HRGreen

Village of Lemont

Feasibility/Cost Study: Water Supply Alternatives

February 2022

HR Green Project No: 211371

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VILLAGE OF LEMONT

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I. Introduction

In 2020, the Illinois State Water Survey (ISWS) published a report to the Southwest Water Planning Group (SWPG) which indicated that the Cambrian-Ordovician aquifer is rapidly depleting at unsustainable rates. According to the study, the communities within the southwestern suburbs of Illinois may be at risk of not meeting their drinking water demands in the coming decades. In response, the City of Joliet has initiated efforts to establish a southwest suburban regional water commission (RWC) so that numerous municipalities could work together to establish the infrastructure necessary to bring Lake Michigan water to the area. To adequately size the future system, the City of Joliet has requested for all communities interested in joining the regional commission to sign a preliminary agreement by February 28, 2022.

The Village of Lemont hired HR Green to complete a feasibility and cost study to assess alternatives for the Village's future water supply. According to the ISWS study, the Village of Lemont's water supply may be at risk due to unsustainable aquifer withdrawal dates. However, the Village is interested in taking a deeper dive to better understand the risk level associated with staying on the existing groundwater wells. Additionally, the Village requested for HR Green to assess the possibility of obtaining Lake Michigan water from either Illinois American Water or the proposed Joliet RWC. This report evaluates the feasibility and costs associated with the three water supply alternatives and offers guidance to help the Village make an informed decision to meet current and future water needs.

II. Background

This section provides background on the Village of Lemont's existing water system, including future water demand projections and the system's water quality.

II.A. Existing Conditions

The existing water system in the Village of Lemont consists of the following major assets:

- Four deep wells
- One emergency shallow well
- One 500,000 gallon storage reservoir
- One 750,000 gallon elevated storage tank
- One 300,000 gallon elevated storage tank
- Three booster pumps
- 104 miles of watermain ranging in size from 3 inches to 16 inches in diameter
- Approximately 1,614 fire hydrants and 800 valves in the water distribution system
- 6,038 service connections

Table 1 provides the Village's well depths and capacities. Approximately 99.95% of the Village's water is obtained from the Cambrian-Ordovician aquifer (deep sandstone aquifer). The deep wells have a capacity of 4.9 million gallons per day (MGD). The Village also has one shallow well (Well 2) which is considered an emergency well. The total capacity for all wells is approximately 5.3 MGD.

TABLE 1: VILLAGE OF LEMONT WELL INFORMATION

Village of Lemont Well Information			
Well Number	**Depth of Well (feet)**	**Capacity (gal/min)**	**Capacity (MGD)**
2 (Emergency Well)	238	250	0.4
3	1,640	700	1.0
4	1,660	700	1.0
5	1,630	1,000	1.4
6	1,665	1,000	1.4
Total		**3,650**	**5.3**

II.B. Future Conditions

Table 2 provides the Village of Lemont's current and future projections for average day and maximum day demands. The projected water demands are based on the anticipated population growth within the Village in the next 40 years.

TABLE 2: CURRENT AND FUTURE DEMAND PROJECTIONS

Current and Future Demand Projections			
Year	**Population**	**Average Day Demand (MGD) [1]**	**Maximum Day Demand (MGD) [2]**
2020	17,629	1.61	2.74
2030	20,500	1.85	3.14
2040	24,000	2.16	3.67
2050	27,500	2.48	4.21
2060	31,000	2.79	4.74

Notes:
[1] Assumes 90 gallons per capita per day
[2] Assumes 1.7 peaking factor

II.C. Water Quality

The Village of Lemont's water quality information is released to the public annually in the consumer confidence report (CCR), as required by the Illinois Environmental Protection Agency (IEPA). Table 3 provides the Village of Lemont's 2020 water quality data in comparison to national drinking water regulations established by the United States Environmental Protection Agency (USEPA). Primary drinking regulations are legally enforceable goals and limits to protect public health. Secondary drinking regulations are non-enforceable guidelines that are recommended by the USEPA to minimize cosmetic effects (skin or tooth discoloration) and aesthetic effects (odor, taste, color)[1]. Based on the Village's CCR, the existing drinking water supply's contaminant levels are below the maximum contaminant levels required by the USEPA.

TABLE 3: VILLAGE OF LEMONT'S EXISTING WATER QUALITY INFORMATION

Water Quality Information				
Contaminant	Village of Lemont (2020 CCR)	USEPA Drinking Water Regulations		
	Highest Level Detected	Primary Maximum Contaminant Level Goal (MCLG)	Primary Maximum Contaminant Level (MCL)	Secondary Maximum Contaminant Level
Total Coliform Bacteria (% positive/month)	0%	0	5%	N/A
Fecal Coliform and E. Coli (# positive/month)	0	0	0	N/A
Chlorine (mg/L)	0.7	4	4	N/A
Arsenic (ug/L)	1.9	0	10	N/A
Barium (mg/L)	0.0015	2	2	N/A
Copper (mg/L)	0.16 (90th percentile)	1.3	Action Level = 1.3	1
Lead (mg/L)	4.4 (90th percentile)	0	Action Level = 15	N/A
Fluoride (mg/L)	1.26	4	4	2
Iron (mg/L)	0.026	N/A	1	0.3
Sodium (mg/L)	210	N/A	N/A	N/A
Sulfate (mg/L)	130	N/A	N/A	250
Zinc (mg/L)	0.017	5	5	5
Combined Radium 226/228 (pCi/L)	1	0	5	N/A
Gross alpha excluding radon and uranium (pCi/L)	5	0	15	N/A
Total Nitrate & Nitrite [as nitrogen] (mg/L)	Below detectable levels	10	10	N/A
TTHMs [Total Trihalomethanes] (ug/L)	Below detectable levels	N/A	80	N/A
HAA5 [Haloacetic Acids] (ug/L)	Below detectable levels	N/A	60	N/A
Notes:				
mg/L	milligrams per liter			
ug/L	micrograms per liter			
pCi/L	picocuries per liter (a measure of radioactivity)			
Maximum Contaminant Level Goal	The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.			
Maximum Contaminant Level	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration.			

III. Water Supply Alternatives

This section provides a feasibility assessment for the three water supply alternatives: 1) Illinois American Water Company System, 2) Joliet RWC, and 3) maintaining the existing groundwater system. This section also provides discussion on additional considerations that must be accounted for when switching the water source from groundwater to Lake Michigan water.

III.A. Alternative #1: Illinois American Water Company System

The Illinois American Water Company (ILAWC) owns several systems in the area which deliver Lake Michigan Water to numerous communities, including Homer Glen, Bolingbrook, Santa Fe, and Plainfield. The water source is obtained from the Village of Bedford Park, which purchases water from the City of Chicago. A 54-inch pipeline from the Village of Bedford Park routes water to two 5 million gallon ground storage tanks at the ILAWC-owned Grant Road Booster Station. This booster station is located to the northeast of the Village of Lemont. From this booster station, ILAWC routes water through a 42-inch pipeline to the west and through a 36-inch pipeline to the south. The 36-inch pipeline is located within ComEd right-of-way just west of Bell Road and currently only services the Village of Homer Glen. If the Village of Lemont considers purchasing water from ILAWC, the 36-inch pipeline would be the connection pipeline.

III.A.1 Capacity Analysis

In August 2021, ILAWC completed a Lake Water Delivery Analysis to assess whether servicing the Village of Lemont is feasible from a capacity standpoint. The system was assessed at three different locations:

1. 54-inch pipeline from Bedford Park to Grant Road Booster Station
2. 36-inch pipeline from Grant Road Booster Station to Homer Glen connection point (151st Street)
3. Grant Road Booster Station

At this time, the 54-inch pipeline from Bedford Park has sufficient capacity to service the Village of Lemont. The 54-inch has a total capacity of 57 MGD. Meanwhile, the projected maximum day demands vary depending on the quantity of customers that ILAWC will have in the future. Figure 1 summarizes ILAWC's 54-inch pipe capacity assessment. If the ILAWC maintains services with all of its existing customers and develops water service agreements with three additional future customers (Lemont, Shorewood, and Oswego), the system will have sufficient capacity through 2050. However, if ILAWC develops water service agreements with five future customers (Lemont, Shorewood, Oswego, Montgomery, and Yorkville), the current capacity will be reached by 2045. It should be noted that many of these potential customers are exploring other water service options. In fact, according to recent publications, Oswego, Montgomery, and Yorkville are joining the DuPage Water Commission[2]. Therefore, the 54-inch pipeline should have sufficient capacity unless other communities choose to join ILAWC in the future. ILAWC has not identified capacity improvements for the 54-inch at this time. Note that ILAWC only assessed the capacity for communities that expressed interest in a water service agreement with ILAWC to date. In the future there may be other communities that express interest, especially with the Joliet RWC's pressure to commit to an agreement by the end of February 2022.

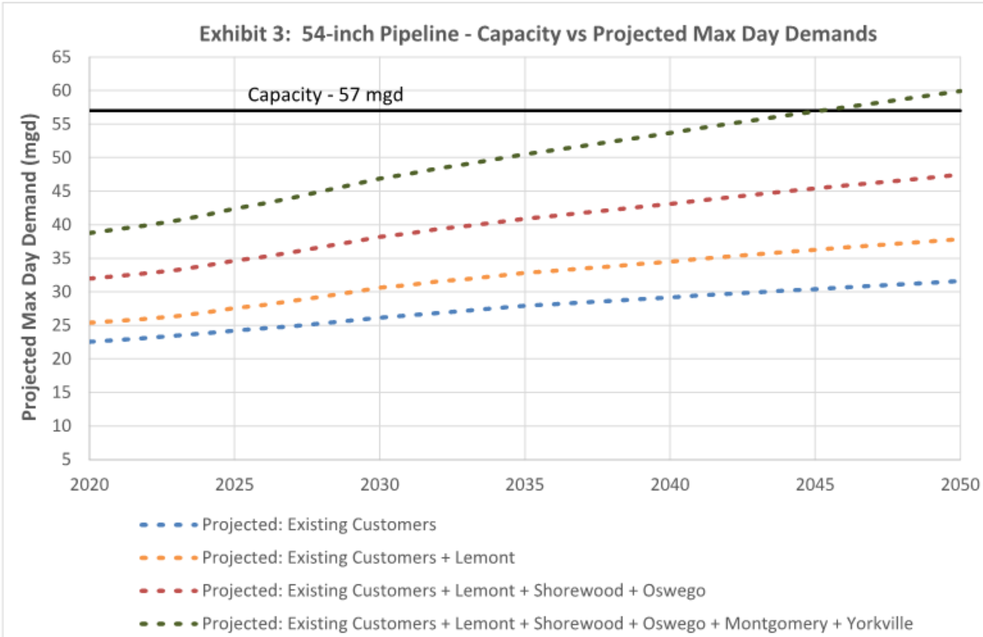

FIGURE 1: 54-INCH PIPELINE CAPACITY ANALYSIS FOR VARIOUS CUSTOMER SCENARIOS. EXHIBIT PROVIDED BY ILAWC IN 2021 DELIVERY ANALYSIS FOR VILLAGE OF LEMONT (FIGURE FROM ILAWC'S LAKE WATER DELIVERY ANALYSIS FOR VILLAGE OF LEMONT).

According to the ILAWC assessment, the 36-inch pipeline servicing Homer Glen has sufficient capacity to service the Village of Lemont. Figure 2 summarizes ILAWC's 36-inch pipe capacity assessment. The 36-inch has a capacity of 23.5 MGD, while the projected maximum day demands for Homer Glen and Lemont combined are expected to be between 10 to 11 MGD by 2050. ILAWC does not anticipate additional customers for the 36-inch pipeline at this time. The 36-inch was constructed in 2001 and consists of prestressed concrete cylinder pipe (PCCP). ILAWC has recently completed a condition assessment for the 36-inch pipeline and found that the pipe is in "very good" to "excellent condition." PCCP mains typically have a service life of approximately 50 years or longer depending on the pipe's operating conditions[3]. Therefore, it is expected that the 36-inch pipe will likely need to be replaced in approximately 29 years.

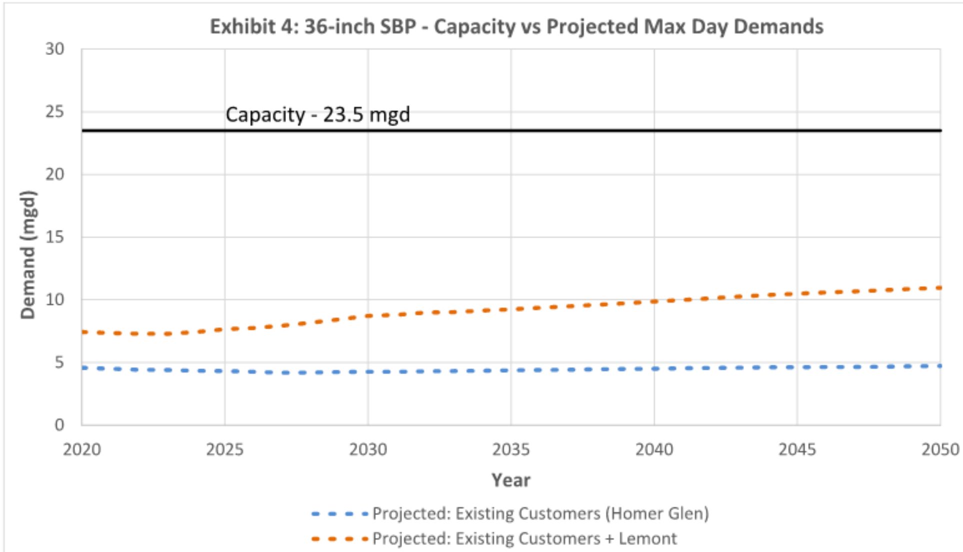

FIGURE 2: 36-INCH PIPELINE CAPACITY ANALYSIS FOR VARIOUS CUSTOMER SCENARIOS. EXHIBIT PROVIDED BY ILAWC IN 2021 DELIVERY ANALYSIS FOR VILLAGE OF LEMONT (FIGURE FROM ILAWC'S LAKE WATER DELIVERY ANALYSIS FOR VILLAGE OF LEMONT).

The Grant Road Booster Station is expected to require pump improvements to meet the projected future demands. The booster station currently has five pumps. The quantity of pumps requiring replacement will vary depending on how many new customers develop water service agreements with ILAWC. Potential pump replacement scenarios and timelines are provided in Table 4. If the Village of Lemont develops an agreement with ILAWC, Pump 5 would have to be replaced by 2030 and Pump 2 would have to be replaced by 2037. Additional pump replacement may be needed if more customers join ILAWC. The capital costs for pump replacement would be paid for by ILAWC and would result in adjustments to water rates. According to ILAWC, pump replacement would have a limited impact on rates since the capital cost would be spread across the entire customer group. Note that ILAWC only assessed the capacity for communities that expressed interest in a water service agreement with ILAWC to date; other communities may express interest in joining ILAWC in the future, which may require adjustments to the pump replacement timelines.

TABLE 4: PUMP IMPROVEMENT SCENARIOS FOR GRANT ROAD BOOSTER STATION

Potential Pump Improvements For Various Future Customer Scenarios			
Year	**Existing Customers**	**Existing + Lemont**	**Existing + Lemont + Shorewood**
2021			
2024			Replace Pump 5
2026			
2030		Replace Pump 5	Replace Pump 2
2034			
2035	Replace Pump 5		
2037		Replace Pump 2	Replace Pump 4
2041			

III.A.2 Proposed Connection Point

The proposed connection point for the Village of Lemont would be at the southwest corner of Bell Road and 131st Street. Appendix 1 provides a system map showing the proposed delivery connection point. This location is approximately 1,000 feet to the east of the existing 36-inch pipeline. The predicted water pressures for projected maximum day demands are 34 pounds per square inch (psi).

III.A.3 Cost Assessment

The following section provides the anticipated costs that the Village of Lemont can expect for the ILAWC alternative. Costs will include water supply costs, capital costs for system improvements, and operation & maintenance costs.

III.A.3.a Water Supply Costs

ILAWC's water supply costs are dependent on several factors, including City of Chicago water rates, Village of Bedford Park water rates, ILAWC capital improvement costs, and ILAWC operation & maintenance costs. The current 2021 rates are provided in Table 5. As shown in the table, approximately 77% of the rate is directly dependent on Village of Bedford Park and City of Chicago water rates. ILAWC's portion of the water rate is primarily dependent on system costs and operation & maintenance expenses.

TABLE 5: ILAWC'S CURRENT WATER SUPPLY RATES

ILAWC: Current Water Supply Rates	
	2021 Water Rates ($/1000 gallons)
City of Chicago	$4.13
Village of Bedford Park	$1.66
ILAWC	$1.76
Total	**$7.55**

During the City of Chicago's negotiations with the Joliet RWC, Chicago agreed to more favorable, reduced rates for the Joliet RWC. ILAWC is anticipating that similar negotiations for rate reductions can occur for Chicago's existing customers, including ILAWC. Although a formal agreement has not yet been established, ILAWC has provided potential rate reductions based on initial discussions with Bedford Park and Chicago. For this assessment, two scenarios were considered: no rate reduction vs. rate reduction. The "no rate reduction" scenario is considered the worst-case-scenario while the "rate reduction" provides the more favorable scenario if negotiations with the City of Chicago and Bedford Park are successful.

Both scenarios accounted for an annual rate increase to estimate the future rates up to the year 2050. Table 6 provides the anticipated annual rate increases. Historically, water rates for Chicago, Bedford Park, and ILAWC combined have been increasing by approximately 4.65% annually. In a scenario where water rates are not adjusted, it is assumed that the combined annual rate would continue to increase by 4.65% in the future. In Joliet RWC's preliminary discussions with Chicago, the annual rate increases were assumed to be 1.35% annually. It is assumed that ILAWC could negotiate with Chicago to have annual rate increases that match Joliet RWC annual rate increases. Therefore, the "rate reduction" scenario assumes a combined annual rate increase of 2.45%. Note that Chicago's historical annual rate increases have been higher. Additionally, Chicago annual rate increases for Joliet RWC are subject to change to account for inflation and water service costs.

TABLE 6: ANTICIPATED ANNUAL RATE INCREASES FOR TWO ILAWC WATER RATE SCENARIOS

Anticipated Annual Rate Increases				
Scenario	**Chicago**	**Bedford Park**	**ILAWC**	**Combined Rate Increase**
No Rate Reduction (Assume Historical Rates)	6.56%	5.48%	1.48%	**4.65%**
Rate Reduction (Based on Joliet Agreement)	1.35%	5.48%	1.48%	**2.45%**

Table 7 provides the projected water supply rates for both the "no rate reduction" and "rate reduction" scenarios. As seen in the table, negotiations for reduced rates with Chicago and Bedford Park could have a drastic impact on the water rates. Additionally, the future water rates will be significantly dependent on Chicago's actual annual rate increases. Since ILAWC does not yet have formal agreements with Chicago or Bedford Park on rate reductions, the rate reductions and annual rate increases are subject to change. Note that ILAWC anticipates that rate reductions from the City of Chicago would occur in 2030; for the purposes of this assessment, it is assumed that the Bedford Park rate reductions would also occur in 2030.

TABLE 7: ILAWC'S WATER SUPPLY RATE PROJECTION

ILAWC: Water Supply Rate Projection		
Year	**No Rate Reduction Scenario ($/1000 gallons)**	**Rate Reduction Scenario ($/1000 gallons)**
2030	$11.36	$4.77
2040	$17.90	$6.08
2050	$28.20	$7.74

III.A.3.b Capital Cost and Debt Service

III.A.3.b.i ILAWC System Improvements

Obtaining water from ILAWC would require constructing additional infrastructure to route water into the Village's existing water distribution system. The Village of Lemont would be responsible for the upfront capital costs associated with these components. However, some of the components would be owned and maintained by ILAWC. The proposed ILAWC system improvements which will be paid for by the Village of Lemont but owned and maintained by ILAWC include:

- Approximately 1,000 feet of 24-inch transmission main along 131st Street to Lemont connection point
- Service connection and buried meter vault

III.A.3.b.ii Lemont System Improvements

The Village of Lemont would have to construct, own, and maintain the following proposed Lemont system components:

- Pump station at point of connection at Bell Road and 131st Street
- At least 3.7 million gallons of storage at Bell Road and 131st Street
- Approximately 2,000 feet of 24-inch transmission main from the pump station to Lemont's water distribution system

The storage tank sizing estimate is based on City of Chicago storage requirements, which require that customers maintain a storage size of at least two times the average daily supply. For the purposes of this study, HR Green used the projected average daily demand for the year 2030 to obtain an approximate storage size.

Additional capital improvements may be needed within the Village's existing water distribution system beyond what is identified above. Improvements may include additional watermain upgrades to effectively route water to the Village's existing water system. Further, the IEPA will require the Village to complete a corrosion control study before switching from groundwater to Lake Michigan water (see Section III.D.1 for additional information). The costs associated with the water distribution improvements and corrosion control study are not included in the capital cost estimates detailed in the next section.

III.A.3.b.iii Capital Cost Estimate

Table 8 provides the preliminary capital cost estimate (in 2021 dollars) for the construction of the infrastructure necessary for ILAWC to provide water to the Village of Lemont. The table provides both the costs for the ILAWC system improvements and the Village system improvements, both of which would be paid for by the Village. Note that the preliminary capital costs are expected to increase by 3% per year to account for inflation.

TABLE 8: PRELIMINARY COST ESTIMATES FOR THE ILAWC WATER SUPPLY ALTERNATIVE

ILAWC Alternative: Capital Costs (2021 Dollars)	
Improvement	**Cost**
ILAWC System Improvements	
1,000 feet of 24-inch Transmission Main [1]	$750,000
Service Connection & Buried Meter Vault [1]	$350,000
Engineering (20%)	$220,000
Contingency (30%)	$230,000
Subtotal	$1,650,000
Lemont System Improvements	
Two 2 MG Ground Storage Tanks [2]	$8,205,000
Booster Station [3]	$1,675,000
Transmission Main to Water Distribution System [4]	$1,500,000
Subtotal	$11,380,000
Total	**$13,030,000**

Notes:
[1] Preliminary estimate provided by ILAWC
[2] Preliminary cost estimate for two ground storage tanks, electrical, instrumentation & controls, excavation, paving, watermain, engineering, and contingency.
[3] Preliminary cost estimate for booster station building, pumps, SCADA, electrical, generator, engineering, and contingency.
[4] Preliminary cost estimate for approximately 2,000 feet of 24" watermain, including engineering and contingency.

III.A.3.c Operation & Maintenance

The ILAWC's O&M maintenance costs are incorporated into the water supply cost (See Section III.A.3.a). The Village will also have to consider O&M costs for the Village-owned water distribution system, including the personnel, fleet maintenance, administration, and well maintenance costs. If the Village elects to obtain water from ILAWC, all wells would be decommissioned with the exception of Well 5 and Well 6, which will be used for emergency purposes only. The emergency wells will require some annual operation & maintenance costs to confirm that they remain reliable in case of emergencies. Table 9 provides the Village's projected O&M costs, assuming a 2% annual cost escalation (consistent with Joliet RWC's O&M cost escalation assumption). The Village's O&M costs were calculated by Village staff and were shared with HR Green.

TABLE 9: ANTICIPATED VILLAGE O&M FOR LAKE MICHIGAN WATER ALTERNATIVES

Lake Michigan Water: Anticipated Village System Operational Costs			
	2030	**2040**	**2050**
Well Maintenance	$86,866	$105,889	$129,079
Personnel	$613,398	$747,729	$911,477
Administrative Costs	$213,323	$260,039	$316,987
Fleet Maintenance	$91,890	$112,014	$136,544
Total	**$1,005,478**	**$1,225,672**	**$1,494,087**

III.A.3.d Cost Summary

Table 10 provides the projected total costs for the years 2030, 2040, and 2050 in dollars per thousand gallons of water for the ILAWC alternative. The table provides the anticipated rates for two scenarios: no rate reductions vs. rate reductions. The tables include the expected cost distribution, which include Village operation costs, ILAWC water costs, and the capital with debt. As evident by the tables, the cost feasibility for ILAWC will drastically depend on whether ILAWC can secure lower rates with the City of Chicago and the Village of Bedford Park. Note that in both scenarios, the 2030 costs are expected to be higher because of the additional capital costs required to construct the infrastructure to obtain Lake Michigan water. Meanwhile, the costs for the years beyond 2030 are expected to become more heavily dependent on the ILAWC water supply costs.

TABLE 10: ILAWC TOTAL COST AS WATER RATE FOR "NO RATE REDUCTION" AND "RATE REDUCTION" SCENARIOS

ILAWC: Total Cost As Water Rate ($/1000 gallons)			
No Rate Reduction Scenario			
	Year 2030	**Year 2040**	**Year 2050**
Village Operation Cost	$1.49	$1.55	$1.65
ILAWC Water Costs [1]	$11.36	$17.90	$28.20
Capital with Debt [2]	$17.17	$4.94	$3.55
Total ($/1000 gallons)	**$30.02**	**$24.39**	**$33.40**
Rate Reduction Scenario			
	Year 2030	**Year 2040**	**Year 2050**
Village Operation Cost 2	$1.49	$1.55	$1.65
ILAWC Water Costs 2	$4.77	$6.08	$7.74
Capital with Debt 2	$17.17	$4.94	$3.55
Total ($/1000 gallons)	**$23.43**	**$12.57**	**$12.94**

Notes:
[1] ILAWC water costs include the water supply rates from water suppliers, ILAWC O&M costs, and ILAWC general capital improvement costs.
[2] Capital with debt includes debt with issuance as well as capital CIP and equipment. Capital CIP includes the cost of ILAWC system improvements and Lemont system improvements required to obtain water from ILAWC. This includes the cost for new transmission main (both for ILAWC and Village system), new service connection, a new Village pump station, and ground storage tanks at the delivery point.

III.B. Alternative #2: Joliet Regional Water Commission

The City of Joliet has been leading efforts for planning and preliminary engineering to construct the infrastructure necessary to route Lake Michigan water from the City of Chicago to the southwest suburban region. The efforts involve developing a Regional Water Commission (RWC) to establish participating members and to support project financing. The Joliet RWC has developed numerous scenarios for the proposed water system and the final system design will depend on which communities agree to join the RWC. The Joliet RWC has asked communities wishing to join to approve the Preliminary Agreement by the end of February 2022. The Joliet RWC has indicated that the system will not be designed for excess capacity. Therefore, it is unclear whether it will be possible to join the Joliet RWC at a later time.

III.B.1 Capacity Analysis

The proposed transmission main and system capacity will be designed and constructed based on the 2050 maximum demand declared by participating member communities of the RWC. The Village of Lemont's 2050 maximum demand is projected to be approximately 4.21 MGD. The transmission main will be designed to meet future projected demands by pumping the water through the pipeline at higher velocities. The proposed pipeline material for the large transmission main will be steel or PCCP. Ductile iron pipes may be considered for smaller diameter pipes. Since the pipe components will be in new condition, they are expected to have a long service life if designed and properly installed.

III.B.2 Proposed Connection Point

The proposed connection point for the Village of Lemont would be at the southeast corner of Derby Road and 131st Street. The Joliet RWC would construct and own the transmission main up to this delivery point. Note that the exact transmission main route may change depending on which communities join the Joliet RWC. The predicted water pressures at the delivery point will be at least 25 psi, but the exact range will not be known until the Joliet RWC finalizes its design based on which members elect to participate. Appendix 2 provides a system map showing the proposed delivery connection point.

III.B.3 Cost Assessment

The following section provides the anticipated costs that the Village of Lemont can expect for the Joliet RWC alternative. Costs will include water supply costs, capital costs for system improvements, operation & maintenance costs, and commission administration costs.

III.B.3.a Water Supply Costs

Joliet RWC has negotiated reduced water supply rates with the City of Chicago through a preliminary water supply agreement. The proposed rates are provided in Table 11. Joliet RWC estimated the projected rates through 2050 assuming an annual rate increase of approximately 1.35% (provided by the City of Chicago). Note that annual rate increases are subject to change to account for inflation and/or increases in water service costs. Note that the rates in Table 11 exclude operation & maintenance costs, capital costs, and commission administration costs, which will be discussed in sections to follow.

TABLE 11: JOLIET RWC WATER SUPPLY RATES (ADDITIONAL COSTS TO FOLLOW IN NEXT SECTIONS)

Joliet RWC: Water Supply Rates	
Year	**Water Rate ($/1000 gallons)**
2030	$2.74
2040	$3.00
2050	$3.29

III.B.3.b Capital Cost and Debt Service

III.B.3.b.i Joliet RWC System Improvements

The Joliet RWC is planning to obtain water from the City of Chicago's Eugene Sawyer Water Purification Plant. This effort will involve construction of new infrastructure for both the City of Chicago and the Joliet RWC. The City of Chicago will own and construct a tunnel connection & extension, low-service pump station, and new Chicago service valve. The Joliet RWC will own and construct all infrastructure after the Chicago service valve, including the meter vault, suction well, transmission mains, pump stations, intermediate standpipe, delivery metering stations, and a commission administrative building. The capital costs for the infrastructure will be distributed among all members and will be subdivided based on each member's declared contractual maximum day demand for the year 2050.

Note that the Joliet RWC would arrange for financing for RWC members to assist with covering the capital costs associated with the Joliet RWC system improvements. The debt service would require the Village of Lemont to begin debt repayment in the year 2026 and would continue into the year 2064.

III.B.3.b.ii Lemont System Improvements

To obtain water from Joliet RWC, the Village of Lemont would have to construct, own, and maintain the following proposed Lemont system improvements:

- Pump station at point of connection at Derby Road and 131st Street
- At least 3.7 million gallons of storage at Derby Road and 131st Street

The storage tank sizing estimate is based on City of Chicago storage requirements, which require that customers maintain a storage size of at least two times the average daily supply. For the purposes of this study, HR Green used the projected average daily demand for the year 2030 to obtain an approximate storage size.

Additional capital improvements may be needed within the Village's existing water distribution system beyond what is identified above. Improvements may include watermain upgrades to effectively route water from the Joliet RWC delivery point to the Village's existing water system. Further, the IEPA will require the Village to complete a corrosion control study before switching from groundwater to Lake Michigan water (see Section III.D.1 for additional information). The costs associated with the water distribution improvements and corrosion control study are not included in the capital cost estimates detailed in the next section.

III.B.3.b.iii Capital Cost Estimate

Table 12 provides the preliminary capital cost estimate (in 2021 dollars) for the construction of the infrastructure necessary for Joliet RWC to provide water to the Village of Lemont. The table provides both the costs for the Joliet RWC system improvements and the Village system improvements, both of which would have to be paid for by the Village. Note that the preliminary capital costs are expected to increase by 3% per year to account for inflation.

TABLE 12: PRELIMINARY COST ESTIMATE FOR JOLIET RWC ALTERNATIVE

Joliet RWC Alternative: Capital Costs (2021 Dollars)	
Improvement	**Cost**
Joliet RWC System Improvements	
Capital Cost [1] [2]	$55,905,053
Subtotal	$55,905,053
Lemont System Improvements	
Two 2 MG Ground Storage Tanks [3]	$8,205,000
Booster Station [4]	$1,675,000
Subtotal	$9,880,000
Total (2021 Dollars)	**$65,785,053**

Notes:
[1] Preliminary capital costs were estimated using the Regional Cost Calculator spreadsheet developed by Joliet's Alternative Water Source Program engineering team. The Village of Lemont's 2050 maximum day demand was adjusted based on projected future demands.
[2] The Regional Cost Calculator spreadsheet provided costs in 2020 dollars. To offer a more accurate capital cost comparison, the cost was adjusted for 2021 dollars, assuming a 3% cost escalation.
[3] Preliminary cost estimate for two ground storage tanks, electrical, instrumentation & controls, excavation, paving, watermain, engineering, and contingency.
[4] Preliminary cost estimate for booster station building, pumps, SCADA, electrical, generator, engineering, and contingency.

III.B.3.c Operation & Maintenance

The Joliet RWC will require each participating member to begin paying operation, maintenance, and repair (OM&R) reserve costs between 2025 to 2029. The contributions to this reserve will be used for future operation of the system and future replacement projects. Table 13 provides the Village of Lemont's anticipated OM&R reserve contribution.

TABLE 13: JOLIET RWC OM&R RESERVE COSTS FOR YEAR 2025 TO 2029

Joliet RWC OM&R Reserve Costs	
Year	**Reserve Cost**
2025	$162,590
2026	$165,841
2027	$169,158
2028	$172,541
2029	$175,992

Once the Joliet RWC water system is operational in 2030, the commission will collect annual OM&R, which will be dependent on actual water usage. This cost will include energy costs for pumping operations, in-house operations staff, as well as labor, materials & equipment for O&M. The Joliet RWC assumed a 2% cost escalation per year. Table 14 provides the Joliet RWC OM&R rates and expected annual costs.

TABLE 14: JOLIET RWC OM&R RATES FOR 2030 AND BEYOND

Joliet RWC: OM&R Rates		
Year	**Rate ($/1000 gallons)**	**Annual Cost**
2030	$0.39	$262,636
2040	$0.44	$346,896
2050	$0.53	$478,789

The Village will also have O&M costs for the Village-owned water distribution system, including the personnel, fleet maintenance, administration, and well maintenance costs. If the Village elects to obtain water from Joliet RWC, all wells would be decommissioned with the exception of Well 5 and Well 6, which will be used for emergency purposes only. The emergency wells will require some annual operation & maintenance costs to confirm that they remain reliable in case of emergencies. The Village's projected O&M costs will be the same as for ILAWC, provided in Table 10 of Section III.A.3.c.

III.B.3.d Commission Administration

The Joliet RWC will require each member to contribute to commission administration costs on an annual basis. This cost will support funding for the in-house Executive Director, Operations Manager, and management support. The costs will also include legal finance services, utilities, insurance, office equipment and supplies, management training/conferences, custodial services, and other administrative costs. These costs will be split evenly between all commission members. The costs will start in 2022 and will be inflated at 2% per year. Table 15 provides the Village of Lemont's anticipated commission administration contributions.

TABLE 15: JOLIET RWC'S ANNUAL ADMINISTRATION COSTS

Joliet RWC: Administration Costs	
Year	**Annual Administration Cost**
2022	$114,444
2023	$116,733
2024	$119,068
2025	$121,449
2026	$123,878
2027	$126,355
2028	$128,883
2029	$131,460
2030	$195,039
2040	$237,752
2050	$289,818

III.B.3.e Cost Summary

Table 16 provides the projected total costs for the years 2030, 2040, and 2050 in dollars per thousand gallons of water for the Joliet RWC alternative. The table includes the expected cost distribution, which includes Village operation costs, Joliet RWC water costs, and the capital with debt. Note that the 2030 cost is expected to be higher because of the additional capital costs required to construct the Village-owned pump station and ground storage tanks to obtain Lake Michigan water.

TABLE 16: TOTAL COST AS WATER RATE FOR JOLIET RWC ALTERNATIVE

Joliet RWC: Total Cost As Water Rate ($/1000 gallons)			
	Year 2030	**Year 2040**	**Year 2050**
Village Operation Cost	$1.49	$1.55	$1.65
Joliet RWC Water Costs [1]	$7.28	$7.69	$8.03
Capital with Debt [2]	$13.79	$4.77	$3.40
Total ($/1000 gallons)	**$22.56**	**$14.01**	**$13.08**

Notes:
[1] Joliet RWC water costs include the water supply costs, capital costs for Joliet RWC system improvements, annual administration costs, and OM&R.
[2] Capital with debt includes debt with issuance as well as capital CIP and equipment. Capital CIP includes the cost of Lemont system improvements required to obtain water from Joliet RWC. This includes the cost for a new Village pump station and ground storage tanks at the delivery point.

As mentioned previously, Joliet RWC would also require members to contribute to the OM&R reserve and annual administration costs between 2022 and 2029. Additionally, debt repayment for Joliet RWC's capital improvement costs would begin in the year 2026. Table 17 summaries the total anticipated costs from 2022 to 2029. The total payment to Joliet RWC before the year 2030 is expected to be approximately $4,255,051 in 2021 dollars.

TABLE 17: ANTICIPATED COSTS TO JOLIET RWC BEFORE 2030

Joliet RWC: Village's Anticipated Costs before 2030					
Year	**Administration Cost**	**OM&R Reserve Cost**	**Joliet RWC Debt Repayment**	**Total**	**Present Worth (2021 Dollars)**
2022	$114,444	$0	$0	$114,444	$111,111
2023	$116,733	$0	$0	$116,733	$110,032
2024	$119,068	$0	$0	$119,068	$108,964
2025	$121,449	$162,590	$0	$284,039	$252,365
2026	$123,878	$165,841	$111,046	$400,765	$345,704
2027	$126,355	$169,158	$760,348	$1,055,862	$884,268
2028	$128,883	$172,541	$1,110,449	$1,411,873	$1,147,982
2029	$131,460	$175,992	$1,332,542	$1,639,994	$1,294,626
				Total Costs Before 2030 (2021 Dollars)	**$4,255,051**

Notes:
[1] Administration costs, OM&R reserve costs, and Joliet RWC debt repayment costs were estimated using the Regional Cost Calculator spreadsheet developed by Joliet's Alternative Water Source Program engineering team.

III.C. Alternative #3: Maintain Existing Groundwater System

The final water supply alternative is to continue using the existing groundwater system as the Village's drinking water source. Appendix 3 provides the Technical Memorandum on the Hydrogeologic Evaluation prepared by LRE Water, Inc. (HR Green's hydrogeology subconsultant) on the feasibility of continuing to use the groundwater supply.

III.C.1 Capacity Analysis

III.C.1.a Well Capacity Analysis

The Village's existing wells are meeting current water demands, but as the Village's population grows through year 2060, it is expected that additional wells will be needed. Table 18 provides the existing well capacities compared to the projected 2060 average day and maximum day demands. The table shows that the projected year 2060 maximum day demand exceeds the existing well capacity in a scenario where the largest well is out of service. To meet the projected maximum day demands, the hydrogeologic evaluation recommended two additional Cambrian-Ordovician aquifer wells by 2060 with a minimum capacity of 1,000 gallons per minute (gpm) each. Since the four existing groundwater wells each have a pumping capacity above 500 gpm, it is recommended that both of the proposed wells are rated at 1,000 gpm to provide redundancy for the water supply system.

TABLE 18: FUTURE WELL CAPACITY ANALYSIS

Future Well Capacity Analysis		
	Capacity/Demand (gpm)	**Capacity/Demand (MGD)**
Existing Well Capacity [1]	3,400	4.90
Existing Well Capacity With Largest Well Out of Service [1]	2,400	3.46
Year 2060 Average Day Demand	1,938	2.79
Year 2060 Maximum Day Demand	3,292	4.74
Notes: [1] Well capacity excluding the emergency well		

For the purposes of the cost assessment, it was assumed that one well would be installed in 2030 and one well would be installed in 2040. However, the exact well installation dates and the number of required wells will be heavily dependent on numerous factors. The following considerations may impact well installation timelines:

- Population growth may vary from what is projected.
- Water usage per person may change over time.
- Wells may degrade over time. As the existing wells age, the existing well capacities may decrease. Additionally, the static and pumping water levels may drop over time.
- Some wells may require replacement due to unpredictable circumstances, such as shifts in water quality, water quantity, or well condition.
- Constructing additional storage (i.e., a water tower) may increase system redundancy during water use peaks, which could delay the need for another well.

The Village should regularly re-evaluate its well capacities, water demands, and the above factors to better predict when a new well may be needed. The proposed year 2030 and 2040 installation dates are approximate timelines that should be re-evaluated once better data becomes available. For example, as the year 2030 approaches, the Village could re-evaluate whether a new well is needed in the year 2030 based on more up-to-date knowledge on water system conditions. Similarly, as the year 2040 approaches, the Village could re-evaluate whether another well is needed in the year 2040 or if it can be delayed to a later date.

III.C.1.b Aquifer Capacity Analysis

In 2020, the Illinois State Water Survey (ISWS) published a report to the Southwest Water Planning Group (SWPG) which indicated that the Cambrian-Ordovician aquifer is rapidly depleting at unsustainable rates within the southwest suburbs of Chicago. The Cambrian-Ordovician aquifer is a very important water supply source for many communities within Chicago's southwest suburbs, including for the Village of Lemont. The ISWS completed a study for this region, which included an update to an existing 2018 groundwater flow model. The purpose of the model was to assess the aquifer status for each community that currently uses the Cambrian-Ordovician aquifer in the study area (the Village of Lemont was included in the study area). The study assumed that the City of Joliet will cease use of the Cambrian-Ordovician aquifer in 2030 and that Oswego, Yorkville, and Montgomery will cease use of the aquifer in 2035.

The ISWS study concluded that based on current growth trends, most communities in the southwest suburbs of Chicago using the Cambrian-Ordovician aquifer will be at risk of not meeting their drinking water demands in the coming decades. The study predicted that the Village of Lemont's wells will decline in performance but it did not forecast that Village wells will be at risk of becoming inoperable. The risks facing the Village of Lemont and other private Cambrian-Ordovician aquifer users in the study area include the risk of dry wells, potential for wells to pump sand, increased well interference, increased well maintenance, and increased cost of pumping due to declining water levels[4]. The ISWS study concluded that the Village of Lemont's wells will be affected by regional declines in water levels. However, the study did not predict that the Village wells would be so severely affected that the wells would become inoperable or that the aquifer could not sufficiently meet the Village's future demands. Continued use of the aquifer may require for the pumps to be lowered, more frequent maintenance, and a greater spacing of future wells[5].

The results of LRE Water's evaluation paint a somewhat different picture than what the ISWS study is predicting. As detailed in the Technical Memorandum, the existing groundwater wells have hydraulic conductivities that are higher than typical for a consolidated sandstone aquifer. Hydraulic conductivity is a measure of flow of water in the aquifer[6] and higher values are better. The Technical Memorandum mentions that the typical hydraulic conductivity for a consolidated sandstone aquifer is between 0.01 to 10 gallons per day per square foot of aquifer (gpd/ft^2) while the hydraulic conductivity values for the Village's wells are between 42 and 218 gpd/ft^2. The results of LRE's hydrogeological assessment using data provided by the Village support a more optimistic projection of the viability of the Village's wells in the future.

According LRE Water's hydrogeological evaluation, the Village should be able to continue meeting its projected water demand by year 2060 as long as the Village constructs two additional deep wells. Of course, as with any modeling projections, several assumptions were made related to future growth and the continued use of the aquifer by others. If the Village's flow projection increases dramatically beyond what was assumed or if other parties outside the Village significantly expand withdrawals from the aquifer, the modeling projections may change. The pump setting for Village wells and other local private wells should be checked regularly to make sure that the equipment is adequately submerged for the projected drawdown impacts, including those predicted by the ISWS study. The Village should maintain long-term records of well static and pump levels. The Village should also maintain long-term records of specific capacity, especially prior to and after well rehabilitation projects.

III.C.2 Cost Assessment

The following section provides the anticipated costs that the Village of Lemont can expect for maintaining the existing groundwater system. Costs will include capital costs for two new wells, and Village operation & maintenance costs.

III.C.2.a Capital Cost and Debt Service

The anticipated capital costs for maintaining the existing groundwater system will include the construction of one well in 2030 and one well in 2040 to account for the Village's population growth. It is anticipated that well installation will include a new softening plant similar to the existing softening plants in the Village's current water system. Based on discussions with the Village staff, a new one million gallon (MG) water tower will also be needed by the year 2030 to meet the Village's water demands and fire flow. This water tower was not included in the ILAWC and Joliet RWC alternatives because it is expected that the required ground storage tanks at the Lake Michigan water connection points would substitute the need for a water tower. For the purposes of this cost assessment, it was assumed that the water tower would be installed in 2030. Table 19 provides the preliminary costs for two new wells and a water tower in 2021 dollars. Note that the preliminary capital costs are expected to increase by 3% per year to account for inflation.

TABLE 19: PRELIMINARY COSTS FOR MAINTAINING THE GROUNDWATER SYSTEM

Groundwater System Alternative: Capital Costs (2021 Dollars)	
Lemont System Improvements	
2030 Well Installation & Softening Plant [1]	$7,665,000
2040 Well Installation & Softening Plant [1]	$7,665,000
1 MG Water Tower [2]	$7,500,000
Total	**$22,830,000**

Notes:
[1] Preliminary cost for well drilling, well pump & motor, softening plant, generator, engineering & contingency.
[2] Preliminary cost for water tower, including engineering & contingency. Note that costs may fluctuate as a result of market volatility in the steel industry. The proposed water tower capacity was assumed to be 1 million gallons based on discussions with the Village.

III.C.2.b Operation & Maintenance

The Village will have O&M costs for the Village-owned water distribution system, including the personnel, fleet maintenance, administration, and well maintenance costs. If the Village elects to remain on groundwater, all wells will remain active and two additional wells will be installed (one in 2030 and one in 2040). With more active wells in the Village's system, the well maintenance costs will be higher when compared to the Lake Michigan alternative. Table 20 provides the Village's projected O&M costs, assuming a 2% annual cost escalation (consistent with Joliet RWC's O&M cost escalation assumption). The Village's O&M costs were calculated by Village staff and were shared with HR Green.

TABLE 20: ANTICIPATED VILLAGE O&M COSTS FOR MAINTAINING THE GROUNDWATER SYSTEM

Existing Groundwater System: Anticipated Village Annual Operational Costs			
	2030	**2040**	**2050**
Well Maintenance	$417,401	$508,809	$620,236
Personnel	$613,398	$747,729	$911,477
Administrative Costs	$213,323	$260,039	$316,987
Fleet Maintenance	$91,890	$112,014	$136,544
Total	**$1,336,012**	**$1,628,592**	**$1,985,244**

III.C.3.c Cost Summary

Table 21 provides the projected total costs for the years 2030, 2040, and 2050 in dollars per thousand gallons of water for maintaining the existing groundwater system. The table includes the expected cost distribution, which includes Village operation costs and the capital with debt. This alternative does not include water costs since the Village would be the water supplier. Note that the 2030 and 2040 costs are expected to be higher because of the additional capital costs required to construct two new wells.

TABLE 21: TOTAL COST AS WATER RATE FOR THE GROUNDWATER SYSTEM ALTERNATIVE

Groundwater System: Total Cost As Water Rate ($/1000 gallons)			
	Year 2030	**Year 2040**	**Year 2050**
Village Operation Cost	$1.98	$2.07	$2.20
Water Costs	$0.00	$0.00	$0.00
Capital with Debt [1]	$25.57	$11.10	$5.34
Total ($/1000 gallons)	**$27.55**	**$13.17**	**$7.54**

Notes:
[1] Capital with debt includes debt with issuance as well as capital CIP and equipment. Capital CIP includes the cost of one new well in 2030, one new water tower in 2030, and one new well in 2040.

III.D. Lake Michigan Source Water Considerations

There are several considerations when switching to Lake Michigan source water that would apply for both ILAWC and Joliet RWC. This includes the need for a corrosion control study, meeting IDNR Lake Michigan Allocation requirements, and a switch in the water quality.

III.D.1 Corrosion Control Study

Obtaining water from ILAWC or Joliet RWC would mean that the Village's source water would change from groundwater to surface water. The IEPA requires that public water systems complete a corrosion control study whenever they propose to change their water source. Changes in source water can have significant impacts on water quality, can impact the effectiveness of corrosion control treatment, and can increase lead and copper release into drinking water[7]. The IEPA's corrosion control study requirements have become more stringent in recent years due to recent water quality issues experienced in various communities, including University Park, Illinois. A thorough corrosion control study is necessary to confirm that water pipe corrosion will not occur after the water source switch. If the Village decides to switch its water source to Lake Michigan water, a corrosion control study will need to be accounted for in the budget and schedule.

III.D.2 IDNR Lake Michigan Allocation Requirements

To obtain Lake Michigan water, the Village will have to obtain a Lake Michigan water allocation permit from the Illinois Department of Natural Resources (IDNR) and will have to meet IDNR requirements. The IDNR requires that communities seeking to obtain and maintain water allocation must have less than 10% of losses from non-revenue water. If losses are above 10%, the community must establish a plan to reduce losses. The plan could include efforts such as water conservation within the community or establishing a water distribution system capital improvement program to reduce water losses. The Village is currently in the process of applying for a Lake Michigan Allocation through the IDNR.

III.D.3 Water Quality Comparison

Both ILAWC and Joliet RWC will provide water to the Village of Lemont from the City of Chicago's Sawyer Water Purification Plant. Therefore, both Lake Michigan alternatives are expected to have similar water quality. Table 22 provides a summary comparing the City of Chicago and Village of Lemont water quality from the 2020 CCR. As shown in the table, the City of Chicago's water source contaminant levels are below the maximum contaminant levels required by the USEPA. Note that unlike Lemont's current water source, Lake Michigan water has disinfection by-products, including TTHMs and HAA5. Disinfection by-products are formed when naturally occurring organic materials in water react with the chlorine used to kill waterborne bacteria and viruses[10]. Disinfection by-products are common in water supplies with surface water sources because there are higher levels of organic materials in surface water[10].

The City of Chicago's water source has significantly less sodium and sulfate, which are both contaminants that are currently unregulated by state and federal regulations[5]. High sodium levels can occur as a result of the water softening process. Higher sulfate levels are also more common in groundwater due to contact with soil and rock containing sulfate minerals[11].

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TABLE 22: WATER QUALITY COMPARISON FOR CITY OF CHICAGO AND VILLAGE OF LEMONT

Water Quality Comparison					
Contaminant	City of Chicago (2020 CCR)[8]	Village of Lemont (2020 CCR)[9]	USEPA Drinking Water Regulations		
	Highest Level Detected	Highest Level Detected	Primary Maximum Contaminant Level Goal (MCLG)	Primary Maximum Contaminant Level (MCL)	Secondary Maximum Contaminant Level
Total Coliform Bacteria (% positive/month)	0.2%	0%	0	5%	N/A
Fecal Coliform and E. Coli (# positive/month)	0	0	0	0	N/A
Chlorine (mg/L)	1	0.7	4	4	N/A
Arsenic (ug/L)	Below detectable levels	1.9	0	10	N/A
Barium (mg/L)	0.0201	0.0015	2	2	N/A
Copper (mg/L)	0.091 (90th percentile)	0.16 (90th percentile)	1.3	Action Level = 1.3	1
Lead (mg/L)	9.1 (90th percentile)	4.4 (90th percentile)	0	Action Level = 15	N/A
Fluoride (mg/L)	0.75	1.26	4	4	2
Iron (mg/L)	Below detectable levels	0.026	N/A	1	0.3
Sodium (mg/L)	9.55	210	N/A	N/A	N/A
Sulfate (mg/L)	27.8	130	N/A	N/A	250
Zinc (mg/L)	Below detectable levels	0.017	5	5	5
Combined Radium 226/228 (pCi/L)	0.95	1	0	5	N/A
Gross alpha excluding radon and uranium (pCi/L)	3.1	5	0	15	N/A
Total Nitrate & Nitrite [as nitrogen] (mg/L)	0.42	Below detectable levels	10	10	N/A
TTHMs [Total Trihalomethanes] (ug/L)	28.6	Below detectable levels	N/A	80	N/A
HAA5 [Haloacetic Acids] (ug/L)	12	Below detectable levels	N/A	60	N/A
Notes:					
mg/L	milligrams per liter				
ug/L	micrograms per liter				
pCi/L	picocuries per liter (a measure of radioactivity)				
Maximum Contaminant Level Goal	The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.				
Maximum Contaminant Level	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration.				

IV. Financial Summary

Table 23 provides a summary of the approximate costs in dollars per thousand gallons for the three water supply alternatives: ILAWC, Joliet RWC, and maintaining the existing groundwater system. The anticipated expenses including capital costs, O&M, water supply costs, debt & issuance, and administration costs, as applicable to the given alternative. The ILAWC alternative has two scenarios to account for the possibility of the City of Chicago and Village of Bedford Park potentially reducing their rates in the future.

TABLE 23: TOTAL COSTS AS WATER RATES: ALTERNATIVE & SCENARIO COMPARISION

Alternative Comparison: Total Cost as Water Rate ($/1000 gallons)			
Alternative/Scenario	**Year 2030**	**Year 2040**	**Year 2050**
ILAWC - No Rate Reduction	$30.02	$24.39	$33.40
ILAWC- Rate Reduction	$23.43	$12.57	$12.94
Joliet RWC	$22.56	$14.01	$13.08
Maintain Groundwater System	$27.55	$13.17	$7.54

Figure 3 provides the 2030 water costs for all the alternatives and scenarios, including the expected Village operation costs, water costs, and capital with debt. As shown in the figure, the capital expenses for maintaining the groundwater system are expected to be higher in the year 2030 because the cost includes the installation of a new well and a new water tower. However, the capital costs for the groundwater option will reduce significantly after 2030 once the well and water tower are installed. Figure 4 provides a comparison of the anticipated costs as a water rate from 2030 through 2050 for all alternatives and scenarios.

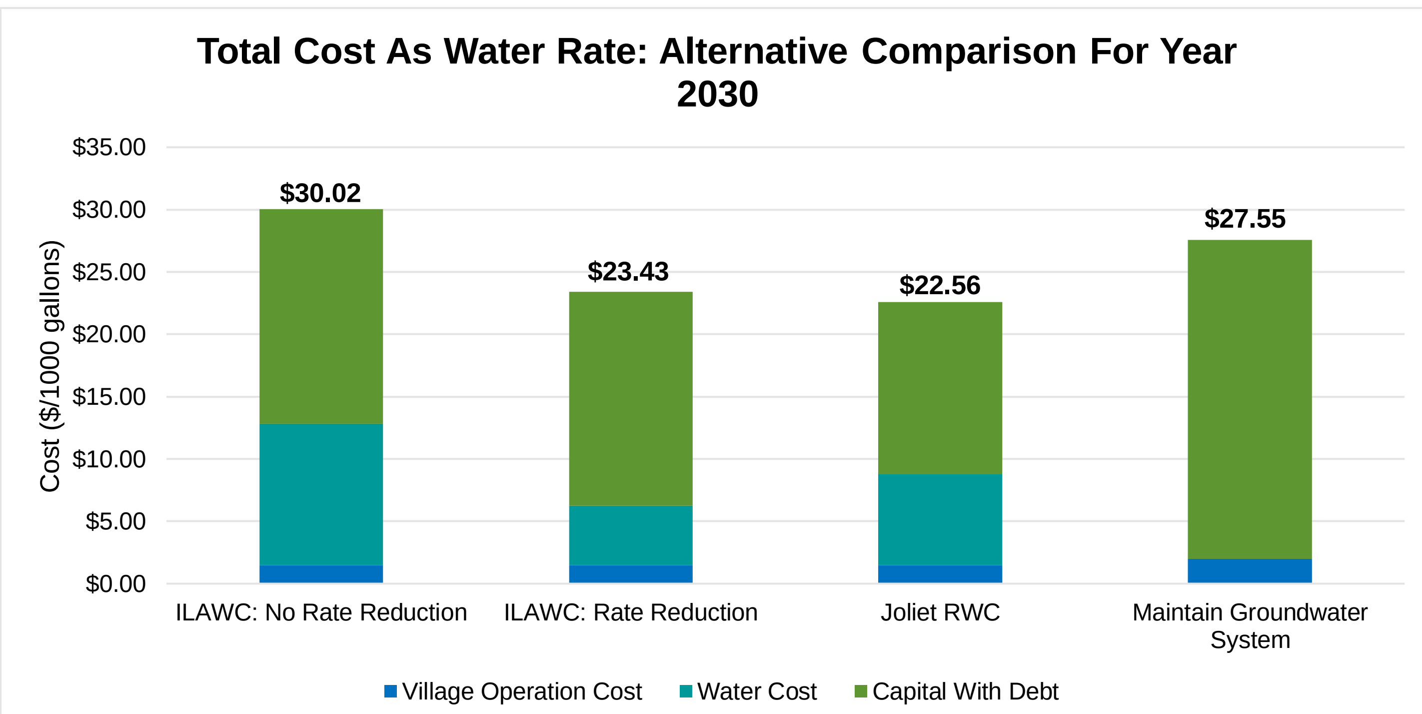

FIGURE 3: YEAR 2030 TOTAL COST AS WATER RATE FOR ALL ALTERNATIVES & SCENARIOS

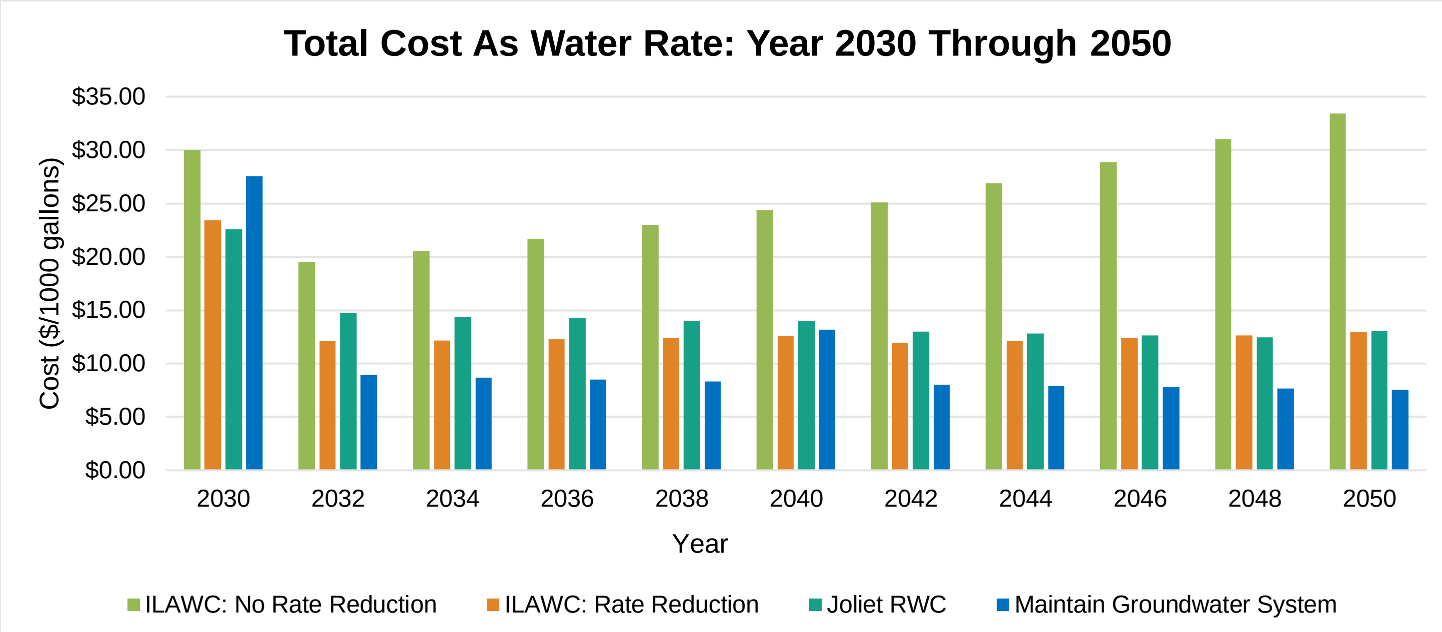

FIGURE 4: TOTAL COST AS WATER RATE FOR ALL ALTERNATIVES & SCENARIOS FOR YEAR 2030 THROUGH 2050

Figure 5 provides the total present value (2021 dollars) of the expected water costs through 2050 for each alternative and scenario. The figure shows that maintaining the existing groundwater system is currently the least costly option. When comparing the two Lake Michigan alternatives, the more cost effective solution will be heavily dependent on if the ILAWC will be able to secure lower water rates from the City of Chicago and Village of Bedford Park.

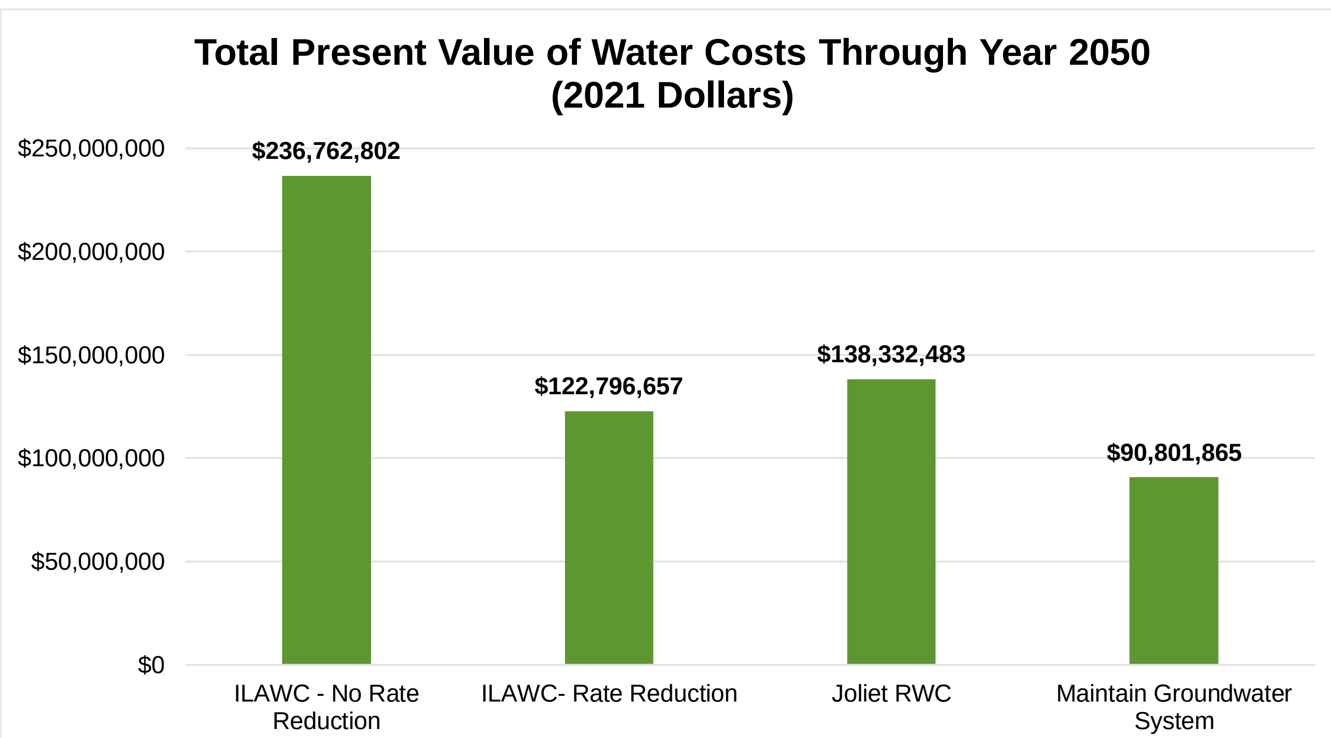

FIGURE 5: TOTAL PRESENT VALUE OF WATER COSTS THROUGH 2050 FOR ALL ALTERNATIVES & SCENARIOS (2021 DOLLARS)

V. Water Alternative Comparison

In addition to financial considerations, there are numerous qualitative considerations that should be considered before selecting the water supply alternative that works best for the Village. Table 24 provides a water alternative comparison matrix which lists other considerations for the three alternatives.

TABLE 24: WATER ALTERNATIVE COMPARISON

Water Alternative Comparison Matrix			
Category	**ILAWC**	**Joliet RWC**	**Groundwater System**
Water Security	Lake Michigan water is considered a reliable, long-term source water option.		Currently, the predicted groundwater depletion is not expected to be severe enough to prevent the Village from meeting future demands. However, according to the ISWS, the aquifer's withdrawal rate is currently unsustainable and there is some future uncertainty with the water source.
Existing System Infrastructure	ILAWC's infrastructure is well established.	Joliet RWC infrastructure has not yet been constructed. Construction costs, project schedule, and system parameters are subject to change.	The Village's groundwater infrastructure, including wells and softening plants, are well established.
System Condition	ILAWC has indicated that system components are in good condition at this time. The 36-inch PCCP transmission main's remaining service life is approximately 29 years. Some pumps at the Grant Road Booster Station may need to be replaced in the future.	The system will be new and is expected to have a long service life.	The existing groundwater system is currently in fair condition and regularly maintained by the Village water staff.
System Capacity	Currently the system has sufficient capacity to handle the Village's demands. However, the addition of new ILAWC customers in the future may reduce the available capacity.	The system would be designed to handle the Village's projected future capacity.	The system will have sufficient capacity once two new wells are built to account for future growth (one well in 2030 and one well in 2040).
Customers and Cost Distribution	Existing customers are well established. The anticipated cost distribution among existing customers for O&M costs and capital costs are predictable.	O&M costs & capital costs are in preliminary stages. Cost distribution among members may change depending on the finalized construction costs and the actual number of members who join the Joliet RWC.	Not applicable - Existing groundwater system capital and O&M costs are paid for by the Village of Lemont.
Governance	The Village would be an ILAWC customer rather than an equal partner.	The Village would be an equal partner of the Joliet regional water commission.	Not applicable

TABLE 24 CONTINUED: WATER ALTERNATIVE COMPARISON

Water Alternative Comparison Matrix			
Category	**ILAWC**	**Joliet RWC**	**Groundwater System**
Supplier Water Rates	City of Chicago and Village of Bedford Park water rates may reduce in the future, but no formal agreements have been made yet. The future annual cost escalation is not yet known.	Joliet RWC has established an agreement with the City of Chicago with favorable water rates. The agreement also has a cap on the annual cost escalation.	The Village is the water supplier and has more control over establishing future water rates. The established rates would primarily depend on the Village's water expenses.
Water Quality	Lake Michigan water has a higher level of organic materials, meaning that disinfection by-products are more common. The Lake Michigan water source has significantly less sodium and sulfate.		Groundwater sources have fewer organic materials, making disinfection by-products less common. The water has higher sodium and sulfate levels.
Corrosion Control Study	Switching water sources will require a corrosion control study.		No corrosion control study is anticipated.
Village O&M	Since a majority of the wells will be decommissioned once on Lake Michigan water, the Village's O&M costs are expected to decrease.		Village O&M costs will be higher than the Lake Michigan option to account for well maintenance.
Overall Costs	Total water costs will be higher due to water supplier costs (water rates, O&M, commission capital improvements, etc.).		Maintaining the existing groundwater system is expected to have the lowest total water costs.

VI. Conclusion

This report evaluated the feasibility and costs associated with the three water supply alternatives: 1) Illinois American Water Company System, 2) Joliet RWC, and 3) maintaining the existing groundwater system. The purpose of this report was to provide guidance to help the Village make an informed decision to meet current and future water needs.

All three alternatives will have some level of uncertainty. The financial analysis shows that maintaining the existing groundwater system will be the most cost effective option. Currently, the predicted groundwater depletion is not expected to be severe enough to prevent the Village from meeting future demands. However, according to the ISWS, the aquifer's withdrawal rate is currently unsustainable and there is some future uncertainty with the water source. The primary uncertainty with ILAWC is related to the water rates; the cost feasibility will be heavily dependent on whether ILAWC can secure a formal agreement with the City of Chicago for reduced water rates and a cap on the annual cost escalation to match Joliet RWC's agreement. Lastly, the primary uncertainty with the Joliet RWC is that the infrastructure is not yet constructed, so the exact costs and timeline of the system are subject to change. The Village's ultimate decision should consider both the financial and qualitative aspects of each water supply alternative.

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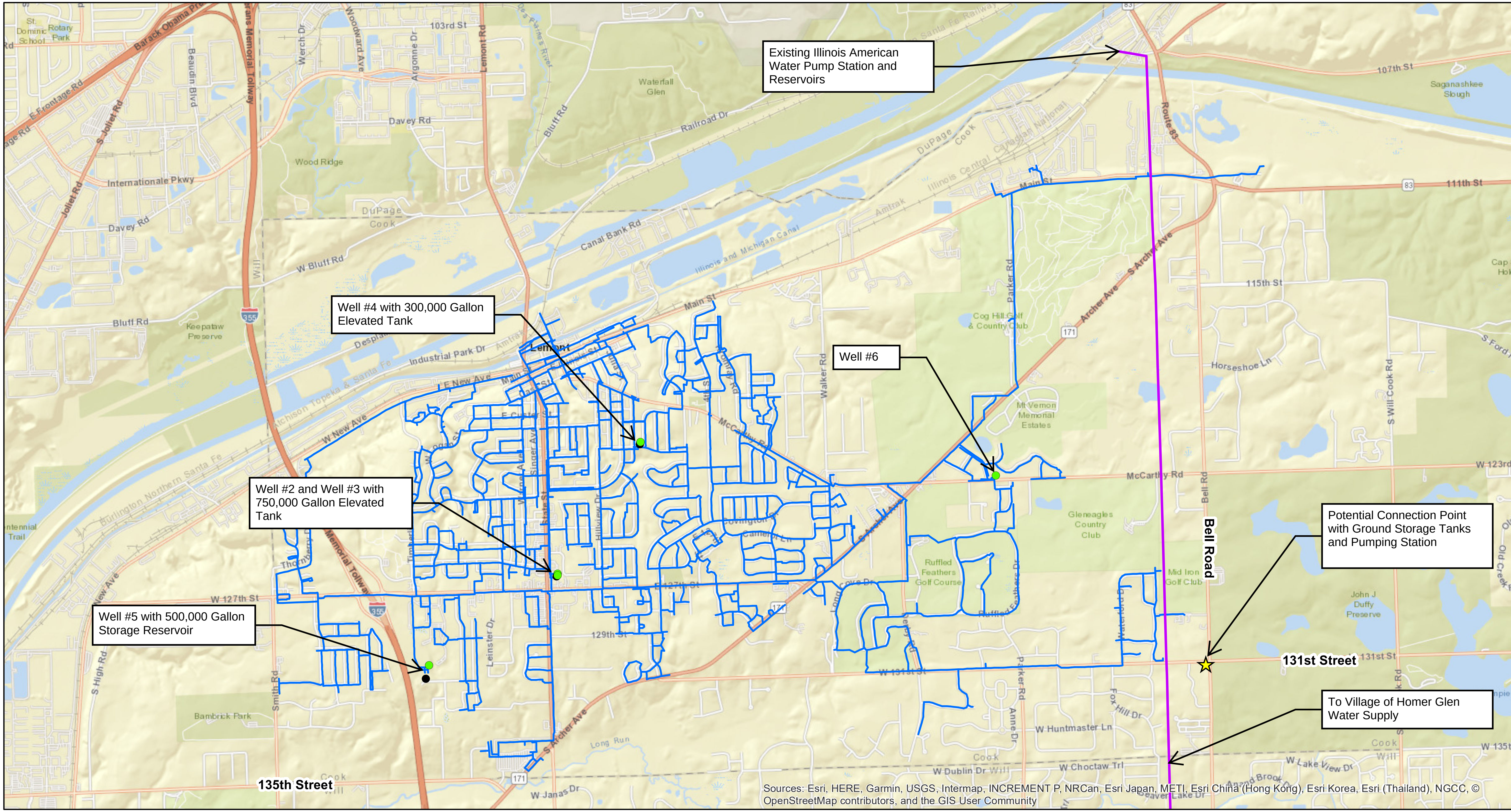
Appendix 1



Potential Water Connection with Illinois American Water

Village of Lemont, Illinois

Legend

- Existing Watermain
- Existing Well
- Existing Storage Tank
- Potential Village of Lemont Connection to Illinois American Water
- Approximate Location of Existing Illinois American Water 36" Water Transmission Main

Data Source:
Coordinate System: NAD 1983 2011 StatePlane Illinois East FIPS 1201 Ft US
Projection: Transverse Mercator
Datum: NAD 1983 2011
Units: Foot US

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Feet

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HRGreen

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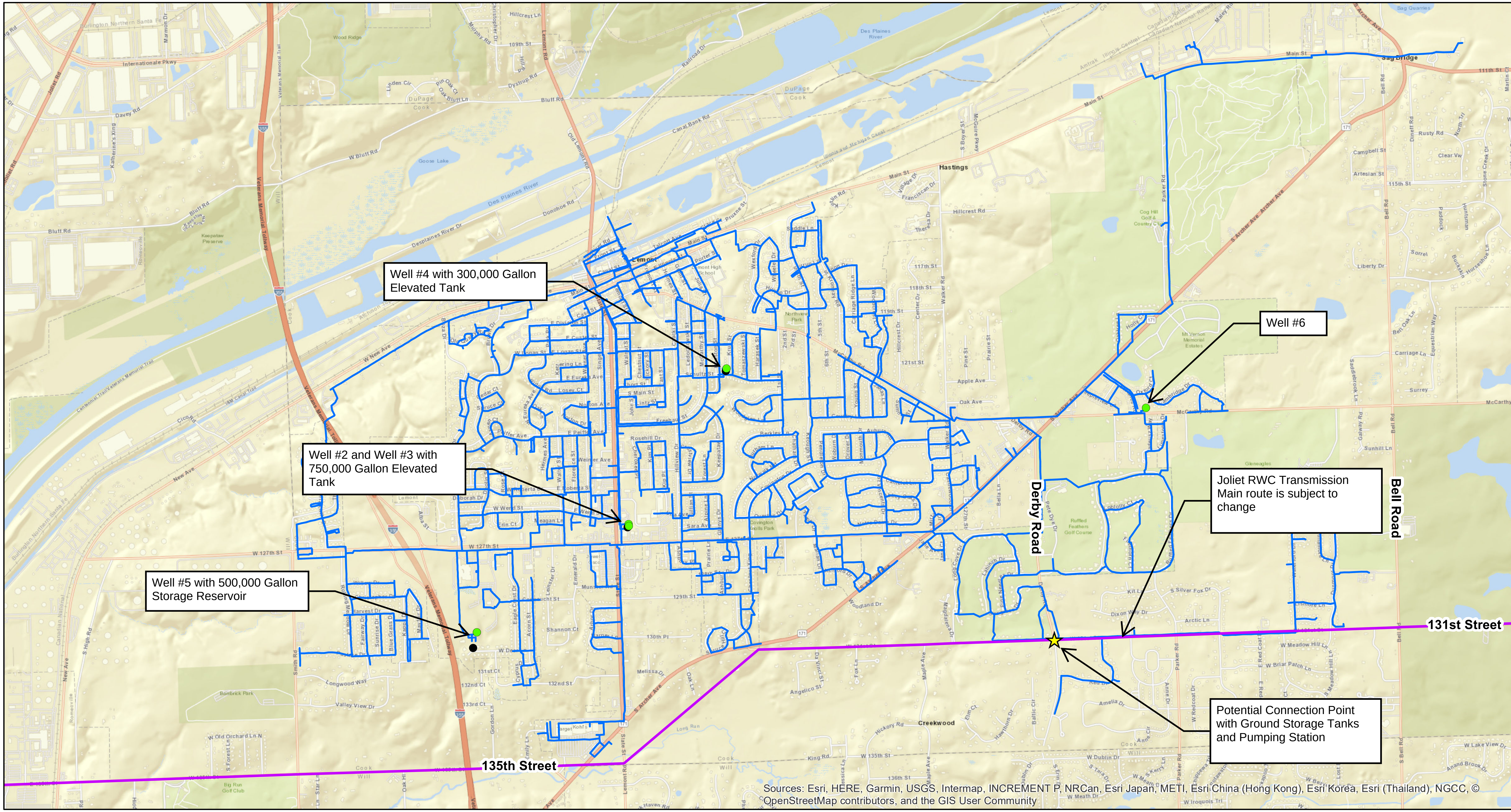
Appendix 2



Potential Water Connection with Joliet RWC

Village of Lemont, Illinois

Legend

- Existing Watermain
- Existing Well
- Existing Storage Tank
- Potential Village of Lemont Connection to Joliet Water Agency
- Approximate Location of Proposed Joliet RWC Transmission Main

Data Source:
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Units: Foot US

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Feet

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HRGreen

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Appendix 3

Technical Memorandum

To: Ravi Jayaraman, HR Green
From: Martha Silks, LRE Water
Reviewed by: Mike Plante, PG, GISP and Dave Hume, LRE Water
Date: December 2, 2021 (Revised 02/16/2022)
Project: LRE No. 5018HRG18
Subject: Hydrogeologic Evaluation on the Feasibility of a Groundwater Supply Option for Expanding Raw Water Supply, Village of Lemont, Illinois

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1.0 INTRODUCTION AND PROJECT OBJECTIVE

The Village of Lemont (Village) is currently using groundwater wells for its water supply. The Village was interested in evaluating whether they should stay on groundwater wells or move to alternate water supply sources – specifically Lake Michigan water from Illinois American Water Company (ILAWC) or from proposed Joliet Regional Water Commission. LRE Water (LRE) was retained by HR Green as its hydrogeological subconsultant to assist with the evaluation of groundwater wells at water supply source. In addition to that effort, LRE was tasked with completing a hydrogeologic evaluation (Evaluation) to estimate the feasibility of developing additional public water supply (PWS) wells completed in the deep Cambrian-Ordovician aquifer (C-OA) for the Village of Lemont, Illinois (Village).

The Village is in Cook County, approximately equal distance between the cities of Joliet and Naperville, and the Village of Summit, Illinois. It is the Village's desire to locate new wells within the Village boundaries (Study Area). One new proposed well is planned to be located on property owned by the Village near the intersection of Derby Road and Archer Avenue. Possible locations for a proposed second well were evaluated as part of this Evaluation. It is intended that each new well will be designed for a 1,000 gallon per minute (gpm) capacity. Figure 1 presents the Study Area and the existing Village water system map. Figure 2 presents historical and/or existing deep wells (> 1,000 feet total depth) located within the Study Area. An inventory of these wells is included as Attachment A.

Illinois Environmental Protection Agency (IEPA) recommends that the Village's average day demand be able to be supplied by the Village's firm water supply capacity. Firm water supply capacity is defined as the capacity of the system with the largest well out of service. The Village has projected a population of 31,000 by Year 2060. The projected Village average day and maximum day demand by year 2060 is 2.79 MGD (1,938 gpm) and 4.74 MGD (3,292 gpm).

2.0 REGIONAL HYDROGEOLOGY AND USAGE

LRE reviewed available geologic and hydrogeologic reports, and other available pertinent data from municipal and private well records within the Study Area. Deep groundwater resources in the region are developed mainly from two aquifer systems 1) shallow dolomite formations (Silurian aquifer), and 2) deep sandstone and dolomite formations of the C-OA (HR Green, 2016). All of the high-capacity wells within the Study Area are open to the C-OA. The formations open to C-OA wells include limestone, shale, and sandstone. The combined thickness of the sandstone units ranges from 235 to 300 feet thick within the Study Area and are considered the most productive.

Cambrian-Ordovician aged formations, including those that comprise the C-OA, occur at or near the land surface or directly below glacial deposits in parts of north-central and northwestern Illinois (and into southern Wisconsin). Recharge to the C-OA is predominately from precipitation and surface water infiltration and to a lesser extent from leakage of other geologic units that are hydraulically connected (K-Plus, 2014). A more detailed literature review of the C-OA was conducted by HR Green in 2015 and their technical memorandum (Attachment B) covers the hydrostratigraphy of the C-OA in detail. Future well sites were recommended to be to the east-northeast of the Village to move pumping centers farther away from the intensely stressed area near Joliet and into areas with greater available drawdown (HR Green, 2015).

In 1864, when the first known well was drilled into the C-OA in Chicago, the well flowed with sufficient pressure to produce an 80-foot column of water. By the mid-1900’s, withdrawals from the C-OA had exceeded the annual naturally occurring recharge rate (K-Plus, 2014). By 1979 there was a pronounced water level depression centered on the Chicago metropolitan area with as much as 850 feet of decline in Chicago and other major pumping centers. The extent of the water level decline extended throughout northeastern Illinois and into parts of southern Wisconsin (K-Plus, 2014). After 1979, due to many concerns related to the declining piezometric surface, other sources of water supply were developed. These conversions to alternate sources reduced withdrawals from the C-OA and, for a time, reversed the drawdown trend (K-Plus, 2014). The C-OA remains the most used groundwater source in the region.

3.0 STATE REQUIREMENTS REGARDING LOCATION OF PWS WELLS

The State Administration Code (Title 77, Section 920.50) states that a minimum lateral distance is 200 feet between a new well's location from a potential contamination source (PCS) that exist on or adjacent to the location of the well. The State may allow a variance to the minimum separation distances if the PCS and well have the same owner. In such a situation the State will require assurances the well is constructed with applicable and sufficient protective measures to minimize the potential for contamination of the well. Table 1 provides the United States Environmental Protection Agency (USEPA) listed activity types and sources they consider a PCS. It is important to note that these are examples of what is considered a PCS and not a complete list.

Table 1 - USEPA List of Potential Contaminant Sources

Activity Type	EPA List of Potential Contaminant Sources
Agriculture	Fertilizer storage and use, animal feedlots, animal waste disposal systems, animal burial, manure stockpiles (e.g., pits and lagoons), manure spreading, general waste disposal wells, pesticide storage and use (e.g., spread by airplane), field irrigation
Commercial	Airports, boatyards, railroad track and yards, junkyards, recycling and waste transfer stations, auto repairs shops, carwashes, laundromats, dry cleaners, paint shops, gas stations, construction sites, golf courses, floor drains and waste disposal wells, research laboratories and medical institutions, funeral homes and cemeteries
Industry	Oil and gas production and storage, pipelines, petroleum refineries, chemical manufacture and storage, mining, electroplating facilities, foundries, metal fabrication facilities, machine shops, waste disposal wells, paper mills, textile mills
Residential	Fuel oil storage tanks, household chemical storage and use, swimming pool chemical storage, septic tanks and leach fields, sewer lines, floor drains, lawn fertilizer storage and use
Other	Road de-icing, landfills, sewer lines, storm water pipes and drains, abandoned production and disposal wells, nearby active disposal wells, illegal dumping

Source: www.epa.gov/privatewells/potential-well-water-contaminants-and-their-impacts

4.0 EXISTING AND PROJECTED FUTURE VILLAGE GROUNDWATER USE

Table 2 presents completion and usage information of active Village wells. Four of the five active Village wells are completed in the C-OA. Well 2 is completed in the Silurian Aquifer and is used for emergency backup. Projected Village average day and maximum day demand by year 2060 is 3.94 MGD (2,736 gpm) and 6.7 MGD (4,653 gpm) (HR Green Correspondence 11/8/2021). To meet this projected demand, with the largest well out of service, two additional 1,000 gpm C-OA wells are required.

Table 2 - Village Well Completion and Usage Information

Well ID	Date Completed	Casing Diameter (in)	Casing Depth (ft bgs)	Open Hole Interval (ft bgs)	Pump Setting Depth (ft bgs)	Capacity (gpm)
Well #2	Backup Well for Emergency Use, Shallow Aquifer TD 241 ft					350
Well #3	10/01/1963	12	1,152	1,152 – 1,723	931	705
Well #4(1)	9/01/1978	16	1,150	1,150 – 1,658	935	712.5
Well #5	4/24/1996	18	1,175	1,175 – 1,675	948	970
Well #6	10/18/2004	18	1,186	1,186 – 1,665	1,089	970

Notes: Completion information are from Well Records Provided by Layne Christensen.
Pumping capacities are from HR Green, 2016. TD = Total Depth
(1) Record notes the well alignment is off at 650 ft bgs.

5.0 HYDROGEOLOGICAL ASSESSMENT OF EXISTING GROUNDWATER WELLS

The Village obtained historical completion and testing information from Layne Christensen on the Village's C-OA wells and this data is provided in Attachment C and summarized in Table 3. The summary below includes static water levels, test pumping rates, and specific capacities for each test and rate step. Specific capacity (Q/s) is the pumping rate divided by the resulting water level drawdown and is presented as gallons per minute per foot of drawdown (gpm/ft).

Table 3 - Summary of Well Test Data of Village C-OA Wells

Well ID and Ground Elevation	Date of Pumping Test	Test/Step Rate (gpm)	Test/Step Duration (min)	SWL (ft bmp)	PWL (ft bmp)	Specific Capacity (gpm/ft)
Well #3 736 ft msl	3/24/2009	822	60	775	815	20.6
		852	60		821	18.5
		881	60		824	18.0
Well #4 731 ft msl	10/2/1978	613	30	740	796	10.9
		856	240		790	17.1
		1032(1)	780		804	16.1
		841(2)	390		794	15.6
	8/24/1989	890	NR	795	827	27.8
	8/19/1991	700	NR	831	855	29.2
	6/19/2007	723	30	745	802	12.7
		781	30		804	13.2
		856	30		810	13.2
Well #5 740 ft msl	7/1/1997	902	30	789	824	25.8
		982	30		830	24.0
		1020	30		834	22.7
		1096	30		841	21.1
	2/20/2006	852	30	789	828	21.8
		867	30		835	18.8
		909	30		842	17.2
		1007	NR		842	19.0
Well #6 718 ft msl	6/15/2006	950	30	707	817	8.6
		963	45		820	8.5
		982	45		829	8.0
	4/29/2009	815	30	705	786	10.1
		860	25		797	9.3
		916	30		806	9.1
	1/18/2012	584	30	701	801	5.8
		641	30		811	5.8
		676	30		821	5.6
	8/18/2021	976	5	711	848	7.1
		1001	10		853	7.0
		1050	5		863	6.9
		1044	10		868	6.6

Notes:
(1) Pumping rate varied from 1,000 to 1073 gpm during step, average rate was 1,032 gpm.
(2) Pumping rate varied from 810 to 876 gpm during step, average rate was 841 gpm.
Ground elevations were estimated from GoogleEarth™.
NR: not recorded, ft bmp: feet below measuring point

The data presented in Table 3 do not show a significant change in static water levels from 1978 to 2021 in the Village wells.

The specific capacity can be used to estimate aquifer transmissivity (T), in a confined aquifer, using the empirical equation: Q/s = T/2000 (Driscoll, 1986). The estimated C-OA T values obtained from the variable rate tests of the Village wells (Table 3) ranged from 11,200 to 58,400 gallons per day per foot of drawdown (gpd/ft) or 1,497 to 7,807 square feet per day (ft^2/day). Dividing by an aquifer thickness of 267.5 feet (average thickness value) results in hydraulic conductivity values between 42 and 218 gallons per day per square foot of aquifer (gpd/ft^2) or 5.6 to 29 feet per day (ft/day). These are high values for a consolidated sandstone aquifer indicating the C-OA has higher than typical hydraulic properties. Typically, the hydraulic conductivity of a consolidated friable sandstone aquifer is between 0.01 to 10 gpd/ft^2 (Driscoll, 1986, p. 75).

Specific capacities, obtained from data on the well registration forms of other private wells within the Study Area, ranged from 3.36 to 15.92 gpm/ft. (Attachment A). The estimated T values obtained from this data ranged from 6,700 to 31,840 gpd/ft or 898 to 4,257 ft^2/day. Dividing by an aquifer thickness of 267.5 feet results in hydraulic conductivity values between 25 and 119 gpd/ft^2 or 3.35 to 15.9 ft/day

We would have preferred a greater number of well test results to include in the analysis. The pump setting of Village and local private wells should be regularly checked to make sure there is adequate equipment submergence for the projected drawdown impacts. The Village should maintain long-term records of well static and pumping levels. Also maintain long-term records of specific capacity particularly prior to and after well rehabilitation projects.

Software produced by HydroSOLVE, Inc. (AQTESOLV ver. 3.01) was used to generate a plot of time-recovery data from the October 2, 1978 test in Well #4 and estimate T of the C-OA near the Village (Attachment C). This analysis resulted in a T for the C-OA to be 19,420 gpd/ft or 2,596 ft^2/day. Dividing the T by an aquifer thickness of 267.5 feet results in a hydraulic conductivity value of approximately 73 gpd/ft^2 or 10 ft/day Again, this is a high value for a consolidated friable sandstone aquifer (Driscoll, 1986, p. 75).

6.0 ISWS REPORT TO SOUTHWEST WATER PLANNING GROUP

In 2020, the Illinois State Water Survey (ISWS) published a report to the Southwest Water Planning Group (SWPG) on the status of the C-OA within the southwest suburbs of Chicago. The Village was included in the ISWS study area. An important source of water supply to many communities within the ISWS study area is the C-OA. The report cites that withdrawals from the C-OA have been unsustainable for nearly a century and, as a result, water levels have declined.

In 2018, the City of Joliet (Joliet) assessed its long-term water supply and determined that the C-OA could not meet their needs as early as 2030. With Joliet planning to cease use of the C-OA, communities in Kendall County have also considered converting their water supply to another source.

The ISWS study included the update of an existing 2018 groundwater flow model to assist SWPG in making a community-by-community assessment for existing C-OA users. In the model scenarios and study conclusions, it was assumed that Joliet ceases use of the C-OA in 2030, and the cities of Oswego, Yorkville, and Montgomery cease use of the C-OA in 2035. The ISWS study concluded that most C-OA wells in the SWPG region are at risk of not meeting supply in the future and, as water levels continue to decline, they will become increasingly vulnerable to new demands in the region. Their predictions were, that by 2030, the Village wells would be at risk of declining well performance but did not forecast Village wells would be at risk of no longer operating. The risk factors facing the Village and private C-OA users in the Study Area include risk of dry wells, potential for wells to pump sand, increased well interference, increased well maintenance, and the increased cost of pumping due to declining water levels (ISWS, 2018).

The ISWS study concluded that the Village wells would be affected by the regional C-OA water level decline. The ISWS study did not predict that the Village wells would be so severely affected that they would be inoperable or the C-OA could not sufficiently meet Village's future demand. Continued use may require the pumps be lowered, more frequent maintenance, and greater spacing of future wells (ISWS, 9/07/2020).

A meeting was held between HR Green Project Engineer (Ravi Jayaraman, PE), LRE Hydrogeologist (Martha Silks), and the ISWS modelers (Daniel B. Abrams and Cecilia Cullen, M.S) on 11/30/21. From the discussion the following clarifications and modifications were offered:

1. The risk areas in the ISWS model results (shown in orange in both the ISWS model report and the summary reports: ISWS, 9/07/2020) are assumed to be 600 feet above the top of the Ironton-Galesville formations of the C-OA. Historically when water levels (static and pumping) fall to this level, wells are at risk of declining production.
2. In the ISWS prepared summary for the Village of Lemont (ISWS, 9/07/2020) where a drawdown of 200 feet was used for a Well #3 hydrograph. This drawdown was assumed because ISWS did not have an actual drawdown for the

well. The actual water level drawdown observed in Well #3 is much less (Table 3). ISWS agreed to revise the hydrograph based on actual data. ISWS clarified that the change in drawdown trend of the hydrographs around 1980 was a result of a number of groundwater users switching from C-OA to a shallow aquifer or surface water source. ISWS ran their model with the revised drawdown data for Well #3 and mentioned that there was no substantial change to the initial recommendations.

3. HR Green and LRE Water asked if the groundwater model could be re-run to account for the Village of Romeoville, Illinois recent decision to switch from their use of the C-OA to Lake Michigan as their water supply source. ISWS responded that they could not do this additional modeling but that the water level recovery expected from the reduction in Romeoville's withdrawal from the C-OA would not be significant.
4. ISWS clarified that the 2050 and 2070 peak demand conditions simulated in the groundwater model were the results of annual time steps with the addition of 14 days of peak demand pumping for both 2050 and 2070. The groundwater model simulations with the additional C-OA withdrawal of 1.5 and 3.0 MGD were hypothesized as a new data center or if a large industry should switch from a surface water to a C-OA water supply source.

The results of hydrogeological assessment completed by LRE paint a somewhat different picture than what ISWS modeling study is predicting. As detailed above in Section 5 of this Memorandum, the estimated aquifer transmissivity (T) values obtained from the variable rate tests of the Village wells ranged from 11,200 to 58,400 gallons per day per foot of drawdown (gpd/ft) or 1,497 to 7,807 square feet per day (ft2/day). Dividing by the aquifer thickness of 267.5 feet (average thickness value) results in hydraulic conductivity values between 42 and 218 gallons per day per square foot of aquifer (gpd/ft2) or 5.6 to 29 feet per day (ft/day). These are high values for a consolidated sandstone aquifer indicating the existing groundwater wells have higher than typical hydraulic properties. Also as mentioned in the Section, the typical hydraulic conductivity of a consolidated friable sandstone aquifer is between 0.01 to 10 gpd/ft2. The results of the hydrogeological assessment completed by LRE with the data provided by the Village support a more optimist projection of the viability of the Village's wells in the future.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Calculations of drawdown impact on Village wells with the addition of two C-OA wells indicate that the Village should be able to meet future projected demand by year 2060. Of course, as with any modeling projection there are assumptions related to growth and likely continued use of the aquifer by others. Should the Village's flow projection increase dramatically beyond those assumed or should other parties outside the Village access or significantly expand withdrawals from the C-OA the modeling projections could be impacted. The pump setting of Village and local private wells should be checked to make sure there is adequate equipment submergence for the projected drawdown impacts, including those predicted by the ISWS study. The Village should maintain long-term records of well static and pumping levels. Also maintain long-term records of specific capacity particularly prior to and after well rehabilitation projects. Table 4 presents predictions of drawdown impact in each of the identified C-OA wells within the Study Area, with both proposed wells (Well #7 and Well #8) pumping 1,000 gpm for 90 days. These predictions of drawdown impact do not include drawdown in the well or cumulative impact from private C-OA wells. Information on private well usage, static water levels, and pumping water levels would be required to include these impacts.

Should the Village decide to continue use of the C-OA aquifer two well sites are proposed to meet future Village demand. The proposed well sites for Well #7 and Well #8 are shown on Figures 2 and 3. It is recommended that both wells are completed in the C-OA with well depths of approximately 1,665 feet bgs, similar to Wells #5 and #6.

LIST OF FIGURES

LIST OF ATTACHMENTS

REFERENCES AND BIBLIOGRAPHY

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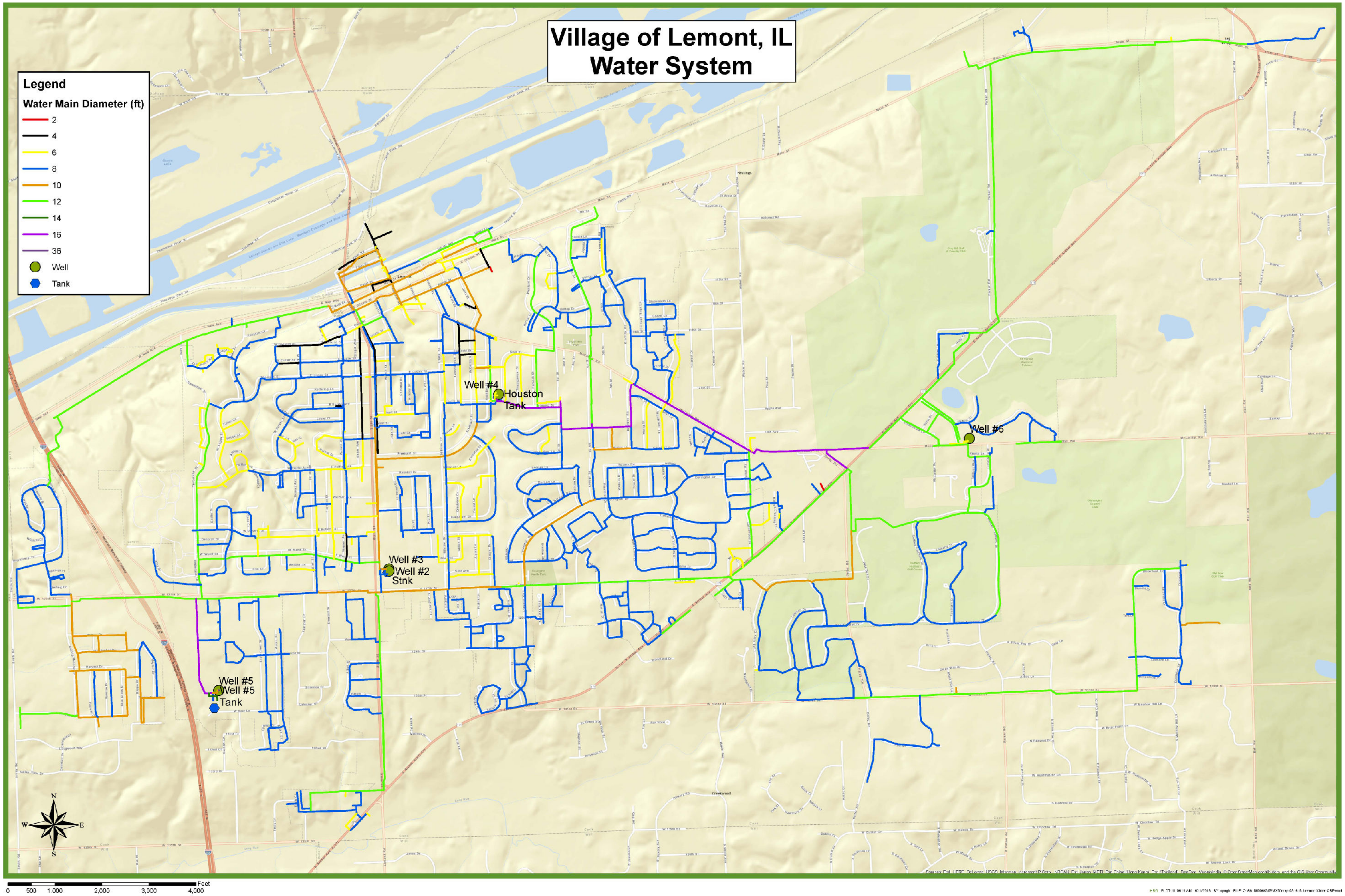

IL
Site

LRE WATER
CONNECTING WATER TO LIFE

Prepared By:
LRE Water
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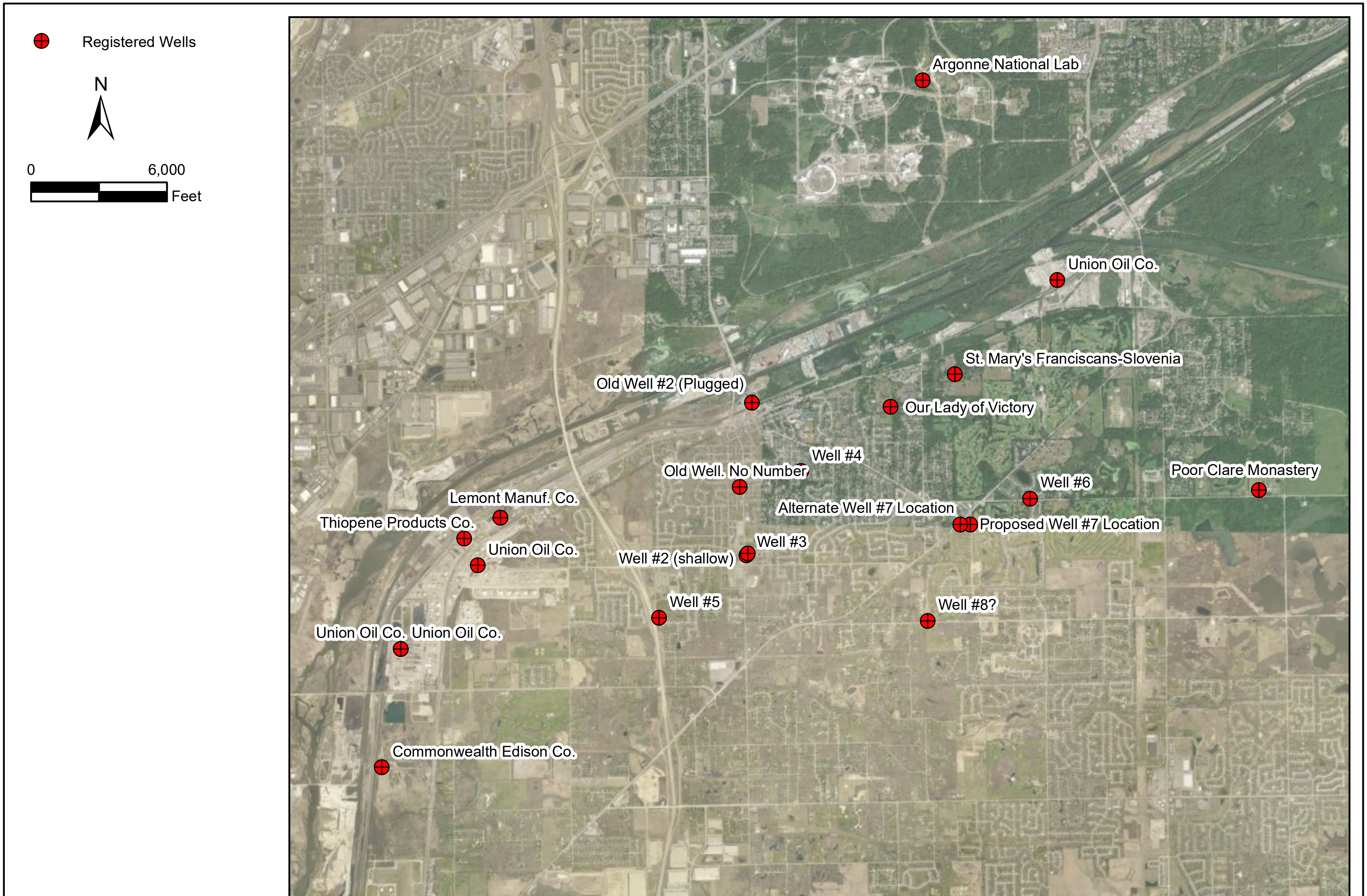
HR GREEN, INC.
FEASIBILITY OF GROUNDWATER OPTION FOR VILLAGE OF LEMONT, ILLINOIS
LEMONT, ILLINOIS

VILLAGE OF LEMONT WATER SYSTEM

FILE: 5018HRG18_1a.MXD	DATE: 10/20/2021	FIGURE: 1



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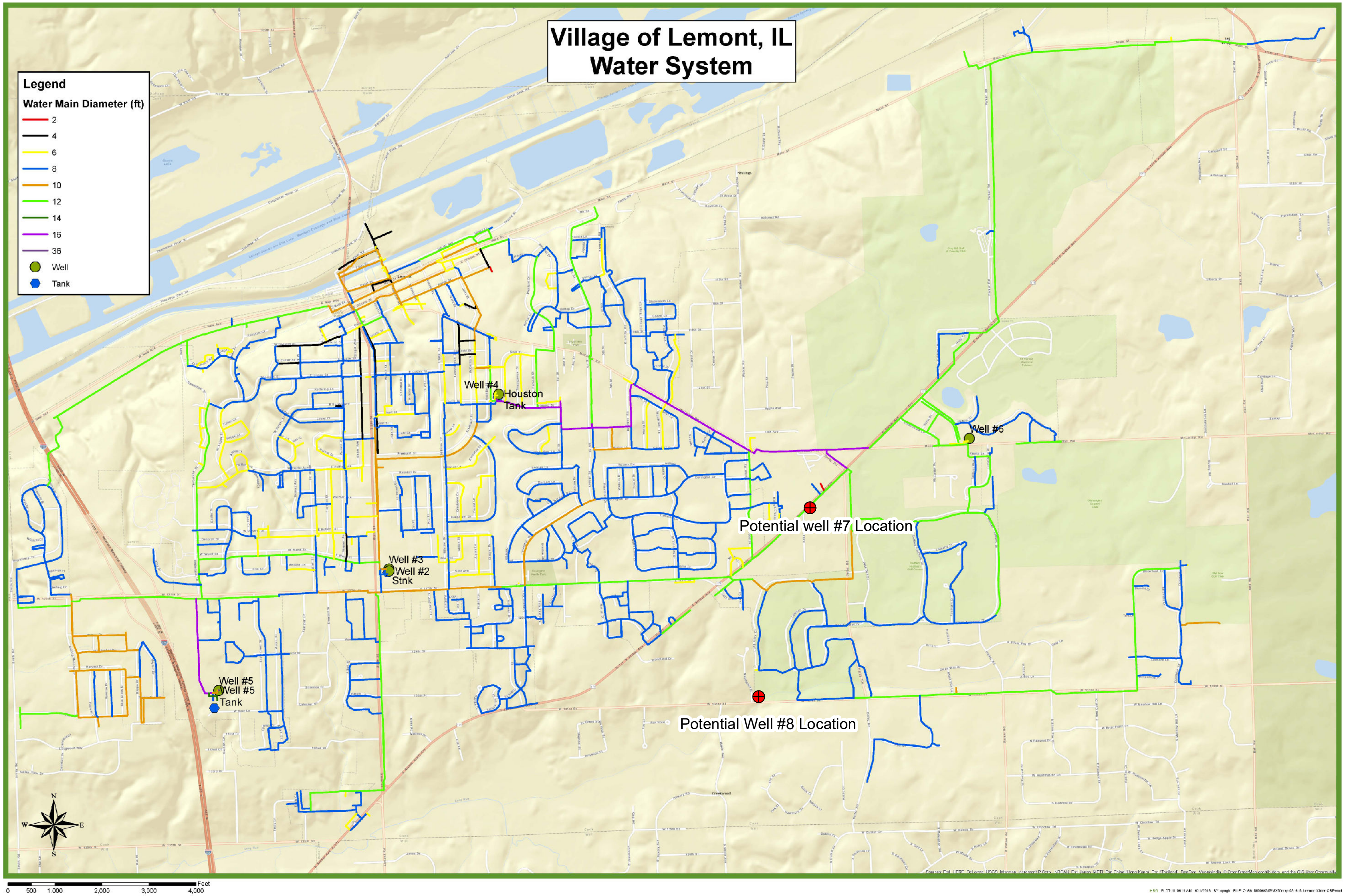
LEMONT, ILLINOIS

REGISTERD WELLS WITHIN VILLAGE BOUNDARIES THAT EXCEED 1,000 FOOT DEPTH

FILE: 5018HRG18_1b.MXD	DATE: 10/20/2021	FIGURE: 2



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FEASIBILITY OF GROUNDWATER OPTION FOR VILLAGE OF LEMONT, ILLINOIS
LEMONT, ILLINOIS

PROPOSED WELL #7 AND WELL #8 LOCATIONS

FILE: 5018HRG18_1c.MXD	DATE: 10/20/2021	FIGURE: 3

Attachment A

Inventory of C-OA Wells in Study Area

Attachment A Inventory of Registered Wells Within Study Area

Well ID		Latitude	Longitude	Completion Date	Well Status	Well Depth (ft bgs)	Inner Casing Depth (ft bgs)	SWL on Record (ft TOC)	PWL on Record (FT TOC)	Pumping Rate on Record (gpm)	Pumping Duration on Record (hrs)	Calculated Specific Capacity (gpm/ft)	Estimated Aquifer Transmissivity (gpd/ft)
Well 2	Village of Lemont	41.658015	-87.999293	NR	Backup	241	NR	NR	NR	NR	NR	-	-
Well 3	Village of Lemont	41.657803	-87.999509	10/1/1963	Active	1723	1152	NR	NR	NR	NR	-	-
Well 4	Village of Lemont	41.668103	-87.990797	8/1/1978	Active	1658	1150	NR	NR	NR	NR	-	-
Well 5	Village of Lemont	41.650128	-88.013471	4/24/1996	Active	1675	1175	NR	NR	NR	NR	-	-
Well 6	Village of Lemont	41.665082	-87.953783	10/18/2004	Active	1665	1186	NR	NR	NR	NR	-	-
Old Well 2	Village of Lemont	41.676326	-87.998929	1892	Plugged	2284	NR	NR	NR	NR	NR	-	-
	Poor Clare Monastery	41.666414	-87.916823	4/12/2002	Unknown	1600	1400	NR	NR	NR	NR	-	-
	North American Car Co.	41.691618	-87.949755	9/1/1960	Unknown	1601	392	415	475	955	24	15.92	31,833
	St. Vincent DePaul Seminary	41.680058	-87.966114	NR	Unknown	1685	NR	NR	NR	NR	NR	-	-
	Public Service (NRG Will Co. Power Generating Station)	41.634751	-88.062200	1952	Unknown	1536	320	NR	NR	NR	NR	-	-
	Commonwealth Edison Co.	41.631601	-88.057979	4/15/1974	Unknown	1503	852	NR	NR	NR	NR	-	-
	Prairie State Paper Mills	41.516835	-88.054041	pre 3/14/1964	Unknown	1635	NR	NR	NR	NR	NR	-	
	Prairie State Paper Mills	41.516835	-88.054041	10/1/1963	Unknown	1639	1169	457	680	750	18	3.36	6,726
	Our Lady of Victory	41.676036	-87.976495	3/20/1969	Unknown	1633	1074	616	744	1000	24	7.81	15,625
	Union Oil Company	41.645971	-88.055146	8/1/1968	Unknown	1460	810	509	543	302	6	8.88	17,765
	Union Oil Company	41.645991	-88.054227	6/29/1968	Unknown	1460	320	520	552	289	6	9.03	18,063
	Union Oil Company	41.656194	-88.042919	6/1/1969	Unknown	1501	340	480	588	510	NR	-	-
	Thiopene Products Co.	41.659429	-88.045122	12/1/1930	Unknown	1456	827	209	247	275		7.24	14,474
	Lemont Manufacturing Co.	41.662009	-88.039310	5/1/1959	Unknown	1498	400	NR	NR	NR	NR	-	-
	Argonne National Lab	41.715666	-87.971917	1/1/1950	Unknown	1595	NR	NR	NR	NR	NR	-	-
	Proposed Well #7	41.661816	-87.965000										
	Proposed Well #8	41.650126	-87.970071										

(1) NA = Not Applicable: Well #2 is completed in the shallower Silurian Aquifer that is not hydraulically connected.

(2) Well Drawdown assumes only 10% well loss (80% well efficiency) and does not include drawdown imapct from other wells.

Attachment B

HRG 2015 Technical Memorandum – Literature Review Cambrian-Ordovician Aquifer

Technical Memorandum

LITERATURE REVIEW
CAMBRIAN-ORDOVICIAN AQUIFER

April 28, 2015

Prepared For:

Village of Lemont
418 Main Street
Lemont, IL 60439

Prepared By:

HRGreen

Literature Review
Cambrian-Ordovician Aquifer

For

Village of Lemont, Illinois

Prepared By:

Name: Greg Brennan, P.HG., P.G.
Professional Geologist
Certified Professional Hydrogeologist

Signature: Greg Brennan

Date: 4/28/2015

HR Green, Inc.
8710 Earhart Lane SW
Cedar Rapids, IA 52404
Phone: (319) 841-4000
Fax: (319) 841-4012

HR Green was contracted to perform a literature review of existing hydrogeologic studies to identify viable areas for current and future wells. The following is a summary of findings, which focus on the deep groundwater resources of the region.

Geology and Hydrogeology

Deep groundwater resources in the region are developed mainly from two aquifer systems, including: 1) shallow dolomite formations known as the Silurian aquifer; and 2) deep sandstone and dolomite formations known as the Cambrian-Ordovician aquifer. The Village of Lemont Well #4 driller's log is shown below; the Well #5 log is not available. Table 1 shows the generalized stratigraphic units encountered and their corresponding hydrologic function. The Cambrian-Ordovician aquifer, which extends to a depth of about 1,640 to 1,700 feet beneath Lemont, is discussed herein.

Well #4, 1978. Total depth is 1,658 feet.

Formation	Top Depth
Silurian	116 Feet
Maquoketa	258
Galena	488
St Peter	833
Ironton	1,453
Eau Claire	1,638

The Cambrian-Ordovician aquifer (aka, "deep sandstone aquifers") is comprised of two major sandstone aquifers including the shallower St. Peter and the deeper Ironton-Galesville. These major sandstone aquifers are separated by a low permeability interval of dolomite and shale (the Prairie du Chien, Eminence-Potosi, and Franconia Formations) which forms a confining layer between them. The Ironton-Galesville sandstone is the more productive of the two sandstone aquifers, but supplemental yields are often obtained St. Peter sandstone. The Cambrian-Ordovician aquifer is bounded above and below by regional confining units – above by the Ordovician age Galena-Platteville dolomite and Maquoketa shale and below by the Cambrian age Eau Claire formation which is dominantly shale (Burch, 2008).

- The St. Peter sandstone is part of the Ancell Group (composed of the Glenwood Formation and St. Peter sandstone) which often exceeds 200 feet in thickness. The St. Peter sandstone consists of fine-grained well-sorted quartz sandstone. The majority of municipal and industrial wells finished in the St. Peter sandstone produce less than 200 gallons per minute (gpm), (Burch, 2008).

- The Ironton-Galesville sandstone is generally 175 to 200 feet thick (Suter et al., 1959). Most high-capacity, deep municipal and industrial wells in the region obtain a major part of their yields from this aquifer (Burch, 2008).

The hydrologic properties of an aquifer describe how the aquifer responds to pumping, which in turn determines the pumping rates and spacing of production wells. Testing in the region indicates the Cambrian-Ordovician aquifer exhibits confined aquifer behavior with the following average hydraulic properties: Transmissivity of 17,000 gallons per day/foot (gpd/ft) and Storage Coefficient of 0.0003 (Prickett & Lonnquist, 1971).

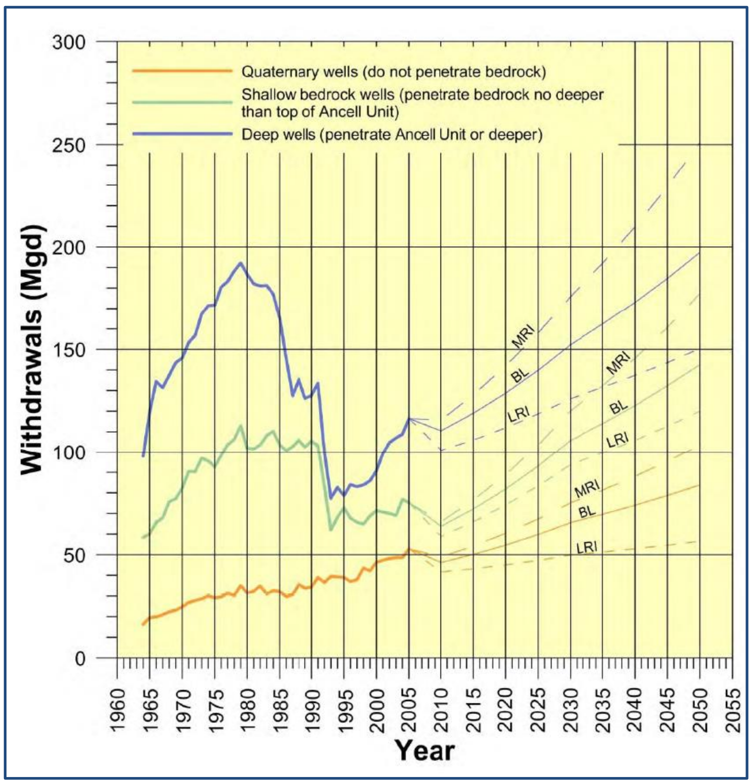
Table 1: Generalized Stratigraphy and Hydrologic Function
(From: USGS, Scientific Investigations Report 2005-5122)

SYSTEM	GROUP	FORMATION	REGIONAL AQUIFER OR CONFINING UNIT	LOCAL HYDROGEOLOGIC DESIGNATION		THICKNESS (feet)	DESCRIPTION
Quaternary		Cahokia	Sand and gravel aquifers and till, silt, and clay confining units	Glacial drift aquifers and confining units		0-400	Alluvial silt, sand, gravel
	Mason	Equality					Lacustrine silt, clay, sand
		Peoria and Roxanna Silt					Eolian silt
		Henry					Glacial alluvial silt, sand, gravel
	Wedron	Lemont					Glacial till
Silurian		Kankakee	Silurian aquifer	Shallow bedrock aquifer	Units of Maquoketa Group less than 160 feet below bedrock surface part of shallow bedrock aquifer. Units more than about 160 feet below bedrock surface part of upper confining unit. Galena-Platteville part of shallow bedrock aquifer where unit is at bedrock surface, part of upper confining unit where overlain by Maquoketa Group.	0-100	Dolomite
		Edgewood					
Ordovician	Maquoketa	Neda	Upper confining unit			0-150	Shale, locally argillaceous dolomite or limestone
		Brainard					
		Fort Atkinson					
		Scales					
	Galena					0-350	Dolomite and limestone
	Platteville						
	Ancell	Glenwood	Cambrian-Ordovician aquifer system		Ancell aquifer. Part of shallow bedrock aquifer where at bedrock surface. Part of Cambrian-Ordovician aquifer system where overlain by Galena-Platteville unit	200-300	Sandstone, shale at top.
		St. Peter					Sandstone. Basal shale (Kress Member)
	Prairie du Chien	Shakopee		Middle confining unit	Upper part of Prairie du Chien part of shallow bedrock aquifer where at bedrock surface. Parts of Prairie du Chien Group and sandstones are aquifers locally where not at bedrock surface.	0-200	Dolomite
		New Richmond				0-65	Sandstone
		Oneota				0-250	Dolomite
		Gunter				0-15	Sandstone
Cambrian		Eminence				100	Dolomite and sandstone
		Potosi				100-150	Dolomite
		Franconia				100	Dolomite, sandstone, and shale
		Ironton		Ironton-Galesville aquifer		175-200	Sandstone, fine-to-medium grained, well sorted, upper part dolomitic
		Galesville					
		Eau Claire	Lower confining unit	Lower confining unit		300-400	Shale, siltstone, dolomite
			Mt. Simon aquifer	Mt. Simon aquifer			Sandstone (Elmhurst Member)
		Mt. Simon				2500-2800	Sandstone

Deep Aquifer Pumpage and Groundwater Levels

Decades of groundwater pumping have led to significant groundwater level decline in the metro-area. Figure 1 shows Simulated Groundwater Withdrawal versus Time; By Aquifer Group and Scenario. In this figure the low water withdrawal scenario is called the Less Resource Intensive scenario (LRI), and the high withdrawal scenario is called the More Resource Intensive (MRI) scenario. Between these is the Baseline (BL) scenario. Dziegielewski and Chowdhury (2008) developed these three different scenarios of future water withdrawals that assume 1971-2000 average climate condition. Note that under any scenario pumping from the deep Cambrian-Ordovician represents the greatest use of groundwater resources. The rapid decrease in groundwater pumpage from the deep bedrock aquifers during the 1980s and 1990s initially resulted in a rapid recovery of regional groundwater levels. However, the rate of water-level change flattened and the aquifer water levels have resumed a slow decline since 2000 corresponding to increasing groundwater withdrawals, which is a trend that is anticipated to continue.

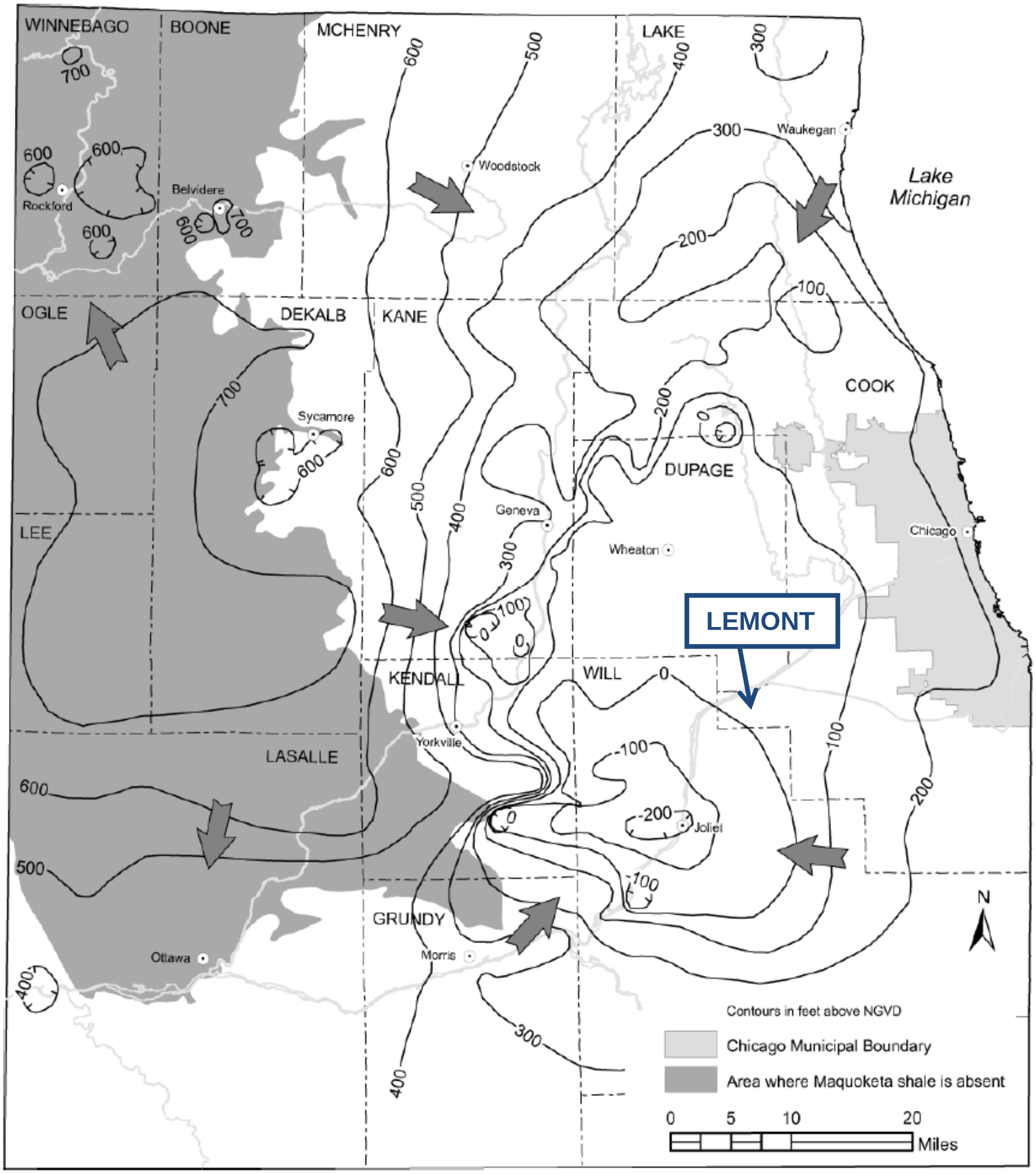
Figure 1: Simulated Groundwater Withdrawal versus Time; By Aquifer Group and Scenario.



(From Meyer, 2012)

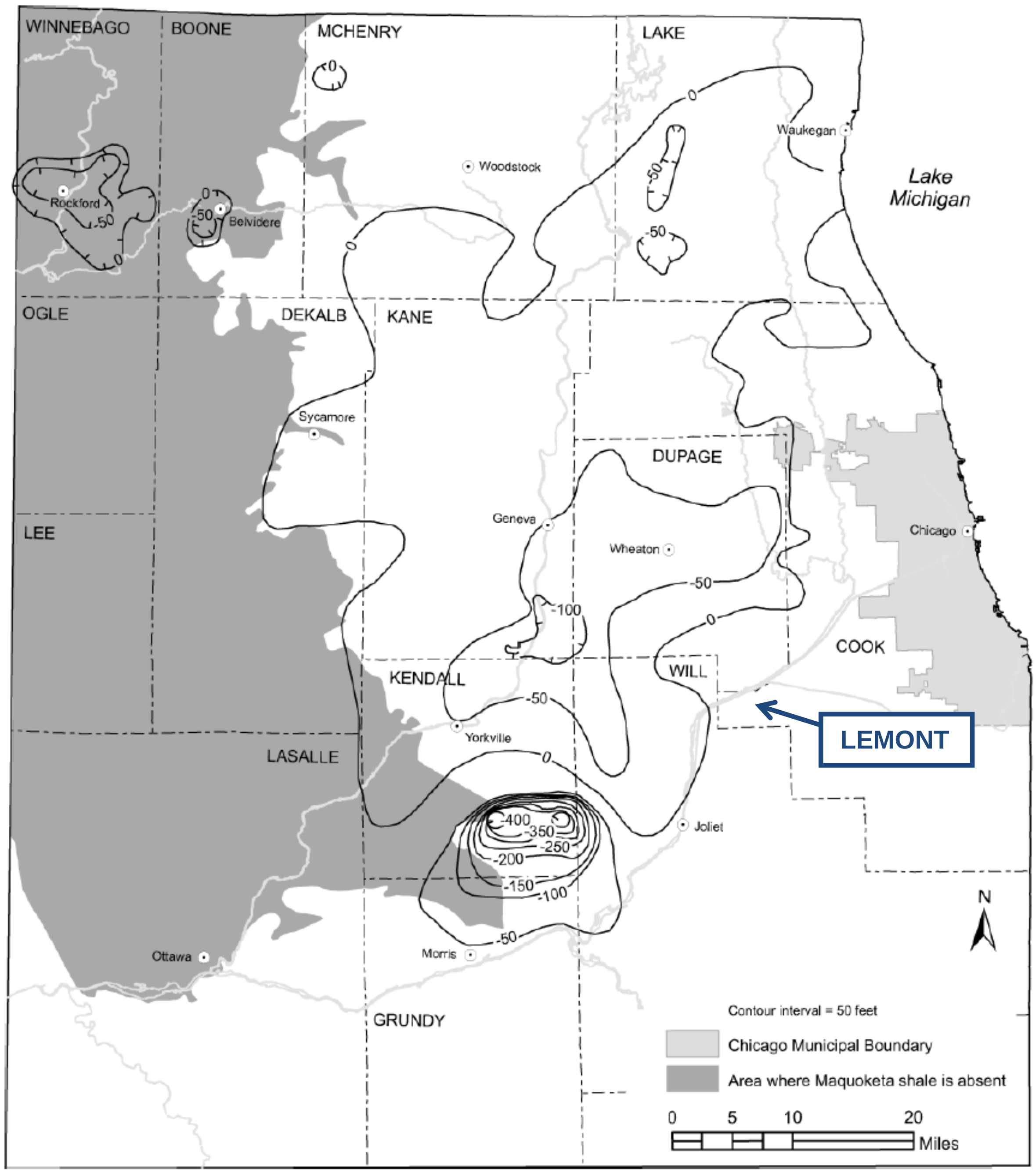
Figure 2 shows the water level condition of the Cambrian-Ordovician aquifer. The major feature of the 2007 potentiometric surface map is the pumping cone around Joliet, which is only about 10 miles from Lemont. Joliet continues to be the largest public water supply using the deep sandstone aquifers, where the water level elevation of about -200 feet represents an approximate 900 foot decline from pre-development (year 1865) conditions. The potentiometric surface represents the water level elevation in wells that penetrate the deep aquifer.

Figure 2: Potentiometric surface of the deep sandstones in northeastern Illinois, fall 2007 (From: Burch, 2008)



To assess the aquifer's recent water level trend Figure 3 illustrates a comparison between the observed groundwater levels in 2000 and in 2007. Groundwater levels in a large portion of the Chicago region have declined from 0 to 50 feet. The area around Joliet remains similar to 2000 as indicated by the zero change contour though new pumping wells west of Joliet expanded the cone of pumping significantly westward during that 7 year period. In area of Lemont the aquifer's water level did not decline indicating less development stress.

Figure 3: Changes in groundwater levels in deep sandstone wells between 2000 and 2007 (From: Burch, 2008)



The current and future aquifer conditions are described as follows by Meyer, et. al., 2012:

> "*Computer simulation of plausible scenarios of future pumping suggests that significant additional drawdown,…and changes in the quality of groundwater withdrawn from deep wells are all possible…before 2050. Regional model simulations suggest heads will continue to recover to a limited degree in eastern parts of northeastern Illinois, where many water systems abandoned deep wells in the 1980s and 1990s. The combination of continued head declines in the Joliet - Aurora area and continued head recovery in Cook and DuPage Counties* ***shifts the deepest parts of the Chicago area cone of depression west-southwest to the Joliet-Aurora area****.* ***Modeling suggests limited areas of partial to complete desaturation (draining of pore spaces) of the Ancell Unit by 2050. Deep wells in the areas where the Ancell Unit head is near to the top of the Ancell, and where the Ancell Unit is partially desaturated, may be vulnerable to increases in arsenic, barium, and radium concentrations…Partial desaturation of the Ancell Unit will also lead to decline in well yield and increasing pumping expenses****. Modeling also suggests desaturation of portions of the Ironton-Galesville may occur before 2050, which would contribute to further declines in well yields and increases in pumping costs.*"

Figure 4 depicts two maps (year 2005 and projected year 2050) which project that most of the future Cambrian-Ordovician aquifer development will be west-southwest of Lemont. Such a geographic focus means the greatest drawdown stress on the aquifer will be west-southwest of Lemont. Figure 4 also anticipates additional development in or near Lemont.

Figure 5 depicts mapping of observed available deep composite head above the top of the Cambrian-Ordovician aquifer (i.e., the Ancell Unit), based on 2007 potentiometric surface mapping by Burch (2008). (A map of available observed deep composite head above the top of the Ironton-Galesville was not included in the Meyer report because nowhere in northeastern Illinois was the 2007 available observed deep composite head above the top of the Ironton-Galesville less than 200 feet.) The area of Lemont appears to have greater than 100 feet of available head (i.e., available drawdown) with the value increasing toward the east-northeast.

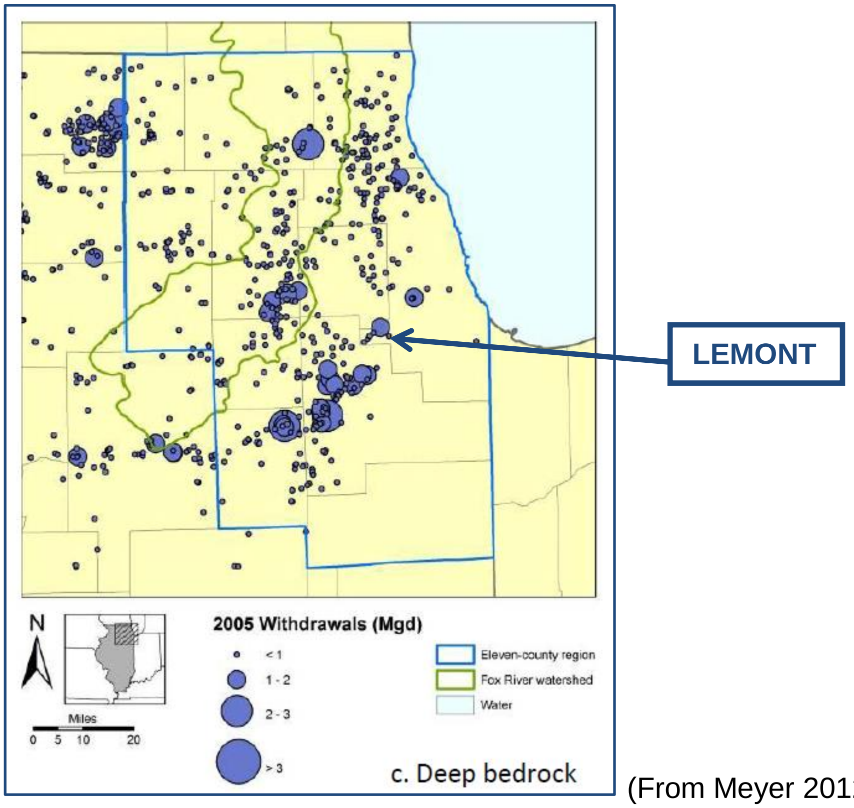
Conclusions and Recommendations

For Lemont, it appears the siting of an additional high-capacity Cambrian-Ordovician well(s) is feasible. Site selection should focus on areas as far east-northeast as possible from existing wells. This would extend source development farther away from the intensely stressed area near Joliet and into areas with greater available drawdown.

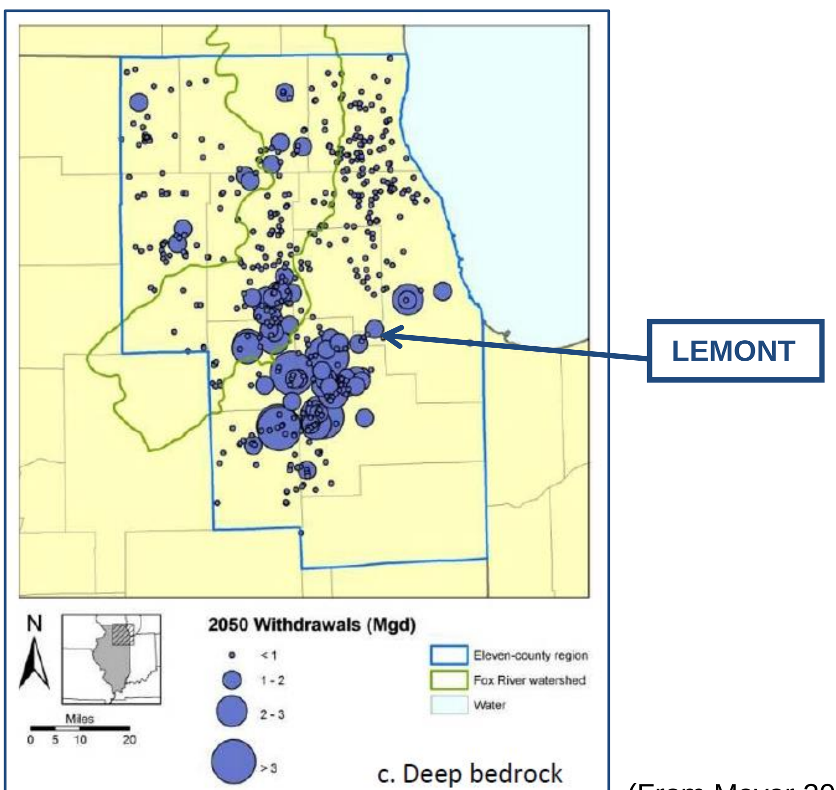
Greater available drawdown has two major benefits. First, in a confined aquifer such as this, it corresponds in direct relationship to increased well capacity. Second, production can be more easily managed to maintain a target maximum drawdown level, such that the overlying confining unit (i.e., the Galena-Platteville dolomite and Maquoketa shale) and upper portion of the Cambrian-Ordovician aquifer (i.e., the Ancell Group) are not dewatered. When such dewatering occurs vertical drainage of water filtered through the overlying "dirty" shale confining unit enters the aquifer thereby imparting poor quality characteristics such as increased metals and radium.

If desired HR Green can evaluate well construction and operations records (i.e., pumping rates, static and pumping levels, quality) to assess the efficiency of existing well field management and expansion scenarios such as capacity, drawdown management, and well spacing criteria.

Figure 4: Recent and Projected Groundwater Withdrawal – Cambrian-Ordovician Aquifer.

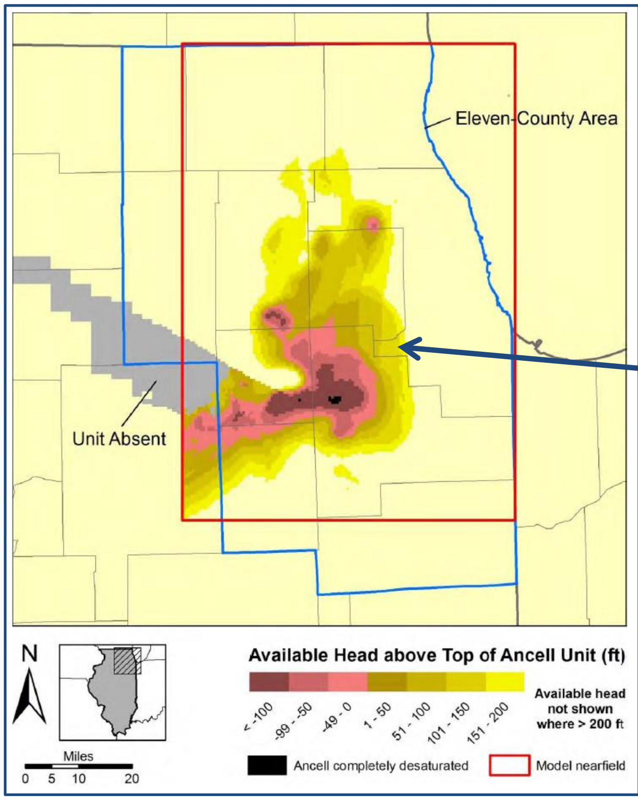


(From Meyer 2012, Figure 32)



(From Meyer 2012, Figure 40)

Figure 5: Available observed composite deep well head in 2007 based on mapping by Burch (2008). Available head is not shaded where greater than 200 feet.



(From: Meyer 2012, Figure 115)

References

Burch, Stephen, 2008. A Comparison of Potentiometric Surfaces for the Cambrian-Ordovician Aquifers of Northeastern Illinois, 2000 and 2007. Center for Groundwater Science, Illinois State Water Survey, Institute of Natural Resource Sustainability, University of Illinois.

Dziegielewski and Chowdhury, 2008. *Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050*. Report prepared for the Chicago Metropolitan Agency for planning. Department of Geography and Environmental Resources, Southern Illinois University.

USGS, 2005. Surface-Water and Ground-Water Resources of Kendall County, Illinois, Scientific Investigations Report 2005-5122.

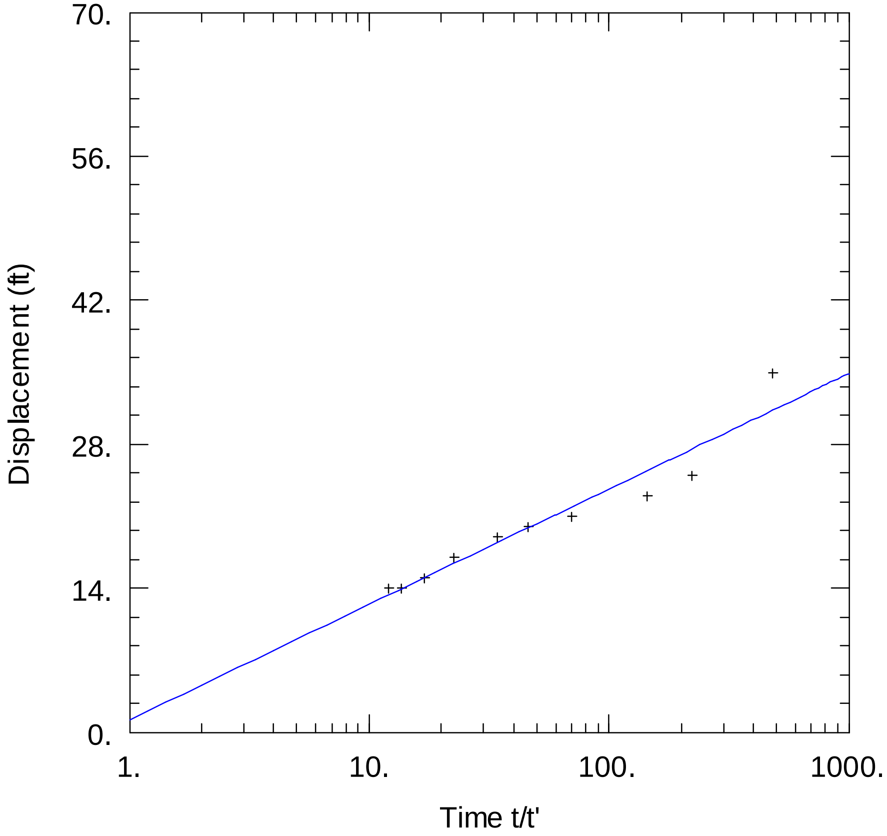
Meyer, Scott, et. al, 2012. Northeastern Illinois Water Supply Planning Investigations: Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois. Contract Report 2012-03. Illinois State Water Survey, Prairie Research Institute, Champaign, Illinois.

Prickett, T.A. and C.G. Lonnquist. 1971. Selected Digital Computer Techniques for Groundwater Resource Evaluation. Illinois State Water Survey Bulletin 55, Champaign, Illinois.

Attachment C

Aqtesolv Plot of Time-Recovery Data of Well #4 1978 Pumping Test Data

Layne Christensen File Information on Village Wells



PREFORMANCETEST FOLLOWING CONSTR., WELL #4

Data Set: F:\Lemont\Well4.aqt
Date: 10/19/02 Time: 21:09:09

PROJECT INFORMATION

Company: LRE Water
Client: HR Green
Project: 5018HRG18
Test Location: Village of Lemont, IL
Test Well: Well #4
Test Date: 10/02/1978

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 1.942E+04 gal/day/ft
S' = 0.7833

AQUIFER DATA

Saturated Thickness: 200. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #4	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ Well #4	0.1	0

Village of Lemont, IL

Records and Logs

Well 3
Well 4
Well 5
Well 6

October 27, 2021

Layne Christensen Company
721 W. Illinois Avenue
Aurora, IL 60506
630.897-6941

A GRANITE COMPANY

Jason Gray
721 W. Illinois Avenue
Aurora, IL 60506
630.897.6941
graniteconstruction.com

October 27, 2021

Mr. Jerry Turrise
Village of Lemont

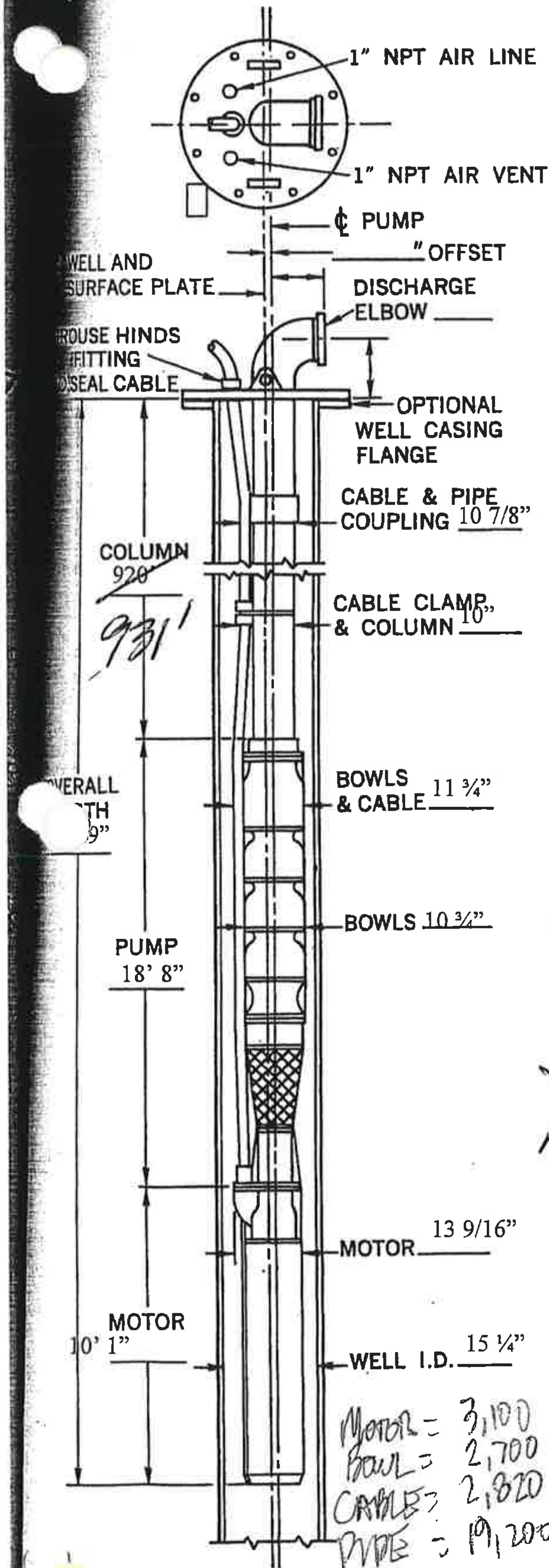
RE: Well Logs and Well Test Data Sheets

Jerry:

Attached please find your requested information for available well logs, drill records, and pumping records accessible to Layne for Wells 3, 4, 5 and 6.

Best regards,

Jason Gray
Project Manager I
Layne, a Granite Company



Motor = 3,100
Bowl = 2,700
Cable = 2,820
Pipe = 19,200
Surf. Plt = 600
28,420#

FLOWSERVE

Byron Jackson Pump Division

SUBMERSIBLE OUTLINE

STANDARD WELL SEAL CONSTRUCTION

DATE ~~December 11, 2000~~ 12/2006

NAME OF CUSTOMER Village of Lemont

WELL NO. 3

SERIAL NO. 00-RN-1284

LAYNE-WESTERN JOB NO. C-8650T

NO. OF UNITS 1

SURFACE PLATE Per existing head TH'K

8-7/8"FOUNDATION HOLES.STR.c.l. ON ______ B.C.

8 " -8T.P.I.-3/4" TAPER T&C ST'D. COLUMN

8 " -150# F.F.(STEEL) DISCHARGE FLANGE

BOWL ASSEMBLY ~~11MQH~~ 12" ~~CH~~ 2CKH / ~~17~~ 15 STGS. USED bronze

FLA = 367

300 HP 1770 RPM B.J. SUBM. MOTOR TYPE H

14" SIZE 3 PH. 60 HERTZ 460 VOLT

950 GPM 950' TDH

CABLE SIZE ~~300MCM~~ 500MCM VOLTAGE 600 LENGTH ~~940'~~ 940'

~~2 #10 dual cables~~

REMARKS

1. 2-8" surge control valves located 100' & 540' above bowl
2. 2-1/4" Toro plastic airlines
3. Vinyl or Plasite coating on pipe, in & out — Not Recoated in 2006
4. ~~Nickel oxide coating on all cast iron bowl surfaces~~
5. ~~2" PVC FLUSH JOINT BANDED TO PIPE FOR~~

~~NOTE: VILLAGE MAY DESIRE TO SUPPLY TRANSDUCER FOR OUR INSTALLATION.~~

LAYNE-WESTERN

BJ DEALER: 721 W. ILLINOIS AVENUE, AURORA ILLINOIS 60506

TEL: 630/897-6941

8650121100.DOC

☐ CARDHOLDER
☐ ENGRAVED ACRYLIC – BLACK LETTERS ON WHITE BACKGROUND
☐ BLANK NAMEPLATES
UNIT
LOAD

LOCATION Nº 37N11E-29.4b
OWNER'S Nº ~~X~~3
WELL NO. 3

City Lemont County Cook

Section 29 Twp. No. 37N Range 11E

Location (in feet from section corner) ~~850'~~ 450 N, ~~2275'~~ 2525 W, SE corner
Correction per RTS 7/77

Owner Village of Lemont #~~X~~ 3 Authority

Contractor Wehling Well Works Address Beecher

Date drilled Oct. 1963 Elev. above sea level top of well 742

Depth 1723

Log see test report

Were drill cuttings saved yes Where filed SGS

Size hole 20" 0-118.5' If reduced, where and how much 19 1/4" 118.5-519', 15 1/4" 519-1152 12" 1152-1723'

Casing record 20" 0-118 1/2', 16" 0-520' (cemented), 12" 1086 1/2-1152'

Distance to water when not pumping 605 Distance to water is 714

feet after pumping at 1020 G. P. M. for 23 hours.

Reference point for above measurements top of casing, 3' above LSD

Type of pump test turbine Distance to cylinder 730'

Length of cylinder Length of suction pipe below cylinder

Length stroke Speed

Hours used per day Type of power

Rating of motor Rating of pump in G. P. M.

Can following be measured: (1) Static water level

(2) Pumping level (3) Discharge

(4) Influence on other wells

Temperature of water Was water sample collected yes

Date 10-18-63 Effect of water on meters, hot water coils, etc.

Date of Analysis Analysis No. 161698

Recorder Wehling Well Works RTS

Date Nov. 14, 1963

1/4

8	7	6	5	4	3	2	1

2807-22617 12

WELL NO. 3
2/4

November 27, 1963

WELL PRODUCTION TEST
VILLAGE OF LEMONT, WELL NO. 3
COOK COUNTY
by

Wehling Well Works

Owner:	Village of Lemont
Location:	850'N and 2275'W of SE corner of Section 29.4b, T. 37N., R. 11E.
Date Completed:	October 1963
Date of Test:	October 17-18, 1963
Length of Test:	23 hours
Aquifer:	Cambrian-Ordovician

WELL DATA

PUMPED WELL

Well No:	3
Driller:	Wehling Well Works
Drill Cuttings:	State Geological Survey - Naperville
Depth:	1723'
Hole Record:	20" 0-118 1/2'; 19 1/4" 118 1/2-519'; 15 1/4" 519-1152'; 12" 1152-1723'
Casing Record:	20" 0-118 1/2'; 16" 0-520' (cemented); 12" 1086 1/2-1152'
Pump and Power:	Johnston Turbine 14" bowls set at 730', 330 hp electric motor
Ground Elevation at Well:	742'
Measuring Point:	Top of casing, 3' above LSD
Measuring Equipment:	730' air line
Static Level:	605'

Remarks: Shot with 420 qts solidified nitroglycerine in 8 shots. Shots at 1646', 1642', 1625', 1608', 1600', 1580', 1560', 1540'

WELL NO. 3

3/4

MEASUREMENTS

PUMPED WELL

Date 1963	Hour	Time (min)	Alt. gage (ft)	Depth to water (ft)	Draw-down (ft)	Piez. tube (in.)	Pump. rate (gpm)	Remarks
10-17	5:50P			605				Nonpumping level
	5:50	0	125			35	830	Pump on
	6:00	10	60	670		36	830	
	6:15	25	32	698		36	830	Cloudy
	6:30	40	40	690	85	36	830	Cloudy
	6:45	55	45	685	80	36	830	Cloudy
	7:00	70	45	685	80	36	830	Cloudy
	7:00	70				54	1030	Started pumping 1030 gpm
	7:20	90	30	700	95	54	1030	Cloudy
	7:30	100	27	703	98	54	1030	Cloudy
	7:45	115	24	706	101	54	1030	Cloudy
	8:00	130	25	706	101	54	1030	Clearing
	8:30	160	25	706	101	54	1030	
	9:00	190	25	706	101	54	1030	Started pumping 1090 gpm
	9:15	205	21	709	104	60	1090	Clearing
	9:30	220	21	709	104	60	1090	Started pumping 1100 gpm
	10:00	250	20	710	105	61	1100	Clearing
	10:30	280	20	710	105	61	1100	
	11:00	310	20	710	105	61	1100	
	11:30	340	20	710	105	61	1100	
	12:00	370	19	711	106	61	1100	
10-18	12:30A	400	17	713	108	61	1100	
	1:00	430	15	715	110	61	1100	
	1:30	460	15	715	110	61	1100	
	2:00	490	14	716	111	61	1100	
	2:30	520	12	718	113	61	1100	
	3:00	550	12	718	113	61	1100	
	3:30	580	12	718	113	61	1100	
	4:00	610	11	719	114	61	1100	
	4:30	640	11	719	114	61	1100	
	5:00	670	11	719	114	61	1100	Water
	5:30	700	11	719	114	61	1100	Clearing
	6:00	730	11	719	114	60	1090	Seal brake aroun oil tube, leak about 100 gpm
	6:30	760	15	715	110	53	1020	Clearing
	7:00	790	15	715	110	53	1020	Clearing
	7:30	820	16	714	109	53	1020	Clearing
	8:00	850	16	714	109	53	1020	Clearing
	8:30	880	16	714	109	53	1020	Clearing
	9:00	910	16	714	109	53	1020	Clearing

WELL NO. 3

4/4

Date 1963	Hour	Time (min)	Alt. gage (ft)	Depth to water (ft)	Draw-down (ft)	Piez. tube (in.)	Pump. rate (gpm)	Remarks
10-18	9:30A	940	16	714	109	53	1020	
	10:00	970	16	714	109	53	1020	
	11:00	1030	16	714	109	53	1020	
	12:00	1090	16	714	109	53	1020	
	1:00	1150	16	714	109	53	1020	Clear
	2:00	1210	16	714	109	53	1020	
	3:00	1270	16	714	109	53	1020	
	4:00	1330	16	714	109	53	1020	
	5:00	1390	16	714	109	53	1020	Start to pump 1100 gpm
	5:15	1405	6	724	119	61	1100	
	5:30	1420	6	724	119	61	1100	
	5:45	1435	6	724	119	61	1100	Pump off

DRILLER'S LOG

VILLAGE OF LEMONT, WELL NO. 3

Formation	From	To
Clay	0	20'
Clay, gravel, mud	20	94
Broken lime	94	128
Lime	128	268
Lime and shale	268	273
Shale	273	397
Lime	397	414
Shale	414	498
Lime	498	846
Sand	846	1093
Shale and lime	1093	1464
Sandy lime	1464	1504
Sand	1504	1571
Lime	1571	1576
Sand	1576	1648
Shale and lime	1648	1723

Layne
WATER · MINERAL · ENERGY

WELL TEST DATA SHEET

Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Lemont, IL	Well No. 3	Date Tested	8/9/2017
Location	State Street		Tested By	Morganegg-Fecht-Rumple
Dia. of Well	16" x 12"		Driver	300HP BJ, 460V, 14"H
Depth of Well	1,640 ft.		Column & Shaft	8" T&C
Length of Airline	927 ft.		Bowls	16 Stage - 12 2CKH Bronze
Static Level	767 ft.		Manufacturer	Byron Jackson
Orifice Size	8" x 6"		Serial No.	00-RN-1284

Time	Piez. (in)	G.P.M.	Air Gauge (ft)	Pumping Level	Drawdown	Dis. Press. Lbs.	Dis. Press. Ft.	Total Head	AMPS	Remarks
		0	160	767	0	0				
8:20	27.0	822	125	802	35	55			305/298/306	Black
8:25	26.5	815	125	802	35	55				Rusty - little scale
8:35	26.5	815	125	802	35	55				Clearing/cloudy
8:45	26.5	815	125	802	35	55			300/296/293	
8:50	26.5	815	122	805	38	45			299/296/293	Trace of silt
9:00	26.5	815	120	807	40	45				
9:10	26.5	815	119	808	41	45			299/293/296	Clear
9:20	26.5	815	119	808	41	45				
9:30	30.0	867	112	815	48	35			305/300/303	
9:45	30.0	867	112	815	48	35				Clear
10:00	30.0	867	112	815	48	35				
10:10	30.0	867	112	815	48	35			300/305/303	
									FLA = 367	

FINAL SPECIFIC CAPACITY = 18.1 GPM/FT.

WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	3
Location	State St. ?		
Dia. of Well	16" x 12" x 10" ?		
Depth of Well	1640 ft.		
Length of Airline	931 ft.		
Non-Pump Level	775 ft.		
Orifice Size	8 x 6		

Date Tested	3/24/2009
Tested By	Poppen
Driver	300HP BJ Type H, 460V
Column & Shaft	8" T&C
Bowls	15 stage - 12" 2CKH all bronze
Manufacturer	Byron Jackson
Serial No.	00-RN-1284

Time	Piez. (in)	G.P.M.	Air Gauge (ft)	Pumping Level	Drawdown	Dis. Press. Lbs.	Dis. Press. Ft.	Total Head	AMPS	Remarks
		0	156	775	0	0				
9 20	27.0	822	127	804	29	55			294-303-299	Dirty
9 25	27.0	822	122	809	34	55			290-299-294	Clearing
9 30	27.0	822	121	810	35	55				Clear
9 40	27.0	822	118	813	38	55				
9 50	27.0	822	117	814	39	55				Clear
[illegible]00	27.0	822*	116	815	40	55			287-297-291	Trace of sand
					[illegible]					
10 10	29.0	852	117	814	39	45				Clear
10 20	29.0	852	113	818	43	45			290-297-299	
10 30	29.0	852	111	820	45	45				
10 40	29.0	852	111	820	45	45				Clear
10 50	29.0	852	110	821	46	45				Trace of sand
					[illegible]					
11 00	31.5	888	109	822	47	35				Clear
11 10	31.0	881	108	823	48	35				
11 20	31.0	881	108	823	48	35			293-303-297	
11 30	31.0	881	107	824	49	35				
11 45	31.0	881	107	824	49	35				
Sp. Q = 18.0										
***FLOWMETER READS: 830GPM**										

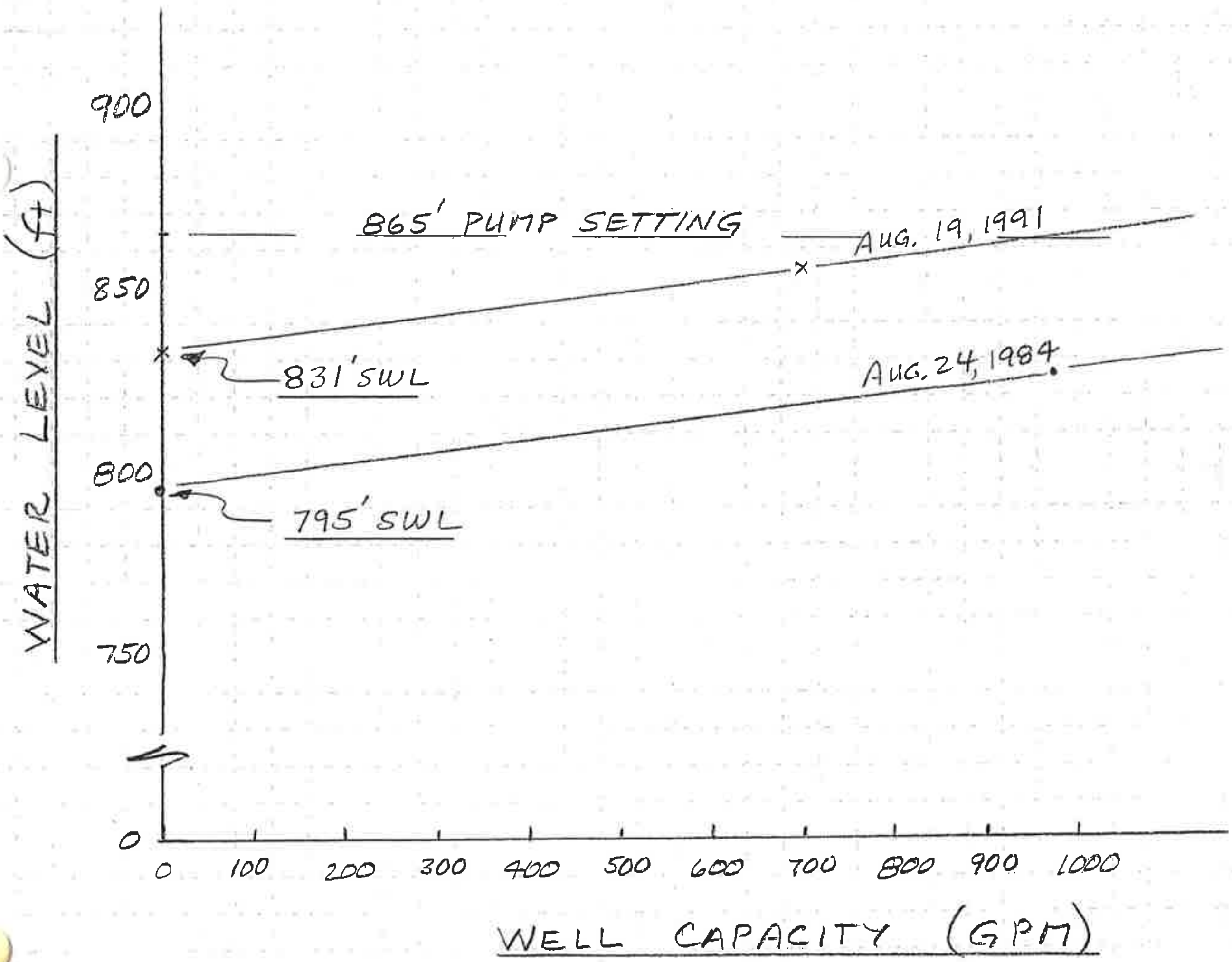
Layne-Western Company, Inc.

Subject VILLAGE OF LEMONT WELL #4 Date AUG 19, 1991

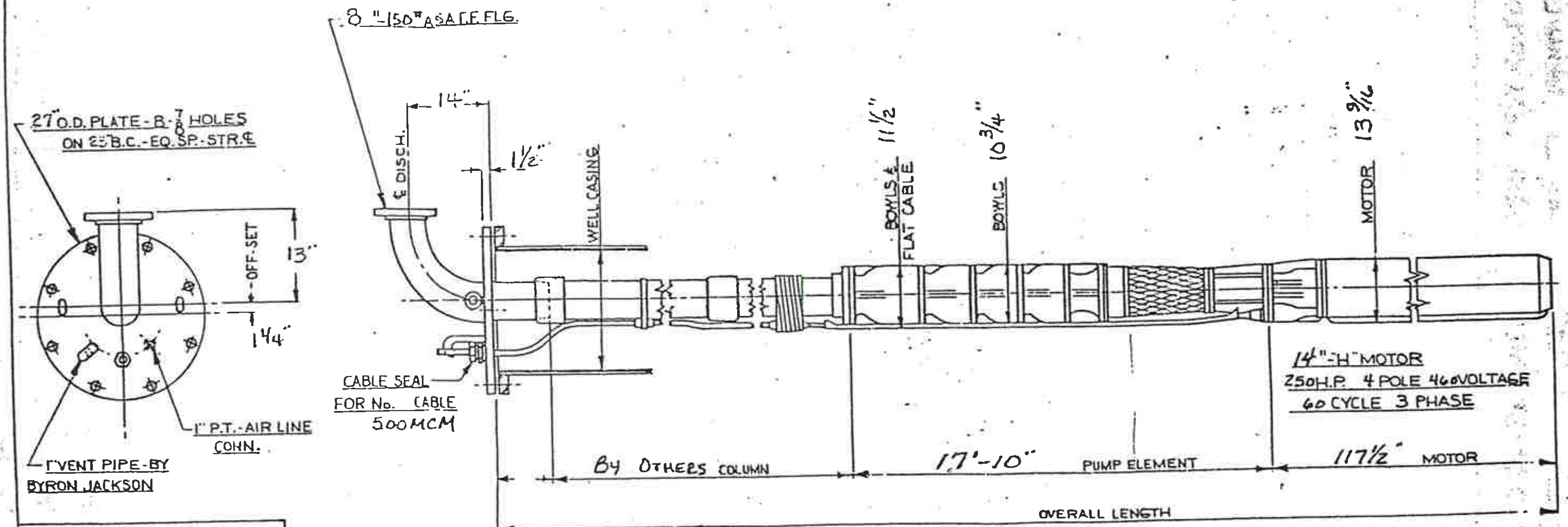
WELL: 16" DIA X 1660' DEEP GALESVILLE SANDSTONE (WELL MISALIGNMENT AT 650')

PUMP: BYRON JACKSON 250 HP, 14", "H", 460V MOTOR
11 MQH - 16 ~~STAGE~~, CIBF, BOWLS, (900 GPM @ 927' TDH)
865' - 8" STRAIGHT THREAD PIPE, 500 MCM CABLE
→ 2007 = 935' pipe (2 80' cable extens.)

sp/Q	DATE	SWL	CAPACITY	PWL	DISCH. PRESS	TDH	AMPS	REMARKS
27.8?	8-24-84	795'	890 GPM	827'	60psi (138.6')	966'	342, 345, 345	NEW PUMP
29.1?	8-19-91	831'	700 GPM	855'	68psi (157')	1012'	340	PUMP CHECK
15.2	10-2-78 (TEST PUMP)	740'	853 GPM	796				



R.J.J.
8-19-91



CUSTOMER: MILAEGER WELL
DUTY: 900 G.P.M. 927 T.D.H. 1760 R.P.M.

BYRON JACKSON DIVISION			
CUSTOMERS ORDER	JOB No.	ITEM No.	BYRON JACKSON JOB No.

APPROVED FOR CONSTRUCTION
BY:
DATE:

LET.	CHANGED FROM	BY	DATE
(D)			
(C)			
(B)			
(A)			

11 MQ H 16 STG. WELL SEAL TYPE SUBMERSIBLE	ORDER No. / DRAWN BY CARROLL	CHKD BY / DATE 6/22/58
BYRON JACKSON DIVISION	SK-841-C-0071	

Copy – Dept. of Public Health
Copy – Well Contractor
Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

WELL 4 Y6

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

20" 116
19 1034

1. Type of Well
   a. Dug ____. Bored ____. Hole Diam. 15 in. Depth 508 ft. 1658 total depth
      Curb material ____. Buried Slab: Yes ____ No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled X. Finished in Drift ____. In Rock X.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest: Approved by the E.P.A.
   Building 10 Ft. Seepage Tile Field 75
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) ____
   Septic Tank 50 Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Well furnishes water for human consumption? Yes X No ____
4. Date well completed 8/4/78
5. Permanent Pump Installed? Yes ____ Date ____ No X
   Manufacturer ____ Type ____ Location ____
   Capacity ____ gpm. Depth of Setting ____ Ft.
6. Well Top Sealed? Yes X No ____ Type ____
7. Pitless Adapter Installed? Yes ____ No ____
   Manufacturer ____ Model Number ____
   How attached to casing? ____
8. Well Disinfected? Yes X No ____
9. Pump and Equipment Disinfected? Yes ____ No ____
10. Pressure Tank Size ____ gal. Type ____
    Location ____
11. Water Sample Submitted? Yes ____ No X

REMARKS:

shot well from 1651-1558
with 900#

IDPH 4.065

GEOLOGICAL AND WATER SURVEYS WELL RECORD

1st test 10/3/7 Sp FNO3 Mn Ca Mg

10. Property owner Village of Lemont Well No. 4
    Address Huston Rd. Lemont, IL
    Driller R. H. Wehling License No. 102-223
11. Permit No. 75752 Date June 19, 1978
12. Water from ____ (Formation) at depth ____ to 1658 ft.
13. County Cook
    Sec. 29, 1g
    Twp. 37N
    Rge. 11E
14. Screen: Diam. ____ in.
    Length: ____ ft. Slot ____
    1170'S & 120' W of NE of above Elev. ____

SHOW LOCATION IN SECTION PLAT 1170'S, 120'W NE/c

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
20	Black steel	+1	116'
16	Black steel		1150'
	cemented in		

(mun. wat. supply)

16. Size Hole below casing: ____ in. not tested yet
17. Static level ____ ft. below casing top which is ____ ft. above ground level. Pumping level ____ ft. when pumping at ____ gpm for ____ hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
~~(See attached sheet)~~		

(CONTINUE ON SEPARATE SHEET IF NECESSARY)
Wehling Well Works, Inc.
SIGNED ____ DATE 8/22/78

WELL 4 2/6

Drift	116	116
Lime	142	258
Shale	135	393
Dolo w/shale	20	413
Shale	75	488
Lime	25	513
Dolomite	320	833
Sand	250	1083
Lime with shale	70	1153
Lime	30	1183
Lime w/shale	55	1238
Lime	155	1393
Shale w/ sand	60	1453
Sand	185	1638
Sand w/shale	15	1653
Shale	5	1658

WELL 4 3/6

WELL PRODUCTION TEST
Wehling Well Works, Inc.
COOK COUNTY
VILLAGE OF LEMONT

WELL NO. 4

Owner:	Village of Lemont
Location:	COK 37N 11E-29.1g 1170' S, 120' W of NEcor
Date of Test:	October 2-3, 1978, and November 1-2, 1978
Length of Test:	24-hour tests before & after shooting
Aquifer:	Sandstone
Date Drilled:	August 1978

WELL DATA

PUMPED WELL

Well No:	4
Depth:	1658'
Driller:	Wehling Well Works, Inc.
Hole Record:	20" 0-116', 19" 116-1153', 15" 1153-1658'
Casing Record:	20" 0-116', 16" 0-1150', cemented
Screen Record:	---
Gravel Pack Record:	---
Pump & Power:	Test turbine
Surface Elevation:	737'
Measuring Point:	
Measuring Equipment:	855' airline, 8" meter
Water Sample:	
Static Level:	733' below MP

Remarks: The well is north of Schultz St. and east of Huston St.

Well was shot from 1558'-1651' with 900 lb.

WELL 4 4/6

Drift	116	116
Lime	142	258
Shale	135	393
Dolo w/shale	20	413
Shale	75	488
Lime	25	513
Dolomite	320	833
Sand	250	1083
Lime with shale	70	1153
Lime	30	1183
Lime w/shale	55	1238
Lime	155	1393
Shale w/ sand	60	1453
Sand	185	1638
Sand w/shale	15	1653
Shale	5	1658

Well Test Data Sheet

WELL 4 5/6

Job: Village of Lemont # 4

Location: Huston St. - Lemont, Ill.

Dia. of Well: 16"

Depth of well: 1658'

Length of airline: 855'

Non-pumping level: 740'

Date tested: Oct. 2, 1978

Tested by: Jeff, Stan & Herman

Pump used: Driver: 3 Waukesha NKR engines

Column and shaft: 10"x3"x2-3/16"

Bowls: 11 Stage

Manufacturer: Aurora

Orifice or meter size: 8" meter

TIME	PIZOMETER OR METER (READING INCHES) READING	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	TEMP.	REMARKS
9:30	68450100 0	0	115		0		START OF TEST
10:00	68468500	613	72	783	43		Dirty some sand
10:30	68494300	860	69	786	46		
11:00	68520000	856	67	788	48		
11:30	68545700	856	66	789	49		
12:00	68571400	856	65	790	50		Trace Sand
12:30	68597100	856	65	790	50		Clearing
1:00	68622800	856	65	790	50		Clear
1:30	68648500	856	65	790	50		
00	68678500	1000	55	800	60		
2P30	68709400	1030	54	801	61		Clear Little Sand
3:00	68740200	1026	53	802	62		
3:30	68772400	1073	53	802	62		
4:00	68803400	1033	53	802	62		
4:30	68834100	1023	53	802	62		
5:00	68865000	1030	53	802	62		
5:30	68896100	1036	52	803	63		
6:00	68927000	1030	51	804	64		Sand test 0
6:30	68957900	1030	51	804	64		
7:00	68988900	1033	51	804	64		
7:30	69020100	1040	51	804	64		
8:00	69051100	1033	51	804	64		
8:30	69082300	1040	51	804	64		
~~9:00~~	~~69113000~~	~~1023~~	~~51~~	~~804~~	~~64~~		
9:30	69143700	1023	51	804	64		
10:00	69174500	1026	51	804	64		
:30	69205400	1030	51	804	64		

WELL 4 6/6

Well Test Data Sheet

Job: Village of Lemont

Location: Huston St., Lemont, Ill.

Dia. of Well: 16"

Depth of well: 1658'

Length of airline: 855'

Non-pumping level: 740'

Date tested: 10-2-78

Tested by: Jeff, Stan & Herman

Pump used: Driver: 3 Waukesha NKR engines

Column and shaft: 10"x3"x2-3/16"

Bowls: 11 Stage

Manufacturer: Aurora

Orifice or meter size: 8" Meter

TIME	PIZOMETER OR (READING INCHES) METER READING	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	TEMP.	REMARKS
11:00	69234200 o	1026 o	51	804	64 o		START OF TEST
11:30	69267300	1036	51	804	64		
12:00	69298600	1043	51	804	64		
12:30	69329900	1043	51	804	64		
1:00	69360900	1033	51	804	64		
1:30	69391800	1030	51	804	64		
2:00	69422500	1023	51	804	64		
2:30	69453700	1040	51	804	64		
[illegible]0	69484900	1040	51	804	64		
[illegible]:30	69509800	830	59	796	56		
4:00	69534700	830	59	796	56		
4:30	69559700	833	59	796	56		
5:00	69584900	840	60	795	55		
5:30	69610000	836	60	795	55		
6:00	69634300	810	60	795	55		
6:30	69659700	846	60	795	55		
7:00	69685900	873	60	795	55		
7:30	69710700	826	60	795	55		
8:00	69737000	876	59	796	56		
8:30	69762600	859	59	796	56		
9:00	69788200	853	59	796	56		
9:30	69813000	826	58	794	54		
9:35			80	775			
9:40			90	765			
9:45			92	763			
10:00			94	761			
10:15			95	760			
[illegible].30			96	759			
11:00			98	757			
11:30			100	755			
12:00			101	754			
12:20			101	754			

WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	4	Date Tested	6/19/2007
Location	Houston Street			Tested By	Iverson
Dia. of Well	16"			Driver	250HP 14" Type H 460V
Depth of Well	1658' Original			Column and Shaft	8" T&C
Length of Airline	922 feet			Bowls	13 Stg - 12 MQL Bronze
Non-Pumping Level	745 feet			Manufacturer	Byron Jackson
Orifice Size	8 x 6			Serial No.	841-C-0071

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (ft)	Pumping Level	Drawdown	Disch. Pressure Psi.	Disch. Pressure Ft.	Total Pump. Hd.	AMPS	Remarks
11:50		0	177	745	0	0				
11:55	21	725	121	801	56	75			341-343-341	Dirty, 1/8 Sand
12:00	21	725	123	799	54	75			318-333-338	Cloudy
12:10	21	725	123	799	54	75				Clearing
12:20	20	717	120	802	57	75			319-334-337	Clear
12:30	24	775	118	804	59	65			318-333-338	
12:45	24	775	118	804	59	65				No Sand
1:00	25	791	118	804	59	55			327-337-339	
1:[illegible]	24.5	783	118	804	59	55				
1:30	24.5	783	118	804	59	55				
1:45	29.5	860	113	809	64	45				
2:00	29	852	112	810	65	45				Clear

Final Specific Capacity = 13.1 GPM/FT

Item 2-400
2-400-8

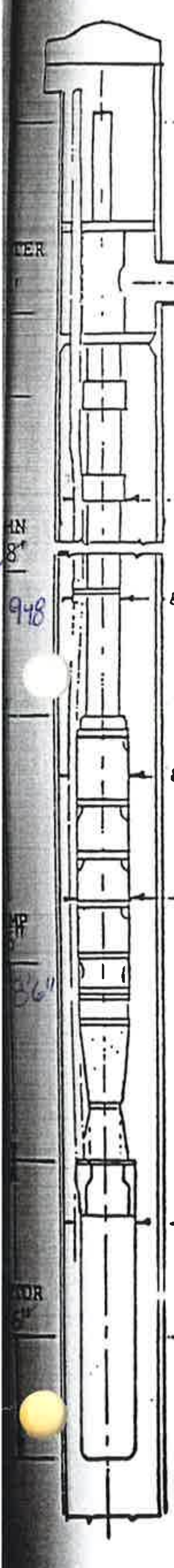
BJ Byron Jackson Pump Division
BORG-WARNER CORPORATION.

BORG WARNER

Effective Sept. 69

SUBMERSIBLE OUTLINE

PITLESS ADAPTER CONSTRUCTION



30"

6-1/2'

CABLE & PIPE COUPLING 10-7/8"

CABLE CLAMP & COL. PIPE 10"

BOWLS & CABLE 14"

BOWLS 13"

MOTOR 16-1/8"

WELL I.D. 17-1/4"

DATE May 20, 1996

NAME OF CUSTOMER Village of Lemont, IL

Well No. 5

PROPOSITION NO. -

ORDER NO. 96NR1259

PURCHASE ORDER NO. -

NO. OF UNITS 1

ADAPTER MANUFACTURER Baker-Monitor

MODEL NUMBER 8PS1820WBWE08M10S

8 "—8 T.P.I. — ¾" TAPER T&C ST'D. COLUMN

10 "— ~~XXX# F.F. (STEEL) DISCHARGE FLANGE~~ MECHANICAL JOINT DISCHARGE

ALL BRONZE 2/06 - S/N 17-5270-4-2RB

BOWL ASSEMBLY 13MQ/12MQL / 14 STGS.

350 H.P. 1770 RPM B. J. SUBM. MOTOR TYPE H

17" SIZE 3 PH. 60 CYCLE 2300 VOLT

1000 GPM ~~917'~~ 942' TDH

CABLE SIZE No. ~~4~~ 1/0 VOLTAGE 5KV LENGTH 960'

REMARKS: (1) 8"x5' S.S. pipe off bowl. (2) 2-back flow control valves & 2 - 1/4" Toro airlines included. (3) Plasite coating on pipe, inside only. (4) 1-1/2" PVC pipe to be installed to pitless for transducer installation.

5.) PROVIDE MAGNESIUM ANODE BAG FOR CASING PROTECTION

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED	
JOB NO.	PROP. NO.
CERTIFIED CORRECT	DATE

WELL INFORMATION – ROCK WELLS

Layne-Western Company, Inc.

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone: 708/897-6941

Name of Job: Village of Lemont Date: 4/24/96

City: Lemont State: IL

Well No.: 5 Drillers: Ed Hall/Art Leasure

Well Location 2250 ft. (S) and 1320 ft. (W) of the NE corner of the - ¼ of Section 31, Twp. 37 (N), Range 11 (E) Cook County.

Otherwise located as South of 127th St. off Timberlane Dr.

Work Began: 1/24/96 Work Completed: 6/18/96

Casing Record:

Amount	Dia.	Wt. or Thickness	Material	with	joints from	to
128′	24"	.500"	steel	welded	0	128′
177′	18″	.375"	steel	welded	+2′	1175′

Hole Record:

inch	from	to
29″	0	128′
22-3/4″	0′	1175′
17″	1175′	1675′ bottom of hole

Cementing Record: 24″ pipe pressure grouted with 140 sacks neat cement; also pressure grouted 18″ pipe - 1113 sacks.

Well Test Data: Static Level 771'; pumping level 873' after 16 hours pumping at 1507 g.p.m.

Length of test 16 hrs. See Well Test Data Sheet Dated June 18, 1996

Remarks: Well was shot from 1565′ to 1665′ every 10′ with 100# shots (1000 lbs. total). Well then air lifted for total of 341 hrs. to develop well.

LW-96

SEE OTHER SIDE

WELL LOG

Feet		Feet	Description
0	to	30	Clay
30	to	60	Sandy clay
60	to	105	Clay sand gravel
105	to	110	Broken lime
110	to	300	Lime
300	to	330	Red gummy shale
330	to	365	Green very gummy shale
365	to	400	Shale
400	to	425	Firmer shale
425	to	460	Shale and lime
460	to	500	Hard gray shale
500	to	505	Lime streak
505	to	510	Shale
510	to	850	Lime hard
850	to	980	Sand
980	to	985	Streaks of lime
985	to	990	Streaks of shale
990	to	1005	Sand
1005	to	1010	Streaks of lime sand shale
1010	to	1015	Shale
1015	to	1020	Sand lime shale
1020	to	1025	Limey sand and shale
1025	to	1045	Limey sand
1045	to	1055	Limey sand and trace of shale
1055	to	1065	Limey sand
1065	to	1080	Lime with some shale
1080	to	1095	Limey sand
1095	to	1110	Lime shale sand
1110	to	1130	Lime sand
1130	to	1155	Sandy lime with trace of shale

WELL LOG

Feet		Feet	Description
1155	to	1170	Lime
1170	to	1415	Green limey with sand
1440	to	1480	Sandy shale
1480	to	1530	Sand and lime
1530	to	1535	Sand and shale
1535	to	1590	Sand and lime
1590	to	1640	Sand and lime
1640	to	1675	Sand
	to		
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WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	5	Date Tested	2/20/2006
Location	S. 127th behind school			Tested By	Senne
Dia. of Well	18"			Driver	350 BJ, 17" H-2300 volt
Depth of Well	1631 Feet			Column and Shaft	8" T&C
Length of Airline	954 Feet			Bowls	14 stage - 13MQ/12MQL brz.
Non-Pumping Level	789 Feet			Manufacturer	Byron Jackson
Orifice Size	8 x 6	Page 1 of 1		Serial No.	96-NR-1259

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (feet)	Pumping Level	Drawdown	Disch. Pressure Lbs.	Disch. Pressure Ft.	AMPS	Remarks
		0	165	789	0	At Hydrant	Inside		
10:20	29	852	138	816	27	62	67	66-66-66	Black
10:30	29	*852	132	822	33	62	67		Black
10:40	29	852	128	826	37	62	67	68-68-68	Cloudy
10:50	29	852	126	828	39	62	67		Clear
11:00	30	*867	124	830	41	50	55	66-66-66	Clear
11:10	30	867	121	833	44	50			125' transducer
11:20	30	867	120	834	45	50	55		Clear
11:30	30	867	119	835	46	50		66-66-66	
11:40	33	909	118	836	47	40		66-66-66	
11:50	33	909	115	839	50	40			
12:00	33	909	113	841	52	40			
12:10	33	909	112	842	53	4			
	40.5	1007	112	842	53	4			
Into system		1175	123 (transducer)			20			
* At 10:30am and 11:00am: Meter indicated 1050 gpm.									

WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone: 630/897-6941

Job: Village of Lemont   Well No.: 5   Date Tested: July 1, 1997

Location: South of 127th Behind School   Tested By: Rogers

Dia. of Well: 18"   Driver: 350HP 17" H 2300V

Depth of Well: 1675 Ft.   Pump Used: Column and Shaft: 8" T&C

Length of Airline: 954 Ft.   Bowls: 14-stage 13MQ/12MQL

Non-Pumping Level: 789 Ft.   Manufacturer: Byron Jackson

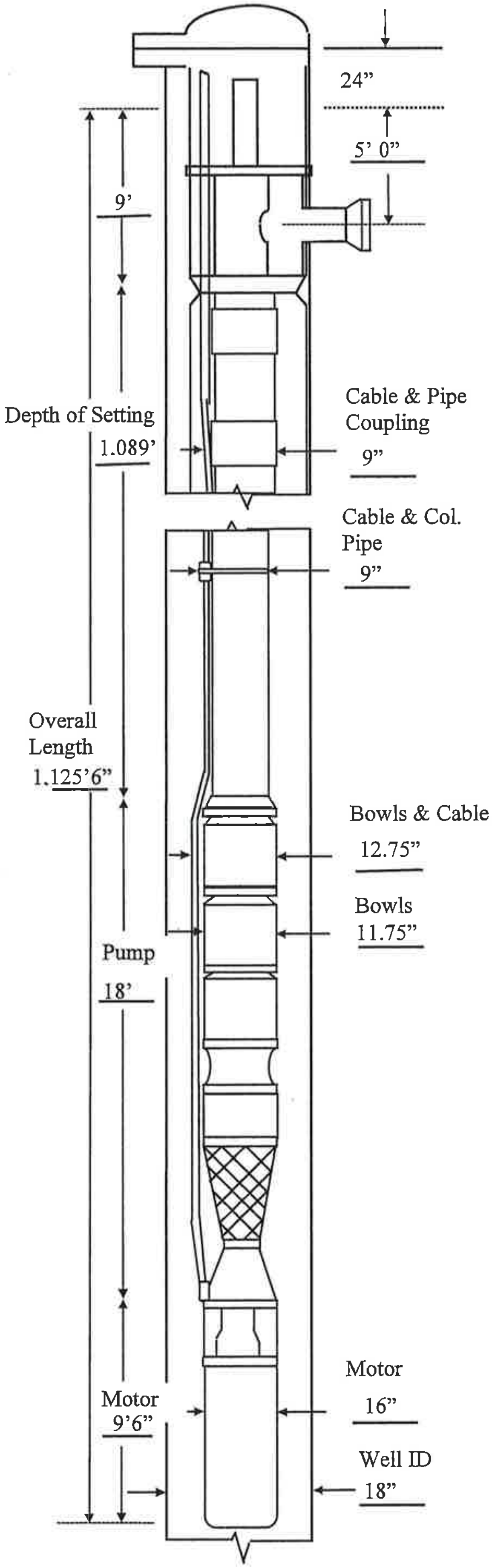
Orifice Size: 8"x6"   Serial No.: 96NR125901

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (feet)	Pumping Level	Drawdown	Disch. Pressure Lbs.	Disch. Pressure Feet	Total Pumping Head	Remarks
		0	165					Amps	
09:40	Start								
09:45	33.5	916	140	814	25	75		74/74/77	Clear
10:00	32.5	902	132	822	33	73			
10:10	32.5	902	130	824	35	73*	93**		
10:20	38.5	982	127	827	38	50	67	77/78/82	
10:30	38.5	982	124	830	41	50	67	76/79/80	No Sand
10:40	38.5	982	124	830	41	50		76/78/82	
10:50	41.5	1020	120	834	45	35	53	76/78/82	No Sand
11:00	41.5	1020	120	834	45	35	53	76/78/83	
11:10	41.5	1020	120	834	45	35	53	76/79/82	
							24		
11:20	48	1096	115	839	50	4	23.5	76/78/82	
11:30	48	1096	114	840	51	4	23.5	76/78/82	
11:40	48	1096	113	841	52	4	23.5	76/78/82	No Sand
								FLA=89	

Note: Airline transducer readings 1'-2' different than airline
flowmeter 2-6 gpm lower than orifice pipe.
*Pressure at hydrant.
*[illegible]essure inside pumphouse.

TESTW335.WK4

L-921 6/96



FLOWSERVE

Byron Jackson Pump Division

SUBMERSIBLE OUTLINE

PITLESS ADAPTER CONSTRUCTION

DATE 8/30/2021

NAME OF CUSTOMER VILLAGE OF LEMONT, IL

WELL NO. 6

LAYNE JOB NO. 1128296

PITLESS MANUFACTURER BAKER

MODEL NUMBER 7PS1820WBWE08M12SX

8 " LINE PIPE T&C COLUMN

12 " FLANGED DISCHARGE

BOWL ASSEMBLY 12RKBEH – 14(H) 2 (L) / 16 STAGE

350 HP 1765 RPM B.J. SUBM. MOTOR TYPE M

17" SIZE 3 PH. 60 HERTZ 2300 VOLT

1,000 GPM 1,100' TDH

CABLE SIZE #2 AWG VOLTAGE 2400 LENGTH 1,116

REMARKS

(2) ¼" PVC AIRLINE ASSEMBLIES

(2) SURGE VALVES 100' AND 700' ABOVE BOWL

COLUMN PIPE: 4' PITLESS PUP / 100' ROUND / 20' TRANSITION / 969' 8V TAPERED THREAD

LAYNE CHRISTENSEN COMPANY

BJ DEALER: 721 W. ILLINOIS AVENUE, AURORA ILLINOIS 60506

TEL: 630/897-6941

WELL INFORMATION - ROCK WELLS

Layne®-Western

a division of Layne Christensen Company

— PROFESSIONAL SERVICES FOR WATER SYSTEMS —

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone 630/897-6941
229 West Indiana Avenue • Beecher, Illinois 60401 • Phone 708/946-2244

Name Of Job: Village of Lemont   Date: October 18, 2004

City: Lemont   State: ILLINOIS

Well No.: 6   Drillers: Alwardt

Well Location: 1450 ft. (W) and 2450 ft. (S) of the NE corner of

the ---- 1/4 of Section 27, Twp. 37 (N), Range 11 (E) Cook County

Otherwise located as: North side of McCarthy road, just east of Rt. 171 (Archer Avenue)

Work Began: 7-27-04   Work Completed: 10-18-04

Casing Record:

Amount	Dia.	Wt. or Thickness	Material	with	joints from	to
159'	24"	0.500"	Steel	Welded	0	159'
1188'	18"	0.375"	Steel	Welded	+2	1186'

Hole Record:

inch	from	to
29	0	159'
22 ¾	159'	1186'
17	1186'	1665' bottom of hole

Cementing Record: 229 sacks neat cement outside 24" and 1741 sacks neat cement between 18" and 24" casings to 1186'

Well Test Data: Static Level 723'; pumping level 853' after 16 hours pumping at 1062 g.p.m.

Length of test 16 hrs. See Well Test Data Sheet Dated October 14, 2004

Remarks: Final specific capacity = 8.2GPM/Ft.

Layne Job No. 169216T   IEPA Well Permit No.: 0906-FY2004   Chicagoland Map No. 520

LW-96   SEE OTHER SIDE   102204

WELL LOG

Feet		Feet	Description
0	to	150	Glacial drift
150	to	170	Lime
17	to	303	White lime
303	to	455	Gray bluish shale with lime streaks
455	to	680	Lime and shale mix
680	to	691	Lime and sand mix
691	to	835	Gray lime
835	to	855	Lime
855	to	1090	Sand
1090	to	1120	Lime, sand and chert
1120	to	1130	Gray shale
1130	to	1135	Fractures lime with sand and shale
1135	to	1175	Lime with sand, green shale
1175	to	1195	Lime 60% - shale 40%
1195	to	1365	Dark gray lime
1365	to	1475	Dark gray sandy lime
1475	to	1485	Dark gray sandy lime with white sandstone
1485	to	1575	White sandstone
1575	to	1665	White sandstone
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		

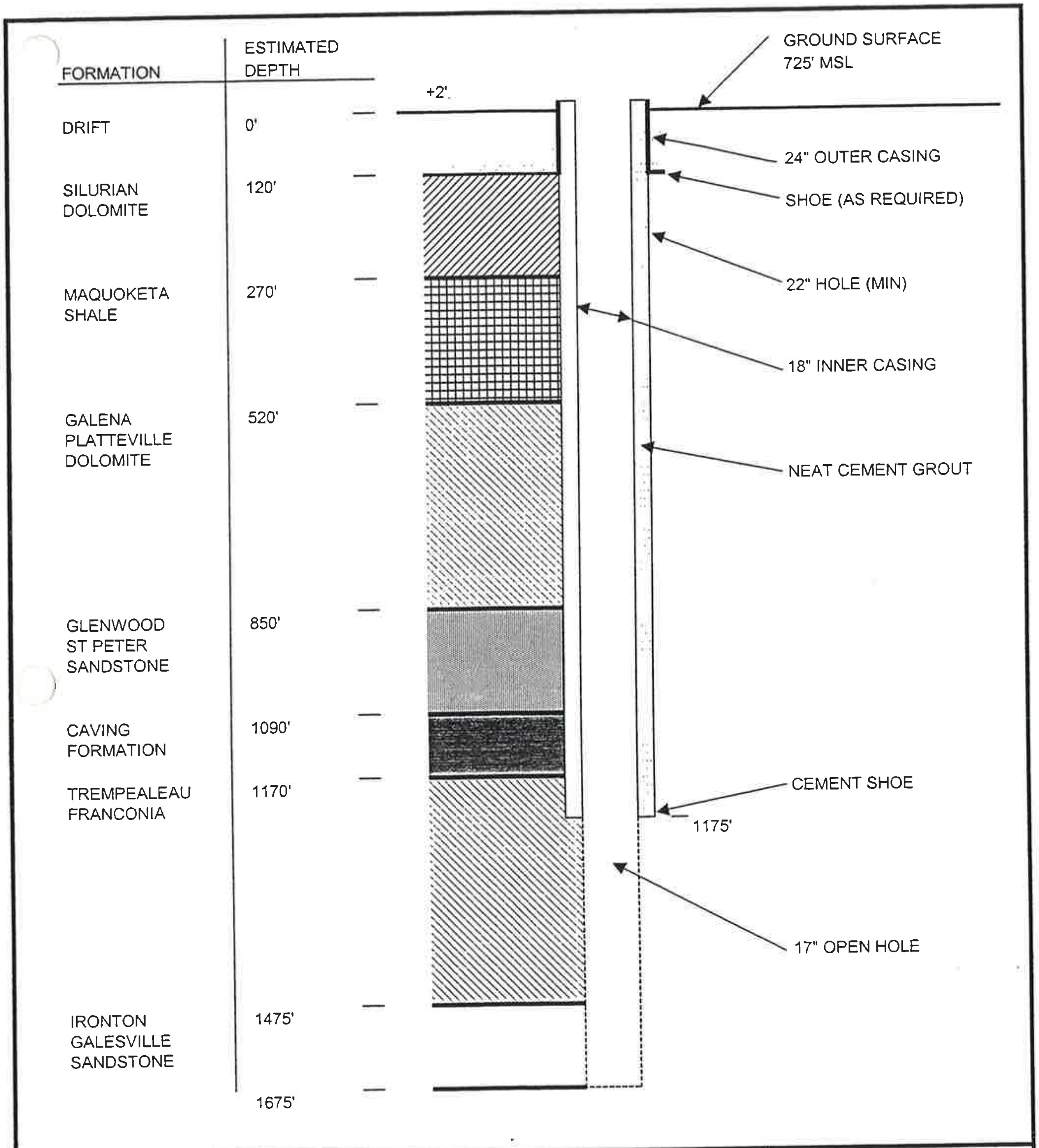


FIGURE 2	VILLAGE OF LEMONT, ILLINOIS WELL NO. 6 TENTATIVE CONSTRUCTION LOG	STRAND ASSOCIATES, INC. ENGINEERS®

WELL TEST DATA SHEET

Layne Christensen Company

Layne-Western Division

PROFESSIONAL SERVICES FOR WATER SYSTEMS

229 West Indiana Avenue • Beecher, Illinois 60401 • Phone: 708/946/2244

Job: Lemont, IL #6
Location:
Dia. of Well:
Depth of Well:
Length of Airline: 1093
Non-Pumping Level: 711
Orifice Size: 8x6

Well No.: 6

Pump Used: 80/70/60

Date Tested: 8-18-2021
Tested By: Gilchrist
Drive:
Column and Shaft:
Bowls:
Manufacturer:
Serial No.:

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (feet)	Pumping Level	Drawdown	Disch. Pressure Lbs.	Disch. Pressure Feet	Total Pumping Head	Remarks
			382						
1135	38	976	245			80		89-89-91	BLACK
1145	40	1001	240			80		88-88-90	Cloudy
1[illegible]0	44	1050	230			65		89-90-91	clear
1200	43.5	1044	225			65		89-89-91	Clear trace
		Gen thru transformer							
		Gen thru BUILDING							
			382						

L-1073 6/05

WELL TEST DATA SHEET

Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	6
Location	McCarthy Road		
Dia. of Well	18"		
Depth of Well	1665 ft.		
Length of Airline	901 ft.		
Static Level	701 ft.		
Orifice Size	6 x 5		

Date Tested	1/18/2012
Tested By	Warren / Carson
Driver	350 HP BJ 2300 Volt
Column & Shaft	8" T & C
Bowls	14 Stg-12RKEH(13)H(1) All Brnz
Manufacturer	Byron Jackson / Layne
Serial No.	55-10-1290

Time	Piez. (in)	G.P.M.	Air Gauge (ft)	Pumping Level	Drawdown	Dis. Press. Lbs.	Ft.	Total Head	AMPS	Remarks
		0	200	701	0	0			PANEL	
10:20	20.0	557	100	801	100	80			69	Clear
10:30	22.0	584	100	801	100	80			70	
10:40	22.0	584	100	801	100	80				Clear
10:50	22.0	584	100	801	100	80			70	
11:00	27.5	653	90	811	110	70				Clear
11:10	26.5	641	90	811	110	70			74	
[illegible]20	26.5	641	90	811	110	70				
11:30	26.5	641	90	811	110	70			74	
11:40	29.5	676	80	821	120	60				
11:50	29.5	676	80	821	120	60			76	
12:00	29.5	676	80	821	120	60			76	Clear
									FLA = 89	
										Final Specific Cap'y = 5.6GPM/ft.

WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	6	Date Tested	4/29/2009
Location	McCarthy Rd.			Tested By	Poppen
Dia. of Well	18"			Driver	350HP BJ 2300V
Depth of Well	1665 ft.			Column & Shaft	8" T&C
Length of Airline	901 ft.			Bowls	14 stg-12RKEH(13)H(1) bronze
Non-Pump Level	705 ft.			Manufacturer	Byron Jackson/Layne
Orifice Size	8 x 6			Serial No.	55-10-1290

Time	Piez. (in)	G.P.M.	Air Gauge (ft)	Pumping Level	Drawdown	Dis. Press. Lbs.	Dis. Press. Ft.	Total Head	AMPS	Remarks
		0	196	705	0	0				
8:45	25.0	791	122	779	74	80				Dirty
8:50	26.5	815	119	782	77	80			90-90-87	Clearing
9:00	26.5	815	117	784	79	80				
9:10	26.5	815	115	786	81	80				Clear
[illegible]:20	29.0	852	106	795	90	70				1/16" Silt/sand
[illegible]:30	29.5	860	104	797	92	70			94-94-91	Clear
9:40	29.5	860	104	797	92	70				
9:50	33.5	916	99	802	97	60				Clear
10:00	33.5	916	97	804	99	60				
10:10	33.5	916	96	805	100	60			99-99-95	Trace of sand/silt
10:20	33.5	916	95	806	101	60				
										Sp.Q = 9.1
									FLA = 89	
2350(±) Volts per panel.										

WELL TEST DATA SHEET

Layne-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue, Aurora, Illinois 60506-2892 Telephone 630/897-6941
229 West Indiana Avenue, Beecher, Illinois 60401 Telephone 708/946-2244

Job	Village of Lemont	Well No.	6	Date Tested	6/15/2006
Location	McCarthy Road			Tested By	John Geltz
Dia. of Well	18"			Driver	350HP - 2300
Depth of Well	1665 Feet			Column and Shaft	8" T&C
Length of Airline	910 Feet			Bowls	17 Stage - 12EMM
Non-Pumping Level	707 Feet			Manufacturer	Flowserve
Orifice Size	8x6			Serial No.	55-10-1290

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (ft)	Pumping Level	Drawdown	Disch. Pressure Psi.	Disch. Pressure Ft.	Total Pump. Hd.	AMPS	Remarks
		Average Running Volts=2375								
		0	203	707	0					
9:00	36.5	956	103	807	100	80			89-84-86	Sand=1/4"+
9:15	36.5	956	98	812	105	80			87-83-84	Clear-Sand=1/16"+
9:30	36	950	93	817	110	80				Clear-V.slight Sand Trace
9:45	37.5	969	91	818	111	70			88-83-84	Above
10:00	37	963	90	820	113	70				Clear
10:15	37	963	90	820	113	70			87-83-84	Clear-No Sand
10:30	39	988	84	826	119	60			87-83-84	
10:45	38.5	982	82	828	121	60				Clear-No Sand
11:00	38.5	982	81	829	122	60			87-83-84	
									FLA=89	
OFFICIAL STARTUP.										
	Power supplied to building is 480 then stepped up through transformer to 2300									
	6/14/06 ComEd Supply=494 Volts									
	6/15/06 ComEd Supply=484 Volts									