a pumping test can improve confidence in a review for member and state decision makers. Elements to consider for a test include time of year, test pumping rate, length of test, pre-test conditions, measuring schedule, observation wells,

multi-pumping wells, recovery period, and correct analysis method for the local aquifer conditions.

A**dditional wells and standby wells.** Additional wells may be necessary to allow a partial sale and change of water right use from irrigation to a higher value beneficial use. This additional well activity is distinguishable in the management program from efforts to add one or more wells to supplement or restore aquifer extraction rate capacity to replace lost capacity due to general water level decline. The statewide additional well rule in the District may not uphold the prohibition for increasing water use under the changed water right over time and may not protect prior rights in the over appropriated and declining GMD3 supply, based on GMD3 flow measurement observations. This raises concern for changing the purpose and conservation strategy of the management program by causing a disproportionate local rate of aquifer depletion and a "chasing water" concern that shortens the time to eventual complete depletion of supply to all. Opportunity exists to improve the water conservation administrative outcome of the additional well rule implementation to be consistent with the management program. A **standby well** is different from an additional well as it may only lawfully be operated in the event catastrophic failure of the primary well occurs. A standby well meets standard spacing from other water rights. A primary well is not required to meet well spacing from its standby well and emergency operation is for 60 days. Ask DWR how they would write this for consistency?

Depletion rate analysis. Research suggests more efficient use reduces irrigation returns back to the aquifer. There exists a question whether adding wells to water rights is adding depletion rate and long-term water risk in the District. GMD3 will work with water managers and partners to study the methods for changing water rights that add or overlap irrigation wells. The conditions authorized by recent approvals will be evaluated for any exceedance of the total annual quantity otherwise likely to have been withdrawn absent the approval of such proposals.

Multi-well use flexibility. Careful evaluation of critical well concerns with an emphasis on water conservation assures that any change in pumping allotments is consistent with provisions of law and the official management program. For example, the WCA law in K.S.A.82a-745(e)(2) may allow aggregate use flexibility between participating wells as long as impairment of non-participating rights does not occur. This optional voluntary provision can be encouraged when no critical well conditions exist. Legislative tools for optional water management may not be allowed if they can cause water right impairment locally. An example of this in the upper part of the Arkansas River IGUCA (GMD3 Upper Ark GMA) is where MYFA's are not allowed by the Chief Engineer because of drying surface water conditions and potential impairment of water deliveries. Drying aquifer conditions elsewhere in GMD3 present similar concerns.

Assisting in water right impairment investigations. Impairment usually refers to a condition caused when water diverted under one or more junior (newer) water rights reduces the quantity or quality of water available to one or more senior (older) water rights to an extent that the senior water right(s) cannot be satisfied (KDA fact sheet posted HERE). Changes to a water right's point of diversion, place of use, use made of water or other well use flexibility that may temporarily change pumping limits between wells through a WCA plan are prohibited from impairing existing water rights, even if the changing water right is senior to the water right that would be impaired. The GMD3 governing body may advise and assist KDA/DWR with an

investigation, and if an impairment is determined and caused substantially by a regional lowering of the water table, the GMD board shall recommend the steps necessary to satisfy senior water rights. Such recommendations may include pursuing any means to satisfy senior water rights.

Well use drawdown estimates and evaluation service. GMD3 provides use proposal review and well drawdown estimate services to water appropriation applicants and nearby well owners so that members can make their own water risk assessments based on their own water risk profiles. Critical well drawdown evaluations provide the information members need to make the best decision they can for their business and livelihoods looking ahead in time for at least one generation (25 years). Multiple pumping wells can have additive effects. Wells can become partially dry and lose most of the usable water due to groundwater mining practices. These wells are also called partially dewatered wells. GMD3 employs guidelines for consistent review of actual physical conditions that include:

- drawdown and/or stream depletion due to a proposed well pumping
- drawdown from use under existing water rights
- impact of drawdown on existing well completions (infrastructure)
- potential to obtain the rate and/or quantity of water sought
- water availability
- water quality (water usability)
- other information needed to support decision making

Critical Well drawdown evaluation guidelines. The current GMD3 Guidelines For The Assessment of Well Drawdown Estimates are available at GMD3 and online HERE.

Activity 1 - Water Rights Assistance Goals Summary

1. Promote acquiring use rights to resolve disputes over available supply.
2. Maintain published guidelines for estimating well drawdown effects.
3. To Build Trust–Use consistent and verifiable data with shared models/analytical tools.
4. Further define the bottom of the OHP aquifer for local source of supply management.
5. Advise and assist review of proposals with best evidence available to identify critical well concerns, lesser quality water options and water risk ahead one generation (25 years).
6. Promote benefits for member water conservation decisions in water rights assistance.
7. Exchange expert evaluations and information among members, partners, and GMD3.
8. Seek mutual benefits and good will between members.
9. Conduct a post approval additional well evaluation of depletion rates.
10. Engage partners to implement the Management Program and Board recommendations.

ACTIVITY 2 – WATER CONSERVATION

Water conservation is wise water use that requires management activity, especially during the extremes of flood and drought conditions. GMD3 authority to conduct water conservation activity is included in the District Powers section on page 5. Water Conservation investments provide results in increased productivity and reduced supply decline to move society toward sustainability. Wise use requires an understanding of natural wealth and the four elements of water use risk (storage, replenishment, regulation, and reputation), which is essential if future generations are to have the means to live productively within the region and state. Members

regularly implement voluntary undocumented groundwater conservation activities as a matter of their good stewardship. The many existing water conservation activities may be enumerated in separate GMD3 documents. Voluntary water conservation by GMD3 members across the District include without limit:

- No-till farming methods which improve soil moisture retention.
- Crop selection and field fallow rotations that require less water than historically needed.
- Improved irrigation and other systems efficiency technology.
- Participation in sponsored programs of local, state and federal partners.
- Conjunctive use management from multiple surface water and groundwater sources.
- Demand management and non-use of viable wells to leave water for future beneficial use.
- Water and wastewater reuse from primary uses.
- Use of lesser quality water where economically and technologically feasible.

Management Program water conservation activities will encourage members to further conserve local sources and develop conservation of transient surface water sources for a more sustainable water future. The goal is to provide practical leadership and scientific information to managers so they can target limited resources to adopt water project management plans and achieve wise water use while future water transfer projects are being developed. Both are needed long term. The management program recognizes two distinct types of water conservation activity.

Type (1): Use Efficiency. Use efficiency directly benefits the user and the economy as Type (1) water conservation. It is the amount of valued output per unit of consumed water. This type of activity adds present economic value to each unit of groundwater diverted from storage. It also adds risk by adding capacity to consume every drop available from a depleting aquifer supply while reducing the amount of water that returns to the aquifer. So corrective controls may be needed if reduction in local depletion rate over some baseline value is a goal of any water conservation plan. Efficient water use technology products and services are an effective means of economic growth and improving the bottom line of a project. As the cost of water increases, the business incentives and benefits associated with efficient use also increase. When type (1) conservation is utilized by itself, it may only serve to increase groundwater consumption. Therefore, type (1) conservation only saves groundwater when it is accompanied by a commensurate reduction in pumping.

Type (2): Maintaining Aquifer Storage. Type (2) water conservation benefits the aquifer storage available for future use. Maintaining aquifer or groundwater reservoir storage requires effective conserve-to-preserve activities that include without limit: managing and protecting existing aquifer recharge (MAR) sources, adopting lower water demand alternatives, agreeable corrective controls, administering water rights based on reasonable supply metrics, and development of available replacement sources of supply. This includes diversions of high river flow in the state transported to save aquifer inventories. Both Types of water conservation are necessary elements of the management program to strengthening links between natural water infrastructure (rivers, streams, precipitation, playa lakes and groundwater reservoirs) and constructed water infrastructure (wells, tanks, pipelines, pumps, canals, dams, levees, treatment and wastewater) to grow economic and climate resiliency in the GMD3 area.

Measuring the Conserve-to-preserve factor. The quantity of "wet water" preserved or replenished in storage may be considered the conserve-to-preserve factor and the extent of Type (2) water conservation in a plan or program. It is a calculation that separates the inevitable non-use of a water right (inaccessible or unavailable supply) from aquifer maintenance management decisions (reduced demand or replaced supply) that conserves water for the future. For dewatered well areas, there may be a significant amount of "paper water." A tool to measure the conserve-to-preserve factor will be developed by GMD3 to determine proper Type (2) water conservation accounting and reporting. Water management based on conservation requires metrics for meaningful reporting and to document conservation for member recognition and benefits. Such benefits may be realized either in extended supply, monetary incentives or for due consideration in matters of water rights administration. There should be no penalty for conserve-to-preserve activity that is consistent with the management program.

Home-grown management plans. Climate resiliency for each water project in the District involves incorporating water risk mitigation strategies into a project managers water plan that anticipates and responds to supply change and hazardous events in their water risk profile. The long-term process of managing water risk should aim to mitigate an increasing level of risk under climate shifting and groundwater depleting conditions. So, it is important to start. This inevitably begins with improving your own operational practices and exploring the water risks facing you and other water users in the local area. The key questions to answer are: 1) How well do you understand your current and emerging water risks? 2) What level of activity and engagement is necessary to reduce these risks? Local groundwater storage is generally slow in lateral flow, so members can expect benefits of their managed conserve-to-preserve activities to remain home and not merely benefit other nearby water users. GMD3 will encourage member activity to incorporate actual well conditions, demand management, water rights management, groundwater recharge opportunities, and options for alternate sources of supply into a bottom-line improvement set of water strategies.

Every Manager A Water Conserver (EMAWC) activity. The management program asks that each project manager use water wisely and conserve-to-preserve water by developing a water budget of minimum use with maximum value utilizing both Type I and Type II water conservation strategies. Each family, farm or corporate water manager must act in their own way to manage climate variability and address water risk with wise use that improves their bottom line. Regular investment to maximize water system efficiency is an important part of home-grown water management strategies. Members will be encouraged to provide personal leadership in groundwater conservation to determine the destiny of their water use and the future of their water-dependent enterprise. GMD3 will support such efforts consistent with the management program to facilitate wise decisions and knowledge uptake. Public policy accelerates the adoption of water conservation products and services through reasonable standards and incentives such as regulatory risk protections, cost sharing, tax credits, rebates, and technical assistance. The actions of Every Manager A Water Conserver (EMAWC) activity may ultimately determine the future available groundwater supply for the farms and industry of the GMD3 area.

Master Water Manager. The Master Water Manager pilot project can promote the EMAWC activity and be an extension of the different water use industry sectors, local and state demonstration programs, and home-grown project water manager improvement activities. Master

Water Manager will be designed to facilitate the adoption of proven best management practices by significantly reducing the learning curve for water managers and promote adoption of Type (1) and Type II water conservation. Master Water Manager participants will learn how to manage water use using conservation practices with lawful, practical, accessible tools and strategies. Lectures, problem solving, and hands-on applications will be used during teaching. The length of the program will give participants time to reflect on what they learn and build a network of water managers to rely on when implementing best practices in operations. This may be patterned from the North Texas Master Irrigator program spoken about at the Ogallala Water Summit that occurred April 2018 in Garden City posted HERE and virtually in February 2021.

GMD3 Drought Resiliency. The official groundwater Management Program developed and adopted locally is considered the regions drought resilience program for southwest Kansas. Drought affects southwest Kansas frequently with a subtle onset that develops significant impacts over time. Long-term historical climate variability estimates over the last 1000 years produced by Layzell and others at the KGS indicate significant historical climate variability beyond modern experience and data. Significant value has been realized by decoupling economy from local rainfall and climate variability through the development and use of stored groundwater for irrigation. The current gap between consumption and recharge is dewatering the principal aquifer with an effect of adding farm and ranch vulnerability to water risk and a greater need for adaptation and mitigation strategies. Planning is vital for anticipating and dealing with variable water availability in semiarid areas like GMD3, and as groundwater extraction and resource stresses intensify. USDA Southern Plains Climate Hub adaptation strategies are posted online HERE.

Water Use and Climate Evaluation Service to Irrigators. Annual water use feedback from GMD3 can provide irrigation water managers with local water use and climate information that can help them to become more drought resilient and adapt water management strategies. In a pilot information feedback project, each irrigation water user will receive an annual report detailing their water use compared to other water users within 5 miles that have similar crops, soil, land value, and aquifer characteristics. The report will also include information in five key areas: 1) on remaining saturated thickness of the local aquifer, 2) an analysis detailing the effect in terms of years of additional water supply from a reduction in water use, 3) a drought monitor report for the growing season, 4) the estimated cost per acre-foot of pumping water under local energy and aquifer conditions, and 5) a comparison of the irrigator's total cost of accessing water with water use peers in their area. This project will help build long-term resilience to drought and reduce the need for emergency response actions by providing water users with valuable information that will empower them to better manage and conserve water, increase the usable life of the Ogallala/High Plains Aquifer, and increase farm profitability. This project supports drought planning needs identified in the Groundwater Management Program and the State Water Resources Planning Act.

Conservation plans approved by GMD3. Water conservation plans mandated by the Chief Engineer as a condition of water use have been tied to many water rights in the district. They are intended to provide information and encourage Type (1) water conservation. The KWO develops and maintains guidelines for water conservation plans (K.S.A.74-2608). Current state guidelines for irrigation conservation plans are available online HERE.

Municipal (public water supply) guidelines are available online HERE.

Water conservation under state guidelines. Under statewide Kansas Water Office guidelines, water conservation is defined as:

> "*The utilization of cost-effective water use efficiency practices to curtail the waste of water and to ensure that water use does not exceed reasonable needs.*"

This general definition implementing K.S.A. 82a-733 of the KWA Act focuses on use efficiency, which is Type (1) water conservation activity. Type (2) water conservation emphasized in our management program needs additional guidelines. To implement subsections (g) and (h) of K.S.A 82a-733, GMD3 will review and consider approval of conservation plans and practices and retain this authority for any proposal affecting plans or for due consideration of water conservation activities consistent with the official management program.

GMD3 water conservation plan guidelines. GMD3 will investigate, develop and update water conservation plan guidelines for Type (2) conservation under separate guidance documentation to achieve the following:

1. Provide a conservation plan template that can be used to meet the requirements of the water managers, GMD3 management program, the state and federal program interests.
2. Provide considerable flexibility to develop and monitor water conservation plans.
3. Provide an online source for Guidelines and Plan templates, so that members, consultants, and other management partners can easily download a template or develop a Plan.
4. Include a subsection on source conditions and risk management goals.
5. Make plans useful to member water managers, so that the majority of GMD3 water users can be directly involved in the management of their local water sources and use destiny.
6. Curtail waste of water using readily available best practices that ensure water use does not exceed reasonable need.

Corrective controls. GMD3 has adopted conservation policy measures, advocated for mandatory water right applications, conducted maximum allowable depletion water availability calculations, and made recommendations to the Chief Engineer to fulfill the public right of the District constituency. Water right administration under the prior appropriation doctrine is the most direct form of corrective control provided by the Kansas legislature for water-short supply conditions. Corrective controls are considered administrative water use terms and limitations that secure corrections to water supply decline problems. It is well established that the supply problems set forth in K.S.A.82a-1038 of the GMD Act exist across the entire GMD3 area for the OHP Aquifer and these conditions are perpetuated in routine state decisions. Any voluntary corrective control offered by members to gain added use efficiency in mined aquifer conditions should be intended as a new corrective control that benefits the aquifer storage (Type (2) water conservation). GMD3 will advise and assist efforts to establish appropriate corrective controls to assure new use value benefits fall to all members. Members should not unfairly benefit from higher groundwater use than their peers or unfairly impose new critical well risk on nearby well owners in a declining supply. The water conservation partnership with the Chief Engineer state official includes recent GMD3 requests for an order to close the OHP Aquifer to most new water rights with some exceptions. Those small use exceptions have subsequently been reviewed by

GMD3 and a Board resolution 2018-5 seeking offsets from existing base water rights for any new non-domestic water appropriation and avoiding nullifying member local conservation efforts without compensation and manage appropriation totals in a declining resource.

Offsets and substitute supply. GMD3 will work with the Chief Engineer to efficiently implement offsets, augmentation or substitute supply activities to conserve and extend local groundwater supply for existing water rights. GMD3 will assist in identifying existing base water rights with wet water supply sources in GMD3 that may be available to support new appropriations without expanding appropriations in the district. The fundamental conservation policy of GMD3 is that there is no additional water available in storage beyond what is needed to satisfy the existing water rights over time in mining conditions of the OHP Aquifer.

Additional source supply. Private investments in water infrastructure are private decisions to develop opportunity that also provides significant public benefits. In a similar way, public investments supporting major water infrastructure projects will create a powerful economic driver with significant return on investment for both public and private interests. Economic studies indicate water infrastructure projects are a force multiplier. An investment in sustainable water and wastewater infrastructure has a six-fold return (5 U.S. Chamber of Commerce, Why Water Infrastructure Investment Would Make A Big Splash) – proving that investment in water infrastructure is sound fiscal policy. Water demand has both fulfilled and unfulfilled components in GMD3, where unmet demand caries involuntary land fallowing and a lost opportunity cost. Unmet demand is influenced by dropping aquifer levels, dropping pump capacities, and insufficient replenishing surface water for MAR, as evident in the perfected paper water rights in the District totaling 3.6 million acre-feet and significantly less average annual use.

Flood-MAR projects. The ability to store renewable floodwater underground can restore and replenish those reservoirs and provide a firming supply at a later time. The timing for GMD3 partnerships to develop flood water transfers delivered to Managed Aquifer Storage (MAR) infrastructure may be appropriate while significant Missouri Basin flood protection improvements are being evaluated by the U.S. Army Corps of Engineers (USACE) and an unprecedented multi-state Colorado River Basin Drought Contingency Planning is being marshaled by the U.S. Bureau of Reclamation (Reclamation) to assure continued water safety, future economic growth and other water resource services vital to the future of western water supply and national security. Reclamation has an established interest in aiding development of alternative fresh water sources and other assistance that include the Colorado River Basin Plan, the Fryingpan-Arkansas Project for water diversion, storage and delivery authorized in 1966 by Public Law 87-590, A 2015 Arkansas Basin Plan of Study from John Martin Reservoir in Colorado to Garden City Kansas pursuant to the authority and mandates of the Secure Water Act (SWA), Subtitle F (P.L. 111-11), and Reclamation involvement in developing Missouri River basin water under the Flood Control Act of 1944 (Pick-Sloan Act). Reoccurring Missouri Basin flooding sparked water waste concerns and interest to update the Route B Water Transfer Element of the 1982 Six State High Plains Aquifer Study (High Plains Study). The 2015 update found half again more water available for transfer then original estimates. The update was to move stakeholders and partners in the direction of identifying preferred future water transfer projects to close safe yield gaps and meet future needs and is available online HERE.

Water West. GMD3 Management Program activity will provide leadership with partners to capture surplus transient high flow water wasted from Kansas and encourage water transfer activities that are both distributive and regenerative by design to more effectively capture the anticipated extreme variability of precipitation events associated with a changing climate. Activities will include early proof-of-concept (POC) projects to demonstrate and discover the path to Kansas for interested water partners and gather supporters to advise and assist the Secretary of Interior in conducting a phased planning authorized in PL90-537 in a manner that is favorable to Kansas and GMD3. Otherwise, experts estimate the status quo path may create an annual future economic loss in Kansas gross state product of approximately $18 million, with a $10 million portion lost in GMD3, based on current trends available HERE. Graphics are available HERE. The estimated shortfall is mainly due to the depletion of groundwater supplies, silting of surface reservoir storage space, and lack of water transportation infrastructure. Reclamation is a strong candidate to be the federal lead in a Water West project activity. A newly scoped federal High Plains Study should be conducted and include additional water transfer benefits to provide value added water management alternatives for western states. A gathering of project partners and officials with knowledge and interest in replenishing sustainable western water and power will be encouraged by adapting Kansas policy consistent with the Kansas Water Vision and phase in water transportation system development into their water planning. The GMD3 Management Program commits the District to forward-looking evaluations to integrate natural and public water infrastructure with cost evaluations to fund needed management decisions, including costs to do nothing.

GMD3 advice and assistance for the Groundwater Exploration and Protection (GE&P) Act. GMD3 informs members and program partners using information gathered or provided relative to local and state policy in the GE&P Act and GMD Act. The GE&P Act is a body of Kansas law to provide for the exploration and protection of groundwater through the licensing and regulation of water well contractors who operate in Kansas to protect the health and general welfare of the citizens of the state. The Kansas Department of Health and Environment (KDHE) Bureau of Water administers the GE&P Act with state wide rules as a key partner in the methods for handling the enforceable licensing of water well contractors; providing for enforceable standards for well construction, reconstruction, treatment and plugging; requiring each licensed water well contractor to keep and transmit to the state, upon request, a copy of the log of the well, pump test data if available, and water quality samples, and maintains within the Kansas Geological Survey (KGS) a record system of well logs and water quality data available to the public. Unused water well bore holes in GMD3 are often large in diameter and some of the deepest in the state. They are considered valued water infrastructure, but also may carry concern for protecting aquifer health and member safety. Abandoned wells are required to be properly plugged unless a temporarily abandoned well permit is granted by KDHE. GMD3 will work with KDHE staff and member land owners to implement practical support activities for safe well capping and verified aquifer access network to accomplish the purposes of the GE&P Act and GMD Act with minimal intrusion of private land and infrastructure to accomplish the conservation of useable water supply in the District.

Inhabited source water - KDWP&T partnership. Floodwater and other abundant high flow surface waters hold significant source water development opportunity to close gap between water use and sustainable supply in GMD3 and for other areas. These water sources may be inhabited

by aquatic nuisance species (ANS) that are not living in destination basins. ANS concern for inhabited source water transfer requires Management Program attention and a partnership with KDWP&T (K.A.R. 115-18-10). In addition, inhabited source water may require safeguards to protect species that are considered threatened or endangered under the Kansas Nongame and Endangered Species Act (K.S.A.32-957). Significant coordinating with Kansas and other partners will develop appropriate safeguards to protect and conserve Kansas natural resources.

Targeting designated GMAs. A targeted Groundwater Management Area (GMA) is any targeted area in the district designated for unique specified groundwater management program activity. GMD3 conservation and/or management activity may exist to accomplish special private, corporate or governance purposes and use one or more institutional tools uniquely applied through the district management program in each GMA.

GMD3 Upper Arkansas River IGUCA. The Upper Arkansas River IGUCA was requested by GMD3 in 1984 as a GMA to replace the GMD3 1977 requested moratorium and granted by order of the Chief Engineer for new appropriations in certain counties with high vested right (pre-1945) amounts. The request was to extend corrective controls from the Colorado and Kansas Stateline in a corridor along the river across GMD3. This IGUCA was ordered by the chief engineer after significant public process, testimony and recommendations of the Board and district members. See map of the IGUCA area in the Appendix. Any revision action should include GMD3 review and recommendations implementing the management program. Additional state information on the Upper Arkansas River IGUCA is available online HERE.

Special rule conservation areas. Special rule conservation areas with controls requested and established as state rule provide corrective controls that address concerns such as quantity, usability, or use practice to manage or encourage efficient groundwater use while protecting useable supply. For example, K.A.R. 5-23-4(c) is a special rule for a water quality control area in parts of Seward and Meade Counties where naturally occurring saltwater upwelling from Upper Permian Age formations moves into the overlying connected Ogallala groundwater reservoir formation as groundwater use occurs, threatening water usability depletion in the area.

KDA/DOC partnerships. GMD3 will evaluate groundwater areas to be designated as high priority areas to support state buy-back of water rights, if funded, through the KDA Division of Conservation (K.S.A. 2-1915). The Division of Conservation (KDA/DOC) make water transition assistance program grants available only in areas that have been designated as target or high priority areas by a GMD and the chief engineer. GMD3 will seek funding sources and make budget provisions to advise and assist KDA/DOC, county Conservation Districts and other local, state, federal and non-government organization partners to provide the assistance members can incorporate into their wise water management plans in line with the official Management Program.

LEMAs (Local Enhanced Management Areas). The Legislature added a new GMA tool in 2012 for GMDs after more than a decade of development work by Northwest Kansas GMD4 and partners. GMD3 will support LEMA development with group facilitation resources and evaluate suggested goals for corrective controls, including impacts to property valuation, economy and the Management Program. The Local Enhanced Management Area (LEMA) statute (K.S.A. 82a-1041) provides a procedural structure for the development of LEMA management plans to be adopted by a GMD and recommended to the chief engineer. When members come together to

seek ways to extend supply and reduce the rate of groundwater decline, the GMD3 Board fulfills its purposes under state and local policy to represent member interests with respect to their water rights, use and supply in legal and administrative proceedings or before political bodies. The Board has the authority to adopt a LEMA plan and seek acceptance by the Chief Engineer, who must consider only the requested plan for implementation. A LEMA plan can be recommended to the GMD3 Board by members as a priority GMA to be further managed with infrastructure development, managed aquifer recharge and/or corrective controls in the public interest. Basic steps for establishing a GMD3 LEMA involve formulation of a plan generally accepted by area members, presentation of the plan to the Board, Board adoption of the plan, Board request for a LEMA to the Chief Engineer based on the plan, two prescribed public hearings considering the proposed plan, and a decision order of the Chief Engineer approving, returning, or rejecting the LEMA. Any LEMA plan proposed to the Board for adoption shall include: 1) A clear groundwater management goal; 2) A basis for the proposed boundaries; 3) Evidence in the record of plan development that multiple alternatives were formulated for setting corrective controls on member water rights, including use of the principle of prior appropriation; 4) Reasoning for the use or rejection of each alternative; and, 5) The recommended strategy for determining the will of the eligible voters of the district having property rights within the proposed LEMA area. Previous work on a Kearny-Finney LEMA is available online HERE.

WCAs (Water Conservation Areas). In 2015, the Legislature provided an additional GMA tool referred to as a WCA. A WCA is a tool under the KWA Act where any water right owner, or group of owners can develop a water conservation plan for consideration and agreement of the Chief Engineer to commit water rights to conservation through voluntary corrective controls consistent with other laws and the public interest. A proposal can come forward to the Chief Engineer from either GMDs, directly from local water right holders and their consultants. By law, a WCA plan must be consistent with the rules and management program of the GMD. The purpose of a WCA is to encourage water conservation through voluntary corrective controls and may be used as an agreement tool to document member voluntary water conservation. By order of the Chief Engineer, a WCA plan consent agreement may allow new use authority. Any proposed new pumping authority for a well proposed under a WCA plan should be carefully evaluated using the GMD3 well drawdown evaluation guidelines to avoid adding risk of critical well conditions to nearby non-participating members and negating prior conserve-to-preserve supply efforts under the management program. With the consent of all participating water right owners in a WCA, the Chief Engineer may amend the agreement and order to modify corrective controls or boundaries, add or remove water rights, terminate the WCA, or make other changes requested by the water right owner(s). Under the management program, GMD3 will review each WCA proposal, change, or extension and provide recommendations that implement the management program and voluntary corrective controls in a WCA plan are encouraged accordingly. GMD3 will adopt and enforce policy needed to implement WCAs in harmony with other concerns of the management program. It is well established in Kansas water policy that LEMAs and WCAs are not to be used simply as loopholes around the official management program and the rules that implement it. More state information on a WCA is available HERE.

Managing water use by the drop. Member management of water use by the drop maximizes water value and is achieved through the adoption of field-scale drip irrigation technology for agriculture and municipal applications in southwest Kansas. This technology minimizes the

water thief of direct evaporation during field irrigation. Drip or other precision water application technology requires management investments that improves water value. For example, one 15 gpm leak or preventable evaporation loss during field irrigation equates to: 1 hour = 900 gallons, 1 day = 21,000 gallons, 1 month = 648,000 gallons and 4 months = 2,592,000 gallons. In perspective, that equates to 7.95 acre-foot or 95.5 acre-inches of water. An example activity video is available online HERE.

Activity 2 -Water Conservation Goals Summary

1. Assist all members in evaluating and adapting their water use systems to meet their water supply and water risk management needs with reliable information.
2. Develop annual conserve-to-preserve accounting and recording tools with guidelines.
3. Advise and assist KDHE in implementing the GE&P Act to benefit members and the aquifer.
4. Support Type (1) and encourage Type (2) water conservation.
5. Evaluate Master Water Manager pilot project to promote the EMAWC activity.
6. Develop policy to advise "due consideration" of past conservation (K.S.A. 82a-744).
7. Protect and enhance surface flow infrastructure for Type (2) water conservation.
8. Conduct MAR storage of surface water.
9. Develop policy for additional wells in dividing property vs. supplemental wells that restore aquifer depletion rate and criteria for evaluation consistent with the Management Program.
10. Advise to have standby wells: 1) meet well spacing from other domestic and primary non-domestic wells; 2) limit to 60 days of emergency pumping, and 3) be exempt from spacing from primary well.
11. Participate in each IGUCA review or revision to advise and assist the Chief Engineer.
12. Encourage LEMA plans from members that further manage supply with infrastructure development and agreeable corrective controls.
13. Emphasize need for Type (2) water conservation goals and corrective controls in WCA plans where critical well conditions exist.
14. Develop and update GMD3 conservation plan guidelines for Type (2) water conservation.
15. Evaluate WCA multi-well use flexibility wells to determine critical well conditions.
16. Apply GMD3 well evaluation guidelines to: 1) manage the stacking of "paper water" from poor wells onto better wells; 2) protect past Type (2) water conservation; and 3) limit new hardship or risk imposed on members.
17. Encourage policy development to allow conditional appropriation of waters otherwise lost to Kansas for conservation transfer and storage as enhanced management activity.
18. Seek 2016 Legislative Session HB 2059 compromise language as an addition to the KWAA to allow conservation of high surface water flows out of state.
19. Develop testing and evaluation guidelines for adding additional wells safely in GMD3.

ACTIVITY 3 – MODELS, RESEARCH AND DEVELOPMENT

Groundwater management requires specialized model tools. Models of district groundwater reservoirs, well pumping drawdown estimate, surface water resources, and cost benefit analysis are necessary tools that provide up-to-date information critical to the success of the district management program. Each model is a tool designed to represent a simplified version of reality. The reliability of the model tool depends on how well the model approximates field conditions.

Some extreme events or conditions may be beyond the calibration of a model and wise application of model and other data should account for this. GMD3 will work with state and other partners to use and improve analytical and numerical model tools that elevate district groundwater knowledge and improve management activities. To build trust, GMD3 will encourage use of consistent and verifiable data with shared models and analytical tools: Standard issue software; Standard issue data (KGS,USGS, etc.); Coordination with partners and referees; Common set of facts and tools (Foster's relationships, Fundamental to negotiations); and seek that parties collaborate to improve tools. The following activities are identified without limit.

District area OHP Aquifer model update. A two-year update of the GMD3 area OHP Aquifer groundwater model is expected to begin in late 2021 in partnership with the KWO and the KGS. The model area will cover over 5 million acres in southwest Kansas. A new Geographical User Interface tool will be added that allows greater access to the model through electronic devices using graphical icons and audio indicator such as primary notation, instead of text-based user interfaces, typed command labels or text navigation. GMD3 will partner with the KGS, KWO, and others to complete a successful two year project. Additional data may be needed for improving the model function and utility, including:

a. Index well measurements of groundwater exchange between formations.
b. Groundwater gage measurements of recharge benefits from surface water flow.
c. Groundwater gage measurements of lateral flow and water quality.
d. Data needed for improved model calibration.
e. Graphical user interface tools to connect members to model information.
f. Critical well evaluation and water project supply estimate tools.
g. GMD3 Upper and Lower Ark GMA MAR and conjunctive use tools.
h. OHP Aquifer water use and recharge measurement tools.

Groundwater data. Groundwater levels in southwest Kansas have been on the decline since unregulated water use rapidly increased in the mid-20th century. The KGS and DWR currently measure groundwater levels in December, January and February to avoid, as much as possible, short-term declines caused by widespread pumping during the growing season. Historical annual data for each well measured are available online at the KGS website HERE. This information is exchanged and shared along with other data and measurements secured by GMD3 to provide the best possible models and information for water managers and decision makers. This information may include without limit member test hole data contributions, flowmeter and well yield tests, measured recharge rates, pumping drawdown information and other related studies conducted within the District area or affecting District water supply.

Economy and water valuation models. Economic and valuation models are a critical source of information used to advise and assist water managers in their water project and conservation investments. A public interest of the Kansas legislature is for water appropriation that achieves the highest public benefit and maximum economical development from the use of Kansas water (K.S.A. 82a-711). All values and costs should be included when valuing water because they exist in every water transaction seeking to use or to refrain from using water. A transfer of available water across Kansas would add value and public benefits identified and quantified to help solve the supply decline gap for the GMD3 area and for other western partners across Kansas and beyond. GMD3 will take a leadership role with partner agencies and organizations to examine

various water transfer project scenarios with wealth benefit models to identify preferred projects which may become economically feasible and advisable under future water capitol to meet future resource service needs.

MAR models. MAR activity may involve modeling both natural infrastructure and constructed infrastructure development to determine a plan for long term safe yield water use, which is an important and evolving term of art, involving both law and science. GMD3 will seek data development and feasibility investigations in consultation with member partners, KDHE and other state and federal partners to manage flows and avoid having "statistically significant increase[s] in the concentration of any chemical or radiological contaminant or infectious microorganism that might move into groundwater resulting from surface water infiltration or injection" where possible (K.A.R. 28-26-28d(b)(5) and 28-16-28e(c)(5)).

Water exports. The Board shall inventory and involve itself with direct exportation of District water to any area or location outside the district to ensure that all management program purposes are met and to seek opportunities to support present and future water supply needs. Exported water use may be evaluated to consider net benefits between imported supplies and those exported out of the District to Oklahoma or Colorado.

Federal Farm Programs. Federal farm bill research and other programs provide significant support to the implementation of home-grown water plans and the GMD3 management program. GMD3 will participate in farm bill development to preserve and enhance conservation program utility for members. Using historic water usage data without proper accounting for conserve-to-preserve activity may work against state and federal program purposes by incentivized maximum water use prior to enrollment, which is not consistent with the management program. Those who already work to steward Type (2) groundwater conservation in their declining supply have a greater burden to achieve added conservation that should be properly valued in addressing resource concerns. GMD3 will advocate for flexibility in the use of field level crop bases to encourage conservation of water use over program elements that may force members to continue high water use to preserve crop bases.

Research and development of State and federal water conservation incentive programs. GMD3 will continue to encourage and develop additional partner activities in state sponsored water conservation incentive programs made available to members and investigate opportunities to leverage management program activities with incentivized conservation activities that further the purposes of the management program for district members.

Ark River safe drinking water well study. High radionuclide and other mineralization pollutants in some groundwater supply areas of the district require study to determine the best management practices to secure safe drinking water. Programs that will adequately safeguard the health, safety and welfare of district members will be supported, working with state water agency partners that include KDHE, KDA, KWO and KGS.

Data collection and exchange. GMD3 collects data regularly for use in addressing water quantity and quality concerns. Land ownership records and socioeconomic and use value studies are necessary to implement the groundwater management program and Board initiatives. District

datasets and those of water management partners are exchanged to address mutual concerns. Such cooperative efforts with partner organizations will assure an efficient use of GMD3 manpower, technical, and financial resources.

Activity 3 - Models, R & D Goals Summary

1. Update GMD3 area Ogallala/High Plains Aquifer model with a graphical user interface tool.
2. Support partner R&D for tools to help members evaluate opportunities in local renewable-energy to power flexibly scheduled water treatment and ammonia fertilizer production.
3. Work with partners to provide water use feedback and conservation reporting.
4. Collect additional data on hydrology, member test holes, index wells and water conservation.
5. Develop and update economic models and other water value economic tools.
6. Research Water marketing and transfer projects for conservation and importation of supply.
7. Develop practical programs that advise and assist members to optimize their wise water use.

ACTIVITY 4 – WATER QUALITY PROTECTION

Water quality is basically the amount and type of material in the water. GMD3 authority to conduct water quality protection activities are included in the District Powers section on page 5. Water quality and quantity are interrelated and inseparable elements of water supply. Water quality affects water usability and the public health, safety, and welfare for Kansas citizens, including members of GMD3. The Kansas Department of Health and Environment, Bureau of Water is a key partner along with other local, state and federal partners, to protect the usability of the District water supply. GMD3 will work with partners to ensure water quality needs are met.

GMD3 has an active history of groundwater quality data collection in a network of annual sample collection, analysis and reporting. A more strategic approach of sampling to target water quality management concerns is under development with partner water managers.

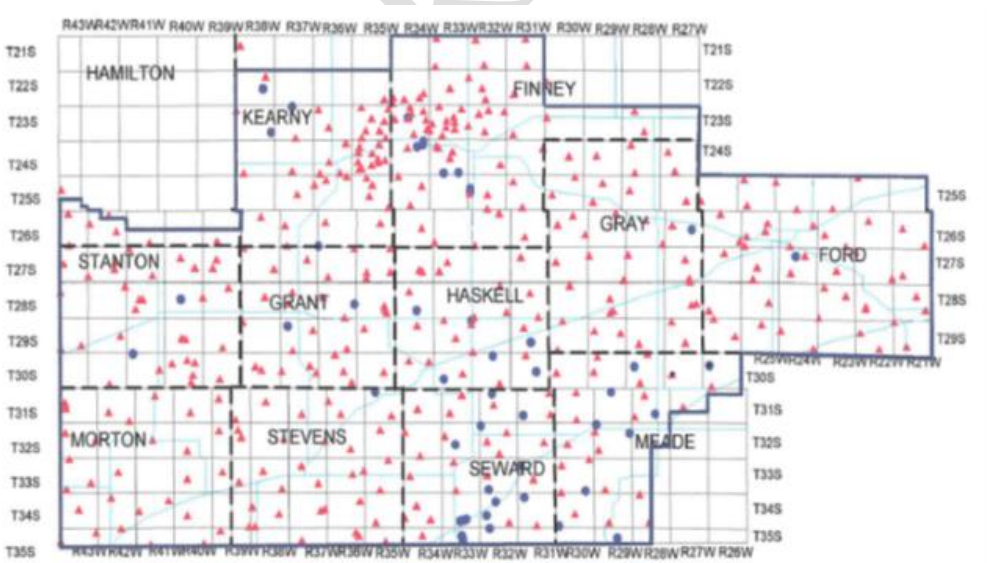

Figure 2. General map of GMD3 water quality sampling network.

Kansas has developed a general Water Quality Management (WQM) plan to achieve the objectives of the Kansas Water Plan (KWP) and to maintain state primacy for administration of federal law and water quality programs. Kansas controls its own water, but federal compacts and environmental laws have an impact.

- **The Clean Water Act,** which regulates water quality by regulating discharges to waters of the US (also known as **WOTUS** or Navigable Streams). Programs and provisions include: National Pollution Discharge Elimination System (NPDES) permits, which govern discharges into surface water from specific sources and indirect discharges through storm-water runoff; Section 404 Permits, which address activities relating to wetlands; and Section 319 to control Non-Point Source (NPS) pollution.
- **The Safe Drinking Water Act**, which regulates water quality in public water systems.
- **The Endangered Species Act** protects species of plants and animals designated as threatened or endangered by the U.S. Fish and Wildlife Service. This involves formal listing, defining critical habitat, and devising a recovery plan.
- **River Compacts**, which equitably divide or otherwise relate to the waters of the Arkansas and Cimarron rivers as federal law.

GMD3 advocates nationally to preserve state and local rights and primacy to groundwater management activities and will monitor, implement, and address the following water quality activities in coordination with partners to advise and assist them in fulfillment of the District Management Program.

1. **Existing Pollution Problems.** Known pollution problems that pose a direct threat to the usability of groundwater supply within the district will be researched and evaluated by staff, in conjunction with KDHE Bureau Of Water (KDHE/BOW) programs and/or other partners to seek adequate mitigation and/or remediation for improving and protecting supply conditions. Where identified concerns exist, staff will present its recommendations to the Board for consideration of advisable action.
2. **Contamination risk.** The water quality protection activity of GMD3 will advise and assist members and business interests to identify the major sources of water usability depletion and address concerns in targeted areas to minimize water risk from contamination of district water supply. A practical state resource for careful land use considerations can be referenced online HERE. Public Notice Concerning Kansas / Federal Water Pollution Control Permits and Applications are reviewed by GMD3 to monitor and coordinate water quality permitting with water appropriation permitting and inform members and partners on matters concerning the Management Program. Notices are available online at the KDHE/BOW website HERE. Practical assistance to members and industry will harmonize actual conditions with enforceable water policies. The special saltwater intrusion rule in Seward and Meade counties is an example of subsurface well construction policy to protect water supply. Management program activities will advance drinking water quality monitoring and supply protection with guidelines for triggering events for drinking water well inspection and for water quality data collection and education.

3. **Oil and gas industry water use and supply risk**. GMD3 should consider a review of data on historical oil and gas activity in the district for review of information with appropriate

state officials to screen for orphaned industry wells and potential for inter-aquifer groundwater connection that can create freshwater drains to deeper, less fresh formations. Opportunities for new technology-based water treatment will be evaluated with assistance from state and federal partners.

4. **The Local Environmental Protection Program(LEPP).** Established by the state in 1990, local authorities were assisted by GMD3 to develop a local group (LEPG) and county water protection plans that complemented other water quality efforts being waged by local, state and federal agencies. At the core of each plan was the adoption and enforcement of county environmental codes with an emphasis on onsite wastewater systems and private water wells. GMD3 will continue to provide advice and assistance to program partners with available resources to local county water protection programs and added information posted HERE.

5. **Abandoned water wells and test holes**. With about 1/4th of non-domestic wells sitting idle each year, GMD3 will assist the KDHE/BOW in their implementation of the Groundwater Exploration and Protection Act and the disposition of temporarily abandoned water wells to assist members in their management of wells and boreholes. GMD3 will advise and assist members to manage well equities, groundwater quality, monitoring well data collection opportunities and on-site water supply and safety concerns.

6. **Groundwater gage network**. GMD3 will continue to develop a district monitoring well network with appropriate assistance by the US Geological Survey and KGS and obtain water samples to be analyzed for water usability depletion. GMD3 has worked with these partners, KDA/DWR and the Kansas legislature to establish Stateline groundwater gages that provide quantity and quality data to support interstate supply management. GMD3 continues work to set up a network of observation wells in areas where additional data is needed to support the management program and water risk concerns.

7. **Uranium, Radium and Radon.** These elements are not normally evaluated in regular domestic drinking water samples but can pose a health risk. According to the KGS, radon and its immediate parent radium largely occur where uranium is present in rocks, soil, or ground water. All rocks contain small amounts of uranium. Uranium can also be present as a solid attached to mineral coatings on sand and silt. Uranium is very soluble and easily weathered into solution—like dissolved salt or sugar. Some groundwater in the district is known to have naturally occurring uranium and radium. Where these occur, close cousin Radon may also occur (Felmlee and Cadigan, 1979). More information is available from KGS online HERE.

Activity 4 - Water Quality Goals Summary

1. Evaluate Permian saltwater data and update enforceable rule policy as needed in the GMD3 chloride management area.
2. Assist and advise KDHE bureau of water partners in governance of injection & water wells, public water supplies, permitting & compliance input, and watershed management benefits consistent with the management program.
3. Evaluate water treatment technologies for reuse of low-quality water sources for potential agriculture supply and other value benefits, working with Reclamation and other partners.

4. Evaluate the extent of old well drainage down gravel pack from upper fresh aquifers into deep brackish formations, working with KCC, KGS and other partners.
5. Support efforts of county sanitarians to protect drinking water supply sources.
6. Identify appropriate sanctions for unlicensed and unlawful well construction and use.
7. Evaluate the needs of district members to access data from a water quality sampling and evaluation network of drinking water wells.
8. Reduce and mitigate district aquifer contamination from tons of uranium and other minerals delivered by Ark River flows from Colorado into aquifers in GMD3.

ACTIVITY 5 – ARK RIVER MANAGEMENT

The Arkansas (Ark) River is the principal source of surface water flow into the District and the area groundwater reservoirs. Authorities for GMD3 Ark River Management activities are include without limit in the District Powers section on page 5. Managing recharge sources for the declining aquifer system makes Ark River Management activity a necessary part of the Management Program for constituents. This activity is intended to **Reduce Uncertainty and Increase Resiliency** of river infrastructure to 1) Develop safe and stable operations, 2) Provide opportunities for collaboration, 3) Balance upstream and downstream risks, 4) Acknowledge shared resources/responsibilities, and 5) Cooperatively respond to change and crises.

The Ark River flows from upstream snow melt, runoff events, aquifer discharge and releases from surface reservoir storage. Since the 1970s, mining of groundwater near the Ark River has lowered the water table, creating a losing stream over the OHP Aquifer. All river flows are now either consumed for irrigation or stored in the river alluvial aquifer and connected OHP Aquifer, effectively operating the basin as a terminal basin and groundwater reservoir that receives what is left over from upstream use and the activities associated with the Kansas and Colorado Ark River Compact. Significant supply decline from heavy upstream demands and poor-quality inflows requires management program activity to better manage the aquifer recharge resource through partnering with members and other interests who want to restore and enhance the river's economic, recreation and environment benefits.

Figure 3. Ark River bank breach upstream of Garden City.

Ark River Basin change over time. The Ark River basin of the District that is shared with Hamilton County, Kansas and areas in the state of Colorado has changed significantly since before the formation of GMD3. Construction of upstream reservoir storage, river flow exchanges, water transfers, re-regulation of river flows, direct diversion improvements, groundwater well development, land use changes and water use efficiency improvements have all contributed to a profound change in the nature of basin water resources. Local management activity is needed to preserve, improve, and protect the remaining groundwater benefits from the river infrastructure and supply. For example, the distribution of recharge benefit from river flow is impaired by a riverbank breach between Garden City and Holcomb. Aquifer recharge is an amenity of river flow. Ark River activity will be a model for managed recharge in other basins.

Managed Aquifer Recharge (MAR). Early experiments near Lakin, Kansas and elsewhere occurred in the decade of the '70s in response to interest to develop feasible methods of artificially recharging area groundwater reservoirs (Bulletin 20, Ks. Water Resources Board, 1977). Those studies concluded that utilization of surface runoff or imported water to recharge by water-spreading techniques would be improved if more water were made available. Natural replenishment estimates away from stream channels are low, typically less than one inch of water annually. Recharge rates may be higher locally, such as beneath river and ditch flows, fully irrigated land and through sandy soils. A GMD3 Systems Optimization Review project along the Upper Arkansas River in 2014 provided river channel loss rates that are also useful MAR or well augmentation rates. Opportunities exist to enhance MAR activities by enhancing source water management and adding water imports with constructed transfer infrastructure that is distributive and regenerative my design.

GMD3 Upper Ark GMA. The portion of the basin above Garden City to the Colorado and Kansas Stateline that include the IGUCA, ditch service areas and tributary underflow affecting supply within a 25-year prospective evaluation period is considered the GMD3 Upper Ark GMA for the purposes of the management program. The river flow and associated recharge benefits to the GMD3 Management Program generally occur year-round to a point near the Kearny–Finney County line above Garden City. The problems of dwindling supply, river sediment accumulation and water usability depletion are significant and growing concerns in the GMD3 Upper Ark river reach. For watershed management purposes, the national Hydrologic Unit Code (HUC) for the GMD3 Upper Ark GMA is HUC 11030001 (Middle Arkansas-Lake McKinney). The NRCS rapid assessment report for the Colorado portion of the HUC can be accessed HERE, and the Kansas Non-Point Source Plan can be accessed HERE.

Public drinking water. All public drinking source water is from groundwater. Within GMD3 portion of the Ark River basin, the cities of Lakin, Deerfield, Holcomb and Garden City have experienced a decline in groundwater quality from some wells due to infiltration of river water near city well fields. The City of Lakin is a member that recently constructed a nanofiltration water treatment facility at great local expense to get their drinking water within the Environmental Protection Agency's (EPA) maximum contaminant level (MCL) for uranium. The community must now bear an ongoing water usability depletion cost of millions of dollars and 15% loss of supply necessary for deep injection waste disposal. The water extracted from the Deerfield and Holcomb wellfields has been within safe drinking water standards, but quality has

been deteriorating. Those cities must develop additional freshwater sources and treatment solutions, including potential reuse.

Water quality. Arkansas River basin OHP Aquifer lateral flow into Kansas and GMD3 area is generally of good quality. However, water entering the state as Arkansas River Stateline flow has seen high contaminate levels from a number of elements that include sulfate salinity and uranium. High radio nuclei levels have a significant effect on water treatment costs to restore water usability for public water supply and other uses. Estimates from the Kansas Geological Survey of the weight of uranium coming into Kansas annually from Colorado via the Arkansas River are concerning, indicating near 10 tons delivered to Kansas each of 2015 through 2019.

Table 5. Colorado annual uranium delivery estimates.

Year	Average annual Sp.C., µS/cm	Average annual uranium concentration, µg/L	Average annual flow, ft^3/sec	Average daily uranium load, kg/day	Annual uranium load, metric ton/yr	Annual uranium load, ton/yr	Annual uranium load, lbs/yr
2012	4,271	73.0	28.7	5.13	1.88	2.07	4,140
2013	4,395	75.9	26.9	5.00	1.82	2.01	4,020
2014	3,813	62.7	92.1	14.1	5.14	5.68	11,400
2015	3,230	50.1	196.1	24.1	8.78	9.68	19,400
2016	3,285	51.3	201.5	25.3	9.25	10.20	20,400
2017	3,324	52.1	234.6	29.9	10.92	12.03	24,100
2018	3,409	53.9	206.6	27.2	9.95	10.96	21,900
2019	3,401	53.7	186.2	24.5	8.93	9.85	19,700

Data and estimates for approach A, based on average annual flow, average annual specific conductance, and estimated average annual uranium concentration for each year (See D. Whittemore, KGS Open-File Report 2017-2, updated January 2019 and February 2020 HERE).

Water contamination depletes usability. The contaminants in the Arkansas River basin water coming into the district diminishes the utility of the water as contaminant levels increase that creates a water usability depletion of native groundwater problem that must be treated at significant cost to local water users. Local irrigators who rely on surface water from river flows must run water through plastic pipes beneath their pivot systems because the saline river water is highly corrosive and will collapse a galvanized steel pipe within a single growing season. Higher volumes of river water must be used for irrigation than would otherwise be the case if the water was less saline.

Federal Reclamation assistance. GMD3 requested assistance from the US Department of Interior, Bureau of Reclamation (Reclamation) and Kansas Water Office to evaluate public water source options along the river above Garden City for options to mitigate deteriorating water quality and declining aquifer levels and assure safe public drinking water supply. The 2014 study included the cities of Coolidge, Syracuse, Kendall, Lakin, Deerfield, and Holcomb to identify possible solutions, including construction of new facilities, infrastructure, and collaboration

efforts. Part of the immediate study need existed outside the GMD3 area in Hamilton County, and additional study in that area has not progressed.

2019 Kansas Legislative Resolutions. GMD3 attempted to partner with Reclamation and state officials in Kansas and Colorado for a basin Plan of Study to collaboratively address the poor-quality water received down the shared river basin. Public meetings were held in Kansas and Colorado, but participation was low. GMD3 worked with the legislature on SR1729 and HR6018 and their request to seek federal aid in addressing water quality issues in the Arkansas River Basin in Southeast Colorado and Southwest Kansas and for state and local partners in both states, including GMD3, to cooperate in addressing the prevalence of radionuclides in the waters of the Arkansas River Basin. In response, the KWO, KDHE and KDA worked with the KGS and GMD3 in a two-year Mineralization Study, with free drinking water testing provided to participating well owners. GMD3 continues to participate in a mineralization study collecting water samples and encouraging further study for interstate basin water usability improvements with federal, state and other partners.

Interstate Compact. The Kansas-Colorado Arkansas River Compact (Compact) was negotiated in 1948 between the States of Kansas and Colorado. Article I of the Compact provides its purposes:

> *Settle existing disputes and remove causes of future controversy between the states of Colorado and Kansas, and between citizens of one and citizens of the other state, concerning the waters of the Arkansas River and their control, conservation and utilization for irrigation and other beneficial purposes.*
>
> *Equitably divide and apportion between the states of Colorado and Kansas the waters of the Arkansas River and their utilization as well as the benefits arising from the construction, operation and maintenance by the United States of John Martin Reservoir Project for water conservation purposes.*

The Compact does not allocate specific quantities of water to each state, but rather provides for maximum release rates for each State from the conservation pool of John Martin Reservoir (JMR). A provision of the Compact requires releases from JMR storage be applied directly to beneficial use, without storage after release. The reservoir is located approximately 60 miles west of the Stateline and has an available capacity for irrigation water supply of approximately 338,000 ac-ft. JMR has an effective priority date in Colorado of 1948, though the Compact operations are not subject to Colorado Water Court Decree as the Compact is both state and federal law. Additionally, the Arkansas River Compact Administration (ARCA) operates the Compact to apportion water, investigate concerns and develop interstate agreements as resolutions. Resolutions include those concerning an operating plan for John Martin Reservoir (1980 Operating Plan) as amended which establishes separate accounts in JMR for users in Colorado and for Kansas, along with related operating provisions affecting basin water use as a temporary agreement. Additional operating accounts are regularly considered for system efficiency improvements that require careful study and decision by ARCA to protect the federal allocations to each state and to the District management area.

Western Water Conservation Projects Fund. The KS v. CO original action no. 105 cash damage award to Kansas, after reimbursing the state for cost to litigate, was split 1/3 to the State Water Plan Fund (SWPF) and 2/3 to the Water Conservation Projects Fund (WCPF) for use in the area affected by the compact violations. The statewide Water Plan portion was used primarily as state cash cost share funding to create the Kansas Conservation Reserve Enhancement Program (CREP) under state contract with USDA. However, several state legislative budget cycles resulted in removal of most of those damage funds from the Kansas CREP activity.

Local leadership for river projects. The 2008 Kansas Legislature provided for GMD3 to administer WCPF to assure those public funds would be preserved from legislative budget sweeps for the intended purposes and created an efficient model program to accomplish the purposes of the WCPF. This also allowed the investment interest on the principal fund to accrue to those purposes under the fiduciary care of GMD3 and to leverage the fund with other grant opportunities. The WCPF became the Western Water Conservation Projects (WWCP) Fund with project goals that are **goals of the management program** for the area to do the following:

1. *Maximize general public good (public interest).*
2. *Maximize efficiency of call water for ditch irrigation (low transit losses).*
3. *Maximize benefits of high river flows to improve recharge.*
4. *Mitigate water quality problems in surface and groundwater.*
5. *Reduce consumptive use of water to help stabilize the system.*
6. *Improve the stability of the hydrologic system for irrigators.*
7. *Address compact compliance.*

Projects funded in whole or in part by the WWCP Fund must be located in the area impacted by the Arkansas River Compact and meet eligibility requirements and goals in K.S.A. 82a-1803 and Senate Bill 534. Under a state legislative budget proviso and KWO Grant Agreement, the local Arkansas River Litigation Fund Committee became the advisory committee to the GMD3 board, who in turn manages the WWCP Fund, approves projects and expenditures, and makes requests to the KWO Director for project approval consistent with grant purposes and state law, in consultation with the Chief Engineer. An annual audit and report to the legislature are provided by GMD3. The 2020 GMD3 Legislative Report is available from GMD3 and online HERE.

Ark River Watershed Group. GMD3 participated in Upper Ark River Water Quality Tours in 2005 hosted by K-State research and Extension and supported the Watershed Restoration And Protection Strategy (WRAPS) activity that followed. GMD3 will continue to provide leadership in supporting the needs to further develop and protect the natural water infrastructure of the Ark River consistent with the GMD Act and the benefits of an Arkansas River Watershed group to support the Management Program. A multi-year federal Reclamation WaterSMART grant was awarded to GMD3 in 2021 to help fulfill this activity of the management program.

GMD3 Lower Ark GMA. The river reach below Garden City and adjacent areas of the IGUCA tributary groundwater recharge is considered the GMD3 lower Ark GMA. Groundwater development and loss of surface inflows to the GMD3 Lower Ark GMA made it necessary to apply targeted groundwater management activities immediately upon the formation of GMD3 to limit additional appropriations and address flow intercept and water distribution issues associated with locating and relocating of wells closer to the river channel. Over time, the GMD3 Lower

Ark GMA has lost base flow and seasonal flushing flows from upstream spring snow melt and runoff events. Rivers and their connected aquifers are natural MAR infrastructure for water supply conservation. The rare pulse or flood flow that may occur in the GMD3 Lower Ark GMA is to be measured for MAR or well augmentation benefits. The lack of regular river flow creates similar land ownership, MAR and flood control issues as in the GMD3 Upper Ark GMA. GMD3 will apply management activity to the natural infrastructure and available river flows to protect, distribute and replenish underground reservoir storage inflows and to evaluate other water sources that can add flow for ecological and MAR benefits while reducing flood risk for others.

Pre-compact water rights and MAR. There are vested rights (pre-1945) and pre-compact (1949) water rights in the portion of the Arkansas River IGUCA between Garden City and Dodge City that have a right to a cumulative rate of diversion of more than 200 cubic feet per second (CFS). Large extended river flow events have become rare across the GMD3 Lower Ark River GMA. In actions intended to meet pre-compact surface water use demand and reasonable needs during wet river conditions below the Garden City gage, state permitting has historically authorized up to an additional acre foot per acre for existing surface water ditch company acreage in the GMD3 Upper Ark GMA without an exceedance of the total authorized amount of all vested water rights of irrigation ditch companies under river flow conditions where 200 CFS average daily flow is measured at Garden City with continuous river flow measured to the Dodge City river gage. Existing vested rights and pre-compact water rights in the GMD3 lower Ark GMA are authorized over 200 cubic feet per second (CFS) of water supply. Records indicate the GMD3 Ark river system can inflow to groundwater storage 200,000 acre-feet per month in the district. GMD3 recommends continuing this practice to protect MAR benefits in the ditch service areas and across the GMD3 lower Ark GMA from upstream post compact development.

Ark River IGUCA review and revision. Several modifications to the first IGUCA order by the Chief Engineer have occurred after the GMD3 request, hearing process and IGUCA Task Force recommendations without public process or GMD3 consultation. GMD3 will advise and assist each proceeding, review or update of the Ark River IGUCA in support of the public interest of the GMD Act and official management program on behalf of constituents. The Arkansas River IGUCA order within GMD3 currently applies little corrective control not already superseded by GMD3 rules or practices. The remaining unique limitation in place under the IGUCA Order is that wells hydraulically connected to the river channel are restricted from relocating closer than a 10% reduction of their current distance. This limitation has been waived by the Chief Engineer in WCA agreements and needs public policy review. Under statewide rules adopted by the Chief Engineer, the Arkansas River IGUCA is required to have periodic formal review, now many years past the 7-year rule deadline.

River navigability for title and GMD3 management program activity. The natural infrastructure of the Ark River across the GMD3 area can be utilized for natural and managed benefits. The state may own the bed and banks up to the normal high-water line. This is the line that can normally be seen where high water has left debris, sand and gravel during its ordinary annual cycle. Effects of basin water development create the need for local metrics to define public property boundaries for water management purposes along the river corridor. Management program concerns include the lack of administrative boundaries and inadequate delegation by the Kansas legislature to consistently manage the state-owned land along the river.

For GMD3, these ownership and boundary issues start with the 1874 survey conducted shortly after the January 1861 time of statehood. Terminology on land deeds may include the phrase "plus or minus accretions" which adds to the confusion under the man-made river conditions. GMD3 activity will be conducted in harmony with management program strategies that utilize Ark River water infrastructure.

Activity 5 - Ark River Management Goals Summary

1. Evaluate adding Hamilton County Ark River lands to the district management area.
2. Seek federal and basin states assistance to augment Ark river basin supply shortages and mitigate usability depletion from contaminated river inflows.
3. Assure a distribution of MAR benefits continue from the water administration practice to supply pre-compact water rights in the GMD3 Lower Ark GMA and protect wet river conditions or reservoir spills supply from upstream post compact use depletions.
4. Propose river management boundaries for MAR operations.
5. Manage MAR/well augmentation to stabilize irrigation in both GMD3 Ark River GMAs.
6. Seek funding for river projects to extend the GMD3 WWCP Fund and advisory committee.
7. Develop member focused study and data to advise and assist the state and ARCA activities.
8. Enhance natural and ditch area infrastructure value.
9. Evaluate ongoing Colorado Stateline groundwater development and effects on flow.
10. Develop Proof-of-Concept projects that include MAR activity.
11. Recommend permitting for strip mining to mitigate harmful river fill and flood risks.
12. Assist in fulfilling 2019 session SR1729 and HR6018 for improving water quality.

ACTIVITY 6 – OUTREACH, ADVOCACY, AND EDUCATION

Southwest Kansas Runs on Water. GMD3 will implement strategies and actions for increasing awareness of District water resources and management activities to inform, advise and assist the public, members, state and federal officials, the Governor, Kansas Legislature and Congress in a meaningful understanding of, and support for, the official groundwater management program for the area. Authority to conduct this Outreach, Advocacy and Education activity is included in the District Powers section on page 5. Working with diverse local, state, and federal interests, institutions and authorities requires significant coordination and outreach activity to secure the necessary productive partnerships implementing the Management Program. These activities will inform, shape, and influence public policy and legislation in support of the local management methods and funding needs to align with the GMD3 mission. GMD3 will actively engage youth, water managers, young professionals, and other partners through original initiatives and cooperative activities to reach and engaging all generations of water users.

KWO/KWA partners. GMD3 routinely works to exchange information and partner with the Kansas Water Office (KWO)/Kansas Water Authority (KWA) in water programs, projects planning needs to carry out the mission of GMD3. The primary function of the KWO under the Kansas Water Planning (KWP) Act is the development and coordinated implementation of the State Water Plan, which is formulated on a continuing basis for the management, conservation, and development of the water resources of the State (K.S.A. 82a-903) and generally updated every five years. The KWA was established in 1981 within and as part of the Kansas Water

Office to ensure their advice to the Governor and Legislature for water policies and programs address the needs of all Kansans, which include the constituents of GMD3. The KWA meets regularly and consists of 13 private citizens and 11 ex officio state water agency advisors for a total of 24 members. One citizen is a board member from one of the three western GMDs.

Kansas Water Plan Fund and Budget advice and assistance. The state Water Plan Fund was created in 1989 (K.S.A. 82a-951) to provide a source for funding the priority needs identified in the continuously updated Kansas Water Plan. Funding includes revenues from statewide fees and SGF/EDIF demand transfers. Access the current Kansas Water Plan Fund activities and budget details online at https://www.kwo.ks.gov/. The Legislature makes appropriations from the State Water Plan Fund. GMD3 participates in the public process in support of the KWO and KWA Water Plan Fund budget activities and the activities of the legislature to fulfill state policy for groundwater management and state Water Planning. Planning is considered vital for anticipating and dealing with variable water availability in the semiarid areas of Kansas, and as groundwater extraction and resource stress intensify. GMD3 will coordinate activities of the official Management Program to benefit constituents in the Upper Arkansas and Cimarron Regional Planning Areas and across Kansas.

Activity 6 – Outreach, Advocacy, and Education Goals Summary

1. Develop On-site project signage, resource education stations, & public water awareness.
2. Promote water saving measures and practices that maintain the economic benefits of water use, such as alternate crops, use of technology, and irrigation scheduling tools.
3. Provide a platform for those who are using less water than their peers to share their methods.
4. Use Proof-of-Concept demonstration projects to reduce the gap to stable groundwater levels.
5. Coordinate with partners to update the long-term goals and objectives of the legislature to better reflect elements of the management program for southwest Kansas.
6. Continue to support state Water Plan funding from a 1/10 cent sales tax dedicated source.
7. Seek state support for activities each year at a level commensurate with what is paid into the Water Plan Fund from the GMD3 area. (e.g. See July 22, 2019 letter to KWO/KWA HERE)
8. Encourage a state Water Plan budgeting process that is coordinated with the official management program and looking ahead 25 years (January 22, 2018 letter to KWO/KWA).
9. Work with RAC members and advisors across the state to enhance understanding of any differing perspectives of common long-term water supply interests and concerns.
10. Work with legislative partners to achieve a consistent and informed perspective on GMD Act implementation, needed water planning, project authorizations and funding.
11. Develop SW Kansas water conservation plan guidelines and conserve-to-preserve accounting tools to aid in communicating the Management Program activities.
12. Study improved access to floodwater for Flood-MAR storage to mitigate supply risk in GMD3 and the west and advise implementation of Public Law 90-537 to include GMD3 needs.
13. Provide annual reports to ARCA and the Kansas – Oklahoma Arkansas River Commission.
14. Report annually to state legislative budget and water committees.
15. Assure member interests are represented in state and federal water research coordination.
16. Advocate for the appointment of qualified members to state water leadership positions on related boards, authorities and compact administrations and support them in their role.
17. Participate in regional and national water organizations to build partnerships and represent the interests of the Board constituency.