RESIDENT ADVOCATE
WATER PLAN
Plan Adopted by City Council - December 2008

1. Background

A municipal water system can be divided into three main categories: supply and treatment facilities, storage facilities, and the distribution system.

- The **Supply and Treatment Facilities** include all equipment necessary to pump, treat, and distribute the amount of water demanded by the system. The City of Carver gets all its water from groundwater supply sources. The supply facilities include the wells, pumps, pump houses, raw water transmission mains, and water treatment facilities.
- The **Storage Facilities** are the reservoirs used throughout the system to store water for use during emergency (fires) and peak conditions (hot summer days). Water from storage is fed into the system by gravity or by pumping from a booster station. Two types of reservoirs feed water directly into the system. These include an underground reservoir (clear well) at the Water Treatment Plant and two elevated reservoirs on Mount Hope Road and by Mills Fleet Farm. These elevated reservoirs are often referred to as a "water tower".
- The **Distribution System** consists of the trunk water mains (primarily 10 inches or larger in diameter), the lateral water mains (4 inches to 8 inches in diameter), the service pipes, valves, and hydrants necessary to move water from the supply sources and storage facilities to the points of demand.

Specific objectives of the Water Plan include:

- Determine future water demands
- Revise and analyze the existing and proposed water main system
- Determine interim supply, treatment, and storage needs
- Optimize supply, treatment, storage, and distribution combination
- Develop preliminary cost estimates
- Provide capacities and locations of proposed water storage facilities

2. Growth & Water Demand

Carver experienced rapid growth with a 1994 population of 572 to a 2005 population of about 2,339. Water needs continue to increase as the City grows. The Water Plan was based on the City's Future Land Use Map.

Water use has increased steadily as population has grown. Water demand is affected by many factors including population, commercial growth, industrial growth, water quality, water rates, climate, soil conditions, economy, sewer availability, water pressures, and the condition of the water system. The projected high daily water use in 2030 is estimated to be 7.45 million gallons per day.

3. Existing Facilities

The City obtains its water from 4 wells. Carver wells draw water from the Franconia Ironton Galesville (FIG) and the Mt. Simon-Hinckley (Mt. Simon) aquifers.

The existing water treatment plant removes iron, manganese, and radium from the well water before it is pumped to the distribution system. Fluoride and chlorine are also added to the water to prevent tooth decay and provide disinfection. After treatment, the water is stored in an underground tank. Pumps supply water from the clearwell to the distribution system as needed, based on signals from the water tower. Removal of hardness from the water is accomplished by in-home softeners.

Two water towers serve the City. The smaller water tower on Mount Hope Road was constructed in 1986 and repainted in 2011. The larger water tower north of Mills Fleet Farm was constructed in 2009.

The existing distribution system consists of water mains that vary in size from 6 to 16 inches in diameter. The existing system operates under three separate pressure zones to provide adequate water pressure to all customers.

4. Existing Water System Evaluation

The existing water supply and distribution system for the City of Carver adequately meets the various water demands currently placed on it. However, the City does have areas of both low and high pressure. Construction of the booster pumps in 2006 and the water tower in 2009 improved water pressure in areas of higher elevation and added much needed storage capacity. In home pressure reducing valves have been added to many homes in Carver Bluffs to reduce the pressure to 80 psi.

As growth occurs in each of the water service areas, the water system needs to be expanded to handle that growth. The Water Plan details the water system improvements required to meet the growth of the City, including the expected phasing of improvements.

5. Proposed Water System Facilities

The ultimate water system proposed to meet future build out as detailed in the Water Plan consists of the following improvements:

- 15 new groundwater wells
- Construction of two new water treatment plants
- 2.25 million gallons of storage in water towers
- 23 miles of new trunk water distribution mains

The existing wells and water treatment plant do not have sufficient capacity to serve all of the proposed additional development. Therefore, additional supply, treatment, and storage are required to serve the northwest and southwest service areas. The most energy-efficient way to serve these areas is to provide wells, treatment, and storage in both the northwest area and the southwest area.

Future groundwater wells will be located in both the Northwest and Southwest Well Fields. Approximately 19 wells will be required to meet total production capacity. This includes three standby wells and assumes an average capacity of 500 gallons per minute (GPM) for all future wells.

5. Proposed Water System Facilities (cont'd)

The ultimate water system has been designed with three supply sources: the Northwest Well Field, the Southwest Well Field, and the existing Water Treatment Facilities. Conceptual locations were selected to be centrally located within the northwest and southwest well fields. Actual locations need to be confirmed as the well fields are developed and the area develops. The existing water treatment facility is sufficient to supply water to the Intermediate and Low Services areas.

A total of 3.1 million gallons of storage is planned for the ultimate water system. The most important considerations in the selection of the type of storage facilities are safety, reliability, and ease of operation. It is recommended that all future storage be elevated water towers.

A strong network of trunk water mains extends in every direction from each well field. Major mains connect the water towers and the well field is looped throughout the system in order to provide reliable service. Because the City's topography varies considerably, four pressure zones are proposed.

6. Water System Phasing

Carver's projected ultimate population is estimated to be 29,478. Based on the projected population growth and water demands detailed previously, additions to the supply and storage facilities are estimated and reviewed annually by the City. These additions will keep pace with the increasing needs of the service area and at the same time maintain a desirable balance between storage and supply for economy and reliability. If growth rates deviate from the rates discussed in reports or if a major water consumer is added to the system, the phasing schedule should be revised in accordance with the latest available data.

7. Economic Analysis

The improvement program for Carver's ultimate trunk water supply, treatment, and distribution system is estimated at $55,810,895. Currently, the City recovers the cost of trunk water system improvements through lateral benefit and connection charges. Connection charges are collected for each unit connected to the water system.