

# I. Executive Summary

## History of Water Feasibility Committee

In 2019, Swisher City Council Member, Jerry Hightshoe proposed forming a Water Feasibility Committee. At the September 9, 2019 council meeting, Councilor Mary Gudenkauf requested guidelines for structuring this committee that she and Councilor James Rowe would serve on. HR Green was retained to evaluate alternatives for water supply, treatment, storage, and distribution.

After discussion, it was recommended to have a core committee of 7 people consisting of: 2 council, 2 business owners, 2 city residents and 1 fire department representative with the city engineer and public works superintendent as advisory members as needed. The City of Swisher asked for letters indicating interest and the following members agreed to serve:

- Curt Cline, Resident
- Mary Gudenkauf, Resident and Swisher City Council Member
- Glein Heims, Resident and Jefferson Monroe Fire Department Chief
- Kris Heims, Resident
- Norm Neal, Resident
- James Rowe, Resident and Swisher City Council Member

The first meeting was held January 29, 2020. The water system study completed by HR Green was presented to the committee on February 7, 2022.

## Summary

The City of Swisher currently has no city-wide community water system. Instead, residents rely on a variety of individual and neighborhood wells for their water. The City has expressed a desire to investigate the feasibility, costs, and potential alternatives to establish a public water system. HR Green was retained to evaluate alternatives for water supply, treatment, storage, and distribution.

For the purpose of this evaluation, water demands were based on an estimated population of 1,175 residents in the year 2045. The average and maximum daily demand were calculated based on typical water use per person. The design average day demand is estimated at 117,500 gallons per day (gpd) and the maximum day demand is estimated at 235,000 gpd. A minimum target capacity of 200 gallons per minute (gpm) is recommended for water supply and treatment rates.

Several potential water supply options were considered as part of this Study including the following:

- A. Alternative 1 – Interconnection with the City of Cedar Rapids
- B. Alternative 2 – Interconnection with the City of North Liberty
- C. Alternative 3 – Interconnection with the Poweshiek Water Association
- D. Alternative 4 – Construction of City-Owned Water Supply Wells and Treatment

HR Green contacted Cedar Rapids, North Liberty and Poweshiek Water Association to discuss opportunities to connect to their respective water supplies to provide water to the City of Swisher. All three water utilities indicated capacity issues and other factors would not allow for Swisher to connect to their water supplies at this time. The only practical alternative for a water supply was determined to be a city-owned water supply which involves developing its own supply wells and construct a treatment system to produce its own potable water. Several water sources were evaluated including surface water from the Iowa River, alluvial wells, Jordan wells, and Silurian-Devonian wells. Based on water availability, water quality, and well development costs, two Silurian wells are recommended for the City to provide the necessary capacity for the water system.

An examination of similar wells in the area showed that the water in the Silurian aquifer would require treatment prior to distribution to meet Primary and Secondary Drinking Water Standards. Contaminants in the water that are near or above the drinking water standards include hardness,

total dissolved solids, iron, arsenic, manganese and ammonia. Minimum treatment required for health and safety will be driven by the water quality results of the actual wells. However, the water quality projections from nearby wells indicate that raw water levels of arsenic have the potential to exceed the primary maximum contaminant level and would need to be reduced prior to consumption. In addition, ammonia has the potential to convert to nitrite and cause compliance issues with water quality in the distribution. Due to these contaminants, it is recommended that the City of Swisher construct a Water Treatment Plant (WTP) to treat water from Silurian wells.

In 2021, the City received a revised permit for the City's Wastewater Treatment Plant (WWTP). This revised permit included a chloride compliance schedule for continued monitoring and plan to address chlorides in the WWTP effluent. Chloride data collected at the plant from 2016-2020 showed effluent chloride concentrations would have exceeded the average chloride limit in the new permit 10% of the time. While chlorides do exist naturally in well water, the primary source of the chlorides in the wastewater is believed to be salt based home water softeners. There are few options to remove chlorides as part of a wastewater treatment plant and the best method to control chloride contribution to the wastewater stream is to reduce or eliminate the chloride contribution from home softening systems.

Due to the need for water softening to reduce or eliminate the need for home water softeners, a new treatment plant that provides water softening is recommended. The following alternatives for water treatment were evaluated:

- A. Alternative 1 – Pressure Filtration for Iron-Manganese Removal
- B. Alternative 2 – Softening with Lime and Recarbonation
- C. Alternative 3 – Softening with Ion Exchange
- D. Alternative 4 – Softening with Reverse Osmosis (RO)

A reverse osmosis treatment system is recommended for the City. An RO system would effectively remove constituents in the water with nearly complete removal hardness, radium, arsenic, dissolved iron, dissolved manganese and nearly 90% of fluoride, ammonia, nitrates. RO treatment would not contribute additional chlorides to the wastewater stream and reduce or eliminate the need for home water softeners.

To site a new water treatment plant and two new Silurian wells, approximately 8 acres of land is required. This would allow the required spacing and legal control for the wells provide sufficient space for a new water treatment plant. Due to space availability within the Swisher corporate limits, the well and treatment plant would have to be located on the outskirts of town. From a hydraulic capacity standpoint, the distribution system's capacity is not a primary concern in locating the new facilities. A hydrogeological investigation and fracture trace analysis would provide additional information as to the anticipated capacities and preferred sites for the proposed Silurian wells. Additional consideration should be given to the anticipated property acquisition process as well as site access and topography.

After water is supplied and treated, it needs to be stored and distributed to the residents. Water storage volume for the city includes the residential and commercial demand as well as fire flow demand. A 150,000-gallon elevated storage tank (EST) is recommended as it provides sufficient capacity to meet the projected design condition with additional storage to accommodate future growth. The proposed height of the EST appears to comply with the height limitations defined by the Eastern Iowa Airport Control Zones, although further analysis is recommended through the FAA as part of the final siting and design of the EST. The EST will provide water pressure throughout town ranging from 50 to 100 psi.

A new distribution system is required in order to convey potable water to customers within the corporate limits of the City of Swisher. The water distribution system layout considered providing water service to all areas within the City of Swisher's corporate limits. Dead-end mains were looped where possible while maintaining the distribution system network entirely within the City's right of way (i.e., not in a permanent easement on private property). The water mains are located on the opposite side of the street as the existing sanitary sewer main in order to meet the required separation distance. The water main is sized to accommodate the anticipated annual average and peak day demands. A majority of the proposed distribution system consist of 6-inch main with a targeted network of 8-inch main. The 8-inch water main acts a backbone for the system and allows for a greater capacity between the Water Treatment Plant and

the elevated storage tank. The proposed 8-inch water main provides a loop around the piping network to allow for future growth and development, as needed.

If the City decides to proceed with developing a new public water system, the following improvements are anticipated:

- Acquisition of land for future well field and water treatment facility. It is recommended that a more thorough site evaluation study be conducted to better identify preferred well locations to maximize the yield.
- Design, construction, and development of two Silurian/Devonian wells, each rated for the full design flow to provide the needed redundancy.
- Design and construction of a new RO Water Treatment Plant Site piping and equipment to include submersible wells pumps and a raw water pipeline to each of the wells.
- Design and construction of buried water distribution network, including approximately nine miles of water main and associated fittings, hydrants, valves, and service lines.
- Acquisition of land for Elevated Storage Tank.
- Design and construction of a new 150,000-gallon Elevated Storage Tank.

The Engineer's Opinion of Probable Cost (OPC) for the entire project including engineering, construction, administrative and contingency is \$26,200,000. To finance this upgrade for Swisher, the City will need to identify and obtain grant opportunities, federal infrastructure funding options, secure low interest loan through the Iowa State Revolving Loan Fund (SRF), establish a public water utility and set water usage rates.