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Existing Water System

The Village of Volo water system currently operates as two independent, unconnected water systems. The North system was constructed to serve the Home Depot retail store, the Terra Springs Subdivision and the Remington Pointe and Remington Pointe North Subdivisions. The South system was constructed to initially serve the Lancaster Falls Subdivision, the Autumn Grove Subdivision, Symphony Meadows Subdivision, residential development north and south of Route 120, the Volo Commerce Center, the new Village Hall, a large data processing center and approximately 90 acres of commercial development between Route 12 and Gilmer Road. Additional service has been provided to the Historic area along Volo Village Road, between IL Route 120 and McNally Lane.

North System

Wells, treatment, storage and water mains for the North system were constructed as follows:

Well No. 1 – 450 gpm (constructed 2001)

Well No. 2 – 250 gpm (constructed 2001)

Well No. 3 – 700 gpm (constructed 2006)

Ion-Exchange Softening Facility – 700 gpm (constructed 2001)

Elevated Storage Tank – 500,000 gallons (constructed 2001)

12” and 16” Diameter Water Mains (constructed 2001)

All of the above facilities are now fully built out.

In addition, there is an emergency connection to the Village of Fox Lake water system to provide either community with water in the event of emergency.

South System

Wells, treatment, storage and water mains for the South system were constructed as follows:

Well No. 4 – 700 gpm

Well No. 5 – 700 gpm

Ion-Exchange Softening Facility – 700 gpm and expandable to 1,400 gpm

Elevated Storage Tank – 1,000,000

12” and 16” Diameter Water Mains

All of the above facilities have been in operation since 2007. Expansion of these facilities is planned with additional development within the central and south areas of the Village.

2030 Water Use and Projections

Population and water usage projections have been estimated to Year 2030. This represents a 20-year planning period. Population projections are in-line with the current Chicago Metropolitan Agency for Planning (CMAP) population projections. The

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projections are derived from the CMAP planning report, as well as input from the Village Planner, Rolf Campbell and Associates. CMAP has estimated a 2030 population for the Village of 13,686 with an employment base of 2,861.

Historical water demands for 2005-2009 were determined based on data from Village billing records. The Village used an average of 175,000 gallons per day over the 12-month period for 2008 and 167,000 gallons per day for 2009. This slight reduction in water usage was due to the reduced water usage by the data processing center, a heavy industrial water user. A summary of the historical usage and population is shown in Table No. 1:

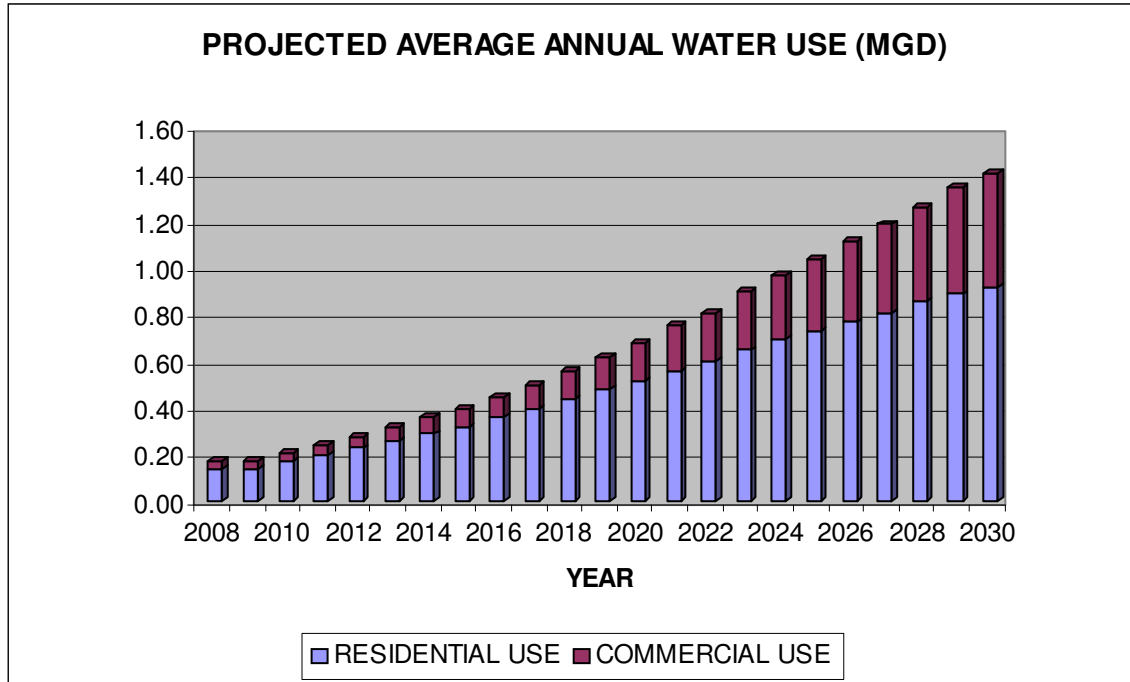
Table No. 1 – Historical Water Usage

Year	Residential Water Use (gpd)	Commercial Water Use (gpd)	Population
2005	53,000	4,000	530
2006	51,000	3,000	1,104
2007	168,000	6,000	1,616
2008	142,000	33,000	1,890
2009	143,000	24,000	2,090

Based on historical water usage the Village currently utilizes between 50-104 gallons per person each day.

It is projected that water use will reach 1,410,000 gallons per day (or 1.41 MGD) in Year 2030. This figure is comprised of 0.92 MGD for residential and 0.49 MGD for commercial development components. Figure No. 1 shows the projected water demands on an annual basis through Year 2030.

Figure No. 1 – Projected 2030 Water Usage



Prior to 2007, Volo was experiencing rapid expansion, along with the 6-county Chicago metropolitan area as a whole. Population and water use projections were based on the strong growth experienced at the time. However, after 2007 an economic slowdown in the housing industry occurred. As a result, a more conservative, slower growth profile has been adopted. Projected future water demands, as examined by the Village of Volo consulting engineer, were reduced in all areas of the Village based on the revised population projections.

In an effort to meet future water demand and maintain quality water for consumption, the Village of Volo continues to examine available options for water source and treatment. To date this includes expanding the existing system, continued use of groundwater, utilizing additional treatment means and the possibility of connecting to Lake Michigan Water through an allocation provided by the Illinois Department of Natural Resources.

Existing System

As previously stated, the Village currently operates, maintains and treats water from five (5) deep wells, three on the North side of the Village and two on the South side. Both facilities utilize ion exchange units to treat raw water. The North Water Treatment Facility treats approximately 50 percent of the raw water pumped to it in order to meet EPA drinking water requirements. Whereas, the South Treatment Facility has a higher concentration of barium and radium in the raw water and must treat approximately 85 percent of the water pumped to it.

Per Illinois EPA standards, the Village's supply capacity must meet the maximum day pumping requirement with the largest well out of service. Based on the projected maximum day use, the Village would need 710 gpm of capacity in Year 2020 and 1,509 gpm of capacity in Year 2030.

The treatment and pumping capacities (i.e. supply) must be able to supply sufficient water to meet the maximum day demand. Instantaneous peaks in demand will be supplied by the elevated storage facilities. Currently, the Village's firm treatment capacity is as follows:

South Treatment Facility:	700-gpm (expandable to 1,400-gpm)
<u>North Treatment Facility:</u>	<u>700-gpm (at max capacity)</u>
Total:	1,400-gpm

The Village will have sufficient treatment and supply to meet the water system demand until Year 2028. Therefore, there is no recommendation for future expansion of the Village's present water supply and treatment facilities until that time.

Volo Village Road Historic Area

During the summer of 2010, the Village of Volo, in cooperation with Lakes Region Sanitary District (LRSD) approved funding for a Special Service Area along Volo Village Road. As a result, water distribution and sanitary sewer lines were installed from IL Route 120 west, along Volo Village Road, under US Route 12 and south on McNally Lane in the first phase of a project that will eventually bring water and sewer to the entire historic area, including the Volo Auto Museum.

Groundwater

Groundwater is water that saturates tiny underground voids (interstitial spaces) between sand, gravel, silt or clay particles, or crevices in underground rocks. Underground formations that are sufficiently permeable to readily yield economically useful quantities of groundwater to wells, springs or streams are called aquifers. Aquifers may consist of “consolidated” bedrock, such as limestone or sandstone, or “unconsolidated” deposits made up of sand and gravel. The size and interconnections of interstitial spaces control how well water flows in these subsurface formations.

Residences, farms and municipal water utilities tap the sand and gravel aquifers because the water is relatively close to the surface (typically within 300 feet) making it fairly easy and inexpensive to drill wells and pump water. However, the amounts of water these aquifers can yield vary a great deal from location to location. Some aquifers may barely supply one well on a small farm, while others may supply entire communities.

Below the unconsolidated deposits are various sedimentary bedrock formations comprised of limestone or sandstones that can function as aquifers. Factories, businesses, homes farms and municipal water utilities tap these aquifers.

Groundwater originates from rainfall and surface water that percolates through the soils until it reaches the saturated zone in the subsurface: a process known as recharge. In some areas, streams, wetlands or lakes recharge aquifers through the soils. The areas that contribute water to aquifers are called recharge zones. In other cases, water flows from the aquifers to the surface in the form of springs or seeps into streams, lakes or wetlands. These are called discharge zones. The water surface in the stream, lake or wetland may or may not be a reflection of the aquifer water table depending on the local hydro geological conditions.

Approximately 25 percent of the precipitation infiltrates into the subsurface where it is available to recharge groundwater. Approximately half the water that makes it to the subsurface is then available for use from aquifers. If total discharge (natural plus water withdrawn for human activities) exceeds the recharge rate, water levels within the aquifer will drop. This decline will continue until a new balance is reached, or until the groundwater in an aquifer is depleted to the point where further withdrawals are no longer feasible.

Volo’s residents and businesses historically have been served by private wells, the most productive of which were finished in the shallow bedrock aquifer. The sand and gravel deposits in and around Volo are not highly productive due to the presence of thick clay deposits, which inhibit water movement in the subsurface. Therefore, as previously discussed, the Village constructed a public water supply utilizing the more productive deep sandstone aquifer.

Based on Volo's allocation for Lake Michigan water from the Illinois Department of Natural Resources, the Village overall average daily demand is projected to increase more than 500 percent by 2030. When combined with the regional demand from the other municipalities in the Lake Michigan Water Planning Group, this has the potential to cause significant additional strain on both shallow and deep aquifer resources.

With continued use of groundwater several concerns need to be considered. First, the shallow sand and gravel aquifers appear to be absent in the Volo area. Second, the shallow bedrock aquifer in this area is not sufficiently productive to support municipal wells and is vulnerable to contamination from the deposits above it. Also, the water levels in the deep sandstone aquifers are dropping. Population growth to the west and north will accelerate the rates of decline and continued pumping of the deep aquifer at ever higher rates is not sustainable over the long-term. Lastly, the radium and barium found in the deep well water will cause operational and compliance issues with both water treatment and waste disposal. This concern is discussed in more detail below.

A conclusion can be made that the future groundwater supply available to Volo is not sustainable over the long-term.

Additional Treatment Means

Due to the higher concentration of barium and radium in the raw water drawn out of the wells on the South system, it is possible that continued operation of the wells on this system may require additional treatment to remove the concentrations, especially if the Illinois Environmental Protection Agency makes adjustments to the maximum contaminant levels. To address this possibility, the Village secured the services of Water Remediation Technology, LLC, (WRT) based in Wheat Ridge, Colorado. WRT provides water contaminant removal systems using its mined and formulated proprietary media in patent pending processes for the removal of contaminant such as barium and radium.

During the summer of 2007 WRT conducted a pilot study to determine the requirements and feasibility of providing a treatment solution to the South water plant that would successfully treat and remove the radium and barium contaminants from the raw water allowing for continued, long-term distribution to the Village as well as reducing the volume of backwash water. The radium and barium contaminants would be collected on-site and hauled periodically to an *approved disposal facility*. Completion of the pilot study in 2008 concluded that such a treatment option would be available. Upon review of cost estimates to the South treatment facility, it was determined that while initial system upgrades were feasible, the long-term operating costs for continued distribution were approaching levels that would lead to significantly higher cost for residential consumers than originally anticipated. In addition to the base water rate an additional charge of \$1.66 per 1,000 gallons of treated water would be applied to each customer bill.

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Rather than move forward with an upgrade to the water system that involved WRT treatment, the Village determined that it would be in the best interest to identify an alternative for long-term water supply, Lake Michigan water.

Lake Michigan Water

Currently, the North West Lake County Lake Michigan Water Planning Group is considering extending Lake Michigan water to the communities of Volo, Antioch, Fox Lake, Lake Villa, Lindenhurst, Wauconda as well as the Lake County water systems of Grandwood Park and Fox Lake Hills. Water will be distributed to the Village along U.S. Route 12 via a proposed 20" transmission main (see Exhibit #1). The Village would be provided a single connection to the transmission main.

Unlike water from the deep aquifer, Lake Michigan water requires minimal treatment, as the Village will receive pre-treated water from an as yet to be determined source. Simple chemical feeds consisting of chlorine and possibly fluoride will need to be provided at the point of connection.

The Village received an allocation from the Illinois Department of Natural Resources (IDNR) starting in Year 2015 of 0.40 MGD and gradually increasing up to 1.41 MGD in Year 2030 (see Exhibit #2). The pumping capacity at the connection to the Lake Michigan supply system should be equal to approximately 900 gpm in its initial construction to meet the maximum day requirements to Year 2020. It should be noted that the maximum day demand for the Lake Michigan water supply scenario is based on 1.75 times the average day demand as established in the design guidelines provided by Applied Technologies, Inc., the consulting engineer for the Water Planning Group. It is recommended that this facility be readily expandable to 1,800 gpm to meet the demand in Year 2030. Based on the projections, this would be sufficient to meet the Village's maximum day requirements of 1,720 gpm for year 2030. Again, this is based on 1.75 times the average day demand. To accommodate Lake Michigan water the Village will need to add a pumping station and ground storage facility at the connection point.

The existing storage facilities will be utilized as part of the Lake Michigan water supply system, and if permitted, the Village should maintain its deep wells for emergency use. The existing treatment facilities (i.e. ion exchange units) would not be needed after the transition from ground water to Lake Michigan water.

Central Lake County Joint Action Water Agency (CLCJAWA)

In conjunction with the work that is being undertaken by the North and West Lake County Lake Michigan Water Planning Group, the Village is in contact with CLCJAWA about the possibility of acquiring water from a limited excess supply of 7.03 million gallons per day available to sell. Preliminary discussions with CLCJAWA have revealed that the available water from the agency cannot supply the entire Water Planning Group. A smaller group of communities within the Water Planning Group could receive

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the available supply. Or, the supply could be used to supplement the entire Planning Group in combination with a separate source.

CLCJAWA has designated two groups for service. One group is Volo and Wauconda. The second group is Lindenhurst, Lake Village and Lake County. These groups and CLCJAWA have jointly authorized Camp, Dresser and McKee (CDM) to evaluate supplying water to one of these two groups with the result of the study being presented to CLCJAWA and participating communities in December 2011 or January 2012. A kick off meeting was held with these communities, CLCJAWA and CDM on October 17, 2011.

The Village of Volo is exploring several alternatives for water supply as well as multiple financing options including grants and long term, low interest loans. As more information becomes available regarding water supply options, the Village will hold public meetings to advise and educate residents.