39 North Conservancy District

Water Study 2023

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Table of Contents

Table of Figures

1. Executive Summary

1.1 Purpose of Study

The purpose of this study is to provide analysis and commentary on the existing 39 North Conservancy District (District) water distribution system as well as to provide recommendations for short- and long-term improvements to said system.

1.2 Conclusions

The existing 39 North Conservancy District water distribution system has sufficient capacity and infrastructure to provide for average daily use for all District residents and property owners up to and including all historical daily average flow maximums. In addition, it has been shown that residential fire flow requirements can be met at all points in the existing distribution system in accordance with local and State fire protection requirements. Additional study has revealed that the District's water supply and infrastructure are currently insufficient to provide adequate fire flow in the case of two (2) or more concurrent fire events.

Further, it has been demonstrated that fire flow requirements for industrial users in the District can, for the most part, be supplied with no issues. It should be noted that, to date, there is one (1) industrial user in the District whose maximum fire flow needs can not be met with existing infrastructure and water supply. Methods to address this single fire flow shortfall have been modeled and have been determined to be sufficient to meet the shortfall in the single recorded instance of the system's inability to address fire flow needs. Methods studied include:

- Construction of a 120-foot tall, 500,000 gallon capacity water tower.
- Construction of a subsurface, 500,000 gallon capacity storage tank.

Finally, this study has demonstrated the efficacy of providing an independent water supply treatment plant at Chaumiers Pres du Lac located just to the north of the 39 North/I-80 Toll Road crossing. It should be noted that this placement will provide full service to the entirety of the existing District's water supply system but will not be sufficient to address the abovementioned fire flow and protection issues on its own. Said treatment plant would merely be sufficient to replace the existing City water supply in the case that said City supply was unavailable.

2. 39 North Conservancy District Water System Overview

2.1 Water System Overview

Established in 1997, the 39 North Conservancy District (District) water distribution system was designed to provide water to an unserved area of LaPorte County along the State Road 39 corridor between Severs Road and US Highway 20. Construction on the District's water system was completed in 1999 and went into operation in the same year. The current system configuration consists of approximately 11,000 feet (2.1 miles) of 12" water main along State Road 39 from the booster station location northward to the Hi-Point Commercial development with an additional 1,400 feet of 6" water main extending northward to County Road 450. Additionally, 8" mains extend eastward at Tiffany Wood Drive to service the Tiffany Woods residential development as well as at west Hi Point Drive to service the Hi Point Commercial development and the La Porte Toll Plaza on the Indiana Tollroad (I-80). Finally, an 8" main extends westward at West Valley Boulevard to service the Chaumiers Pres du Lac residential development.

The booster station itself includes a low flow pump for normal day-to-day operations, two higher flow pumps and a booster pump for peak-flow events such as fire flow tests, hydrant flow tests, etc. The pump station is supplied by a 12" feed line from the City.

The Agreement established between the City of La Porte (City) and the District was that the District would own and maintain the District's system while simultaneously contracting with the City for water supply and ongoing monitoring of the system. The term of the Agreement was set at the time to 20-years with the option of either party to terminate the Agreement with a 2-year notice. The Agreement was extended in 2019 by an additional 5-year term and is scheduled to expire in 2025 barring additional extension.

The Agreement as it stands sets the following limits for water delivery:

Average daily use (not to exceed): 1,000,000 gallons (694 GPM)
Instantaneous Maximum Use (not to exceed): 2,160,000 (1500 GPM)
Booster Station Suction Side Pressure (minimum to maintain): 35 PSI

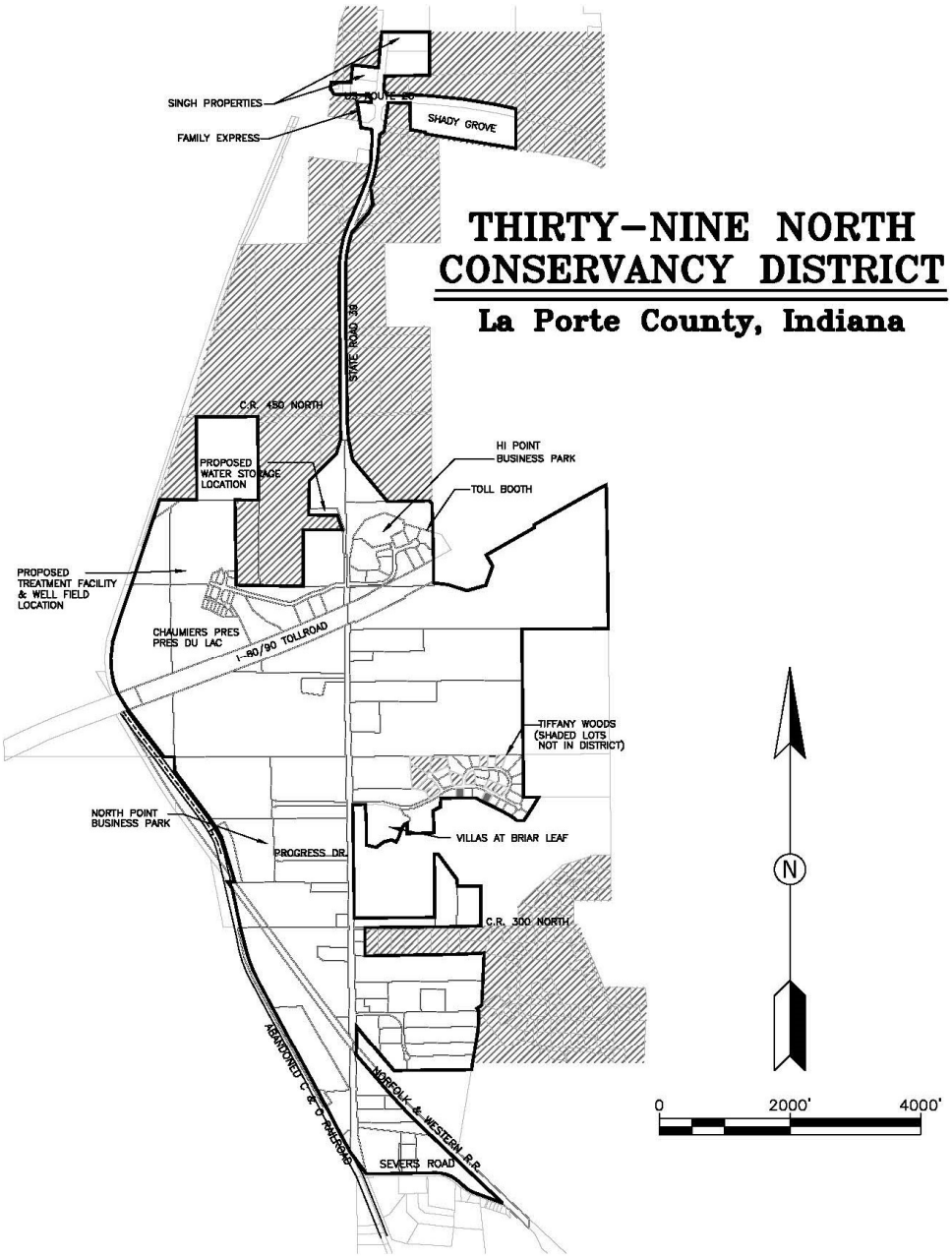
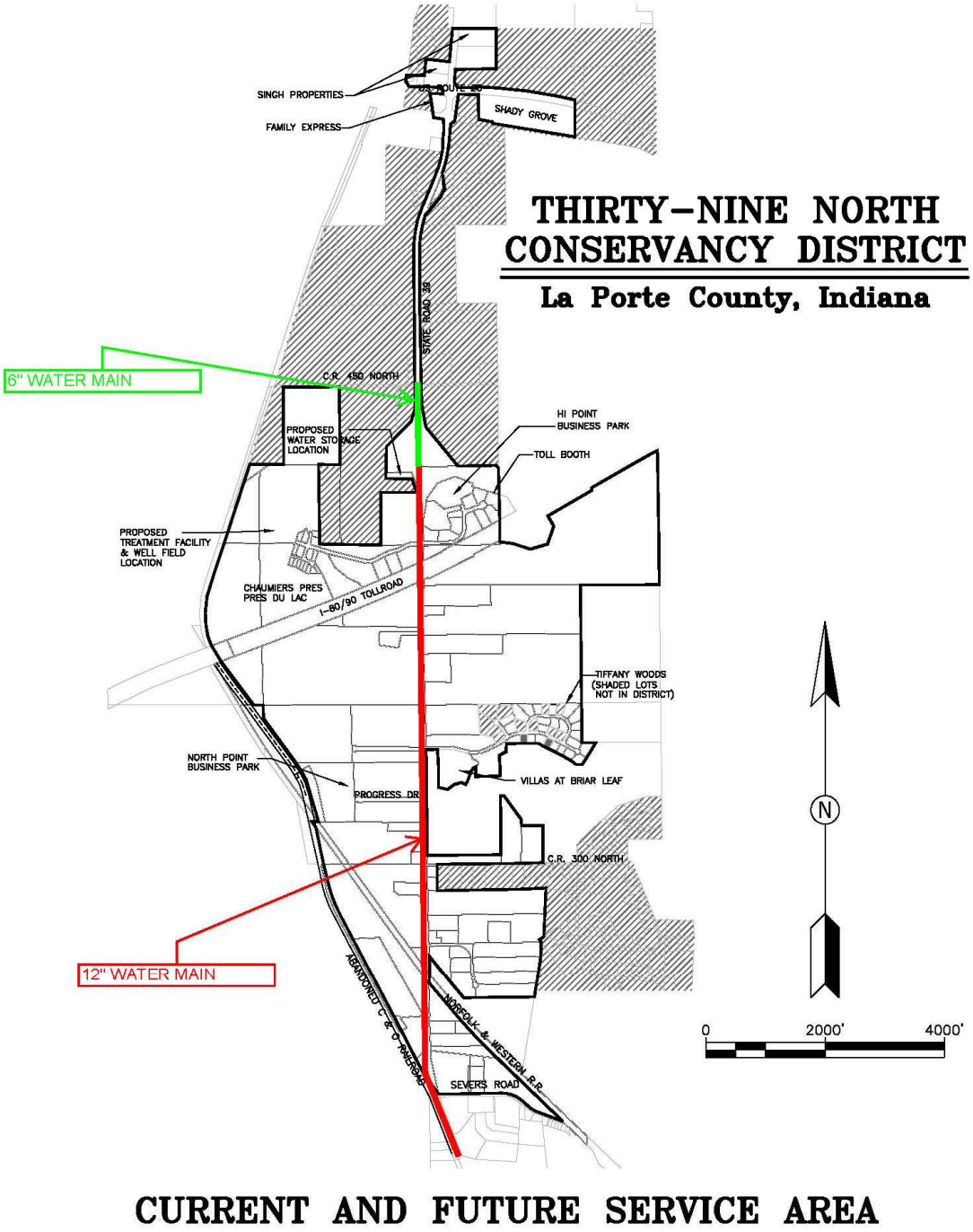


Figure 2-1 – 39 North Conservancy District Service Area Map



CURRENT AND FUTURE SERVICE AREA

Figure 2-2 – 39 North Conservancy District Water Main Layout Map

2.2 Water System Operational Characteristics

The City of La Porte monitors the District's continuously at the City's Lake Street water department offices. As can be seen below, typical daily usage volumes in the District vary between 50,000 gallons per day (GPD) in the winter months and 200,000 gallons per day (GPD) in the summer months.

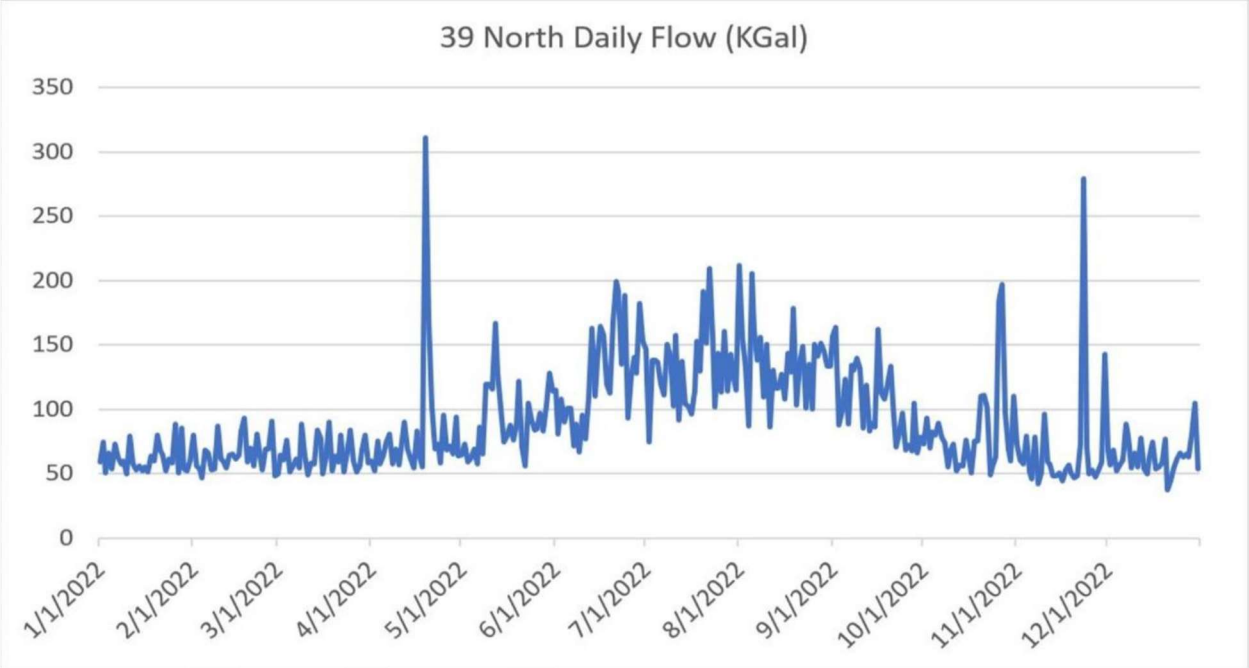


Figure 2-3 - 39 North Conservancy District 2022 Average Daily Flow Rate Chart

The above indicates that the District's average daily usage is well below the maximum allowable daily flow usage. In fact, average daily flow usage is approximately 1/5 (20%) of the maximum allowable daily flow usage which demonstrates that **the 39 North Conservancy District is able to meet daily flow needs for all its users** with ample additional capacity in place for future development.

Figure 2-4 – 39 North Conservancy District Water Main Profile

{INSERT 39 NORTH TRANSMISSION MAIN PROFILE FROM ANALYSIS} Figure 2-5

As can be seen in the transmission main profile above, the high point of the existing water conveyance system at the Toll Road crossing roughly 2 miles north

of the booster pump station location is approximately 60 feet higher than the booster pump station. Given that the typical pressure supplied by the City at the booster pump station is approximately 50 psi and that the pressure drop due to change in elevation is at least 26 psi and given that minimum operating pressure for daily use is 20 psi, it is clear that the booster station is necessary. At maximum, the District's system would be able to deliver 26 psi of pressure to areas north of the Toll Road and that excludes hydraulic, friction and fitting losses. Due to this change in elevation, the booster pump station is necessary for daily use. As previously mentioned, the booster pump station has four (4) pumps. The first (Pump 1) is sufficient to meet the needs of most average daily flow usage based on installed pump curve data. Pumps 2 and 3 are available to provide additional flow during high flow events and Pump 4 is a fire flow pump activated to provide maximum daily flow for fire protection reasons. The booster pump station in conjunction with the District's distribution system is more than sufficient for daily use and has been demonstrated to be effective for high flow and peak-demand (fire flow, hydrant flow tests, etc.) in the past.

It should be noted that, during peak demand events (fire flow, hydrant flow tests, etc.), it has been noted that sediment and/or deposits in the system get stirred up, often causing discoloration in the water supply. This is a typical consequence of peak demand events for water systems in general and is not exclusive to the District or the City.

It is acknowledged that, given the position of the connection to the City at the booster pump location and given the topography of the water distribution system main along State Road 39, water pressure can be an issue at the northern end of the District's system. For this reason, the booster pump system was installed and has been working well with minimal disruption for more than 20 years.

2.3 Fire Protection

Per the analysis provided, fire flow protection is available throughout the 39 North Conservancy District. It has been demonstrated that a required residential fire flow rate of 1200 GPM is available at every hydrant throughout the District meaning that every home and business has this available at an time. It has also been demonstrated that the booster station has this capacity available at all times without risk of exceeding the District's contractual maximum flow capacity of 1,500 GPM. In this "base case" scenario (Case 1) , the District is more than able to meet the required fire flow needs with no particular issue.

However, it should be noted that a number of industrial sites have been developed during the District's 25 year history which might require additional fire flow above and beyond this "base case." Therefore, two alternate cases (Case 2

and Case 3) have been developed for scenarios which could occur in the District in response to suggestions made by local fire agencies.

Case 2 suggests that a larger industrial facility in the District may require fire flows above those available to the District in the peak demand case (i.e. 1500 GPM). Using the largest industrial facility in the District as an example (Haynes International, 3238 SR-39), a calculation can be performed using the Insurance Services Office (ISO) for Needed Fire Flow in both the best and worst cases depending on construction methodology and occupancy factor. In the best case scenario, Needed Fire Flow for a building the size of Haynes International is approximately 2,500 GPM from a hydrant for fire protection. In the worst case, Needed Fire Flow rises to as much as 4,000 GPM. As can be seen, in neither the best nor the worst case does the District's water supply system have sufficient capacity to provide the minimal fire flow necessary to meet safety standards.

In the case at Haynes International, however, an internal fire suppression system has been installed, thereby halving the required hydrant fire flows. This concession is provided on the assumption that the internal fire suppression system is adequate to meet or exceed fire protection needs for the facility in question. While the two fire protection systems (internal and external) combine to provide the necessary fire flow to the facility, it is not possible to operate both systems at the same time using the District's water supply as a source. Based on the above established minimum and maximum required fire flow rates, it is possible that the halved hydrant flow rate might be able to be provided by the District's peak flow rate of 1500 GPM. However, it is not possible that BOTH the hydrant flow rate and the internal fire suppression system could be supplied simultaneously by the District's system. In fact, it is known from a previous fire flow test that the fire suppression system designed for and installed at Haynes International has a maximum pumped flow rate of 2,400 GPM which by itself makes utilizing the District for both internal and external fire flows physically impossible.

Case 3 suggests two concurrent fire events within the District requiring two separate hydrant access points. While this scenario is not part of the State standard for fire protection, it is a possibility that has been raised by local fire authorities. As has been previously discussed, the District system has sufficient capacity at all points to provide for a singe hydrant access for fire protection up to 1,200 GPM (limited by the physical hydrant apparatus). This is sufficient for most residential fire events though not, as discussed in Case 2, for some industrial events. As we know from Case 2 that providing fire flow in the worst case for an industrial event is not possible, Case 3 will be limited to providing fire coverage for two concurrent residential events.

As has been previously noted, maximum fire flow from the District's system is capped at 1,500 GPM. Therefore, a single hydrant flow event at 1,200 GPM is possible anywhere in the system though pressures will drop throughout the system until the hydrant draw is completed. However, two concurrent hydrant flows totaling 2,400 GPM is not possible given the current booster pump configuration and supply. The booster pump station is simply not capable of delivering the required quantity or flow rate to two separate points in the system.

While the District's water supply system has been demonstrated to have sufficient capacity to provide for a single hydrant flow at any given point throughout the District, it has also been shown that more extreme cases representing either a large-scale industrial fire or concurrent fire events in the District are not capable of being served by existing District facilities and available flow quantities and rates. This is a significant issue that the District recognizes and is in the process of being rectified.

3. Proposed Improvements

3.1 Elevated Water Tower at North End of 39 North Conservancy District System (near Toll Road)

An elevated water storage tank (water tower) is currently in the funding stages within the District. The District has recognized the need for an auxiliary water storage facility for fire protection purposes within the District. The study and funding process for the proposed water tower has been in process since 2020. Land acquisition for the property on which the tower will stand has already been completed and the District has begun allocating internal funds for the tower's construction.

3.1.1 Benefits

A water tower located at what is essentially the high point of the entire District would have multiple benefits. It would allow water demands, primarily peak flow fire demands, to be fed from both ends of the District's system, thereby providing for greater flow rates and lower pressure loss across the system. Further, its position at the high point of the system would eliminate the need for additional pumping facilities beyond those necessary to supply the tower and the existing booster station. The tower's placement and capacity would improve fire flow availability through the system by allowing for multiple fire flow draws such as those discussed in Cases 2 and 3 above.

In addition to providing additional storage for fire flow events which is the proposed tower's primary purpose, the additional pressure provided to the system by the elevated storage would minimize pressure losses throughout the system, especially at its northern end. This would significantly reduce or eliminate low pressure events previously noted in the Hi Point Commercial development when the booster pump station went offline.

3.1.2 Limitations

A water tower at the northern end of the District's water supply system would address the fire flow issues discussed in Cases 2 and 3 above. However, the tower as current scoped (120-feet high, 500,000 gallon capacity) would not be sufficient to provide for future development purposes. Put another way, the capacity of the water tower would have to be used as a permanent, dedicated supply of water for fire protection in order to meet the current needs of the District or said supply could be used to further development in the District – not both. The proposed tower

as current scoped is designed to meet the outstanding fire protection needs of the District alone.

In addition, the water tower as currently scoped is designed to work in conjunction with the existing District facilities including the booster pump at the District's southern end. The water tower is not an independent water supply for all fire protection in the District. If this scenario is envisioned, additional storage capacity and tower height should be considered.

Finally, it has been noted by tower manufacturers that have been previously consulted that, due to the fact that the water in the tower will not be regularly circulated due to its primary purpose as fire protection storage, chlorine levels might drop in the elevated supply rendering the water non-potable. Given its connection to the water distribution system, the water tower should be supplied with a mixing/chlorination system to ensure that minimum chlorine and aeration standards are met at all times.

3.2 Subsurface Storage Tank at North End of 39 North Conservancy District System (near Toll Road)

A subsurface storage tank facility has also been considered for installation in lieu of a water tower.

3.2.1 Benefits

A subsurface storage facility of sufficient size has a number of the same benefits as those described for the water tower. The additional storage would provide a reservoir for fire protection events, thereby resolving the ongoing fire protection issues within the district. Additionally, a pump apparatus to distribute the water could provide enough additional pressure to the system to offset pressure losses resulting from peak-demand events and booster pump station failure.

Further, the subsurface storage facility option would likely result in cost-savings versus the previously discussed water tower given its significantly lower infrastructure requirements. Also, future expansion of the storage facility is much easier to implement than increasing the size of an elevated tank would be, thereby increasing opportunities for future development without compromising the fire protection volume already in place.

Finally, the proposed subsurface tank facility would be less obtrusive to the District but would still be able to be installed on the same piece of already-acquired property at the Toll Road location.

3.2.2 Limitations

As currently scoped (500,000 gallon capacity), the proposed subsurface storage tank facility would provide sufficient storage to address the fire flow protection issues currently facing the District. However, as was the case with the proposed elevated storage facility, this volume would have to be dedicated for fire flow purposes and not to account for future development needs. As previously mentioned, expansion of the subsurface storage facility could be accomplished far more easily that to an elevated tower of the same size so this is more easily resolved than in the case of the tower.

Also similar to the case of the tower, the stored volume of water would likely suffer from lack of circulation and aeration due to the need to keep the volume in place for fire protection purposes. Therefore, a chlorination/circulation system would need to be installed to ensure potability standards.

Finally, since the subsurface facility would not be elevated as is the case with the water tower, pressurization of the system in the case of booster pump failure would not be a passive event. Pressurization of the system via the subsurface storage facility would have to be accomplished by a separate pump station at the subsurface tank's location. While this pump system could be designed to provide additional pressure to the system, it is not currently scoped as such.

3.3 Water Treatment & Well Field Facility at Chaumiers Pres du Lac (just north of the Toll Road/SR-39 crossing)

It has been publicized by the City of La Porte that there is a possibility that they may opt to terminate the ongoing Agreement between the District and the City for water supply. As a result, it has been requested that a water treatment and well field facility be explored as an option by the District as a replacement source of potable water.

Said facility would likely be located at or near the system high point in the Chaumiers Pres du Lac residential development just north of the intersection of SR-39 and the Indiana Toll Road. Specific details of the facility such as maximum daily flow, operating parameters, facility sizing, etc. had not been provided at the time of this Study's publication so a similar facility to the existing booster pump station has been utilized as a place holder.

3.3.1 Benefits

Installation of a water treatment and well field facility at the location described above would have a number of benefits, primary among them

an independent treated water supply owned and operated entirely by the District. This would put control of the District's water supply entirely in its own hands and would also eliminate the limitations for maximum flow rate and pressure limitations currently extant at the booster pump station.

Additionally, the placement of the proposed treatment/well field facility at or near the high point of the District's system allows for savings in pumping and storage systems. Since the system does not need to overcome gravity (as is the case with the current booster pump), distribution of water through the existing District system should be accomplished more easily.

Further, this system could be installed at the proposed location and connected to the existing District system with relatively little change to the system's infrastructure. Modelling results indicate that the existing system infrastructure could be utilized to deliver the higher flow rates and pressures demanded for peak flow events, thereby potentially resolving fire flow issues throughout the system. Additional study would be required to determine precise configurations of the proposed facility to accomplish this goal.

3.3.2 Limitations

A treatment facility and well field facility would be an expensive option for development and would require a substantial investment in infrastructure, permitting and construction to connect the proposed facility to the existing District's system.

Further, a system as currently scoped would not necessarily be sufficient to meet the current needs for fire protection. The facility would need to be designed to meet or exceed those needs and so a simple movement of the current booster pump station to the new location would not be sufficient. Rather, the new facility would require a complete redesign. It should also be noted that the currently scoped facility would not be sufficient for future growth although a modular treatment system which allows for expansion could be implemented.

APPENDIX A

APPENDIX B