WATER SUPPLY FEASIBILITY STUDY
FOR THE
CITY OF HARRISBURG, ILLINOIS

DECEMBER 2018

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ENGINEER'S CERTIFICATION

I hereby certify that this report was prepared by me, or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Illinois.

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1. Purpose and Scope

The City of Harrisburg is located in Saline County in southeastern Illinois, approximately 20 miles due east of Marion (see Figure 1). The City owns and operates a municipal water utility, distributing water purchased from the Saline Valley Conservancy District, and has determined the need to investigate the feasibility of developing a different source and supply of potable water. As such, the City authorized Henry, Meisenheimer & Gende, Inc. (HMG) to perform the study and provide this report and the recommendations herein.

The purpose of this feasibility study is to:

- Review historical water demands and develop future demand projections;
- Evaluate the following water supply alternatives based on water quality, quantity and cost:
  - New groundwater source and treatment facility
  - Harrisburg Lake (or other man-made surface water source) and new treatment facility
  - Rend Lake Inter-City Water System
  - Saline Valley Conservancy District, the City's current water supplier
- Provide preliminary details for each alternative, including source & treatment facility locations, transmission routes, preliminary opinions of probable capital cost, funding alternatives and impact on water rates.

Information used in this report was obtained the City of Harrisburg, Rend Lake Inter-City Water System and Saline Valley Conservancy District; field observations; data provided by the Illinois Environmental Protection Agency (IEPA), Illinois State Geological Survey (ISGS), and Illinois State Water Survey (ISWS); preliminary cost data from equipment manufacturers; and research by HMG.

2. Demographics and Water Demand

2.1. Population Trends

Harrisburg's population has declined steadily since the 2000 census, after 50-year period of mildly fluctuation population. The 2010 Census indicated a population of 9,017, a decrease of 745 (7.6%) from the 2000 Census. Harrisburg saw an additional 0.44% annual decrease in population between 2010 and 2017, to 8,737.

With Saline County also experiencing an annual population loss of approximately 0.46% since 2010, continued population loss is expected. Table 1 below shows the projected population estimates through 2040.

Table 1
Population Estimates Through 2040

Year	2010	2017	2020	2025	2030	2035	2040
Population Estimate	9,017	8,737	8,619	8,425	8,231	8,046	7,861

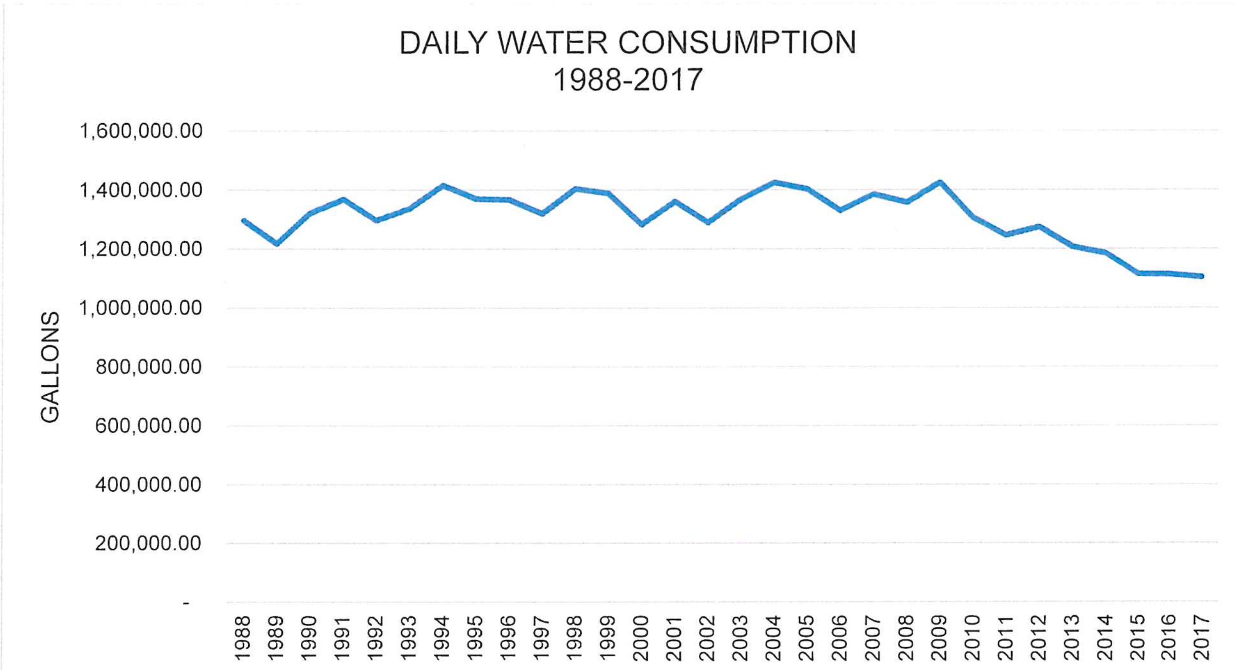
2.2. Water Demand Trends

Figure 1 below shows Harrisburg's average daily water consumption since 1988. Average daily demand was generally between 1.3 million gallons per day (MGD) and 1.4 MGD, with a peak of 1.425 MGD in 2009, but since 2009 the City has seen a steady decline in water demand, to its current level of approximately 1.1 MGD.

There are two primary drivers to this decline in water consumption: the aforementioned population decline, and work by the Public Works staff to fix numerous leaks throughout the distribution system. The current demand of 1.1 MGD is believed to be reasonable for the current population, equating to just over 126 GPD per capita. This includes municipal uses (fire, city buildings, Public Works use, etc.).

Figure 1

Average Daily Water Consumption



Assuming per capita water consumption stays static, at the projected 2040 population the long-term average daily water demand for Harrisburg would be just under 1 MGD. The historical peak period for water demand has been June-August, with recent peak demands of approximately 1.35 MGD (~155 GPD per capita). Assuming this peak per capita water consumption stays static, the long-term peak water demand for Harrisburg would be 1.22 MGD.

For planning purposes, a minimum demand of 0.9 MGD and a peak demand of 1.4 MGD will be used.

3. Source and Supply Alternatives

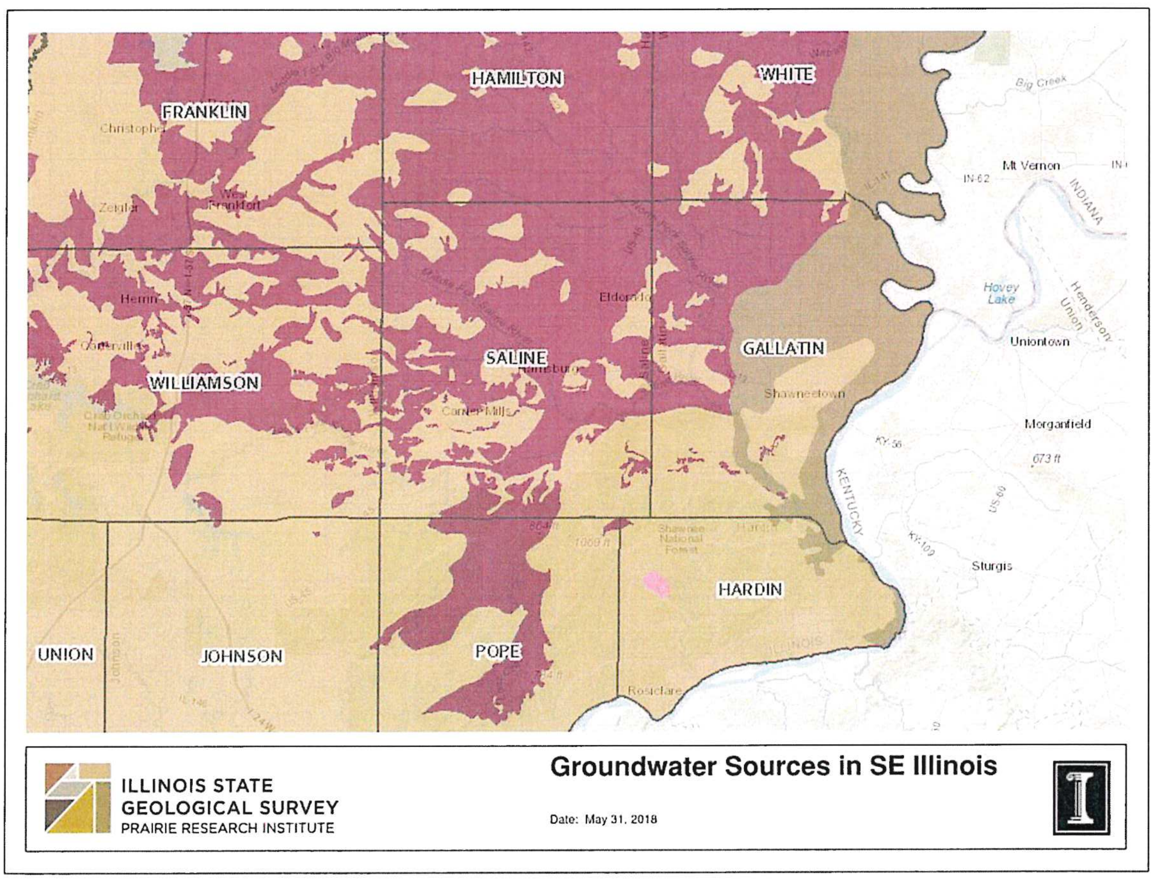
3.1. Groundwater

3.1.1. Groundwater Geology

Figure 2 below shows the potential groundwater sources in southeastern Illinois, as developed by the ISGS. The lighter brown areas indicate potential shallow (<50' deep) aquifers unlikely to provide sufficient long-term capacity for a municipal water supply.

Figure 2

Groundwater Sources in SE Illinois



The purple areas indicate major rock aquifers more than 500' deep. The darker the purple, the more total dissolved solids (TDS) are present in the groundwater. The very dark purple shown indicates the water is at best brackish (3,500-10,000 mg/l TDS), and very possibly saline (>10,000 mg/l TDS). Brackish or saline water would be very difficult to treat, requiring sophisticated treatment such as reverse osmosis, and produce high TDS waste residuals that would also be very difficult to manage. Overall a very, very costly endeavor.

The dark brown areas along the Ohio and Wabash River bottoms indicate major sand and gravel aquifers. These formations are widely used for public water supplies in Illinois, including Saline Valley Conservancy District, whose wells are located in this formation near Junction. Further evaluation of a potential new groundwater supply for Harrisburg will focus on this aquifer.

3.1.2. Groundwater Quality

Table 2 below shows select water quality data obtained from IEPA. The data is taken from Ridgway's abandoned wells (ranging in depth from 85'-101').

Table 2

Select Groundwater Quality Data

Parameter	Minimum	Maximum	Average
Alkalinity (mg/l as $CaCO_3$)	338	388	365
Ammonia-Nitrogen (mg/l)	0.66	1.70	1.45
Arsenic (ug/l)	20	160	76
Barium (ug/l)	70	170	107
Boron (ug/l)	0	62	30
Cadmium (mg.l)	0	5	1
Calcium (mg/l)	62	74	69
Chloride (dissolved, mg/l)	3.62	14	7.40
Copper, Free (mg/l)	0	76	24.20
Fluoride (mg/l)	0.19	0.32	0.27
Hardness (mg/l as $CaCO_3$)	270	320	299
Iron (mg/l)	1.90	20	6.68
Lead (ug/l)	0	35	8.02
Magnesium (mg/l)	28	32	30.60
Manganese (ug/l)	35	88	48.40
Nitrate (mg/l as N)	0	0.22	0.08
pH – field	7.27	8.15	7.54
Phenols (ug/l)	0	12	2.40
Phosphate (mg/L)	8.18	0.71	0.47
Phosphorus (mg/l)	0.34	0.37	0.35
Silica (mg/l)	7.91	15.7	13.42
Sodium (mg/l)	17	44	24.60
Strontium (ug/l)	280	370	330
Sulfate (dissolved, mg/l)	0	14.30	2.86
Total Dissolved Solids (mg/l)	301	343	322
Zinc (ug/l)	0	780	156

The majority of the regulated inorganic contaminants listed in Table 2 are already below the maximum contaminant level (MCL) for those contaminants. The exceptions are arsenic, which has an MCL of 10 ug/l, and iron, which has a secondary MCL of 0.3 mg/l. Manganese levels are near the secondary MCL of 50 ug/l.

The levels of arsenic, iron and manganese shown are considered moderate and will require careful process selection. Alkalinity and hardness will also need to be reduced during the treatment process.

3.1.3. Well Development and Raw Water Transmission

Multiple wells should be developed to provide redundancy and operational flexibility. Recommended Standards for Waterworks (Ten States Standards) requires the capacity to produce the maximum daily demand with the largest well out of service. To provide a total flow of 1,000 gallons per minute (GPM) peak flow, a minimum of two wells, each capable of producing 1,000 GPM would be required. However, multiple wells will provide more operational flexibility.

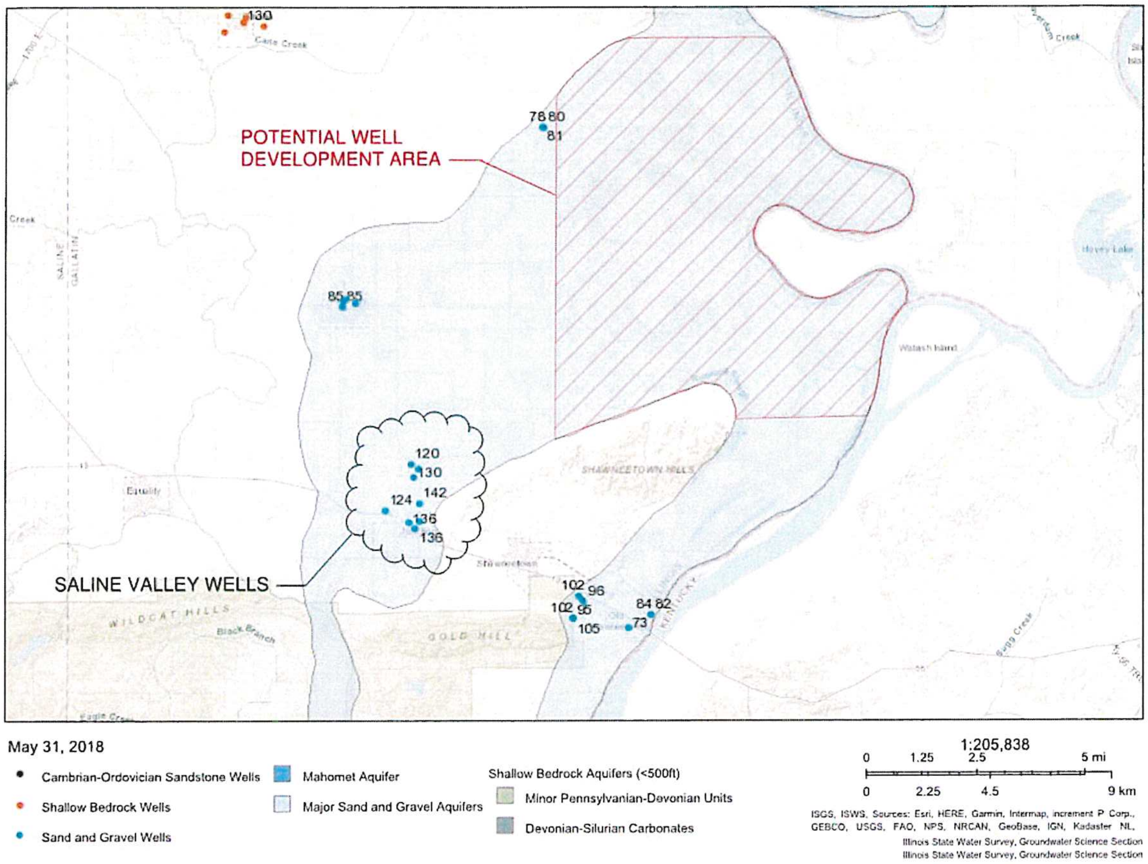
Three wells each rated at 1,000 GPM with variable frequency drives would allow the City to meet peak daily demands with one well, but having more pumping capacity would allow for operational flexibility. For example, with 2,000 GPM of firm pumping capacity (one well out of service), the City could produce water in shorter periods.

Wells should be located in reasonable proximity to the treatment plant to reduce the cost of raw water transmission. Well spacing is also important to allow for proper recovery of water levels. Accessibility is critical, especially in potentially remote areas in river bottoms. Protection from flooding and available power are also necessary. Figure 3 below shows the best area for well development within the previously identified aquifer.

Wells sited closer to the river can be shallower, but flooding, availability of power and accessibility become more difficult. Moving away from the river improves accessibility and provides better access to power, but the wells will need to be developed deeper to achieve the required output.

Figure 3

Area of Well Development

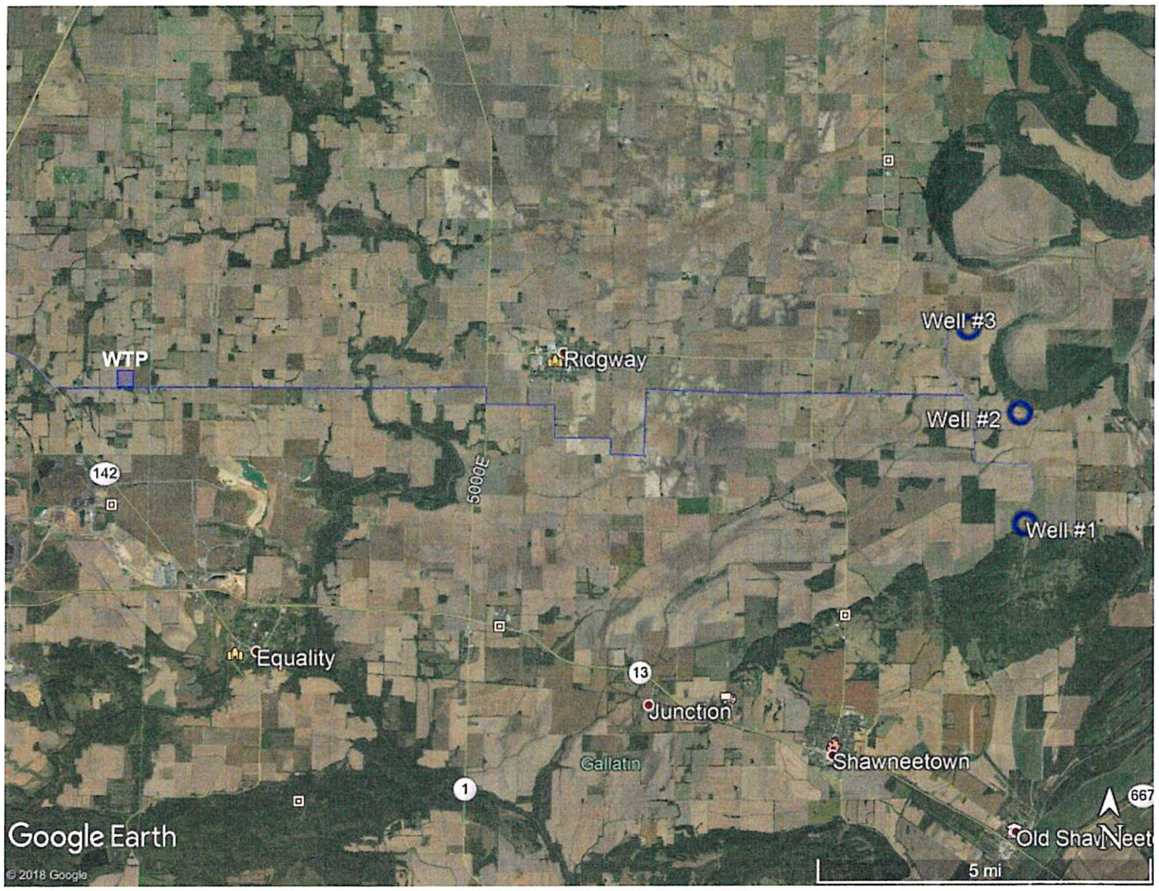


The hatched area in Figure 3 above lies within an area of the aquifer with a potential yield of 300,000-1,000,000 gallons per day (GPD) per square mile, according to "An Analysis of Groundwater Use to Aquifer Potential Yield in Illinois" prepared by ISGS. The same report indicates the potential yield of the aquifer where Saline Valley's wells are located is 100,000-150,000 GPD per square mile.

Figure 4 below shows possible locations of 3 wells and raw water transmission main routing to a possible water treatment plant along Ridgway Road (CH 8). The wells are all located just east of Big Hill Road (CH 3) in eastern Gallatin County. Expected well depth is 150'. The raw water transmission main is 16" diameter to manage friction losses and maintain lower velocities in the pipe.

Figure 4

Wells & Raw Water Transmission Main



3.1.4. Groundwater Treatment & Finished Water Transmission

The treatment scheme for the identified alluvial source is typical of groundwater treatment in Southern Illinois: iron & manganese removal, softening, and disinfection. Arsenic removal will be achieved during iron & manganese removal, as 1 mg/l of iron removal typically achieves 50 ug/l of arsenic removal.

3.1.4.1. Iron & Manganese Removal

Iron & manganese are not considered health hazards (thus the reason they have secondary MCLs), but pose other nuisance problems in public water supplies. Typical effects of iron and manganese in drinking water include:

- Staining of laundry and water fixtures. Iron staining is orange or brown, while manganese staining is typically black or gray.

- Metallic taste in water.

- Red or black water. Iron or manganese may settle out in their dissolved state and appear as specks in water.

- Hydrogen sulfide taste and odor. The same conditions that cause iron and manganese to become dissolved in water also cause hydrogen sulfide to be released. It is common to encounter hydrogen sulfide in water when iron and manganese are present.

- Scale and biofilm growth in the distribution system. Iron bacteria and other heterotrophic bacteria are supported by iron and manganese present in water. The availability of a nutrient allows bacteria to proliferate and buildup on pipe walls, hot water heaters, and point of use treatment units.

Methods of iron & manganese removal include oxidation followed filtration, softening, sequestering and ion exchange. Because the levels of iron and manganese in the proposed source water are moderate, sequestering and ion exchange are not viable alternatives. Oxidation/filtration is commonly the preferred method of iron & manganese removal.

When oxidized, dissolved ferrous iron & manganous manganese form insoluble ferric (iron) hydroxide (large, sticky reddish orange floc) and manganic (manganese) dioxide (fine, black floc) that can be settled out and filtered. The three most common oxidants for iron & manganese removal are oxygen (aeration), chlorine and potassium permanganate.

Aeration typically achieved with induced draft aerators, which are square metal housings (aluminum or stainless steel) with a series of porous trays that oxidize the water by drawing air into the water as it cascades down the trays. The natural reaction forms the settleable particles mentioned above that settle out in a detention tank that follows the aerator.

Alternatively, chlorine (typically sodium hypochlorite) or potassium permanganate can be fed into a rapid mix chamber or static mixer ahead of the detention tank. Chemical oxidation has one major advantage over induced draft aeration: the ability to adjust the dosage based on the amount of iron and manganese in the water to maximize the reaction. This is critical when the levels of iron and manganese in the raw groundwater fluctuate. The ability to utilize chemical oxidation is recommended, even when aeration is the primary oxidation process.

3.1.4.2. Filtration

Filtration in iron & manganese removal plants with low to moderate levels of iron and manganese has traditionally been accomplished using pressure filters. Pressure filters are large cylindrical steel tanks containing filter media operated under pressure from the influent side of the tank. Alternatively, open tank gravity filters could also be used, and are recommended when higher levels of iron and manganese are present. Filter media typically consists of support gravel and manganese greensand.

3.1.4.3. Softening

All water has some level of hardness, which is caused by soluble, divalent, metallic cations – primarily calcium and magnesium, although strontium, aluminum, barium, iron, manganese and zinc can also contribute to hardness. The sum of all of the metallic cations is referred to as total hardness.

Total hardness can also be referred to as the sum of carbonate hardness and noncarbonate hardness. Carbonate hardness is caused by calcium carbonate ($CaCO_3$), calcium bicarbonate ($Ca(HCO_3)_2$), magnesium carbonate ($MgCaCO_3$) and magnesium bicarbonate ($Mg(HCO_3)_2$). Carbonate hardness is equivalent to the alkalinity of the water. Non-carbonate hardness is the sum of calcium and magnesium salts other than carbonate and bicarbonate salts, e.g., calcium sulfate

($CaSO_4$), calcium chloride ($CaCl_2$), magnesium sulfate ($MgSO_4$) and magnesium chloride ($MgCl_2$).

Hardness is expressed in mg/l as $CaCO_3$. Water with a hardness of 150-300 mg/l as $CaCO_3$ is typically considered "hard water," while water with hardness exceeding 300 mg/l as $CaCO_3$ is typically considered "very hard." Hard water is not a health hazard, but it is objectionable for two primary reasons:

- Hard water forms scale (calcium carbonate) on glassware, plumbing fixtures, shower doors, faucets, sinks, and pipes. Scale buildup in pipes can significantly reduce the capacity of the pipe. This scale forms more quickly when water is heated. Subsequently, scale buildup in hot water heaters is a big problem, and can contribute to an increase in heating costs.

- Hard water reduces the ability of soaps, detergents and other cleaning agents to effectively work. Hard water also reacts with soaps and detergents to form soap scum.

In order to reduce hardness, water must be softened. Softening occurs through chemical precipitation (lime softening), or through the exchange of cations for sodium with a strong-acid cationic (SAC) resin (ion exchange). Because lime softening requires more footprint, significantly higher chemical usage and cost, significant maintenance requirements associated with lime feed equipment, and significant quantities of lime waste residuals to manage. Comparatively, ion exchange is simple to operate and fairly cost effective, therefore ion exchange will be the softening process considered in this evaluation.

Cation exchange softening involves the replacement of calcium and magnesium cations with sodium by a cationic resin. The resin can then be regenerated with a brine solution of sodium chloride. The four operating cycles are softening, backwash regeneration, and displacement (slow rinse) and fast rinse.

Ion exchange is typically accomplished in steel pressure vessels with a minimum of 36" of resin packed in the bottom half of the vessel. Multiple vessels are used to provide firm capacity while one unit is out of service for backwashing or regeneration.

Regeneration is necessary after the resin's ability to produce soft water is exhausted, and involves introducing a 4% - 10% sodium chloride solution, or brine, into the ion exchange vessel. The calcium and magnesium are transferred from the resin to the waste stream in the form of calcium and magnesium chlorides, while an equivalent amount of sodium is returned to the resin. The regeneration waste is high in total dissolved solids, so proper wastewater residuals management is essential.

3.1.4.4. Disinfection

Groundwater disinfection is more straightforward than surface water disinfection due to organic matter not typically being in groundwater. As such, disinfection by-product formation is not a concern and free chlorine can be used for disinfection.

A minimum free chlorine residual of 0.2 mg/l must be maintained in the distribution system at all times. The maximum residual is 4 mg/l. Free chlorine can be fed as gaseous chlorine from ton or 150-lb cylinders or as sodium hypochlorite solution in bulk or a hypochlorite generator. Due to storage and risk management requirements for gaseous chlorine, sodium hypochlorite will be considered for this evaluation.

Figure 5 shows a schematic and Figure 6 shows a conceptual layout of a groundwater treatment plant featuring oxidation via an aerator and baffled detention tank, followed by pressure filters and ion exchange softeners. Oxidation would be augmented with potassium permanganate or sodium hypochlorite fed after the aerator and before the baffled detention tank. A minimum of 30 minutes of detention time is required in the detention tank. Sodium hypochlorite would be fed to provide a disinfectant residual in the distribution system.

Major equipment and processes will include:

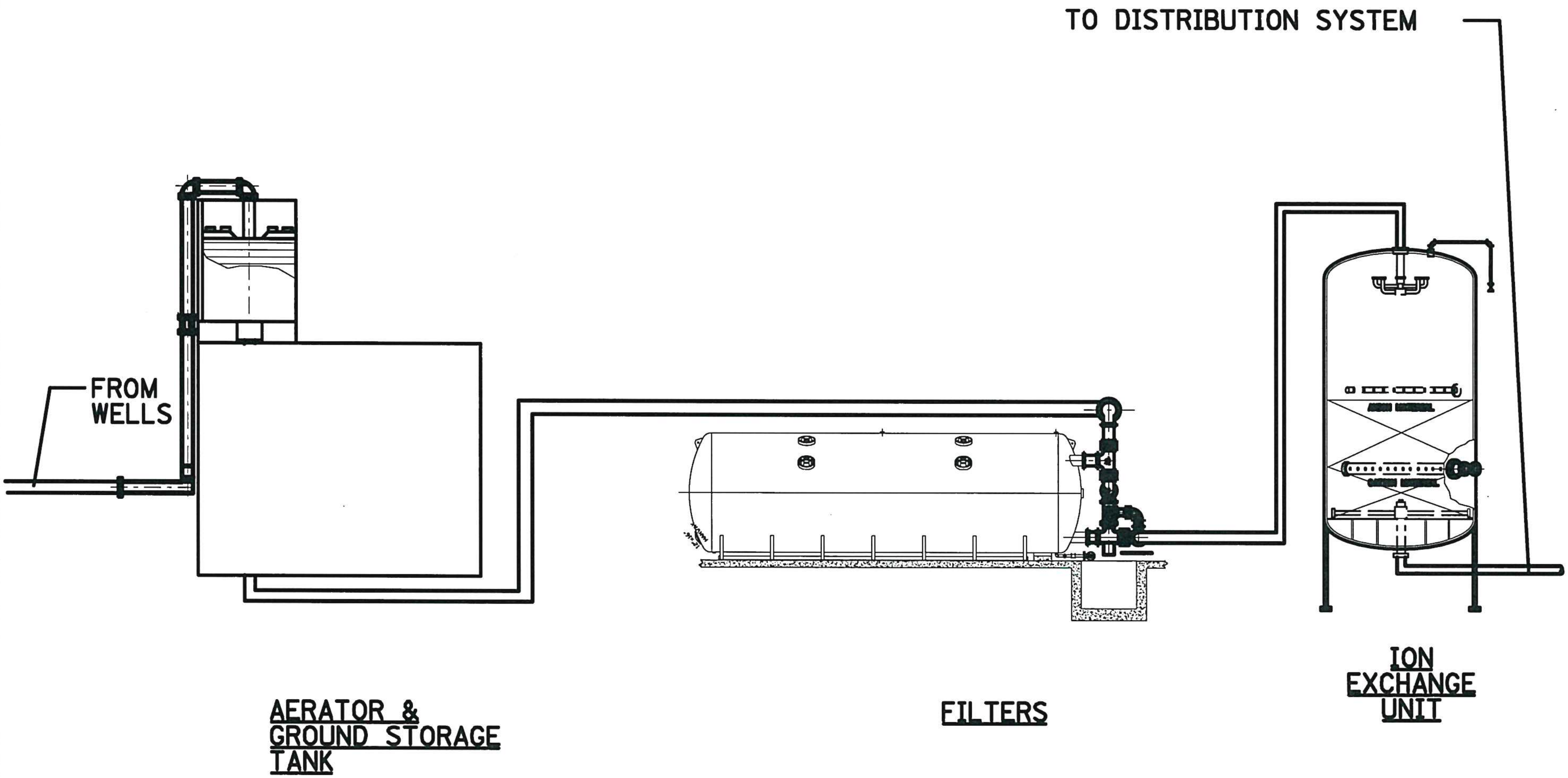


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FIGURE 5
GROUND WATER
TREATMENT PLANT SCHEMATIC

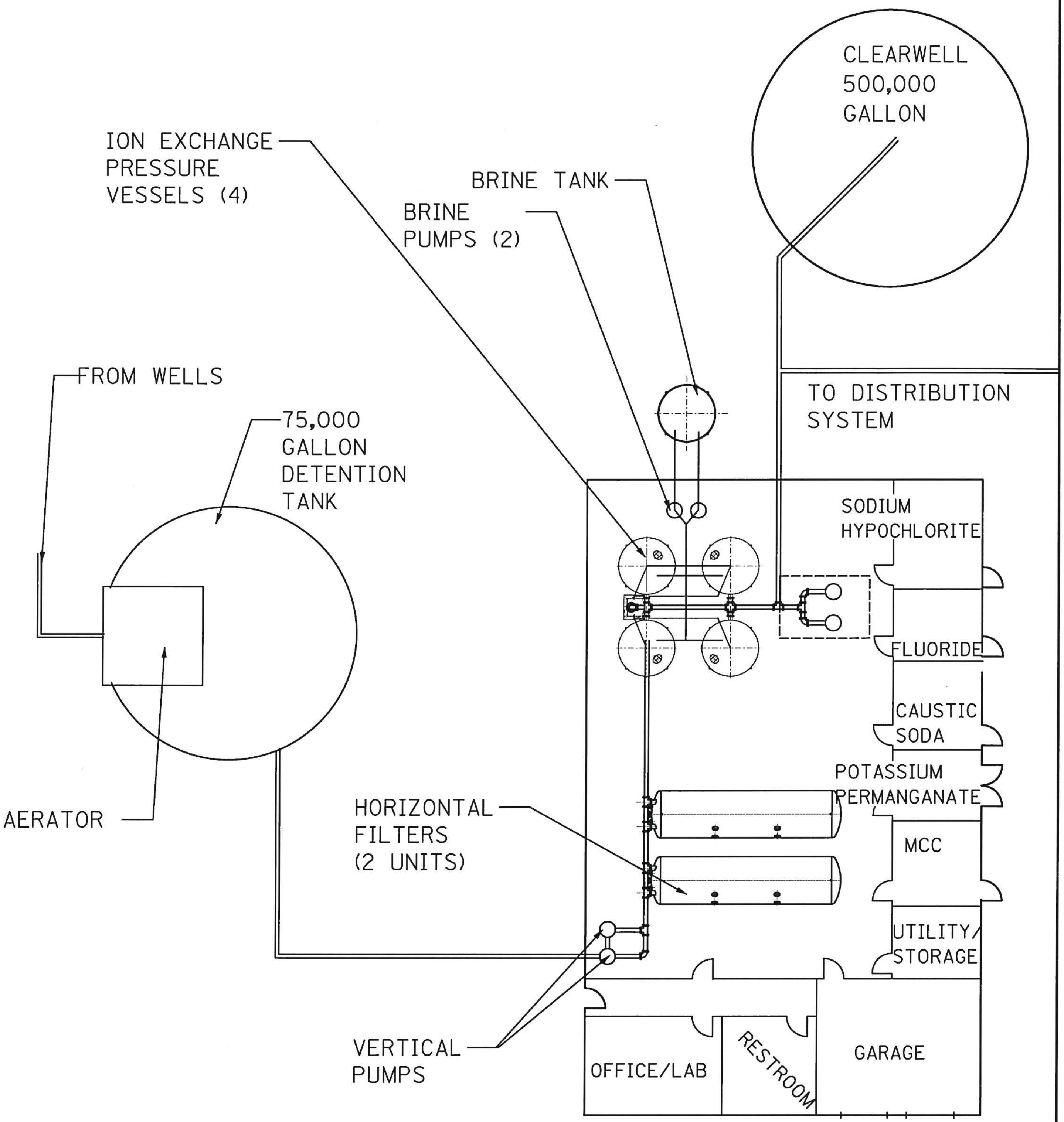

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FIGURE 6
GROUND WATER
TREATMENT PLANT
CONCEPTUAL LAYOUT

- One 6'-6" x 6'-6" x 13'-4" induced draft aerator with 75,000-gallon baffled detention tank.

- Two 10' diameter x 34' long 4-cell horizontal pressure filters would be required to provide a firm capacity of 2,000 GPM at a rate of 4.2 GPM/ft^2 of filter media.

- Four 10' diameter ion exchange softening units to soften the water to 150 mg/l as $CaCO_3$.

- Two variable speed 2,000 GPM low service pumps between the aerator and the filters.

- 500,000-gallon ground storage tank (clear well) and two variable speed 2,000 GPM high service pumps.

- Sodium hypochlorite feed systems for pre-oxidation and distribution system residual.

- Potassium permanganate feed system for pre-oxidation.

- Liquid caustic soda (sodium hydroxide) feed system for pH adjustment.

- Fluoride feed system for distribution system residual.

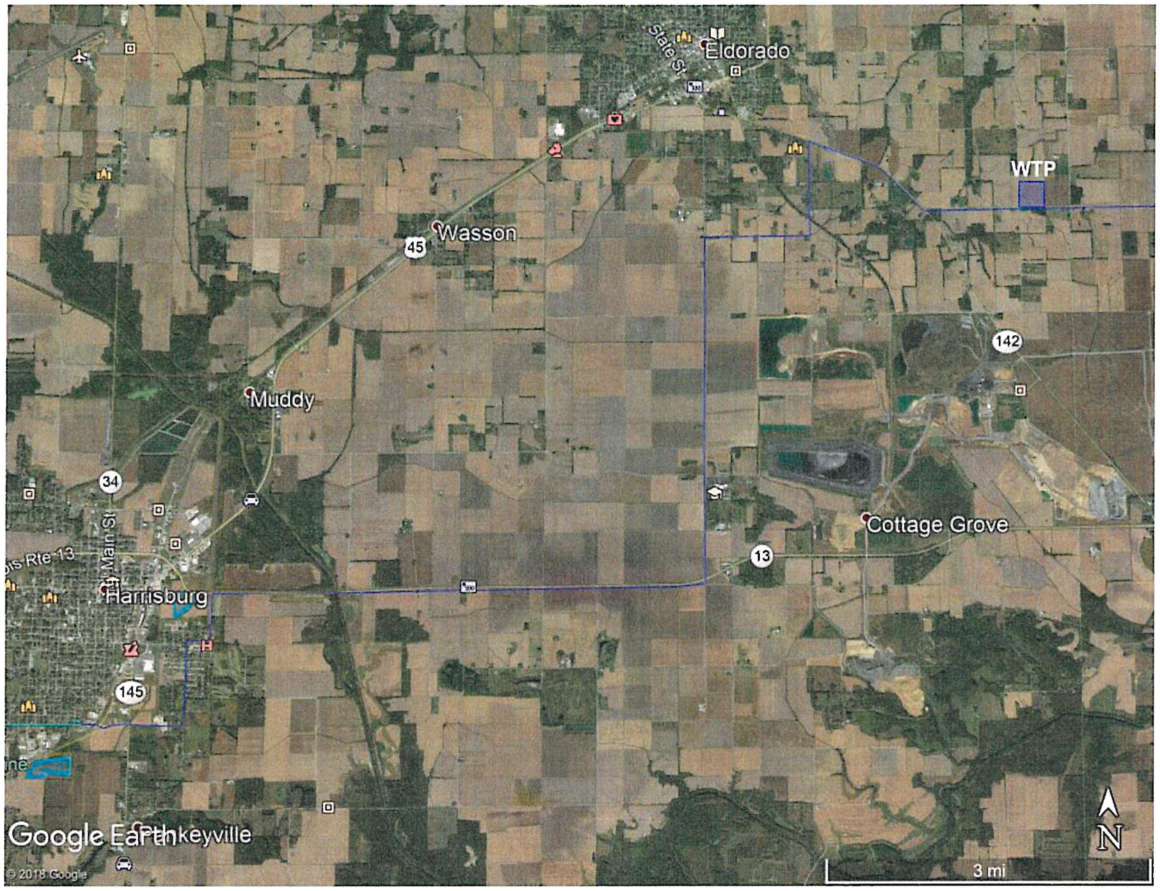
- Salt storage and brine system, including brine pumps.

- Lift station and force main for plant process wastewater and backwash effluent.

Figure 7 below shows the WTP location and transmission main route to Harrisburg. For the purpose of this evaluation, the proposed WTP is located on Ridgway Road (CH 8) (see Figure 4). The finished water main generally follows roadways for access.

Figure 7

Groundwater WTP & Finished Water Transmission Main



3.2. Surface Water

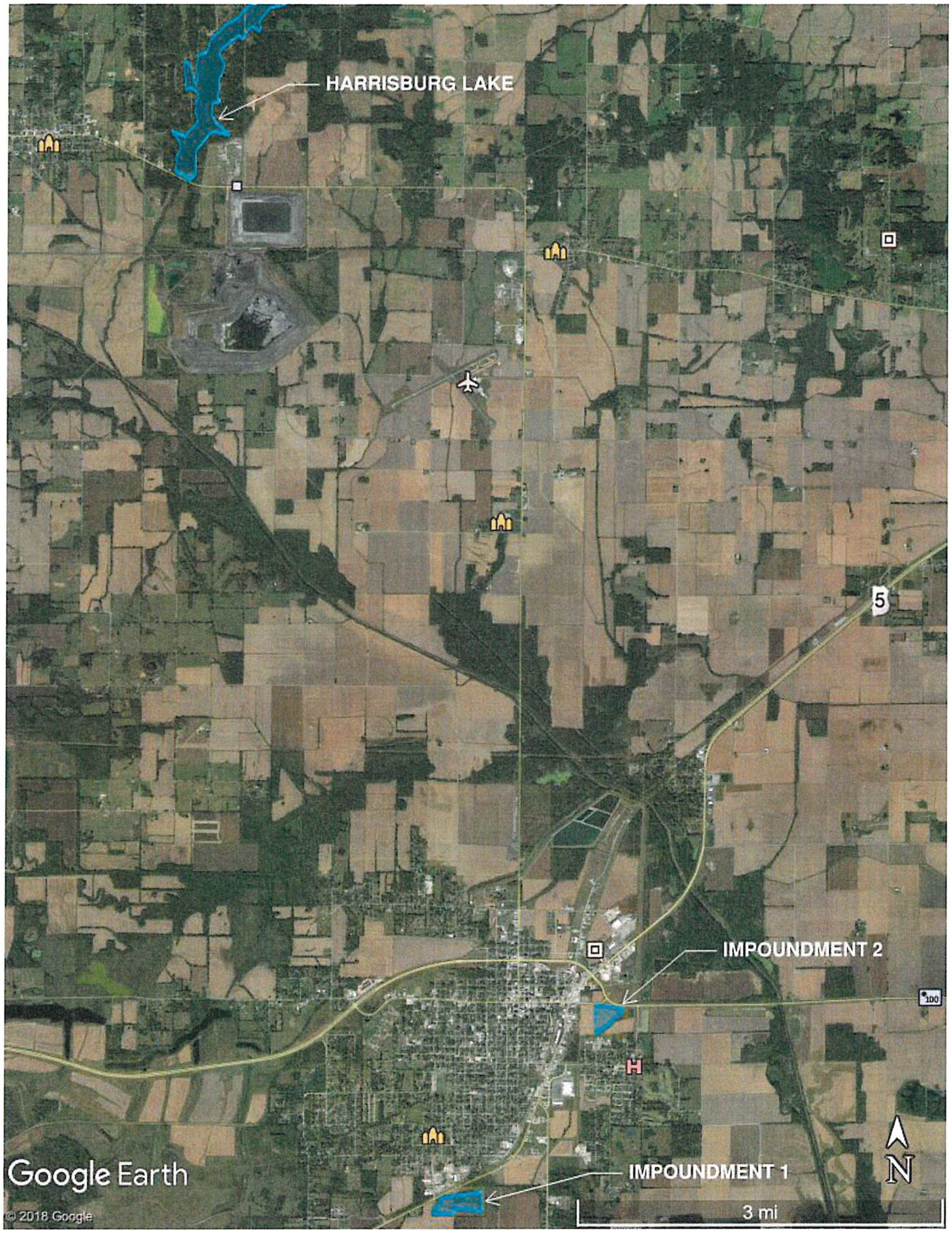
3.2.1 Surface Water Sources - Harrisburg Lake & Flood Impoundments

Figure 8 below shows Harrisburg Lake near Galatia, which served as the primary source of drinking water prior to the City switching to Saline Valley Conservancy District in 1981, and two potential secondary source impoundments.

The Illinois State Water Survey report, *"Potential Surface Water Reservoirs of South-Central Illinois"* (1966), indicates Harrisburg Lake has a watershed of 5.4 square miles, a pool area of 350 acres and a storage capacity of 900 million gallons.

Figure 8

Surface Water Sources



Harrisburg Lake by itself is not adequate to serve the City of Harrisburg during peak usage periods, so as before supplemental raw water capacity will need to be provided. Since the old side channel reservoirs have been repurposed for stormflow detention for the wastewater collection system, new supplemental sources will be required. The flood impoundments would serve as the supplemental sources.

The south impoundment (Impoundment 1) is an existing flood impoundment with a surface area of approximately 30 acres; the north impoundment (Impoundment 2) is a planned flood impoundment with approximately 20 acres. Both are located on Pankey Branch, a stream with a 7-day, 10-year low flow of 0 cubic feet per second (cfs). There is virtually no regulatory guidance available for using a flood impoundment for a drinking water source, so it is assumed that a minimum volume must be left available at all times. In addition, in order to be able to maintain a firm raw water capacity, the City will likely be required to have the ability to pump water from Harrisburg Lake to the impoundments, when possible, to replenish any raw water volume utilized for treatment during periods of low flow in Pankey Branch.

In order to match the storage volume of the previous side channel reservoirs, each impoundment will likely need to be excavated to a usable depth of 25'-30'.

3.2.2. Surface Water Quality

Samples taken from Harrisburg Lake were analyzed for common surface water quality constituents. Table 3 below shows the water quality results.

Table 3

Select Surface Water Quality Data

Parameter	Minimum	Maximum	Average
Alkalinity (mg/l as $CaCO_3$)	16.2	38.1	27.15
Hardness (mg/l as $CaCO_3$)	92	94	93
Iron (mg/l)	0.158	0.153	0.156
Nitrate (mg/l as N)	0.235	0.205	0.220
Total Organic Carbon (mg/l)	14.8	14.6	14.7

The water quality results indicate a surface water that will be a challenge to treat, with very low alkalinity and high total organic carbon (TOC). Water with low alkalinity tends to be corrosive, so the treatment process s will need to increase alkalinity and improve the stability of the water before sending into the distribution system. TOC is an indicator of the presence of natural organic matter (NOM), When chlorine is added to water with NOM, disinfection byproducts (DBPs), including total trihalomethanes (TTHM) and haloacetic acids (HAA), are formed. These DBPs are potentially carcinogenic and highly regulated. Careful process selection will be required.

3.2.3. Surface Water Source Development and Raw Water Transmission

Each reservoir will require an intake screen, consisting of a submerged, slotted tee-shaped screen what takes in raw water. The intake screen is piped to a wet well, were low service pumps transmit the raw water to the treatment plant. These low service pumps can be either submerged solids handling pumps, or vertical turbine pumps. A potassium permanganate feed system should be provided at each raw water pump station for pre-oxidation.

To provide 1.4 MGD firm capacity, a minimum of 975 GPM must be provided with one pump out of service. However, in order to treat that maximum day demand, the pumps must run 24 hours per day. A more efficient operation would be to plan for maximum daily demand to be met in 12 hours of operating time. To facilitate this, like the groundwater alternative, a firm pumping capacity of 2,000 GPM should be provided.

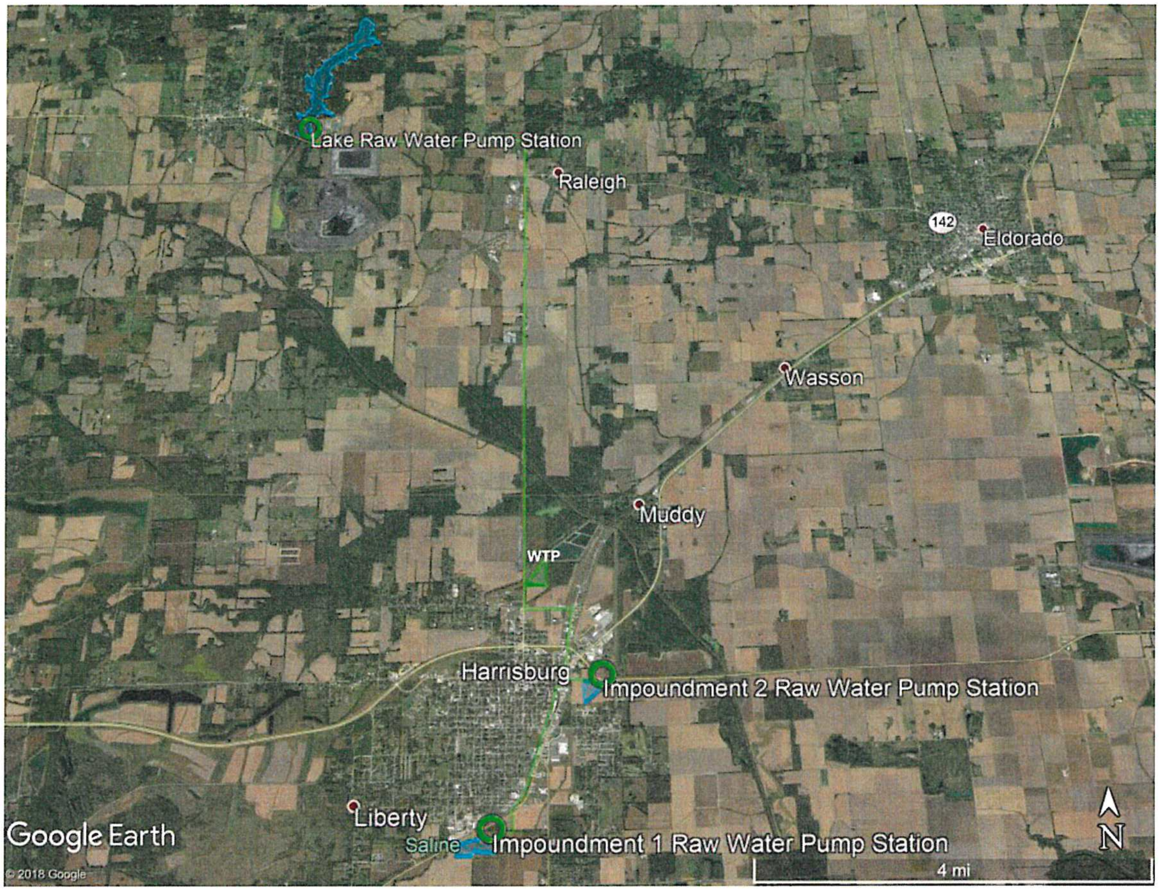
Figure 9 below shows possible routes for the raw water transmission mains to a possible water treatment plant located near the excess flow basins on the north side of the City. The raw water transmission mains are 14" diameter to manage friction losses and maintain reasonable velocities in the pipe.

3.2.4. Surface Water Treatment & Finished Water Transmission

The treatment scheme for the identified surface water sources should include typical surface water treatment processes, including clarification, filtration and disinfection. Particular attention should be paid to TOC reduction and supplementing alkalinity to reduce corrosivity.

Figure 9

Raw Water Facilities & Surface Water WTP



3.2.4.1. Clarification

The primary objective of clarification, or settling, is to remove turbidity from the raw water. This is accomplished by adding positively-charged chemicals to raw water to react with negatively-charged sediment & other particles to form larger, heavier particles (floc) that settle out. Finer, smaller particles are then removed via filtration. DBP precursor reduction is also accomplished by removing these particles from the water. Conventional settling should have optimum coagulation capabilities in order to meet TOC reduction regulations.

Chemicals are applied into a rapid mix basin with an axial-blade, high-RPM mixer to quickly mix the chemicals and water. Alternatively, chemicals can be injected into an inline static mixer that mixes the chemicals via fixed, internal helical elements and the energy of the flowing water, thus requiring no mechanical moving parts. Alum, lime, and anionic polymer would all be fed at this point. Alum is most cost-effective when purchased in tanker loads, so ample storage would be needed. Two 3,000-gallon storage tanks with a day tank would be provided. Lime is fed as a slurry via a volumetric feeder. Dry lime can be stored in a silo or in 50-pound bags. Anionic polymer aids in floc formation and is fed straight from a drum.

Flocculation basins would follow rapid mixing. Flocculation basins must provide thirty minutes of detention time, so a total volume of 60,000 gallons would be necessary. A mixer with two axial impellers will provide mixing, with a G value between 50 and 70 s^{-1}.

Conventional settling basins must provide four hours of detention time with a maximum overflow rate of 0.5 gpm/ft^2. In addition, the weir overflow rate must not exceed 20,000 GPD/ft, and velocity through the settling basins must not exceed 0.5 ft/min. A minimum of two units are required.

For a plant that can treat water at 2,000 GPM, two units each capable of treating a minimum of 1,000 GPM would be necessary. At that rate of flow, each settling basin would be 64’ x 32’ with a side water depth (SWD) of 15’-4”.

Conventional settling is tried and true, but requires a lot of space and a lot of concrete to build. More and more facilities are moving away from conventional settling due to construction cost and footprint concerns. Using plate settlers is an effective way to reduce footprint but still maintain proper settling.

Plate settlers are flat, inclined plates installed in a conventional settling basin that increase the surface area for settling. The plates are typically installed at an angle of 55-60 degrees. As floc settles, it travels down the sloped plates while clarified water flows upward. Since the settling floc travels a shorter path, settling is accomplished at a faster rate. The increase in settling area, coupled with the increased settling rate, mean a smaller basin and, therefore, a smaller footprint.

A maximum loading rate of 0.5 gpm/ft^2 is used, based on 80% of the projected horizontal plate area. For two basins each sized for 1,000 GPM, the dimensions for each basin would be approximately 48' x 10' with a SWD of approximately 16'.

3.2.4.2. Filtration

Filtration in surface water treatment plants removes smaller, lighter floc particles that do not settle out during clarification. In addition, filters also remove *Cryptosporidium*, a parasitic protozoan found primarily in human and animal feces. *Cryptosporidium* is tolerant to disinfection and causes cryptosporidiosis, a potentially fatal type of gastroenteritis.

Rapid rate, dual media gravity filters are the most common type of filters in a conventional surface water treatment plant. Filter media typically consists of 18" of support media (gravel and larger diameter torpedo sand), and 12" of granular activated carbon (GAC).

Filters operate at a required nominal rate of 2 GPM/ft^2, but that rate can be increased up to 5 GPM/ft^2 if continuous turbidity monitoring and recording equipment is provided. Operating at 5 GPM/ft^2 is not optimal, however, and a rate between 3-4 GPM/ft^2 is recommended. For a firm capacity (one unit out of service) of 2,000 GPM, Harrisburg would need a minimum of four filters, each 15' x 12'.

3.2.4.3. Disinfection

Surface water disinfection is much more complicated than groundwater disinfection due to the presence of *Giardia*, viruses, and organic matter in surface water. Assuming treatment credits are provided for conventional treatment, a surface water treatment plant must provide 0.5-log inactivation of *Giardia* and 2.0-log inactivation of viruses through disinfection. This is achieved by feeding free chlorine ahead of the clearwell, which is sized to provide sufficient contact time for the required log removal.

As discussed previously, DBP formation is a concern due to the organics in surface water. To help mitigate the formation of DBPs, ammonia is added to chlorine to form chloramines, which last longer in the distribution system and do not form regulated DBPs like free chorine. A minimum combined chlorine residual of 0.5 mg/l must be maintained in the distribution system at all times. The maximum residual is 4 mg/l.

Figure 10 shows a schematic and Figure 11 shows a conceptual layout of a surface water treatment plant featuring conventional rapid mixing/flocculation/settling, followed by dual media rapid rate gravity filters. Gas chlorine and ammonium sulfate would be fed to provide a disinfectant residual in the distribution system.

Major equipment and processes will include:

- Rapid mix, flocculation basins, and two 64' x 32' settling basins each with a side water depth (SWD) of 15'-4".

- Four 15' x 12' dual media rapid gravity filters would be required to provide a firm capacity of 2,000 GPM at a rate of 3.7 GPM/ft^2 of filter media.

- Two variable speed 3,600 GPM filter backwash pumps.

- 500,000-gallon ground storage tank (clear well) and two variable speed 2,000 GPM high service pumps.

- Alum, lime, and polymer feed systems for coagulation.

- Liquid caustic soda (sodium hydroxide) feed system for pH adjustment.

- 150-lb. cylinders for gas chlorine feed system for *Giardia* & virus inactivation and distribution system residual.

- Ammonium sulfate feed system for formation of chloramines in the distribution system.

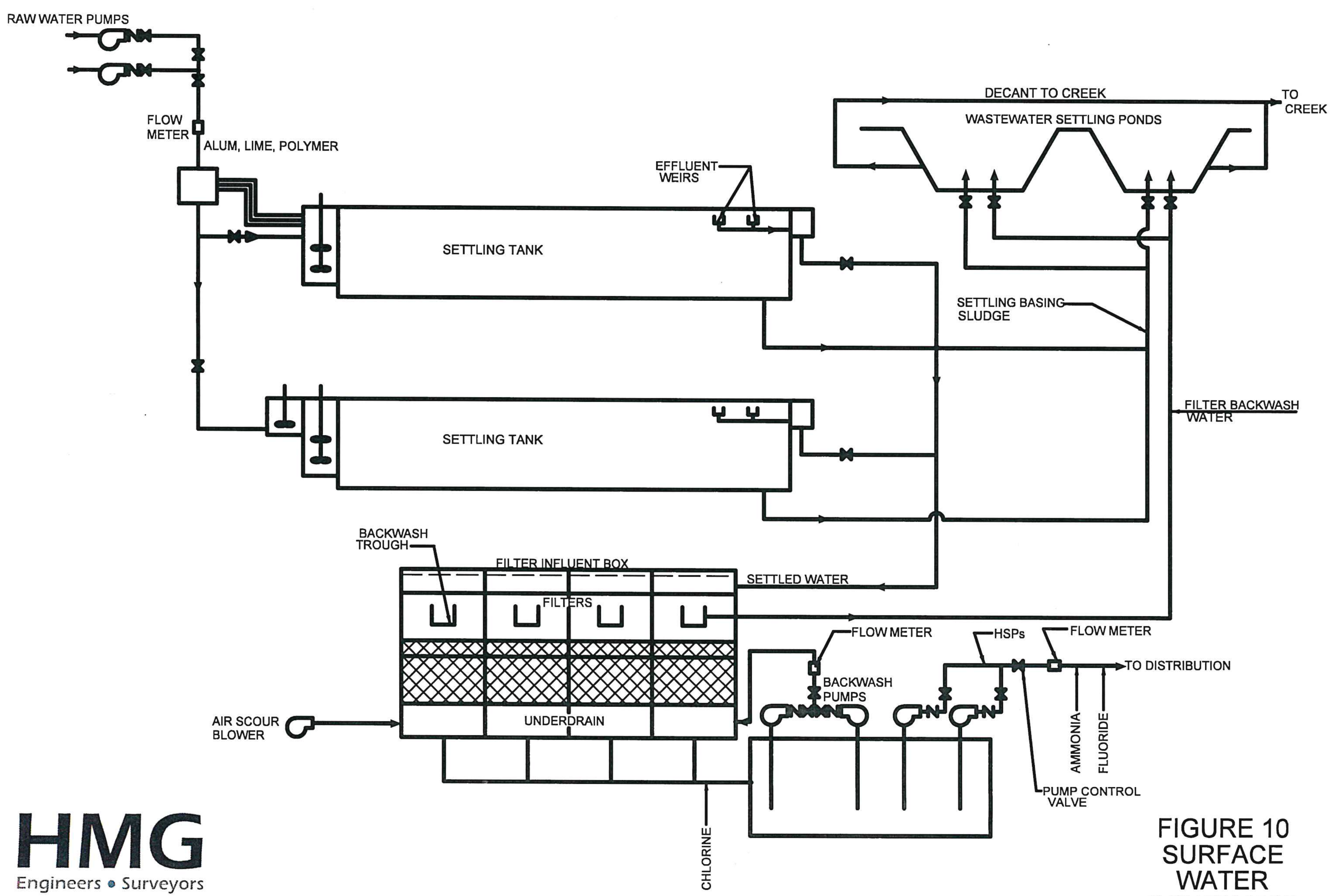


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FIGURE 10
SURFACE
WATER
SCHEMATIC

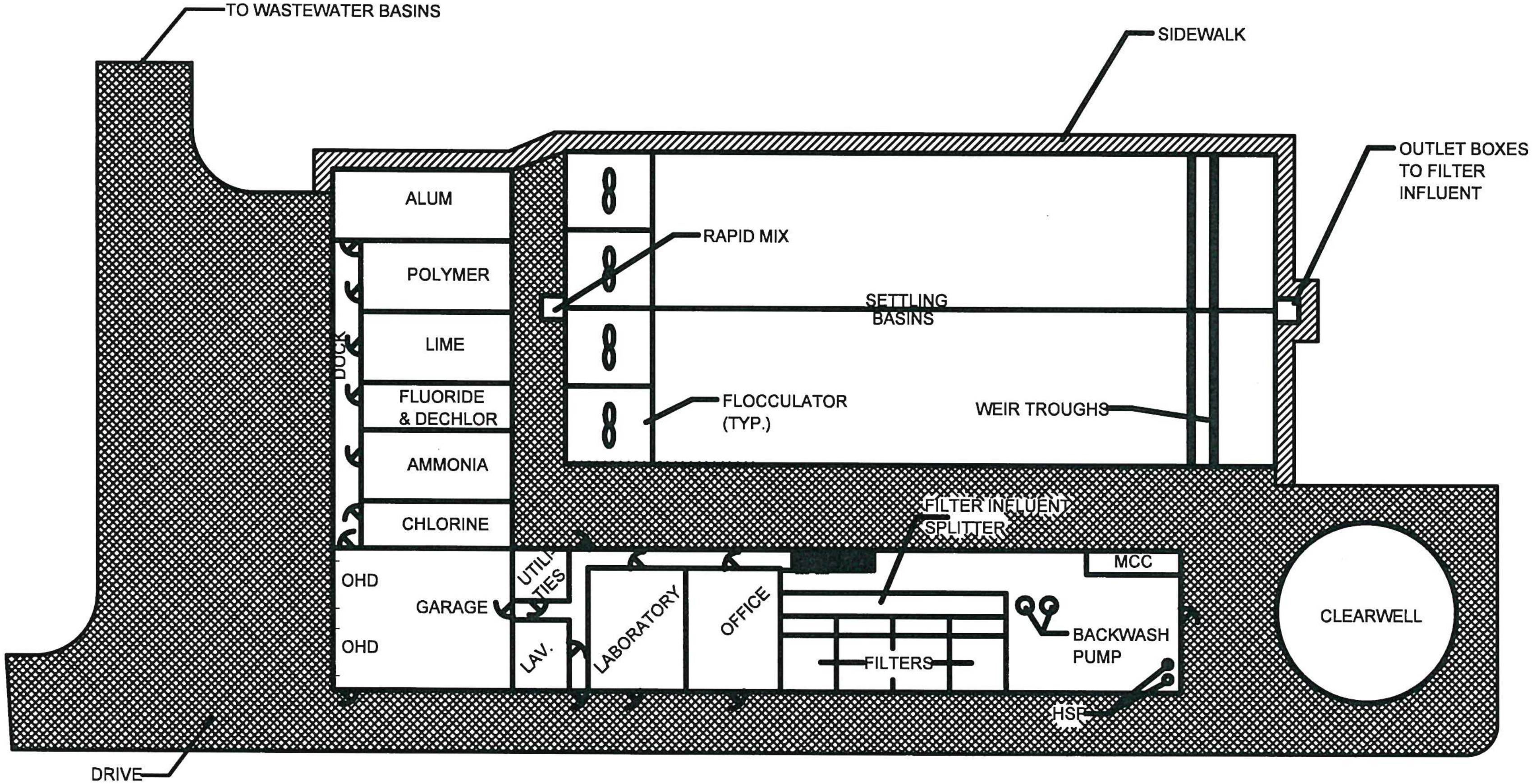

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FIGURE 11
SURFACE WATER WTP
CONCEPTUAL LAYOUT

- Fluoride feed system for distribution system residual.

- Lift station and force main for plant process wastewater and backwash effluent to adjacent excess flow basins.

3.3. Finished Water from Rend Lake Inter-City Water System

The only existing water supply in the area with sufficient capacity to add the City of Harrisburg is the Rend Lake Inter-City Water System. Rend Lake Conservancy District operates the Inter-City Water System, with a 27 MGD water treatment plant adjacent to Rend Lake on Marcum Branch Road. Rend Lake provides water to 35 communities and water districts as sale-for-resale (wholesale) customers, in addition to 1,200 direct customers. Rend Lake's water treatment plant has 5 MGD of available long-term capacity.

3.3.1 Conditions of Supply

Rend Lake provided the following parameters as conditions of supply to the City of Harrisburg:

- For a wholesale customer the size of Harrisburg, the current rate is \$2.39/1,000 gallons for the first 1 million gallons, then \$2.13/1,000 gallons thereafter.

- A ground storage tank and booster pump station are required to be constructed near the point of interconnection with Rend Lake's transmission main.

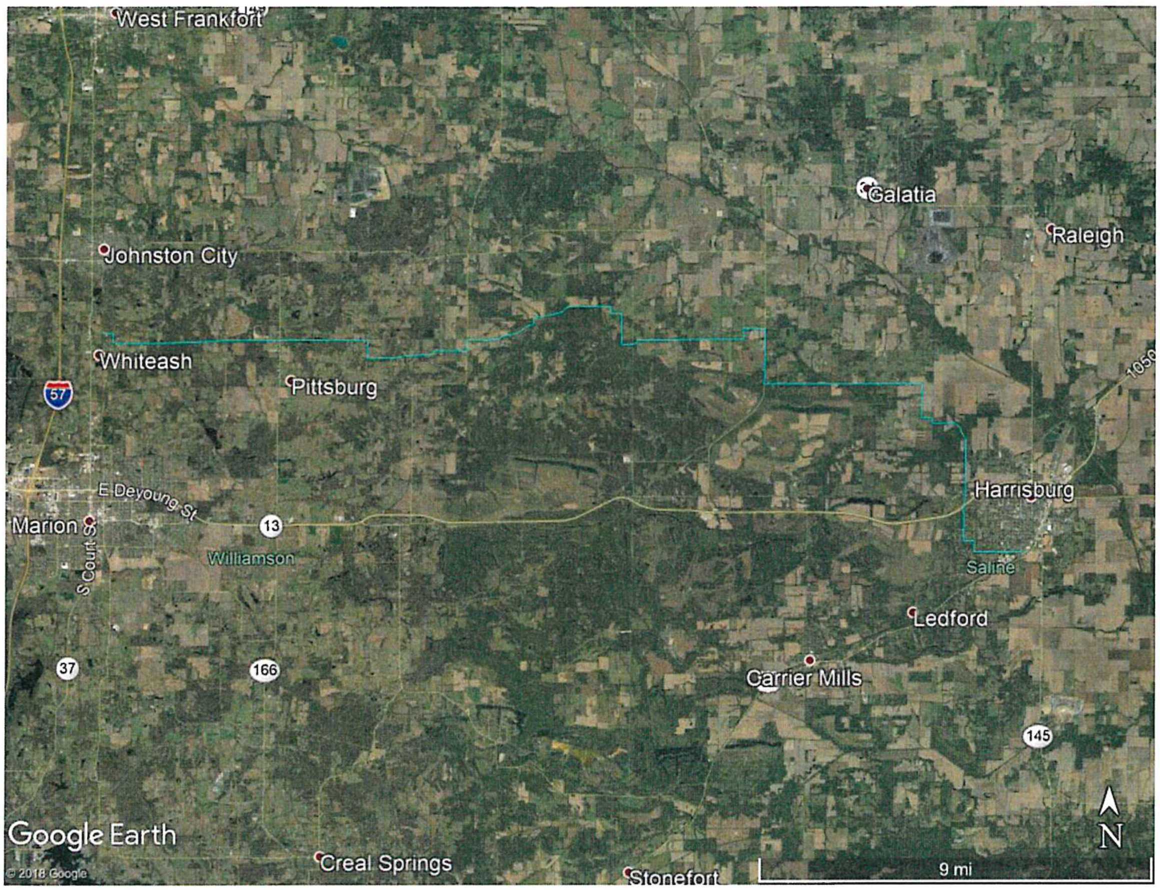
- Large users may be required to purchase a portion of their water from a secondary source during drought periods, depending on levels in Rend Lake.

3.3.2 Interconnection, Storage, Pumping & Transmission

The most likely point of interconnection to assure adequate supply for Harrisburg would be the 24" main between Johnston City and Marion. The main generally parallels the railroad and Illinois Route 37.

Figure 12 below shows a possible interconnection point north of Whiteash and 14" transmission main route to Harrisburg. The route is based on minimizing the operating head of the booster pumps. The route shown is longer, but has much less elevation difference than a shorter route south of Pittsburg. In addition, the area around the strip pits is avoided with the proposed route.

Figure 12
Rend Lake Water Transmission Main



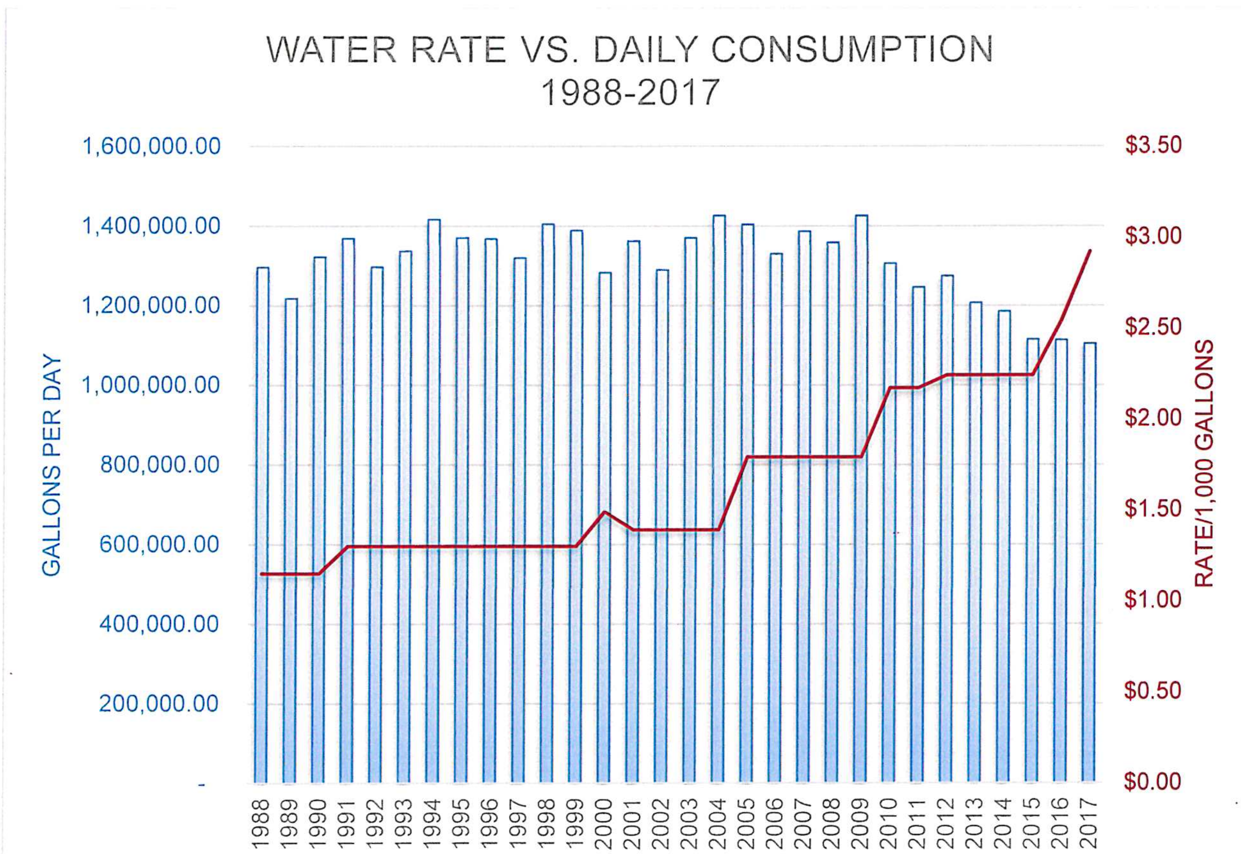
A 500,000 gallon ground storage tank and booster pump station would be constructed as near the interconnection point as possible, depending on land availability. Two 1,000 GPM variable speed pumps would be provided in the booster station. The same approach as the treatment plants could be taken, with larger pumping capacity to reduce pumping hours, but because this is an unmanned pump station, providing peak daily pumping demand should be sufficient. Increasing the pumping capacity would also require the transmission main to be a 16" main as well.

3.4. Finished Water from Saline Valley Conservancy District

The City's current water supplier has ample capacity to continue providing water to Harrisburg. Saline Valley has proposed a new 40-year contract with a beginning rate of $2.92/1,000 gallons, and a minimum required usage of 360 million gallons per year.

Figure 12 below shows the rate history for Harrisburg since 1981, when the City began purchasing water from Saline Valley, plotted against the City's water consumption.

Figure 12
Saline Valley Rate History for Harrisburg



Over 36 years, the absolute increase in the water rate from Saline Valley is 154%, which equates to an annualized increase of 4.28% per year. To compare, the absolute increase in the Midwest Consumer Price Index (CPI) over that same time period is just over 162%, so the Saline Valley rate tracks favorably against the CPI.

Of legitimate concern, however, is the more recent volatility in the Saline Valley rate. From 1981 to the rate increase of May 2001, the absolute increase was only 20.9%, which equates to an annualized increase of only 0.70%. However, starting with the next rate increase in May 2005, the absolute increase in the Saline Valley rate over the last 12 years is 110%, which equates to an annualized increase of 9.17% per year.

It should be noted Harrisburg has the lowest rate of any other Saline Valley wholesale customer. Other wholesale customers have rates that range from $2.93 - $3.48/1,000 gallons.

Saline Valley is moving forward with a capital project to construct three new wells. A Project Plan was submitted to the IEPA Drinking Water Loan Program in October 2017. The projected cost of the project is $1,847,500. The Project Plan indicates debt service from the project will be serviced by increasing water rates by $0.104/1,000 gallons.

4. Alternative Cost Evaluation

4.1. Capital Cost

Table 4 below shows the preliminary opinion of probable cost for necessary capital improvements for each alternative. Construction costs include easements and land acquisition. Engineering costs include Basic Services (Design, Bidding & Construction Guidance) and Construction Observation services. Detailed spreadsheets of the preliminary opinion of probable construction cost presented here are attached in the Appendix.

Table 4

Opinion of Probable Capital Cost

Alternative	Groundwater	Surface Water	Rend Lake	Saline Valley
Construction	$16,555,000	$23,785,000	$7,848,000	$0
Contingency (15%)	$2,483,250	$3,567,750	$1,177,200	$0
Engineering	$1,952,000	$2,600,000	$1,112,000	$0
TOTAL	**$20,990,250**	**$29,927,750**	**$10,137,200**	**$0**

4.2 Operating Cost

Table 5 below shows the City's preliminary opinion of probable operating cost for each alternative. For the purpose of this evaluation, the operating costs presented below are the probable costs for operation, maintenance & replacement (OM&R) for the capital improvements described in this report. Detailed spreadsheets of the preliminary opinion of operating costs presented here are attached in the Appendix.

Table 5

Opinion of Probable Operating Cost (per 1,000 gallons)

Alternative	Groundwater	Surface Water	Rend Lake	Saline Valley
Energy	$0.55	$0.60	$0.20	$0
Chemicals	$0.24	$0.44	$0	$0
Miscellaneous OM&R	$0.25	$0.40	$0.08	$0
TOTAL	**$1.04**	**$1.44**	**$0.28**	**$0**

It is assumed that the City's current operating costs for administration and distribution system will remain the same for each water supply alternative, and therefore are not included in this exercise.

4.3 Labor & Benefits

For the groundwater alternative, a Class B water operator would need to be added to the City's workforce. Because a groundwater plant does not need to be manned to operate, no other additional manpower is expected to be added. Probable cost for a Class B operator for labor and benefits is $85,000 per year.

For the surface water alternative, more additional manpower is needed due to the requirement that a surface water treatment plant must be manned while it is producing water. A Class A water operator would be needed, in addition to 3 additional operators to handle two shifts per day, plus weekends, and cover holidays and vacations. Probable cost for a Class A operator plus 3 additional operators for labor and benefits is $285,000 per year.

No additional manpower is expected to be needed for the other alternatives.

4.4 40-Year Projected Costs

Because Saline Valley has proposed a 40-year contract, each alternative should be evaluated for its total cost over the same 40-year period. Debt service is based on the IEPA Public Water Supply Loan Program, with current regular terms of 1.84% over 20 years. Annual inflation of operating costs is assumed to be 2% for energy, chemicals and OM&R, and 2.5% for labor and benefits. It is assumed that the cost to purchase water from Rend Lake and Saline Valley will also increase annually by 2%. Table 6 below shows the total projected 40-year costs for each alternative. Detailed spreadsheets are included in the Appendix.

Table 6

Projected 40-Year Costs – Regular IEPA Public Water Supply Loan Terms

Alternative	Groundwater	Surface Water	Rend Lake	Saline Valley
TOTAL	**$53,158,249**	**$85,914,433**	**$69,320,885**	**$65,447,601**

At the present time, the IEPA Public Water Supply Loan Program, in accordance with the federal Safe Drinking Water Act, allows principal forgiveness and lower interest rates for loan applicants who meet the criteria for disadvantaged communities. As a community with a population less than 10,000, a median household income below 70% of the statewide average, and an unemployment rate at least 3% greater than the statewide average, Harrisburg meets the criteria.

Loan forgiveness would be equivalent to 75% of the initial loan amount up to a maximum of $1.5 million. In addition, Harrisburg would qualify for a hardship rate of 1% and can amortize the debt over 30 years instead of the normal 20 years. Table 7 below shows the projected 40-year costs given the disadvantaged communities criteria. Detailed spreadsheets are included in the Appendix.

Table 7

Projected 40-Year Costs – Disadvantaged Community IEPA Public Water Supply Loan Terms

Alternative	Groundwater	Surface Water	Rend Lake	Saline Valley
TOTAL	**$50,621,329**	**$83,036,883**	**$67,197,645**	**$65,447,601**

5.0 Conclusions & Recommendations

Based on the parameters of this evaluation, when evaluating the total projected cost over 40-years, only the groundwater alternative provides the City any long-term savings over Saline Valley. The projected savings are considerable at over $12 million based on the regular IEPA Public Water Supply Loan Program terms. When considering the disadvantage community loan terms, the projected savings is nearer to $15 million.

The projected savings is significant enough to warrant further pursuit, including exploring easements/land acquisition and completing a detailed Facility Plan for the purpose of submitting an application to the IEPA Public Water Supply Loan Program for funding.

APPENDIX

GROUNDWATER TREATMENT OPTION
PRELIMINARY OPINION OF PROBABLE COST

<u>RAW WATER FACILITIES</u>	
10" & 16" PVC Raw Water Main (no rock removal)	$4,400,000
Water Supply Wells	$1,200,000
Emergency Generators	$180,000
PROBABLE RAW WATER FACILITIES CONSTRUCTION COST	**$5,780,000**
<u>IRON REMOVAL PLANT WITH ION EXCHANGE SOFTENING</u>	
Earthwork/Sitework	$250,000
Site Piping/Utilites	$200,000
Asphalt Driveway & Parking Lot	$45,000
Pre-Engineered Building, Complete	$1,000,000
Settling Tank w/ Aerator	$300,000
Pressure Filters	$1,250,000
Ion Exchange System	$1,200,000
Sodium Hypochlorite Feed	$50,000
Flouride Feed	$25,000
Caustic Feed	$25,000
Potassium Permanganate Feed	$25,000
Low Service Pumps	$200,000
High Service Pumps	$400,000
500,000 Ground Storage Tank (Clearwell)	$750,000
Process Piping & Valves	$150,000
Lab Equipment	$25,000
Monitoring Equipment	$30,000
Plant Electrical/Controls/SCADA	$400,000
Emergency Generator	$150,000
Waste Handling	$300,000
PROBABLE TREATMENT FACILITY CONSTRUCTION COST	**$6,775,000**
<u>FINISHED WATER MAIN</u>	
16" PVC Finished Water Main (no rock removal)	$4,000,000
PROBABLE FINISHED WATER MAIN CONSTRUCTION COST	**$4,000,000**
SUBTOTAL	**$16,555,000**
CONSTRUCTION CONTINGENCY (15%)	**$2,483,250**
TOTAL PRELIMINARY OPINION OF OF CONSTRUCTION COST	**$19,038,250**

SURFACE WATER TREATMENT OPTION
PRELIMINARY OPINION OF PROBABLE COST

RAW WATER FACILITIES

14" PVC Raw Water Main (no rock removal)	$4,400,000
Impoundment Excavation	$6,000,000
Lake Intake & Pump Station	$1,500,000
Impoundment Intakes/Pump Stations	$1,600,000
Emergency Generators	$225,000
PROBABLE RAW WATER FACILITIES CONSTRUCTION COST	**$13,725,000**

CONVENTIONAL PLANT W/ PLATE SETTLERS

Earthwork/Sitework	$250,000
Site Piping/Utilites	$300,000
Asphalt Driveway & Parking Lot	$60,000
Pre-Engineered Building, Complete	$1,800,000
Floc Basins & Settling Basins with Plate Settlers	$800,000
Gravity Filters with GAC	$1,500,000
Alum Feed	$60,000
Gas Chlorine Feed	$100,000
Flouride Feed	$25,000
Caustic Feed	$40,000
Potassium Permanganate Feed	$25,000
Backwash Pumps	$50,000
High Service Pumps	$75,000
500,000 Ground Storage Tank (Clearwell)	$750,000
Process Piping & Valves	$1,500,000
Lab Equipment	$25,000
Monitoring Equipment	$50,000
Plant Electrical/Controls/SCADA	$2,000,000
Emergency Generator	$150,000
Waste Handling	$500,000
PROBABLE TREATMENT FACILITY CONSTRUCTION COST	**$10,060,000**
SUBTOTAL	**$23,785,000**
CONSTRUCTION CONTINGENCY (15%)	**$3,567,750**
TOTAL PRELIMINARY OPINION OF OF CONSTRUCTION COST	**$27,352,750**

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OPINION OF PROBABLE COST

PROJECT: Water Supply Feasibility Study — HMG NO. 7702

OWNER: City of Harrisburg — DATE: 7-Aug-18

DESCRIPTION: 14" water main from Rend Lake Water

ITEM	SIZE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
PVC Water Main	14"	143,000	LF	$34.00	$4,862,000.00
Restr. Joint PVC Water Main in Steel Casing, Bore & Jack	14"	1,200	LF	$400.00	$480,000.00
Restrained Joint PVC Water Main, Directionally Bored	14"	2,400	LF	$90.00	$216,000.00
Butterfly Valve & Box	14"	150	EA	$4,000.00	$600,000.00
Water Air Release Valve & Vault	1 1/2"	20	EA	$6,000.00	$120,000.00
Fire Hydrant w/ Valve & Box	6"	100	EA	$4,000.00	$400,000.00
Select Granular Backfill			CY	$35.00	$0.00
Asphalt Pavement Replacement			SY	$50.00	$0.00
Connection to Existing Main	24"	1	EA	$15,000.00	$15,000.00
Tapping Sleeve, Valve & Box	12"	1	EA	$5,000.00	$5,000.00
Booster Pump Station, Complete		1	LS	$400,000.00	$400,000.00
Storage Tank	500,000	1	LS	$750,000.00	$750,000.00

CONSTRUCTION SUBTOTAL	**$7,848,000.00**
CONSTRUCTION CONTINGENCY (15%)	**$1,177,200.00**
BASIC ENGINEERING	
Design	$463,000.00
Bidding	$66,000.00
Construction Guidance	$132,000.00
ENGINEERING SUBTOTAL	**$661,000.00**
RESIDENT OBSERVATION	**$451,000.00**
TOTAL PROBABLE COST	**$10,137,200.00**

Groundwater Treatment Plant
Chemical Utilization

CHEMICAL	FEED RANGE, MG/L	PROBABLE RATE, MG/L	CURRENT COST (per lb)	DAILY COST AT 0.9 MGD	DAILY COST AT 1.4 MGD
Potassium Permanganate	2-22	8	$3.10	$186.15	$289.56
Sodium Hypochlorite	5-15	10	$0.18	$13.51	$21.02
Caustic Soda	1-10	5	$0.34	$12.76	$19.85
Fuoride	1	1	$0.28	$2.10	$3.27

COSTS PER YEAR AT FLOW RATE NOTED	$78,300.34	$121,800.53
COSTS PER 1,000 GALLONS	$0.24	$0.24

Groundwater Treatment Plant
Energy Consumption

ELECTRICAL ENERGY CONSUMPTION

UNIT	CONSUMPTION kw-hr per 1,000 gallons		CONSUMPTION kw-hr per year	
WELLS				
Pumping	2.7900			
HVAC/lighting			15,000	
Instrumentation			20,000	
Lighting			75,000	
TREATMENT PLANT				
High service pumps	1.1500			
Low service pumps	0.5000			
Brine pumps	0.2200			
Chemical feed pumps	0.0800			
Wastewater pump	0.0060			
Blowers	0.2500			
Lighting			60,000	
Instrumentation			20,000	
Computers/comm.			10,000	
Ventilation			500	
Air conditioning			8,000	
Furnace, fan			1,000	
	4.9960		209,500	
AT $0.10/KW-HR	$0.50	per 1,000	$20,950	per year
TOTAL ANNUAL ENERGY COSTS	$0.56	per 1,000	$185,068.60	@ 0.9 MGD
	$0.55	per 1,000	$222,288.80	@ 1.1 MGD
	$0.54	per 1,000	$276,245.60	@ 1.4 MGD

Surface Water Treatment Plant
Chemical Utilization

CHEMICAL	FEED RANGE, MG/L	PROBABLE RATE, MG/L	CURRENT COST (per lb)	DAILY COST AT 0.9 MGD	1.4 MGD
Potassium Permanganate	4-8	5	$3.10	$116.25	$181.04
Powdered Activated Carbon	5-15	10	$0.75	$56.30	$87.57
Alum	40-150	90	$0.19	$128.35	$199.66
Lime	20-80	40	$0.16	$48.04	$74.73
Anionic Polymer	0-2	1	$1.35	$10.13	$15.76
Chlorine Gas	1-8	6	$0.43	$19.37	$30.12
Ammonium Sulfate	0-3	2	$0.78	$11.71	$18.21
Fuoride	1	1	$0.28	$2.10	$3.27

COSTS PER YEAR AT FLOW RATE NOTED	$143,169.65	$222,783.78
COSTS PER 1,000 GALLONS	$0.44	$0.44

Surface Water Treatment Plant
Energy Consumption

ELECTRICAL ENERGY CONSUMPTION

UNIT	CONSUMPTION kw-hr per 1,000 gallons		kw-hr per year	
RAW WATER INTAKES				
Pumping	2.5000			
HVAC/lighting			15,000	
Instrumentation			20,000	
Lighting			75,000	
Chemical feeds	0.1200			
TREATMENT PLANT				
High service pumps	1.5000			
Backwash pumps	0.7500			
Chemical feeds	0.4000			
Wastewater pump	0.1000			
Lighting			75,000	
Instrumentation			35,000	
Computers/comm.			10,000	
Ventilation			1,500	
Air conditioning			10,000	
Furnace, fan			2,500	
	5.3700		244,000	
AT $0.10/KW-HR	$0.54	per 1,000	$24,400	per year
TOTAL ANNUAL ENERGY COSTS	$0.61	per 1,000	$200,804.50	@ 0.9 MGD
	$0.60	per 1,000	$240,811.00	@ 1.1 MGD
	$0.58	per 1,000	$298,807.00	@ 1.4 MGD

Rend Lake Water
Energy Consumption

ELECTRICAL ENERGY CONSUMPTION

UNIT	CONSUMPTION kw-hr per 1,000 gallons		kw-hr per year	
WELLS				
Pumping	1.9200			
HVAC/lighting			5,000	
Instrumentation			4,000	
Lighting			25,000	
	1.9200		34,000	
AT $0.10/KW-HR	$0.19	per 1,000	$3,400	per year
TOTAL ANNUAL ENERGY COSTS	$0.20	per 1,000	$66,472.00	@ 0.9 MGD
	$0.20	per 1,000	$80,776.00	@ 1.1 MGD
	$0.20	per 1,000	$101,512.00	@ 1.4 MGD

Annual and Monthly Cost Comparison Between Groundwater Water Treatment Plant and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Groundwater Treated and Distributed (Gallons)	IEPA Loan Annual payment	Energy/Chemicals/OM&R ($/1,000)(2% increase per year)	Labor & Benefits (2.5% increase per year)*	Total Groundwater Production & Transmission Cost	Effective Groundwater Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$1,255,236	$1.04	$85,000	$1,752,479	$4.42	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$1,255,236	$1.06	$87,125	$1,760,747	$4.46	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$1,255,236	$1.08	$89,303	$1,769,159	$4.51	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$1,255,236	$1.10	$91,536	$1,777,718	$4.55	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$1,255,236	$1.13	$93,824	$1,786,428	$4.60	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$1,255,236	$1.15	$96,170	$1,795,290	$4.64	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$1,255,236	$1.17	$98,574	$1,804,308	$4.69	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$1,255,236	$1.19	$101,038	$1,813,485	$4.74	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$1,255,236	$1.22	$103,564	$1,822,823	$4.79	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$1,255,236	$1.24	$106,153	$1,832,326	$4.84	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$1,255,236	$1.27	$108,807	$1,841,997	$4.89	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$1,255,236	$1.29	$111,527	$1,851,839	$4.94	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$1,255,236	$1.32	$114,316	$1,861,855	$4.99	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$1,255,236	$1.35	$117,173	$1,872,048	$5.04	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$1,255,236	$1.37	$120,103	$1,882,422	$5.09	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$1,255,236	$1.40	$123,105	$1,892,980	$5.15	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$1,255,236	$1.43	$126,183	$1,903,726	$5.20	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$1,255,236	$1.46	$129,338	$1,914,663	$5.26	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$1,255,236	$1.49	$132,571	$1,925,794	$5.32	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$1,255,236	$1.52	$135,885	$1,937,125	$5.38	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$0	$1.55	$139,282	$693,421	$1.93	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$0	$1.58	$142,764	$705,160	$1.98	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$0	$1.61	$146,334	$717,109	$2.02	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$0	$1.64	$149,992	$729,272	$2.06	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$0	$1.67	$153,742	$741,653	$2.11	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$0	$1.71	$157,585	$754,256	$2.16	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$0	$1.74	$161,525	$767,086	$2.20	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$0	$1.78	$165,563	$780,147	$2.25	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$0	$1.81	$169,702	$793,444	$2.30	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$0	$1.85	$173,945	$806,980	$2.35	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$0	$1.88	$178,293	$820,761	$2.41	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$0	$1.92	$182,751	$834,791	$2.46	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$0	$1.96	$187,319	$849,075	$2.51	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$0	$2.00	$192,002	$863,618	$2.57	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$0	$2.04	$196,802	$878,425	$2.63	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$0	$2.08	$201,722	$893,502	$2.69	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$0	$2.12	$206,766	$908,852	$2.75	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$0	$2.16	$211,935	$924,482	$2.81	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$0	$2.21	$217,233	$940,398	$2.87	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$0	$2.25	$222,664	$956,604	$2.93	360,000,000	$6.32	$2,275,580
							$53,158,249				$65,447,601

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers

** - Includes debt service from well project for first 20 years

Regular IEPA Loan Terms

Annual and Monthly Cost Comparison Between Surface Water Treatment Plant and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Surface Water Treated and Distributed (Gallons)	IEPA Loan Annual payment	Energy/Chemicals/OM&R ($/1,000)(2% increase per year)	Labor & Benefits (2.5% increase per year)*	Total Surface Water Production & Transmission Cost	Effective Surface Water Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$1,789,706	$1.44	$285,000	$2,645,504	$6.67	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$1,789,706	$1.47	$292,125	$2,661,134	$6.75	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$1,789,706	$1.50	$299,428	$2,677,069	$6.82	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$1,789,706	$1.53	$306,914	$2,693,315	$6.90	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$1,789,706	$1.56	$314,587	$2,709,879	$6.97	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$1,789,706	$1.59	$322,451	$2,726,767	$7.05	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$1,789,706	$1.62	$330,513	$2,743,985	$7.13	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$1,789,706	$1.65	$338,775	$2,761,542	$7.22	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$1,789,706	$1.69	$347,245	$2,779,444	$7.30	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$1,789,706	$1.72	$355,926	$2,797,699	$7.38	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$1,789,706	$1.76	$364,824	$2,816,313	$7.47	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$1,789,706	$1.79	$373,945	$2,835,294	$7.56	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$1,789,706	$1.83	$383,293	$2,854,650	$7.65	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$1,789,706	$1.86	$392,876	$2,874,389	$7.74	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$1,789,706	$1.90	$402,698	$2,894,519	$7.83	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$1,789,706	$1.94	$412,765	$2,915,048	$7.93	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$1,789,706	$1.98	$423,084	$2,935,984	$8.03	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$1,789,706	$2.02	$433,661	$2,957,337	$8.12	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$1,789,706	$2.06	$444,503	$2,979,114	$8.23	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$1,789,706	$2.10	$455,615	$3,001,326	$8.33	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$0	$2.14	$467,006	$1,234,275	$3.44	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$0	$2.18	$478,681	$1,257,382	$3.52	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$0	$2.23	$490,648	$1,280,952	$3.61	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$0	$2.27	$502,914	$1,304,994	$3.69	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$0	$2.32	$515,487	$1,329,518	$3.78	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$0	$2.36	$528,374	$1,354,534	$3.87	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$0	$2.41	$541,583	$1,380,053	$3.97	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$0	$2.46	$555,123	$1,406,086	$4.06	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$0	$2.51	$569,001	$1,432,643	$4.16	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$0	$2.56	$583,226	$1,459,737	$4.26	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$0	$2.61	$597,807	$1,487,377	$4.36	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$0	$2.66	$612,752	$1,515,577	$4.47	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$0	$2.71	$628,071	$1,544,348	$4.57	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$0	$2.77	$643,772	$1,573,702	$4.68	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$0	$2.82	$659,867	$1,603,652	$4.80	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$0	$2.88	$676,363	$1,634,212	$4.91	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$0	$2.94	$693,273	$1,665,393	$5.03	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$0	$3.00	$710,604	$1,697,209	$5.15	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$0	$3.06	$728,369	$1,729,674	$5.28	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$0	$3.12	$746,579	$1,762,803	$5.41	360,000,000	$6.32	$2,275,580

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers $85,914,433 $65,447,601

** - Includes debt service from well project for first 20 years

Regular IEPA Loan Terms

Annual and Monthly Cost Comparison Between Purchasing from Rend Lake Water and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Water Purchased from Rend Lake (Gallons)	Rend Lake Cost to Purchase (2% increase per year)	IEPA Loan Annual payment	Energy/OM&R ($/1,000)(2% increase per year)	Total Rend Lake Transmission Cost	Effective Rend Lake Water Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$847,426	$606,214	$0.28	$1,564,628.62	$3.95	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$864,375	$606,214	$0.29	$1,583,230.87	$4.01	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$881,662	$606,214	$0.29	$1,602,196.73	$4.08	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$899,295	$606,214	$0.30	$1,621,533.35	$4.15	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$917,281	$606,214	$0.30	$1,641,248.02	$4.22	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$935,627	$606,214	$0.31	$1,661,348.16	$4.30	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$954,339	$606,214	$0.32	$1,681,841.35	$4.37	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$973,426	$606,214	$0.32	$1,702,735.33	$4.45	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$992,895	$606,214	$0.33	$1,724,037.97	$4.53	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$1,012,753	$606,214	$0.33	$1,745,757.31	$4.61	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$1,033,008	$606,214	$0.34	$1,767,901.55	$4.69	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$1,053,668	$606,214	$0.35	$1,790,479.03	$4.77	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$1,074,741	$606,214	$0.36	$1,813,498.29	$4.86	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$1,096,236	$606,214	$0.36	$1,836,968.00	$4.95	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$1,118,161	$606,214	$0.37	$1,860,897.04	$5.04	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$1,140,524	$606,214	$0.38	$1,885,294.44	$5.13	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$1,163,334	$606,214	$0.38	$1,910,169.41	$5.22	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$1,186,601	$606,214	$0.39	$1,935,531.35	$5.32	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$1,210,333	$606,214	$0.40	$1,961,389.84	$5.42	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$1,234,540	$606,214	$0.41	$1,987,754.66	$5.52	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$1,259,231	$0	$0.42	$1,408,421.77	$3.93	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$1,284,415	$0	$0.42	$1,435,829.33	$4.02	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$1,310,103	$0	$0.43	$1,463,773.70	$4.12	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$1,336,305	$0	$0.44	$1,492,265.46	$4.22	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$1,363,032	$0	$0.45	$1,521,315.37	$4.33	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$1,390,292	$0	$0.46	$1,550,934.43	$4.44	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$1,418,098	$0	$0.47	$1,581,133.84	$4.54	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$1,446,460	$0	$0.48	$1,611,925.04	$4.66	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$1,475,389	$0	$0.49	$1,643,319.67	$4.77	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$1,504,897	$0	$0.50	$1,675,329.62	$4.89	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$1,534,995	$0	$0.51	$1,707,967.00	$5.01	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$1,565,695	$0	$0.52	$1,741,244.18	$5.13	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$1,597,009	$0	$0.53	$1,775,173.77	$5.26	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$1,628,949	$0	$0.54	$1,809,768.60	$5.39	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$1,661,528	$0	$0.55	$1,845,041.79	$5.52	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$1,694,758	$0	$0.56	$1,881,006.71	$5.66	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$1,728,654	$0	$0.57	$1,917,676.98	$5.79	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$1,763,227	$0	$0.58	$1,955,066.50	$5.94	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$1,798,491	$0	$0.59	$1,993,189.44	$6.08	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$1,834,461	$0	$0.61	$2,032,060.27	$6.23	360,000,000	$6.32	$2,275,580
							$69,320,885				$65,447,601

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers

** - Includes debt service from well project for first 20 years

Regular IEPA Loan Terms

Annual and Monthly Cost Comparison Between Groundwater Water Treatment Plant and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Groundwater Treated and Distributed (Gallons)	IEPA Loan Annual payment	Energy/Chemicals/OM&R ($/1,000)(2% increase per year)	Labor & Benefits (2.5% increase per year)*	Total Groundwater Production & Transmission Cost	Effective Groundwater Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$752,260	$1.04	$85,000	$1,249,503	$3.15	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$752,260	$1.06	$87,125	$1,257,771	$3.19	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$752,260	$1.08	$89,303	$1,266,183	$3.23	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$752,260	$1.10	$91,536	$1,274,742	$3.26	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$752,260	$1.13	$93,824	$1,283,452	$3.30	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$752,260	$1.15	$96,170	$1,292,314	$3.34	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$752,260	$1.17	$98,574	$1,301,332	$3.38	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$752,260	$1.19	$101,038	$1,310,509	$3.42	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$752,260	$1.22	$103,564	$1,319,847	$3.47	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$752,260	$1.24	$106,153	$1,329,350	$3.51	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$752,260	$1.27	$108,807	$1,339,021	$3.55	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$752,260	$1.29	$111,527	$1,348,863	$3.60	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$752,260	$1.32	$114,316	$1,358,879	$3.64	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$752,260	$1.35	$117,173	$1,369,072	$3.69	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$752,260	$1.37	$120,103	$1,379,446	$3.73	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$752,260	$1.40	$123,105	$1,390,004	$3.78	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$752,260	$1.43	$126,183	$1,400,750	$3.83	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$752,260	$1.46	$129,338	$1,411,687	$3.88	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$752,260	$1.49	$132,571	$1,422,818	$3.93	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$752,260	$1.52	$135,885	$1,434,149	$3.98	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$752,260	$1.55	$139,282	$1,445,681	$4.03	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$752,260	$1.58	$142,764	$1,457,420	$4.08	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$752,260	$1.61	$146,334	$1,469,369	$4.14	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$752,260	$1.64	$149,992	$1,481,532	$4.19	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$752,260	$1.67	$153,742	$1,493,913	$4.25	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$752,260	$1.71	$157,585	$1,506,516	$4.31	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$752,260	$1.74	$161,525	$1,519,346	$4.37	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$752,260	$1.78	$165,563	$1,532,407	$4.43	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$752,260	$1.81	$169,702	$1,545,704	$4.49	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$752,260	$1.85	$173,945	$1,559,240	$4.55	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$0	$1.88	$178,293	$820,761	$2.41	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$0	$1.92	$182,751	$834,791	$2.46	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$0	$1.96	$187,319	$849,075	$2.51	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$0	$2.00	$192,002	$863,618	$2.57	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$0	$2.04	$196,802	$878,425	$2.63	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$0	$2.08	$201,722	$893,502	$2.69	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$0	$2.12	$206,766	$908,852	$2.75	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$0	$2.16	$211,935	$924,482	$2.81	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$0	$2.21	$217,233	$940,398	$2.87	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$0	$2.25	$222,664	$956,604	$2.93	360,000,000	$6.32	$2,275,580

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers

** - Includes debt service from well project for first 20 years

$50,621,329

$65,447,601

Annual and Monthly Cost Comparison Between Surface Water Treatment Plant and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Surface Water Treated and Distributed (Gallons)	IEPA Loan Annual payment	Energy/Chemicals/OM&R ($/1,000)(2% increase per year)	Labor & Benefits (2.5% increase per year)*	Total Surface Water Production & Transmission Cost	Effective Surface Water Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$1,097,219	$1.44	$285,000	$1,953,017	$4.93	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$1,097,219	$1.47	$292,125	$1,968,647	$4.99	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$1,097,219	$1.50	$299,428	$1,984,582	$5.06	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$1,097,219	$1.53	$306,914	$2,000,828	$5.12	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$1,097,219	$1.56	$314,587	$2,017,392	$5.19	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$1,097,219	$1.59	$322,451	$2,034,280	$5.26	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$1,097,219	$1.62	$330,513	$2,051,498	$5.33	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$1,097,219	$1.65	$338,775	$2,069,055	$5.41	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$1,097,219	$1.69	$347,245	$2,086,957	$5.48	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$1,097,219	$1.72	$355,926	$2,105,212	$5.56	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$1,097,219	$1.76	$364,824	$2,123,826	$5.63	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$1,097,219	$1.79	$373,945	$2,142,807	$5.71	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$1,097,219	$1.83	$383,293	$2,162,163	$5.79	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$1,097,219	$1.86	$392,876	$2,181,902	$5.88	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$1,097,219	$1.90	$402,698	$2,202,032	$5.96	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$1,097,219	$1.94	$412,765	$2,222,561	$6.04	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$1,097,219	$1.98	$423,084	$2,243,497	$6.13	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$1,097,219	$2.02	$433,661	$2,264,850	$6.22	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$1,097,219	$2.06	$444,503	$2,286,627	$6.31	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$1,097,219	$2.10	$455,615	$2,308,839	$6.41	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$1,097,219	$2.14	$467,006	$2,331,494	$6.50	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$1,097,219	$2.18	$478,681	$2,354,601	$6.60	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$1,097,219	$2.23	$490,648	$2,378,171	$6.70	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$1,097,219	$2.27	$502,914	$2,402,213	$6.80	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$1,097,219	$2.32	$515,487	$2,426,737	$6.90	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$1,097,219	$2.36	$528,374	$2,451,753	$7.01	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$1,097,219	$2.41	$541,583	$2,477,272	$7.12	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$1,097,219	$2.46	$555,123	$2,503,305	$7.23	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$1,097,219	$2.51	$569,001	$2,529,862	$7.34	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$1,097,219	$2.56	$583,226	$2,556,956	$7.46	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$0	$2.61	$597,807	$1,487,377	$4.36	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$0	$2.66	$612,752	$1,515,577	$4.47	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$0	$2.71	$628,071	$1,544,348	$4.57	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$0	$2.77	$643,772	$1,573,702	$4.68	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$0	$2.82	$659,867	$1,603,652	$4.80	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$0	$2.88	$676,363	$1,634,212	$4.91	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$0	$2.94	$693,273	$1,665,393	$5.03	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$0	$3.00	$710,604	$1,697,209	$5.15	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$0	$3.06	$728,369	$1,729,674	$5.28	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$0	$3.12	$746,579	$1,762,803	$5.41	360,000,000	$6.32	$2,275,580
							$83,036,883				$65,447,601

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers

** - Includes debt service from well project for first 20 years

Annual and Monthly Cost Comparison Between Purchasing from Rend Lake Water and Purchasing Water From Saline Valley Conservancy District

Year	Population (0.5% loss per year)	Water Customers	Water Purchased from Rend Lake (Gallons)	Rend Lake Cost to Purchase (2% increase per year)	IEPA Loan Annual payment	Energy/OM&R ($/1,000)(2% increase per year)	Total Rend Lake Transmission Cost	Effective Rend Lake Water Rate/1,000 Gallons	Saline Valley Cons. District Annual Purchase (Gallons)	Saline Valley Rate (2% increase per year)**	Saline Valley Cons. District Annual Cost
1	8,619	3,699	396,387,810	$847,426	$333,368	$0.28	$1,291,782.62	$3.26	396,387,810	$3.02	$1,197,091
2	8,576	3,681	394,405,871	$864,375	$333,368	$0.29	$1,310,384.87	$3.32	394,405,871	$3.08	$1,214,139
3	8,533	3,662	392,433,842	$881,662	$333,368	$0.29	$1,329,350.73	$3.39	392,433,842	$3.14	$1,231,445
4	8,490	3,644	390,471,672	$899,295	$333,368	$0.30	$1,348,687.35	$3.45	390,471,672	$3.20	$1,249,012
5	8,448	3,626	388,519,314	$917,281	$333,368	$0.30	$1,368,402.02	$3.52	388,519,314	$3.26	$1,266,846
6	8,406	3,608	386,576,717	$935,627	$333,368	$0.31	$1,388,502.16	$3.59	386,576,717	$3.32	$1,284,949
7	8,364	3,590	384,643,834	$954,339	$333,368	$0.32	$1,408,995.35	$3.66	384,643,834	$3.39	$1,303,325
8	8,322	3,572	382,720,615	$973,426	$333,368	$0.32	$1,429,889.33	$3.74	382,720,615	$3.45	$1,321,979
9	8,280	3,554	380,807,012	$992,895	$333,368	$0.33	$1,451,191.97	$3.81	380,807,012	$3.52	$1,340,915
10	8,239	3,536	378,902,977	$1,012,753	$333,368	$0.33	$1,472,911.31	$3.89	378,902,977	$3.59	$1,360,137
11	8,198	3,518	377,008,462	$1,033,008	$333,368	$0.34	$1,495,055.55	$3.97	377,008,462	$3.66	$1,379,649
12	8,157	3,501	375,123,419	$1,053,668	$333,368	$0.35	$1,517,633.03	$4.05	375,123,419	$3.73	$1,399,455
13	8,116	3,483	373,247,802	$1,074,741	$333,368	$0.36	$1,540,652.29	$4.13	373,247,802	$3.80	$1,419,561
14	8,075	3,466	371,381,563	$1,096,236	$333,368	$0.36	$1,564,122.00	$4.21	371,381,563	$3.88	$1,439,969
15	8,035	3,448	369,524,655	$1,118,161	$333,368	$0.37	$1,588,051.04	$4.30	369,524,655	$3.95	$1,460,686
16	7,995	3,431	367,677,032	$1,140,524	$333,368	$0.38	$1,612,448.44	$4.39	367,677,032	$4.03	$1,481,715
17	7,955	3,414	365,838,647	$1,163,334	$333,368	$0.38	$1,637,323.41	$4.48	365,838,647	$4.11	$1,503,061
18	7,915	3,397	364,009,454	$1,186,601	$333,368	$0.39	$1,662,685.35	$4.57	364,009,454	$4.19	$1,524,728
19	7,875	3,380	362,189,407	$1,210,333	$333,368	$0.40	$1,688,543.84	$4.66	362,189,407	$4.27	$1,546,722
20	7,836	3,363	360,378,459	$1,234,540	$333,368	$0.41	$1,714,908.66	$4.76	360,378,459	$4.35	$1,569,048
21	7,797	3,346	358,576,567	$1,259,231	$333,368	$0.42	$1,741,789.77	$4.86	360,000,000	$4.34	$1,562,028
22	7,758	3,330	356,783,684	$1,284,415	$333,368	$0.42	$1,769,197.33	$4.96	360,000,000	$4.43	$1,593,268
23	7,719	3,313	354,999,766	$1,310,103	$333,368	$0.43	$1,797,141.70	$5.06	360,000,000	$4.51	$1,625,134
24	7,680	3,296	353,224,767	$1,336,305	$333,368	$0.44	$1,825,633.46	$5.17	360,000,000	$4.60	$1,657,637
25	7,642	3,280	351,458,643	$1,363,032	$333,368	$0.45	$1,854,683.37	$5.28	360,000,000	$4.70	$1,690,789
26	7,604	3,263	349,701,350	$1,390,292	$333,368	$0.46	$1,884,302.43	$5.39	360,000,000	$4.79	$1,724,605
27	7,566	3,247	347,952,843	$1,418,098	$333,368	$0.47	$1,914,501.84	$5.50	360,000,000	$4.89	$1,759,097
28	7,528	3,231	346,213,079	$1,446,460	$333,368	$0.48	$1,945,293.04	$5.62	360,000,000	$4.98	$1,794,279
29	7,490	3,215	344,482,014	$1,475,389	$333,368	$0.49	$1,976,687.67	$5.74	360,000,000	$5.08	$1,830,165
30	7,453	3,199	342,759,604	$1,504,897	$333,368	$0.50	$2,008,697.62	$5.86	360,000,000	$5.19	$1,866,768
31	7,416	3,183	341,045,806	$1,534,995	$0	$0.51	$1,707,967.00	$5.01	360,000,000	$5.29	$1,904,103
32	7,379	3,167	339,340,577	$1,565,695	$0	$0.52	$1,741,244.18	$5.13	360,000,000	$5.39	$1,942,185
33	7,342	3,151	337,643,874	$1,597,009	$0	$0.53	$1,775,173.77	$5.26	360,000,000	$5.50	$1,981,029
34	7,305	3,135	335,955,654	$1,628,949	$0	$0.54	$1,809,768.60	$5.39	360,000,000	$5.61	$2,020,650
35	7,268	3,120	334,275,876	$1,661,528	$0	$0.55	$1,845,041.79	$5.52	360,000,000	$5.73	$2,061,063
36	7,232	3,104	332,604,497	$1,694,758	$0	$0.56	$1,881,006.71	$5.66	360,000,000	$5.84	$2,102,284
37	7,196	3,088	330,941,474	$1,728,654	$0	$0.57	$1,917,676.98	$5.79	360,000,000	$5.96	$2,144,330
38	7,160	3,073	329,286,767	$1,763,227	$0	$0.58	$1,955,066.50	$5.94	360,000,000	$6.08	$2,187,216
39	7,124	3,058	327,640,333	$1,798,491	$0	$0.59	$1,993,189.44	$6.08	360,000,000	$6.20	$2,230,960
40	7,089	3,042	326,002,131	$1,834,461	$0	$0.61	$2,032,060.27	$6.23	360,000,000	$6.32	$2,275,580
							$67,197,645				$65,447,601

* - Based on Bureau of Labor Statistics Data for State & Local Government Workers

** - Includes debt service from well project for first 20 years