OCTOBER 29, 2015

WELL #5 PROPOSED LOCATIONS

VILLAGE OF WESTERN SPRINGS
740 HILLGROVE AVENUE

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INTRODUCTION

The Village of Western Springs for nearly a century has treated its own water. The Village has operated a water treatment plant since 1932 and operated various wells in the community since 1892. The Village remains as one of the few communities in Cook County that still continues to operate its own well and treatment system. The Village's current water infrastructure is however currently showing signs of its age. In 2013 the Village completed a major renovation of its water treatment plant with an $8-million-dollar investment in low pressure reverse osmosis. As the Village's infrastructure ages additional capital investments will need to be made to pumping, distribution and storage system.

In the spring of 2015 the Village Board asked Village staff to provide a list of potential sites that could be considered for a new well location. A group of staff members, former trustees and former infrastructure commissioners set forth to identify feasible locations within the community. The locations identified in this report are those locations that the group felt were logistically feasible for the construction of a well and for the installation of a new water main back to the water treatment plant. None of the locations listed should be construed as a request or an expectation for the construction of a new well.

REPORT CONTRIBUTORS

The following individuals were involved in the research and recommendations provided within this report.

Matthew Supert, Director of Municipal Services

Matt Supert has worked in the Municipal Service's Department for the Village of Western Springs since 2007. In 2011 he became the interim Director of Municipal Services oversaw the construction of the of the new treatment plant during the fall of that year.

The Municipal Services Department currently oversees all major capital projects within the Village and is responsible for all major infrastructure including; water, sewer; roadway; right of way, forestry, properties and the Village's Geographic Information System.

Ken Hayes, Water Plant Superintendent former member of the Water Study Group

Ken Hayes is the Village's Water Plant Superintendent. Ken has worked in the water industry for more than thirty years and has A Class Water Operator's License. Ken has detailed knowledge of the Village's water production system and oversaw the Village lime softening treatment plant and currently oversees the Village's LPRO treatment plant.

John Madell, Former Trustee and former member of the Water Study Group

John Madell was a former member of the Village's infrastructure Commission before becoming a member of the Village Board. John was a member of the Water Study Group which produced the Water Study Report in 2008.

Richard Fisher, Former Chair of the Village of Western Springs Infrastructure Commission

Rich Fisher was the Chair of the Infrastructure Commission from 2009 to 2015 and was a resident of the community until the summer of 2015. Rich is a civil engineer with the Metropolitan Water Reclamation District of Greater Chicago with more than twenty-five years' experience as a civil engineer. His current work at the MWRDGC focuses on stormwater management issues in Cook County.

THE VILLAGE'S CURRENT PRODUCTION SYSTEM

The Village's water system consists of three wells, a water treatment plant, three reservoirs and a distribution system. The water is pumped from the wells to the treatment plant located at 614 Hillgrove Avenue. After the treatment process the water flows to the adjacent near-grade reservoir and from there it is pumped into the distribution system. Two elevated reservoirs (a one-million-gallon elevated tank in Spring Rock Park and a two-million-gallon standpipe in the Garden Market) are connected to the distribution system and provide a fairly uniform pressure throughout the distribution system. The Village's water mains are not uni-directional and flow in the pipes changes depending upon various conditions from the two water tanks and usage within the system. The Village has over 52 miles of water main, of which approximately 77% is over forty years in age.

The Village completed a major renovation of the water treatment plant in 2013 which transitioned the Village from a lime softening treatment process to a low pressure reverse osmosis process (LPRO). Annually the treatment plant outputs nearly 600 million gallons of water to the residents of Western Springs. Average daily consumption levels range from approximately 1.6 – 2.8 millions of gallons per day (MGD).

The Village currently operates on a three well system that feeds the water treatment plant with wells #1, #3 and #4.

Well #1 is a shallow well, drilled to a depth of 385 feet below land surface within the St. Peter Formation. Well #1 was drilled in 1924 and currently has a capacity just under 850 gallons per minute (GPM) or a maximum of 1.2 MGD. This well has a high total hardness and iron, but meets all federal primary drink water standards. Due to the high amount of hardness and iron from the well, the water is typically not put through the water plant for treatment since the water would be a high amount of stress on the treatment equipment within the plant. This well is used only during emergencies and serves as a backup well while one of the other wells is currently offline. When this well is operated to distribution residents will often notice a change in the water quality during that time.

Well #2 was a shallow well similar to well #1 which was located at the water treatment plant. It was capped during the mid-twentieth century and is no longer in use. Due to IEPA requirements the well

shaft was filled and sealed to prevent any contaminants from entering the aquifer system and the well is therefore not a viable location to build a new well.

Well #3 is the primary source of water for the Village. Drilled in 1955 in the Ironton-Galesville formation to the depth of approximately 1,600 feet, well #3 is a deep well and the production capacity is approximately 1,200 GPM or a maximum of 1.7 MGD. Water from this well exceeds the primary drinking water standard for radium; therefore, the water must be treated prior to distribution. All other measurements for water quality however indicate that the well has acceptable water quality.

Well #4 was drilled in 1966 in the Mt. Simon formation and is approximately 1,900 feet below land surface. This well has a production capacity of approximately 1,100 GPM or a maximum of 1.5 MGD. Radium levels in well #4 meet the primary drink water standard; therefore, the water from well #4 may be used with disinfection only, if needed. Total hardness on this well is lower than well #3 and with different mineralization well #4 water will have a noticeable taste change if not treated.

In order to meet system demand the Village is required to run two wells at any one time. All three wells in the Village's system are gaining in age and well #1 presents significant problems with its water quality that do not allow it to be effectively put through the water treatment plant. In order to provide the most security and highest quality of water to the residents of the Village a third deep well would allow for the Village to always have two wells available to the water treatment plant should a well be offline for maintenance or other causes.

CONSIDERATIONS FOR WELL #5

The Village of Western Springs is a mature community located in Cook County. The community is "built out" and available open space land that could be used for the development of a new well is limited. The group set out by identifying locations within the Village that currently have potential areas that could physically and logistically house a well house. Numerous factors have been taken into consideration when reviewing each location. Those factors include, but are not limited to the following.

PROXIMITY TO EXISTING WELLS

The proximity of any new well to the Village's existing wells is one of the most important baseline factors when reviewing potential sites. Under ideal conditions a well sharing the same depth or aquifer as an adjoining well should be approximately one mile from a neighboring well. The Village is only approximately 2.8 total square miles and due to its shape it is nearly impossible to achieve the desired distance. In order to mitigate this issue, the depth of the well becomes more important as its proximity to the existing wells is taken into account. Exhibit 1 was developed to illustrate the locations of the existing wells with .25 mile buffer rings. Potential sites were then considered based upon the proximity to an adjacent well located in a similar aquifer.

DISTANCE FROM EXISTING WATER PLANT

The Village's water distribution system is centralized around the water treatment plant located at 614 Hillgrove Avenue. All of the Village's existing wells are directed to this location where treatment takes place and the resulting finished water is pumped to distribution to the Village's two towers. The Village system is a gravity fed pressurized network that is established by height of the water in the standpipe and the elevated tank.

Any location selected for a new well would have to take into account the cost of running new transmission line to the water treatment plant. If a location was not feasible to run to the existing treatment plant considerations would have to be taken into account regarding the feasibility of offsite treatment and/or the installation of transmission main to one of the Village's existing towers. The centralized location of the existing treatment plant allows plant operators the flexibility to run any well

with treated water to either of the towers within the community, whereas a separate treatment location or transmission line would only allow for a single destination which would result in a modification to current Village operations.

AVAILABLE LAND

The Village is a small residential community and is land locked and currently "built out". Available open space owned by the Village or potentially useable for the location of a new well is limited. The Village's land makeup is almost exclusively residential with the exception of commercial corridors located on Hillgrove Avenue, Burlington Avenue and on portions of Wolf Road and Gilbert Avenue. As a result, there is a high probability that any future well may have to be located adjacent to an existing residential district. Considerations may need to be taken into account on the construction and design of a well building to match the residential look of the neighborhood in which the well is placed. The Village has successfully in the past completed a project in this approach with the completion of the South Fire Station in 2011.

Several locations listed in this report are locations not owed by the Village. Agreements with third party entities for the use of some land or in some cases land acquisition costs must be considered in each location.

Each site that is listed also must consider the available space for the actual construction of the well. Spacing requirements for the drilling equipment and construction site to drill a new well are approximately 100' x 171'. It is important to take spacing requirements and construction requirements into account when considering a well location in any of the residential areas of the community.

CONSTRUCTION COSTS

Construction costs are an important component that needs to be taken into consideration for the location of any new well. Costs are broken down in three main categories which address the potential costs shared at all locations. Please note that other factors may come into play and all cost estimates provided in this report are for comparison purposes only and do not represent any real estate analysis.

WELL CONSTRUCTION

Construction costs for the well vary depending upon some unknown factors such as the depth of the well, construction site and other factors. Total costs for the construction of the well are estimated to be approximately $1.5 million. The Village does have a spare motor and bronze assembly currently located at the Public Works garage. This motor could be used in the development of a new well.

Budget Costs

- Deep Well..... $850,000 - $900,000
- Submersible Pump - Cast Iron Bowl Assembly ..... $450,000 - $475,000
- Adder for Bronze Bowl Assembly ..... $125,000 Est.
- Well Development, if Required ..... $100,000 - $150,000

NOTE: Village has spare 400 HP Byron Jackson motor and bronze bowl.

WELL TRANSMISSION MAIN

With the construction of a new well, it is highly probable that the installation of new transmission main will be required to bring the water to the Village's water treatment plant. Recent cost estimates from the Village Engineer as of 10/01/2015 indicate that both 12" PVC and ductile iron mains cost approximately $110 per lineal foot. Additional trench backfill was $32 per foot bringing the total cost for new main to approximately $142 per foot.

Note that these costs do not include engineer or design costs, costs associated with termination of the pipe or any additional restoration to any parkway or road surfaces that may be disturbed.

LAND ACQUISITION

A complete real estate analysis was not completed as part of this report, but considerations should be taken with respect to the possible need for the Village to purchase land if required. Data on the value of open land is scarce, but the group was able to obtain two data points that could be used for budget discussion purposes.

As of 10/08/15 there is a single vacant lot located at 5700 Wolf Road listed for sale within the Village at a price of $249,000 for 14,810 sq./ft. This puts the unit price at $16.81 per sq./ft.

The Village also sold a vacant lot at 5000 Wolf in 2013 for a unit price of $15.07 per sq./ft. For the purposes of this discussion a cost of $16.00 sq./ft. will be used to illustrate potential costs if needed for three potential land acquisition scenarios.

Site Size	Dimensions	Square Footage	Est. Cost
Construction Site Req.	100'x171'	17,100	$273,600
Typical Buildable lot	60'x178'	10,680	$170,880
Well House	35'x25'	875	$14,000

Costs associated with the development of a location in the community with an existing home on it would raise the cost for land acquisition.

EMERGENCY POWER GENERATION

It is recommended by the group that the new well should accommodate a generator that would allow for the well to be powered in the event that primary power is unavailable during an emergency situation. The installation of a generator would allow for the well to continue to pump water to either the water treatment plant or to the distribution system directly. The installation of a generator would increase the footprint size of the required site. The generator located at Village Hall for well #3 has an approximate footprint of 15'x20 feet and is powered by diesel. The generator size could possibly be decreased with the utilization of a natural gas generator where a storage tank for fuel would not be needed.

The installation of a generator does add some additional considerations to any location, most notably noise. Any generator is required to periodically run a test to ensure proper operation with a frequency typically between weekly and once per month. The installation in close proximity to any residential area may present noise considerations.

The cost associated with a new generator could be approximately $85,000-$150,000.

PROXIMITY TO RAILROAD TRACKS

Most of the Village's current infrastructure, including the water treatment plant and the existing three wells are within 500 feet of the BNSF right of way. Well #1, Well #3 and the Water Treatment Plant currently are within approximately 1000 feet of each other near the intersection of Wolf Road and Hillgrove Avenue. While there have not been any issues with this proximity, it should be noted due to recent high profile rail accidents around the United States in the past decade that a catastrophic rail accident along the tracks in Western Springs could make the Village's existing wells and water treatment plant in operable due to an emergency situation.

MAPS AND REFERENCE DOCUMENTS

The following set of documents were used during discussions to indicate and evaluate potential locations for the Village's new well.

Exhibit 1 – Well Radius - .25 mile increments

Exhibit 2 – Construction Site Requirements

Exhibit 3 – Typical Well Construction Depths

Exhibit 4 – Profile of Cambrian-Ordovician Aquifer System

EXHIBIT 1 - WELL RADIUS - .25 MILE INCREMENTS

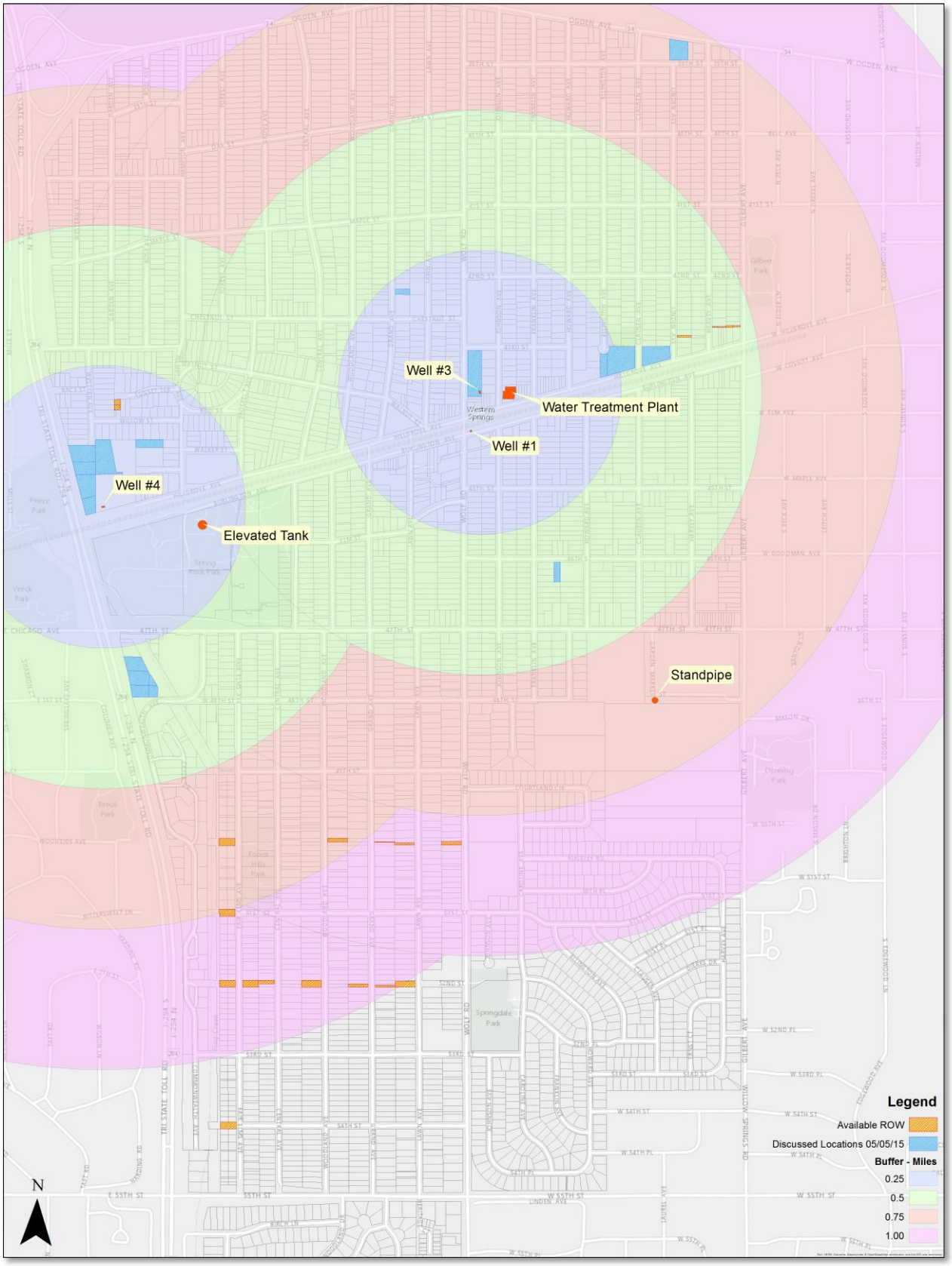


EXHIBIT 2 - CONSTRUCTION SITE REQUIREMENTS

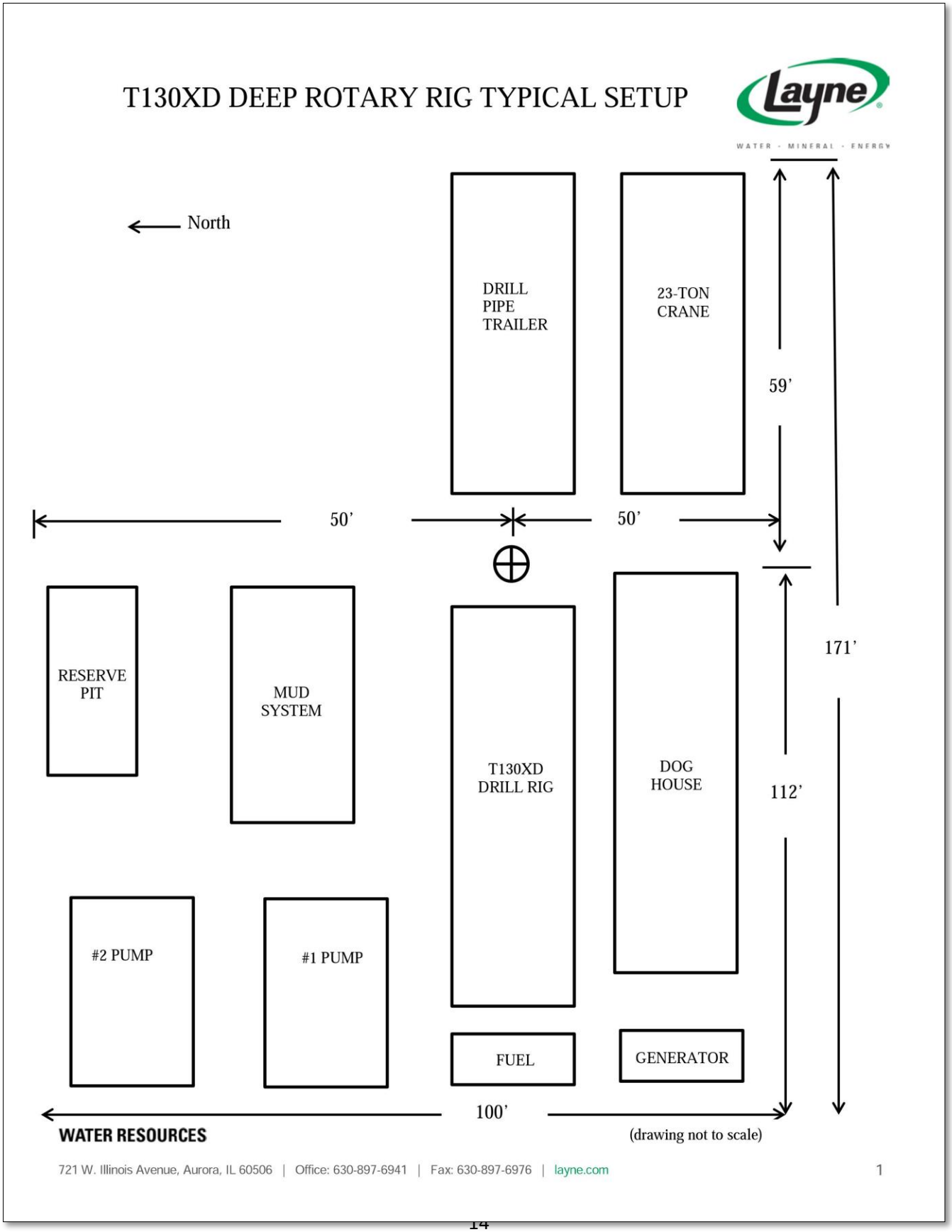


EXHIBIT 3 - TYPICAL WELL CONSTRUCTION DEPTHS

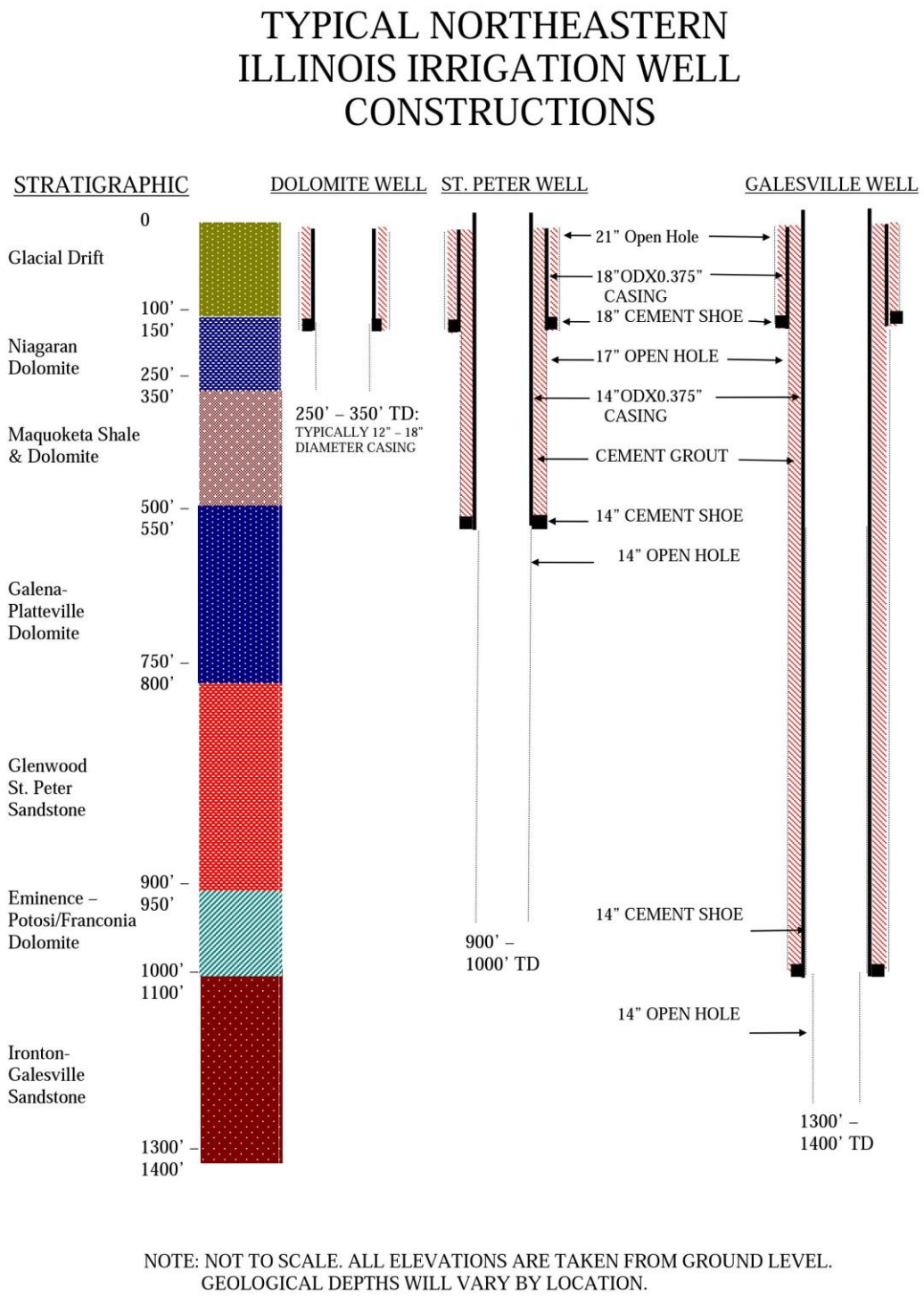
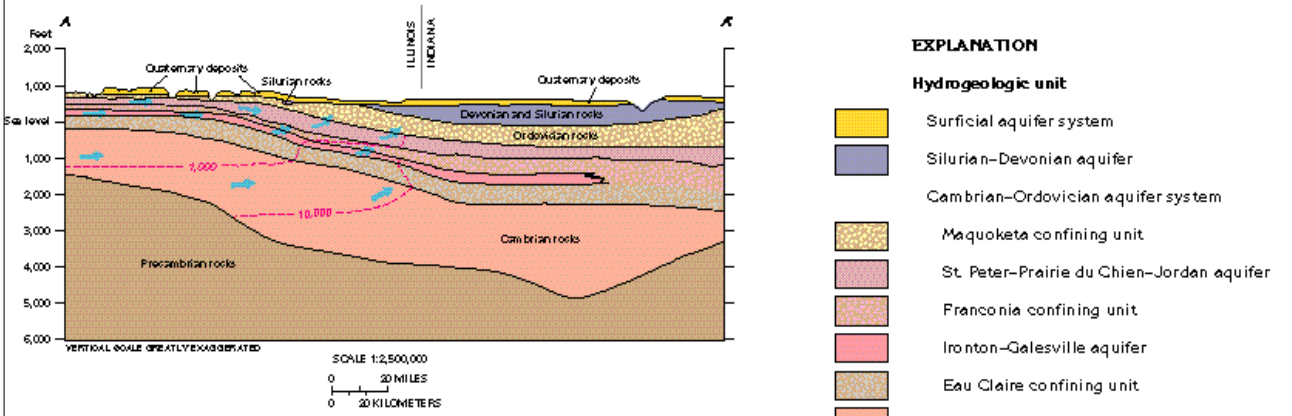


EXHIBIT 4 – PROFILE OF CAMBRIAN-ORDOVICIAN AQUIFER SYSTEM



Modified from:
Siegel, D.I., 1989, Geochemistry of the Cambrian–Ordovician aquifer system in the northern Midwest, United States: U.S. Geological Survey Professional Paper 1405–D, 76 p.
Young, H.L., 1992, Hydrogeology of the Cambrian–Ordovician aquifer system in the northern Midwest, United States: U.S. Geological Survey Professional Paper 1405–B, 55 p.

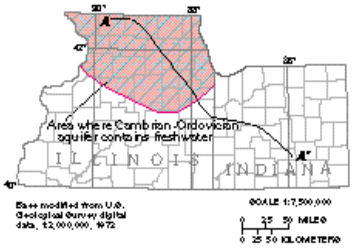
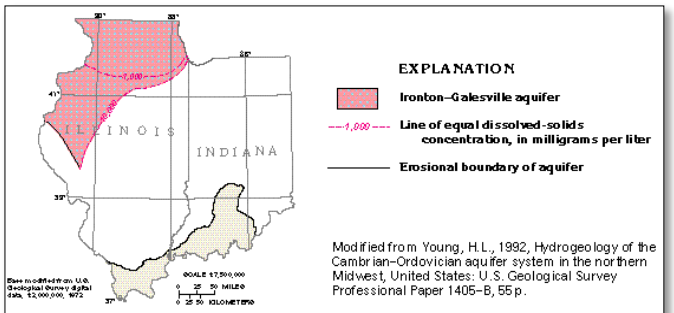
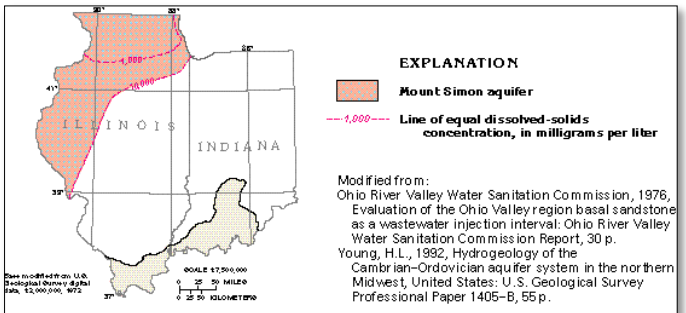


Figure 50. A diagrammatic hydrogeologic section of northern Illinois and Indiana shows the aquifers sloping downward into the edge of the Illinois Basin. The three principal aquifers (St. Peter–Prairie du Chien–Jordan, Ironton–Galesville, and Mount Simon) contain freshwater at depths of as much as 2,000 feet below land surface in northernmost Illinois. In Illinois, depths to saltwater decrease southeastward.



Modified from Young, H.L., 1992, Hydrogeology of the Cambrian–Ordovician aquifer system in the northern Midwest, United States: U.S. Geological Survey Professional Paper 1405–B, 55 p.

Figure 54. The Ironton–Galesville aquifer contains freshwater in the northern one-quarter of Illinois. The 10,000-milligram-per-liter dissolved-solids concentration line marks the practical southeastern limit of the aquifer.



Modified from:
Ohio River Valley Water Sanitation Commission, 1976, Evaluation of the Ohio Valley region basal sandstone as a wastewater injection interval: Ohio River Valley Water Sanitation Commission Report, 30 p.
Young, H.L., 1992, Hydrogeology of the Cambrian–Ordovician aquifer system in the northern Midwest, United States: U.S. Geological Survey Professional Paper 1405–B, 55 p.

Figure 57. Dissolved-solids concentrations are less than 1,000 milligrams per liter in water from the top of the Mount Simon aquifer in northern Illinois. The water becomes much more saline a short distance to the south and with increasing depth in the aquifer.

Source: United States Geological Survey Ground Water Atlas of the United States – Central Lowland Aquifers

POTENTIAL LOCATIONS

1440 HILLGROVE AVENUE - PUBLIC WORKS GARAGE

The current public works yard and is also the current site of well #4. The proximity to well #4 would within 1,000 feet and the well would not be able to be drilled to the Mt. Simon aquifer. It may be possible to drill the well to the Ironton-Galesville, but there is a strong possibility that the proximity could still affect the output of well #4.

The site does have the advantage in that there is an existing transmission main which could be tied into, but the upper limit of the well's potential output would probably not be achievable due to the limitation and bottleneck created by the use of a single transmission main. The use of two wells through a single transmission main also creates a single point of failure that could take both wells offline simultaneously. The site however does have land that is currently owned by the Village which could be useable.

4353 WOLF ROAD - NORTH OF FIRE STATION

This site is the green area located north of the Fire Station which also houses the Ekdhal House owned by the Western Springs Historical Society. The proximity to well #3 would be within 1,000 feet and the well would not be able to be drilled to the Ironton-Galesville aquifer. It may be possible to drill the well to the Mt. Simon, however there is a strong possibility that the proximity could still affect the output of well #3.

The site is close to the water treatment plant and the installation of a new main could be done on existing Village owned property and right of way. The proposed run for the main could be under 1,000 feet. The site does have land that is currently owned by the Village. The current green space could be a potentially sensitive area. A portion of the site is currently occupied by the Ekdhal House historic site and there are several memorial locations on the current green area which may be affected. Installation of a well would likely require the removal or relocation of many of these items including the trees at the location. The total area of the site is approximately 96’x126’ which would not allow for the well drilling operation to remain within the site. The construction site would have to be expanded north onto 43rd street with a temporary closure of the street or south into the parking lot for the Fire Station, resulting in a temporary loss of parking during construction. The site is also bordered to the east by residential properties.

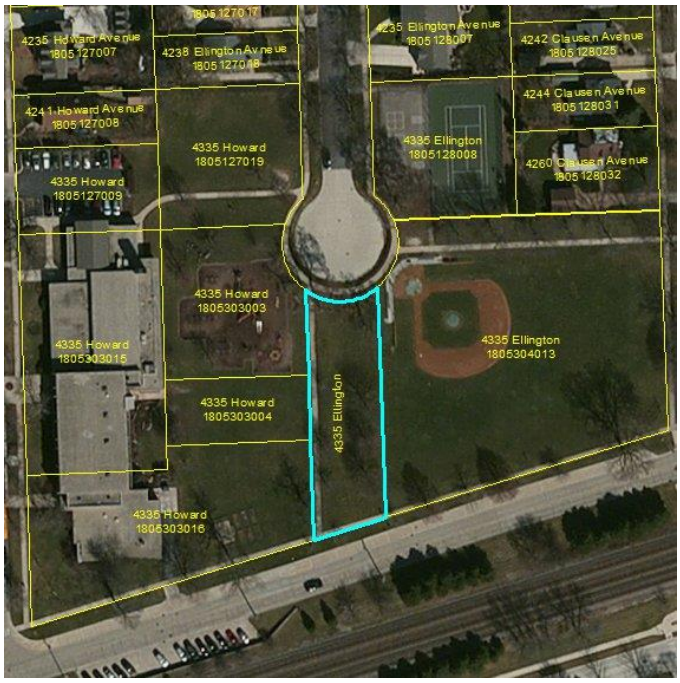
NORTHEAST PARK

Northeast Park is a site located on the northeastern most section of the community and is a park owned by the park district. The site is located approximately .75 miles away from well #1 and well #3 and is located more than 1 mile away from well #4. This would make it a good location for drilling at both of the Mt. Simon or Ironton-Galesville aquifers. The site is also located approximately .75 miles north of the railroad tracks.

The location however is a park currently owned by the Western Springs Park District and use of the land would have to be negotiated with the park. The northern half of the park has several areas of open space that are currently not marked for use as play fields. Ogden Avenue, which is owned by the Illinois Department of Transportation is on the northern edge of the park and the location would be feasible for a well house to be constructed near this area.

The major disadvantage of the site is the proximity to the existing water treatment plant. While the site is north of the railroad tracks it is approximately 4,800 feet from the water treatment plant which would require the installation of an extensive transmission main in order to get the water to the plant.

FIELD PARK



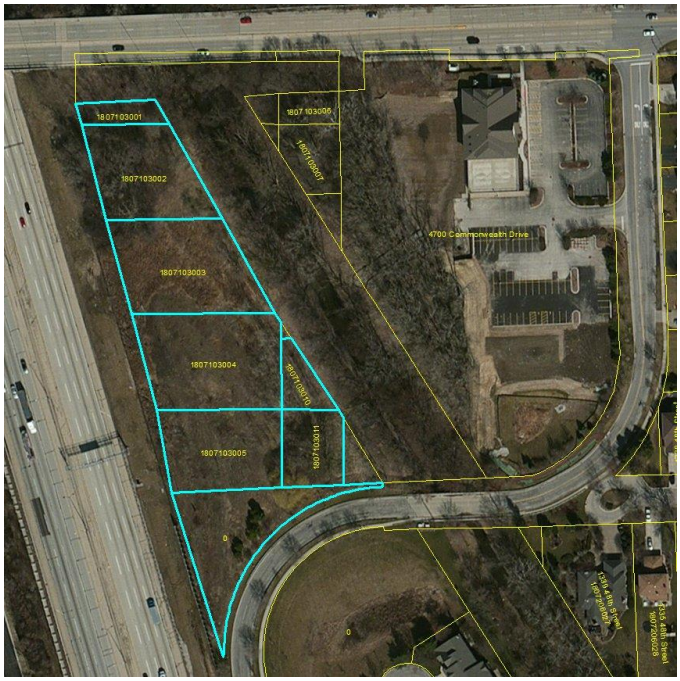
Field Park is a site located directly east of the water treatment plant along Hillgrove Avenue. The site is located approximately .25 miles from well #1 but is approximately 1 mile from well #4. This would make it a good location for drilling of the Mt. Simon aquifer.

The site is advantageous in that it is close to the water treatment plant and the installation of a new main could be installed down Hillgrove Avenue at a moderate additional cost. The proposed run for the main could be under 1,000 feet. The site is also desirable due to the available space. During the creation of the Ellington Avenue cul-de-sac, a portion of the ROW north Hillgrove Avenue was to be abandoned and provided to the park. It has been noted through research of Cook County Assessor files that the right of way appears to still be in the possession of the Village between the cul-de-sac and Hillgrove Avenue. This would allow for the well to be constructed on Village owned property. If the well house were to be constructed on the southern portion of the right of way this site would also provide for one of the greatest distances between the well house and the adjoining residential neighborhoods at approximately 280 feet.

The site is not without its drawbacks. The proposed location for the well was supposed to be deeded over to the Park District and any resolution of that agreement would have to be resolved prior to the construction of the well. The construction site requirements would also require the temporary use of

some park land since the site requirements for the construction area at 100’x171’, the Village owned right of way is only 66’ feet in width and 250’ in length. It would have to be discussed with the well drilling company if this available space would be sufficient for the construction needs.

COMMONWEALTH DRIVE AND 48TH STREET



This site is located north of Commonwealth Drive, west of 48th Street. The site is under consideration since it is one of the few open space sites remaining in the Village and is likely difficult for future commercial or residential development due to its location. The site is currently heavily wooded and is privately owned. The site is a little over .25 miles from well #4 and is approximately .75 miles from well #3. This could make it a potential candidate for drilling into the Ironton-Galesville formation.

The site has a potential for a large amount of available land with approximately 163,000 or about 3.75 acres of area. This location also potentially could be one of the cheapest per square foot for purchase price compared to other locations due to its location.

The site is also about .5 miles or greater from most of the BNSF railroad throughout the Village, with the exception of the rail bridge crossing I-294. The distance from this location from the other facilities and from the railroad could allow for the site to continue to operate in the event that there is a rail accident in Western Springs that would compromise other Village facilities.

The proposed location though has several disadvantages compared to other locations listed. It is one of the furthest locations from the Water Treatment plant and the construction of a transmission main back to the plant may be unfeasible. Transmission of the water to the elevated tank, which is less than .5 miles away may be possible, but additional considerations for onsite treatment at this site or at the elevated tank may need to be taken into consideration.

CLARK PARK

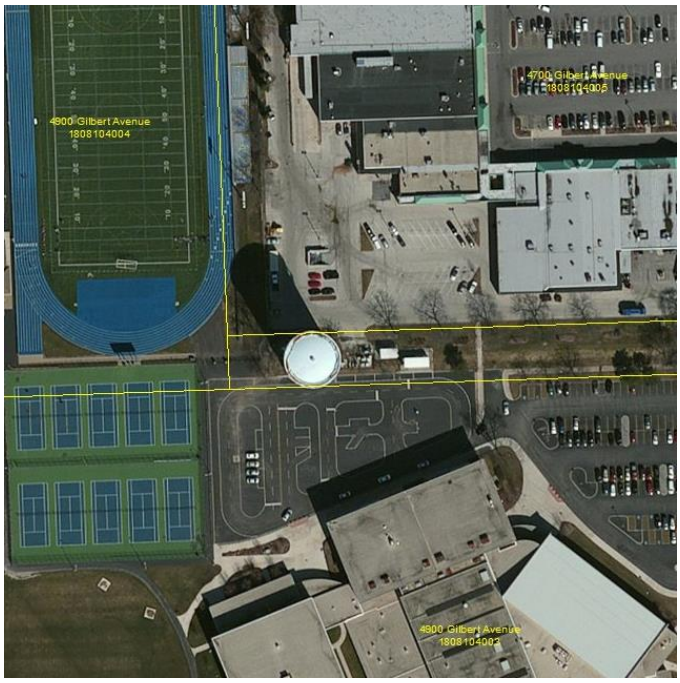
Clark Park is a site located on the corner of 46th Street and Howard Avenue in the Ridgeacres subdivision and is a park owned by the park district. The site is located just above .25 miles away from well #1 and well #3 and is located approximately 1 mile away from well #4. This would make the site a good location for drilling at both of the Mt. Simon or Ironton-Galesville aquifers. The site is also located south of the railroad tracks and is approximately .25 miles from the tracks making it potentially safe and operable if an emergency situation were to occur near the BNSF right of way.

The location is a park currently owned by the Western Springs Park District and use of the land would have to be negotiated with the park. The park is also located in the middle of one of the Village's subdivisions and proximity to residential districts is apparent on all sides. A major portion of the park is currently utilized for an athletic field, however there would be potential space along the south and west sides of the park for the installation of the well. The construction site requirements would require the temporary use of some park land since the site requirements for the construction area at 100'x171'. The park is approximately 208' feet in width and 130' in length and significant portion of the park may be inaccessible while construction of the well is ongoing.

The major disadvantage of the site is the proximity to the existing water treatment plant. The site is south of the railroad tracks it is approximately 2,800 feet from the water treatment plant which would

require the installation of an extensive portion of transmission main in order to get the water to the plant. The Village would also have to get new main under the railroad tracks or utilize the existing main that runs under the tracks for well #1 at Hillgrove Avenue and Wolf Road.

STANDPIPE - 47TH STREET RIGHT OF WAY



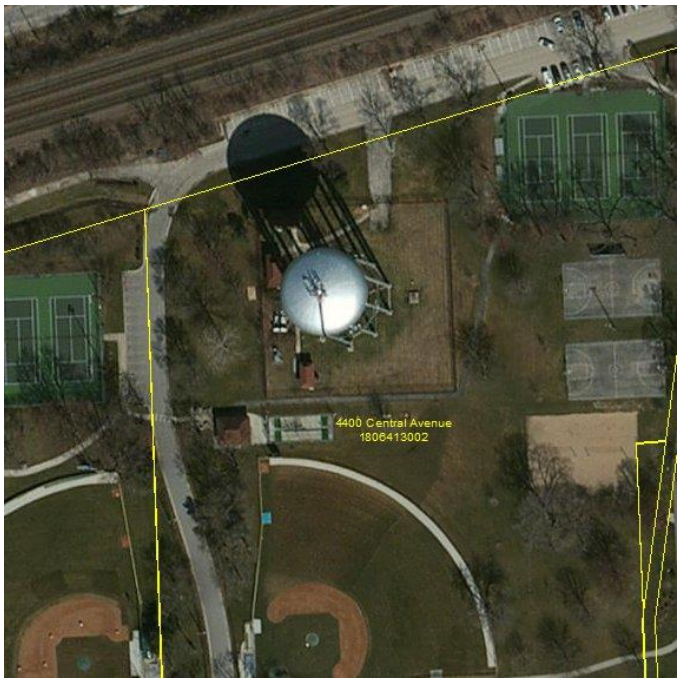
The Village's standpipe is a 2-million-gallon storage tank located near Lyons Township North Campus off of Willow Springs Road. The standpipe is located on the 48th Street right of way. The site is located approximately .75 miles away from well #1 and well #3 and is just over 1 mile away from well #4. This would make the site a good location for drilling at both of the Mt. Simon or Ironton-Galesville aquifers. The site is also located south of the railroad tracks and is approximately .75 miles from the tracks making it potentially safe and operable if an emergency situation were to occur near the BNSF right of way.

The location is on Village owned right of way and no land acquisition would be required for this site. The available right of way to the east of the tower is approximately 66' feet wide and approximately 575' long making this one of the larger potential sites for the construction of a well on. There are a number of cellular providers who also occupy the right of way and space on the standpipe which may need to be taken into consideration.

The major disadvantage of the site is the proximity to the existing water treatment plant. The site is south of the railroad tracks it is approximately 1 mile from the water treatment plant which would require the installation of an extensive portion of transmission main in order to get the water to the plant. The Village would also have to get new main under the railroad tracks or utilize the existing

main that runs under the tracks for well #1 at Hillgrove Avenue and Wolf Road. Alternatively, it may be possible for the Village to install water treatment equipment at the location site to allow for the well to be put directly into the standpipe and distribution. The installation of new treatment equipment at a remote site would offer the Village additional flexibility for treatment should the water treatment plant go offline, but the cost of additional treatment equipment would add significant cost to the installation and additional operational considerations for the water department staff.

ELEVATED TANK - SPRING ROCK PARK



The Village's elevated tank is a 1-million-gallon storage tank located in Spring Rock Park. The site is located approximately .5 miles away from well #1 and well #3 and is just under .25 miles away from well #4. This would make the site a good location for drilling at the Mt. Simon aquifer.

The location is on Village owned property and no land acquisition would be required for this site, however current access to the fenced area around the tank is controlled by the Park District. Additional access to the site may need to be considered with the Park District for the construction of a new well. The site owned by the Village is approximately 170 feet wide and approximately 170 long. There are a number of cellular providers who also occupy the space along with other underground infrastructure which may need to be taken into consideration.

The major disadvantage of the site is the proximity to the existing water treatment plant. The site is south of the railroad tracks it is approximately 1 mile from the water treatment plant which would require the installation of an extensive portion of transmission main in order to get the water to the plant. The Village would also have to get new main under the railroad tracks or utilize the existing main that runs under the tracks for well #1 at Hillgrove Avenue and Wolf Road. It may be possible for the Village to install water treatment equipment at the location site to allow for the well to be put

directly into the standpipe and distribution. The installation of new treatment equipment at a remote site would offer the Village additional flexibility for treatment should the water treatment plant go offline, but the cost of additional treatment equipment would add significant cost to the installation and additional operational considerations for the water department staff.

LOCATION SUMMARY TABLE

	1440 Hillgrove Avenue	4353 Wolf Road	Northeast Park	Field Park	Commonwealth Drive and 48th Street	Clark Park	Standpipe	Elevated Tank
Village Owned	**Yes**	**Yes**	No	Partial	No	No	**Yes**	**Yes**
Dist. Well #3	**>1.0 Mile**	<.25 Mile	.50 -.75 Mile	<.25 mile	.50 - .75 Mile	.25 -.50 Mile	**.75 – 1.0 Mile**	.50-.75 Mile
Dist. Well #4	<.25 Mile	**>1.0 Mile**	**>1.0 Mile**	**>1.0 Mile**	<.25 Mile	**>1.0 Mile**	**>1.0 Mile**	<.25 Mile
Dist. WTP	**>1.0 Mile**	<.25 Mile	.50 - .75 Mile	<.25 Mile	**.75 – 1.0 Mile**	.25 - .50 Mile	**.75 – 1.0 Mile**	.50-.75 Mile
Dist. Residential	100-300 feet	< 100 Feet	100-300 feet	100-300 feet	> 300 feet	< 100 Feet	**> 500 Feet**	**> 500 Feet**
Target Aquifer	Ironton-Galesville	Mt. Simon	Mt. Simon or Ironton-Galesville	Mt. Simon	Ironton-Galesville	Mt. Simon or Ironton-Galesville	Mt. Simon or Ironton-Galesville	Mt. Simon
Est. Length of Trans Main	4,500 feet	**900 Feet**	5,000 Feet	**1,000 Feet**	6,500 Feet	2,700 Feet	4,700 Feet	3,500 Feet
Estimated Cost Range	$2,000,000-2,500,000	$1,600,000-$1,800,000	$2,200,000-$2,500,000	$1,600,000-1,800,000	$2,500,000-$2,800,000	$1,800,000-$1,900,000	$2,100,000-$2,800,000[1]	$2,000,000-$2,700,000[1]

1. *Cost factor for this location incorporated transmission line to water treatment plant or an estimate for onsite treatment. Onsite treatment option was estimated at $1,300,000 with no transmission main back to existing treatment plant. Treatment option cost is an estimate only and utilizes estimates from equipment from exiting LPRO plant as well as construction for a housing facility. Cost does not include design or engineering for treatment equipment.*

ADDITIONAL LOCATIONS CONSIDERED

Through the discussion and research conducted by this group, there were several additional locations that were briefly discussed. They were not included in the primary analysis because each location had a logistical factor which made their feasibility highly questionable. The group however did feel it was worth briefly mentioning each location should future circumstances change to allow them to become feasible.

BEMIS WOODS AND THE FOREST PRESERVE DISTRICT

Through discussion with the Infrastructure Commission and members of the Historical Society, it was noted that in the early 1900's a well was drilled north of Ogden Avenue somewhere in the forest preserve district. It is unknown at this time if the well was completed or put into service. The location of a well in the forest preserve district would alleviate many of the concerns associated with building a well adjacent to a residential district. The site however is located outside of the Village's legal jurisdictional boundaries and construction feasibility was determined to be unfeasible.

4410 HARVEY AVENUE

A small parcel of land previously located at 4410 Harvey Avenue was at one point donated to the Western Springs Park District. The land has sat largely as an open green space since its donation. The location could physically support a small structure for a well house, but the current lot is extremely narrow. The location does not meet the required construction site requirements and the proximity of adjacent homes would make the site largely unfeasible for construction.

FOREST HILLS RIGHT OF WAY

There are several sections in Forest Hills between the 50th Street and 52nd Street Right of Way which could be locations that would be feasible for the location of a new well. The locations could physically support a small structure for a well house. Typical sizes range from 33' to 66' feet wide and approximately 178' long. The locations were largely deemed unfeasible due to the distance required to run a transmission main back to the water treatment plant.

The also locations all would have close proximity to adjacent homes that would make many of the sites unfeasible. Several of the locations adjacent to these Right of Way Sections also contain shared driveways.

PURCHASE OF RESIDENTIAL LOT

A final option discussed and considered by the group was the purchase of a residential lot within the community. While technically feasibly the purchase of an existing residential lot would add substantial cost to any well development site. It was also noted during discussions that the development of a well within a residential neighborhood would present a major disturbance to the area.

A DIFFERENT APPROACH TO IDENTIFYING SITES FOR A NEW BACKUP WELL

The approach used to identify the possible sites for Well #5 in the above sections of this report looked for land that was large enough for drilling a well but not surrounded by residential property. Sites that were obviously too far (e.g., Ridgewood) from the water treatment plant (WTP) were discarded, and those too close to either Well #3 or #4 were rejected or limited to a possible use of a different aquifer than the existing nearby well uses. Ownership of the land was not a factor in this search but, of course, would be in an ultimate decision for a site. As seen in the table of possible sites, the results of using this rather inclusive approach were that most sites were either too close to either Well #3 or Well #4, or too far from the WTP. Also, many of the sites were not owned by the Village, which introduces both uncertainty and cost. As a result, some compromise will be needed in selecting a site from any of the possible ones in the table. An entirely different approach was sought to avoid the limitations of the first approach.

The new approach eliminates the restriction of minimum distance from an existing well and uses an existing main to the WTP (essentially eliminating the cost of a new main). This approach led to the option of two new wells (#5 and #6) located close to Wells #3 and #4, respectively. The distance between the new and existing ones is not known now, but the current thought is less than 1000 feet. This arrangement would satisfy the need of a backup for both Well #3 (i.e., Well #5) and Well #4 (i.e., Well#6). The new wells would also have a high likelihood of producing the same quantity and quality off water as the ones nearby them. Each adjacent well would be drilled to a different depth and aquifer than that of the well adjacent to it in an attempt to provide redundancy and avoid a possible “sphere of influence” which could negatively affect the adjacent well. A possible configuration could be as follows.

Possible Configuration

- Well #3 Drilled to Ironton-Galesville Aquifer Located at Village Hall
- Well #5 Drilled to Mt. Simon Aquifer Located within 1000 ft. of Well #3.

- Well #4 Drilled to Mt. Simon Aquifer Located at Public Works Yard
- Well #6 Drilled to Ironton-Galesville Aquifer Located at Public Works Yard

The obvious reaction would be that the cost of two wells would be double that of a single one, making this arrangement too expensive. The cost of just drilling two wells would be about double the cost of just drilling one, but other costs associated with a production well could be reduced for Wells #5 & #6. Costs associated with connections to the existing main, to normal and emergency power, to RF tower for well data transmissions are already nearby. Also there would be reduced or no land cost. For some sites in the table the cost of the main would be over $1 million, and would be more than $500,000 for any of the likely locations.

Some issues need to be resolved before this approach is included with the possible new wells in the table. One is the recommended minimum distance between wells, i.e., Wells #3 & #5, and Wells #4 & #6. Another is an evaluation of the risk of “common mode failures”, that is, a single failure that would make both wells at one site unavailable, leaving only one in operation. For example, an obvious event is the failure (i.e., a break) in the single main between the two wells. Main breaks are typically repaired within eight hours, which is an acceptable time to operate with only one well, but there might be some cases where the breakage would take too long to operate on a single well. As with the other approach, the cost numbers also need to be more accurate.

NEXT STEPS

This document completes the initial request made by the Village Board to identify potential site locations for a third deep well. The Well 5 Group, Village Staff and the Infrastructure Commission are waiting feedback from the Village Board on next steps, but consider this a 5-7 year planning document due to the cost and complexities of the project.