FILED
October 2, 2023
INDIANA UTILITY
REGULATORY COMMISSION

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

IN THE MATTER OF THE RATE INCREASE PETITION OF MARYSVILLE-OTISCO-NABB WATER CORPORATION	)))	**Cause No. 45955**

PREFILED DIRECT TESTIMONY

OF

ROBERT BELLUCCI

ON BEHALF OF

MARYSVILLE-OTISCO-NABB WATER CORPORATION

Respectfully Submitted By:

/s/ *Darren A. Craig* ________________________________
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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing has been electronically served upon the following via e-mail, the agreed method of service for this proceeding, on October 2, 2023:

Indiana Office of the Utility Consumer Counselor
115 West Washington Street, Suite 1500 South
Indianapolis, IN 46204

/s/ *Darren A. Craig*
Darren A. Craig

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

IN THE MATTER OF THE RATE	)	**Cause No.**
INCREASE PETITION OF	)	
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ROBERT BELLUCCI

ON BEHALF OF

MARYSVILLE-OTISCO-NABB WATER CORPORATION

1. **PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND AFFILIATION WITH MARYSVILLE-OTISCO-NABB WATER CORPORATION.**

   a. My name is Robert M. Bellucci. My business address is Commonwealth Engineers, Inc., 7256 Company Dr., Indianapolis, IN 46237. Other than being retained to provide certain professional engineering services, I am unaffiliated with Marysville-Otisco-Nabb Water Corporation.

2. **PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND, PROFESSIONAL QUALIFICATION, AND ANY EXPERIENCES THAT YOU BELIEVE ARE RELEVANT TO YOUR TESTIMONY.**

   a. I am a Professional Engineer registered in the State of Indiana. My Professional Engineer registration number is Indiana PE No. 10000127. I graduated from Purdue University (West Lafayette) with a Bachelors Degree in Civil Engineering in 1995. I have over 20-years of experience working with and for engineering consulting firms. In my current role I serve as Vice President / Senior Project Manager at Commonwealth Engineers, Inc. My responsibilities include management and oversight for the development, planning, design, and construction administration of Water Resources Improvements Project for Communities throughout the State of Indiana. In this role I have worked closely with funding agency representatives, financial professionals, and legal consultants to assist my clients in navigating through the process of project implementation and subsequent impacts on local user rates and charges.

3. **HOW LONG HAS COMMONWEALTH ENGINEERS, INC. BEEN ENGAGED IN PROVIDING ENGINEERING SERVICES IN INDIANA?**

   a. Commonwealth Engineers, Inc. specializes in Water Resources and has provided engineering and consulting services throughout the State of Indiana since 1974.

4. **DO YOU SERVE THIS UTILITY IN ANY OTHER CAPACITY?**

   a. No.

5. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?**

   a. No, not as an individual.

6. **HAVE YOU PREPARED TESTIMONY AND EXHIBITS ON BEHALF OF MARYSVILLE-OTISCO-NABB WATER CORPORATION ("MON") IN THIS CASE?**

   a. Yes.

7. **WHAT EFFORTS HAVE YOU UNDERTAKEN PRIOR TO THE PREPARATION OF YOUR PRELIMINARY ENGINEERING REPORT AND TESTIMONY IN THIS CAUSE?**

   a. Assembly of a hydraulic model of the Utility's drinking water distribution system in support of assembly of the Preliminary Engineering Report.

8. **WHAT IS THE PURPOSE OF YOUR TESTIMONY AND EXHIBITS YOU HAVE PRE-FILED IN THIS PROCEEDING?**

   a. Commonwealth Engineers, Inc. has prepared this Preliminary Engineering Report (PER) to evaluate the present conditions and future needs for the MON.

9. CAN YOU GENERALLY DESCRIBE MON'S SERVICE AREA AND CUSTOMER BASE?

a. The Service Area of the Utility is located within Clark and Scott Counties and generally consists of the unincorporated communities of Marysville, Otisco, and Nabb. The Utility serves approximately 2,500 customers and was originally created in 1965.

10. WHAT FACILITIES DOES MON CURRENTLY OWN AND/OR OPERATE?

a. MON owns and operates two elevated storage tanks and corresponding distribution system that serves the unincorporated communities of Marysville, Otisco, and Nabb. The Marysville tank is a 75,000 gallon elevated tank and the Otisco tank is a 250,000 gallon elevated tank. During normal operations, the Utility's water supply is purchased from the Stucker Fork Conservancy District and conveyed through a 12" transmission main. In emergency conditions, water can be purchased from Indiana American Water through a booster station and dedicated six-inch water main. The total length of pipe within the entire system is approximately 709,600 LF. The oldest water mains within the distribution system are assumed to have been installed in the late 1960s. The Stucker Fork Conservancy District connection supplies water to the Marysville Elevated Storage Tank. The Indiana American Water emergency connection is connected at the southern end of the distribution system from Charlestown, IN. The average operating pressure of the distribution system is approximately 75 psi. The Utility's existing infrastructure is further described in Section 2 of the Preliminary Engineering Report.

11. PLEASE DESCRIBE MON'S WATER DISTRIBUTION SYSTEM

a. This existing distribution system has large areas of pipe that are two, three, and four inches in diameter. These smaller pipes can lead to a low residual pressure which may fall below the IAC and Ten States Standards threshold of 20 psi. Low residual pressures can lead to system backflow and increased risks to public health, welfare, and safety. IAC and Ten States Standards indicate that fire flow is inadequate in water mains smaller than six-inches in diameter. A large portion of the system is not able to provide significant emergency fire flow and still maintain residual system pressures. Several areas within the distribution consist of thin-walled PVC and asbestos cement (AC) water mains. These areas are prone to frequent breaks causing unnecessary disruptions in service. The system does not have a large diameter back-up connection if the route that includes the twelve inch water main that transports drinking water from the Stucker Fork Conservancy District connection becomes unavailable. The Utility's existing infrastructure is further described in Section 2 of the Preliminary Engineering Report.

12. PLEASE DESCRIBE THE NEED FOR AN ADDITIONAL EMERGENCY SUPPLY SYSTEM CONNECTION.

a. MON primarily sources water from the 12-inch connection with Stucker Fork Conservancy District. A smaller, emergency connection is available through a 6-inch connection with Indiana American Water. In the event of a disruption to the Stucker Fork Conservancy District connection, the emergency connection with Indiana American Water would be unable to satisfy system demands by itself due to reduced volume and residual pressures. To maintain overall health, safety, and reliability, an additional emergency connection is recommended. The needs of the Utility are further described in Section 3 of the Preliminary Engineering Report.

13. PLEASE DESCRIBE THE DIFFICUILTIES POSED BY AGING INFRASTRUCTURE.

a. It was noted in the response to question No. 10 that much of the existing distribution system was constructed in the late 1960's as such, these mains are approaching the end of their useful life. Older piping is more susceptible to leaking, which increases the potential for system water loss, subsequently leading to a reduction in Utility revenue. Based on the water loss analysis performed, the Utility experiences a water loss of approximately 20% which is within the bounds of the average when compared to other similar sized utilities throughout the state. Typically, older distribution systems contain smaller diameter and dead-end mains. IAC and Ten States Standards recommend water mains be at least six-inch diameter to provide sufficient fire flow and maintain minimum residual pressures. Dead end water mains often present water quality issues and low system pressures. Residual pressures would benefit from replacing undersized mains with larger diameter piping. Replacement of the older four-inch and smaller water mains with a six-inch or larger mains is recommended.

14. PLEASE DESCRIBE HOW THE AREA SERVED BY MON IS EXPECTED TO INCREASE IN POPULATION DURING THE PLANNING PERIOD.

a. The average decennial growth for Clark County from 1990 to 2020 was approximately 11.34%. The average growth for Scott County over the same period was approximately 5.18%. Indiana STATS provides population projections through the year 2050 for Indiana Counties. The data shows a continual population increase for Clark County of approximately 11.3%. Based on the Clark County projected population and information provided by the Utility, the population served is projected to increase by approximately 20.5% over the next 20-years. A detailed analysis of population projections is included in Section 1 under paragraph 1.3 and Section 3 under paragraph 3.3 of the Preliminary Engineering Report.

15. PLEASE DESCRIBE YOUR PROCESS FOR THE EVALUATION OF SYSTEM PRESSURES.

In support of assembly of the Preliminary Engineering Report, a hydraulic model of the Utility's distribution system was developed. Model simulations were run to test a variety of conditions for the present and future demands of the system. The results of these simulations are important for determining whether the hydraulic characteristics and capacity of the system are adequate to meet the daily demands and minimum system pressure recommendations. Inadequate system capacity may result if low pressures occur during peak water use in areas where pressures are satisfactory during off-peak periods. In addition to running the model under average flow conditions, the model was also run with demands representing peak hourly conditions. In total, two modeling simulations were evaluated as follows:

- Scenario 1 – Existing System with 72-hr Hydraulic Demand
- Scenario 2 – 20-yr System w/ 72-hr Hydraulic Demand

Each scenario was evaluated for four different alternatives as follows:

1) 200,000-Gallon Tank, Existing 4-inch Transmission Main
2) 200,000-Gallon Tank, New 8-inch Transmission Main

3) 350,000-Gallon Tank, Existing 4-inch Transmission Main

4) 350,000-Gallon Tank, New 8-inch Transmission Main

The hydraulic modeling effort is further described in Section 3 of the Preliminary Engineering Report.

16. PLEASE DESCRIBE THE RESULTS OF THE MODEL WITH REGARD TO EMERGENCY CONNECTION PRESSURE.

a. The results of the modeling simulations are noted as a range of pressures within the southeast quadrant of the distribution, near the location of the proposed elevated storage tank. The results of the model simulations confirmed additional storage tank capacity combined with a new 8-inch diameter looping connection near Charlestown provided sufficient system pressures during normal and peak demand conditions. The results from all model simulations are summarized within Tables ES-2 and ES-3 of the Preliminary Engineering Report Executive Summary. A more detailed summary of the hydraulic modeling process is described in Section 3, beginning with paragraph 3.5 of the Preliminary Engineering Report.

17. PLEASE DESCRIBE THE METHODOLOGY AND RESULTS OF THE RESIDUAL CHLORINE ANALYSIS.

a. Due to length of water mains and span of the distribution system, residual chlorine issues are expected to occur. To analyze chlorine system degradation, chlorine degradation concentrations were based on the average residual chlorine concentration obtained from an analysis of the Utility's historical Monthly Reports of Operation (MRO), as submitted to the Indiana Department of Environmental Management. Water supply was modeled as a constant source of chlorinated water into the system based on an average MRO concentration of 1.0 mg/L. Initial chlorine residual levels for all applicable model elements were set equal to 1.0 mg/L and allowed to degrade over the course of a 30-day modeling period. Average chlorine residual levels were collected based on simulated concentrations of all junctions in the model after the 30-day modeling period expired. The Utility does flush existing water mains on a regular basis to alleviate chlorine residual issues; however, flushing data was unavailable for model calibration. As such, flushing was not utilized for all model simulations. Chlorine degradation was modeled based on two separate degradation factors known as the 1) bulk decay rate and 2) wall reaction rate. The bulk decay rate is associated with the overall breakdown of chlorine within the water system. The wall reaction rate is associated with chlorine degradation due to contact with pipe wall in the distribution system. Chlorine residual was modeled for all scenarios using existing and projected system demands. Chlorine residual was also modeled for the primary Stucker Fork Conservancy District connection and the existing emergency Indiana American Water connection. The results of this effort are summarized within Tables ES-4 and ES-5 of the Preliminary Engineering Report Executive Summary.

b. The results of the simulations indicate that chlorine residual levels were higher during peak demand for looped alternatives compared to the non-looped alternatives. Average demand chlorine residuals were higher for non-looped connections compared to looped alternatives. Chlorine residual levels were more consistent when utilizing the Indiana American Water emergency connection rather than the current primary Stucker Fork Conservancy District connection. Chlorine residual levels were below IAC limits of 0.20 mg/L in dead end water mains and long runs of water main with low daily demand.

18. WHAT ALTERNATIVE SOLUTIONS WERE CONSIDERED?

Alternative solutions were developed to address needs and deficiencies noted within the existing distribution system. Detailed construction cost estimates for each alternative solution are included in Appendix E of the Preliminary Engineering Report. Most of the existing distribution system is able to provide sufficient pressure for the existing customer base but is inadequately sized to meet projected customer demands and fire flow conditions. Much of the existing distribution system has exceeded its useful life and consists of thin-walled PVC and asbestos cement water mains. These mains are prone to frequent breaks causing outages and service disruptions within the distribution system. Existing water mains recommended for replacement were prioritized based on available system pressure and ability to accommodate customer demands with consideration also given to emergency fire flow conditions. Each of the following alternative solutions are described in more detail within Section 4 of the Preliminary Engineering Report.

DISTRIBUTION SYSTEM

No Action Alternative – The Ten States Standards along with the Indiana Department of Environmental Management emphasize residual distribution system pressure must remain above 20 PSI to maintain proper backflow prevention. Under the No Action Alternative the Utility runs the risk of operating below this recommended threshold when water main breaks occur and therefore this Alternative was not considered viable and therefore will not be considered.

Priority No. 1 – Upsize 2" Water Mains to 6"

Alternative No. 1 – Zone I includes replacing existing two-inch water mains within Zone I of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-1 of the Preliminary Engineering Report. Zone I roughly corresponds to the distribution system area west of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressures during emergency fire flow conditions. Approximately 46,700 LF of six-inch water main would be installed to replace the existing undersized water mains. This Alternative does not include approximately 7,200 LF of two-inch water main that is captured within other Alternative solutions. Water main replacements would cross several waterways and would be located primarily in rural sections of the distribution system. The Engineers Probable Cost Estimate for this Alternative is presented in Tables 4-1a and 4-1b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M .

Alternative No. 2 – Zone II includes replacing existing two-inch water mains within Zone II of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-1 of the Preliminary Engineering Report. Zone II roughly corresponds to the distribution system area west of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressures during emergency fire flow conditions. Approximately 17,000 LF of six-inch water main would be installed to replace the existing undersized water mains. This Alternative does not include approximately 6,400 LF of two-inch water main that is captured within other Alternative solutions. Water main replacements would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-2a and 4-2b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 3 – Zone III includes replacing existing two-inch water mains within Zone III of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-1 of the Preliminary Engineering Report. Zone III roughly corresponds to the distribution system area east of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressures during emergency fire flow conditions. Approximately 21,400 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacements would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-3a and 4-3b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 4 – Zone IV includes replacing existing two-inch water mains within Zone IV of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-1 of the Preliminary Engineering Report. Zone IV roughly corresponds to the distribution system area east of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressures during emergency fire flow conditions. Approximately 56,000 LF of six-inch water main would be installed to replace the existing undersized water mains. This Alternative does not include approximately 14,700 LF of two-inch water main that is captured within other

Alternative solutions. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-4a and 4-4b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Priority No. 2 – Upsize 3" Water Mains to 6"

Alternative No. 1- Zone I includes replacing existing three-inch diameter water mains within Zone I of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-2 of the Preliminary Engineering Report. Zone I roughly corresponds to the distribution system area west of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flow conditions. Approximately 123,400 LF of six-inch water main would be installed to replace the existing undersized water mains. This Alternative does not include approximately 15,800 LF of three-inch water main that is covered other Alternatives. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-5a and 4-5b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M

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Alternative No. 2- Zone II includes replacing existing three-inch diameter water mains within Zone II of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-2 of the Preliminary Engineering Report. Zone II roughly corresponds to the distribution system area west of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flow conditions. Approximately 63,100 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-6a and 4-6b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M .

Alternative No. 3- Zone III includes replacing existing three-inch diameter water mains within Zone III of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-2 of the Preliminary Engineering Report. Zone III roughly corresponds to the distribution system area east of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flow conditions. Approximately 36,400 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-7a and 4-7b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 4- Zone IV includes replacing existing three-inch diameter water mains within Zone IV of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-2 of the Preliminary Engineering Report. Zone IV roughly corresponds to the distribution system area east of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flows.

Approximately 74,600 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-8a and 4-8b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Priority No. 3 – Upsize 4" Water Mains to 6"

Alternative No. 1 – Zone I includes replacing existing four-inch diameter water mains within Zone I of the distribution system with new six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-3 of the Preliminary Engineering Report. Zone I roughly corresponds to the distribution system area west of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flow conditions. Approximately 59,900 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-9a and 4-9b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 2 – Zone II includes replacing existing four-inch diameter water mains within Zone II of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-3 of the Preliminary Engineering Report. Zone II roughly corresponds to the distribution system area west of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flow conditions. Approximately 48,800 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-10a and 4-10b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 3 – Zone III includes replacing existing four-inch diameter water mains within Zone III of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-3 of the Preliminary Engineering Report. Zone III roughly corresponds to the distribution system area east of State Road 3 and south of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flows. Approximately 3,100 LF of six-inch water main would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-11a and 4-11b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 4 – Zone IV includes replacing existing four-inch diameter water mains within Zone IV of the distribution system with six-inch diameter water mains. The location of the proposed improvements is provided in Figure 4-3 of the Preliminary Engineering Report. Zone IV roughly corresponds to the distribution system area east of State Road 3 and north of Nelson Dr. Six-inch water mains will provide improved system pressure during emergency fire flows.

Approximately 23,300 LF of six-inch water mains would be installed to replace the existing undersized water mains. Water main replacement would cross several waterways and would be located primarily in rural sections in the distribution system. The Engineers Probable Cost Estimate is presented in Tables 4-12a and 4-12b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Priority No. 4 – Frequent Water Main Breaks and Miscellaneous Improvements

Alternative No. 1 – Replace 6" Asbestos Cement Water Main(s) includes replacing existing six-inch diameter asbestos cement water mains throughout the distribution system with new six-inch diameter PVC water mains. The new six-inch PVC water mains will provide reliable water service that is less prone to breaks. Approximately 49,200 LF of six-inch PVC water main would be installed to replace the existing six-inch AC water main. Water main replacement would be located primarily in rural sections in the distribution system. Disposal of the AC piping material would be performed in accordance with IDEM Standards. The location of the proposed improvements is provided in Figure 4-4 of the Preliminary Engineering Report. The Engineers Probable Cost Estimate is presented in Tables 4-13a and 4-13b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 2 – Miscellaneous Distribution System Improvements includes replacement of the two-inch water main along Henryville Otisco Rd. up to Dieterlen Rd., and replacement of the two-inch water main along Michigan Rd. up to North New Market Rd. Approximately 37,700 LF of six-inch water main would be installed adjacent to existing water mains outside of the roadway. This Alternative does not include approximately 28,100 LF of four-inch water main that is covered in other Alternative solutions. The location of the proposed improvements is provided in Figure 4-5 of the Preliminary Engineering Report. The Engineers Probable Cost Estimate is presented in Tables 4-14a and 4-14b of the Preliminary Engineering Report. This Alternative is not anticipated to incur additional O&M.

Alternative No. 3 – Miscellaneous Utility Needs. The following item can be implemented as desired and as funds are available. An estimate of capital costs for implementing each item can be found in Table 4- 15 of the Preliminary Engineering Report.

1) Neptune Meter Replacement Water meters frequently break and need replacement. The American Water Works Association recommends that water meters are replaced every 10 years. This Alternative sets aside funding to allow for the replacement of approximately 2,400 Neptune Water meters within the distribution system during the planning period.

2) New Service Truck. The existing service truck will likely reach its end of useful service life during the planning period. This reduces the reliability to perform maintenance within the system. A new service truck will provide a reliable means of access to provide repairs and perform additional improvements to the Marysville-Otisco-Nabb system. An additional service vehicle will also allow the possibility of hiring an additional field service employee.

3) Utility GIS Maintenance MON does not maintain a GIS system and relies on physical maps. Physical maps will become less reliable over time and a GIS system will allow the ability to track maintenance and other improvements more accurately within the distribution system. This Alternative will have an annual fee associated with the GIS subscription and is based on a per year basis.

4) Security Cameras The existing storage facilities do not currently utilize a security camera system, which results in potential security vulnerabilities. Security cameras will allow the ability to remotely monitor the site and witness any vandalism or tampering that may occur. Additional O&M costs are expected to be minimal. This Alternative is based on a per site basis.

5) Leak Detection Equipment MON does not currently have a reliable method of detecting leaks. The system experiences a significant number of leaks and a method of detecting them as they occur is needed. The current method for detecting leaks involves physically monitoring the system from the roadway which can result in unidentified leaks and increases the time needed to repair the system.

6) Utility Office Site Improvements The existing Utility Office Site does not currently have any safety barriers to prevent vehicular damage to the building. This Alternative includes installing safety barriers along the front of the office. This Alternative is not anticipated to incur additional O&M costs for MON.

7) Miscellaneous Valve Replacement The existing distribution system includes many undersized and aging valves that are prone to frequent breakage. Undersized or broken valves may be unable to perform their necessary functions when needed. This Alternative is based on a yearly expense to perform the required maintenance.

Distribution System – Emergency Supply Alternatives

The Utility currently lacks a sufficient alternative emergency source of supply when the existing 12-inch connection with the Stucker Fork Conservancy District is disrupted. The existing 6-inch Indiana American Water connection is undersized and will not provide sufficient capacity to meet average daily demands during emergency conditions. The future projected demands will further exacerbate these conditions. Two (2) Alternatives were considered to address this situation. Both Alternatives involve a looped 8-inch water main connection with Charlestown with Alternative 1 utilizing trenchless construction technology and Alternative 2 utilizing open cut construction.

Both Alternatives involve the installation of approximately 26,800 LF of 8-inch water main between Charlestown-Memphis Road and State Route 160. It is anticipated the construction of this proposed looping connection will cross several waterways and would be located primarily within rural sections of the existing service area. Estimated construction costs for both alternatives are provided in Tables 4-16a and 4-16b of the Preliminary Engineering Report.

STORAGE SYSTEM

The Utility's existing storage capacity is insufficient to meet current customer demands and emergency fire flow conditions. The Alternatives considered include the construction of a new 200,000 gallon, 300,000 gallon, or 400,000 gallon elevated storage tanks and are further described below. These Alternatives also include upgrades to the existing booster pump station located immediately downstream of the emergency 6-inch connection with Indiana American Water.

No Action Alternative – The proposed service area will not be able to provide sufficient residual system pressures during emergency conditions. This puts the existing system at risk of inadequate backflow prevention pressure resulting in potential cross-contamination. The existing booster pump station on the Indiana American emergency connection also requires upgrades (inclusive of installation of variable frequency drives) to improve overall system reliability. As such, the No Action Alternative is not considered viable for the Utility.

Alternative No. 1 – New 200,000 gallon Elevated Storage Tank & Booster Pump Station Improvements This Alternative includes the construction of a new 200,000 gallon elevated storage tank to meet the projected average daily demand of the Utility through the end of the planning period. The new tank would be installed along State Route 160 approximately 1/3 of a mile south of Hansberry Road. The new storage tank would be integrated into the Utility's existing control system and include a new gravel access drive and perimeter security fencing. This alternative also includes upgrades to the existing booster pump station immediately downstream of the existing Indiana American Water emergency 6-inch connection. Booster station upgrades include pump replacement, installation of variable frequency drives, a cellular monitoring and control system, and the installation of an emergency standby power generator. Estimated constructions costs are provided in Table 4-17 of the Preliminary Engineering Report.

Alternative No. 2 – New 300,000 gallon Elevated Storage Tank & Booster Pump Station Improvements This Alternative includes the construction of a new 300,000 gallon elevated storage tank to meet the projected average daily demand of the Utility through the end of the planning period as well as supplemental reserve capacity to accommodate fire flow conditions. The new tank would be installed along State Route 160 approximately 1/3 of a mile south of Hansberry Road. The new storage tank would be integrated into the Utility's existing control system and include a new gravel access drive and perimeter security fencing. This Alternative also includes upgrades to the existing booster pump station immediately downstream of the existing Indiana American Water emergency 6-inch connection. Booster station upgrades include pump replacement, installation of variable frequency drives, a cellular monitoring and control system, and the installation of an emergency standby power generator. The estimated construction costs are provided in Table 4-19 of the Preliminary Engineering Report.

Alternative No. 3 – New 400,000 gallon Elevated Storage Tank & Booster Pump Station Improvements This Alternative includes the construction of a new 400,000 gallon elevated storage tank to meet the projected average daily demand of the Utility through the end of the planning period as well as sufficient capacity to accommodate fire flow conditions. The new tank would be installed along State Route 160 approximately 1/3 of a mile south of Hansberry Road. The new storage tank would be integrated into the Utility's existing control system and include a new gravel access drive and perimeter security fencing. This Alternative also includes upgrades to the existing booster pump station immediately downstream of the existing Indiana American Water emergency 6-inch connection. Booster station upgrades include pump replacement, installation of variable frequency drives, a cellular monitoring and control system, and the installation of an emergency standby power generator. The estimated construction costs are provided in Table 4-21 of the Preliminary Engineering Report.

19. HOW SHOULD THE PROPER ALTERNATIVE BE SELECTED?

a. A Life Cycle Cost Analysis was performed for each Alternative based on the minimum requirements of the Water Resources Reform and Development Act of 2014. This type of analysis determines the total amount of money spent to implement each of the Alternatives. The overall cost for each Alternative is compared on a "Present Worth" basis where the alternative with the smallest

Present Worth is the least costly to implement. This analysis was done for a planning period of 20 years, which is typical for a life cycle cost analysis for municipal infrastructure improvements. This analysis is dependent on the real discount rate. In planning work for public waterwork facilities, the federal discount is used. This rate is found in OMB Circular No. A-94, Appendix C, and the most recent value was published in February 2023. The current value of 2% was used for a planning period of 20 years. The various cost considerations used for a present worth analysis are as follows:

- **Construction Costs**: Include initial capital investment required to purchase and install facilities as well as all related equipment. The costs are based on 2023-dollar values.
- **Operation and Maintenance Values:** These costs are based on the following unit rate estimates:

• Labor costs: Based on assumed rate of $35/hour, including benefits and overhead.

• Power costs: Based on an average rate of $0.13 per kilowatt hour.

• Equipment Replacement Fund annual cost is the annual funding needed to replace equipment with estimated service life of less than or equal to 15 years. The annual cost assigned is equal to the purchase cost divided by estimated lifespan.

The Salvage Value for an asset is the value of that asset after it has been repurposed for another function. This analysis used a planning period of 20 years. After 20 years, the structural and piping components have 20 -30 years left to their useful life. The value of these assets is used to lower the present worth cost of the alternatives. Straight line depreciation is used.

The total present worth of an alternative is found by adding the initial total project cost, present worth of the operation, maintenance, and equipment costs, and subtracting the salvage value. Some of the multiplying factors to bring items to present worth current dollars based on the interest rate noted previously include:

- 16.35 to bring the 20 years of O&M&R back to present worth
- 0.67 to convert 20-year salvage value back to present worth.

20. WHAT NON-MONETARY FACTORS EXIST?

a. Non-monetary factors such as social, environmental, and safety concerns need to be considered. Complaints may be filed due to sound pollution from the new booster station. The increased size of the 400,000-gallon elevated storage tank will allow adequate supply for the existing demand of the system fully support the fire flow capacity identified within Section 3 of the Preliminary Engineering Report. The 200,000-gallon or elevated storage tank may lead to low residual pressures or other issues within the system during fire flow. The 300,000 gallon tank Alternative also supports future demands while providing supplemental reserve capacity to address emergency fire flow conditions. The booster station improvements would be consistent among all of the alternatives. Environmental effects will be localized and likely be attributed to short-term construction activities, and are expected to be minimal for all Alternatives.

21. HOW WOULD PHASING FOR ALL ALTERNATIVES WORK?

a. For all Alternatives, installation of the storage tanks and the booster station improvements could occur without interruption to existing customer service. Each tank would have to remain isolated until they hydrostatically tested and pass all chlorine and bacteriological testing. Phasing the remaining Alternatives should occur as funding opportunities become available. As noted in the Executive Summary of the Preliminary Engineering Report, the Phase 1 project was presented with alternative consideration given to implementation of Phase 1A (construction of a new 300,000 gallon tank and booster station upgrades) and Phase 1B (installation of a new 8-inch looping water main connection). We have shown that combining the 1A and 1B projects into a single Phase 1 project would save the utility nearly $400,000 compared to keeping them as separate projects.

22. WHAT PROJECTS DOES COMMONWEALTH ENGINEERS, INC. RECOMMEND AS NECESSARY FOR MON?

a. The existing water facilities were evaluated to identify viable Alternatives for addressing the Utility's needs. Alternatives were compared using a life cycle cost analysis as well as consideration given to non-monetary cost factors. Commonwealth Engineers, Inc. recommends combining the Phase 1A and 1B projects described in Section 6 and the Executive Summary of the Preliminary Engineering Report into a single capital improvements project. Combining these projects would save the Utility nearly $400,000 in capital expenditures.

23. WHAT ARE THE PHASES OF THE RECOMMENDED PROJECT?

a. Based on the present worth analysis and the non-monetary factors discussed herein, the following summarizes the recommended alternate: The proposed capital improvement projects are high in cost and vary with importance in relation to providing a sufficient water supply and water quality to MON's customers. **It is recommended that the Town pursue the following improvements in four phases.**

1) Phase I-Installation of 8" Water Main Loop at Charlestown- New 300,000-Gallon Elevated Storage Tank

2) Phase II (5-year project) – Not included in Current Phase 1 Funding Application for Distribution System. Priority 1 – Upsize 2" Water Main to 6"

3) Phase III (10-year project) – Not included in Current Phase 1 Funding Application for Distribution System. Priority 2 – Upsize 3" Water Main to 6"

4) Phase IV (15-year project) – Not included in Current Phase 1 Funding Application for Distribution system. Priority 3 – Upsize 4" Water Main to 6". Priority 4 – Frequent Break Water Mains and Miscellaneous Improvements

The overall project cost for the combined Phase 1 Project is estimated to be $9,485,200. This estimated cost is inclusive of a 10% planning level contingency as well as consideration for compliance with funding agency requirements associated with Federal Buy American Build American provisions. The ranking of remaining phases shall be re-evaluated by the Utility after construction is completed for each prior phase.

24. WHERE IS THE LOCATION OF THE PROJECT, WHAT ENVIRONMENTAL CONSIDERATIONS EXIST, AND WHAT DID HISTORICAL OR ARCHAEOLOGICAL RESOURCES REVEAL ABOUT THE PROJECT LOCATION?

a. The unincorporated communities of Marysville, Otisco, and Nabb are located in Clark and Scott Counties in Indiana, approximately 15 miles northeast of Louisville. The land use within the Planning Area is primarily cultivated crops, hay/pasture, deciduous forest. developed open space and developed low, medium, and high intensity land uses are concentrated in incorporated and unincorporated communities within the Planning Area. The recommended improvements are located on property which is owned by MON, on utility right-of-way, or in existing easements. Projects proposed as part of this report will not impact established land use plans, policy, or regulations of any agency with jurisdiction over the project. Project elements will take place on both disturbed and undisturbed land. Construction projects are not expected to have any detrimental, long-term impacts on the soils. Short-term impact associated with material and equipment transport and installation is expected and will be mitigated through appropriate techniques. The DNR's State Historic Architectural and Archaeological Research Database GIS website was reviewed for archaeological and historical sites located within the Project Area. Numerous historic resources are noted within the Project Area; however, no sites are anticipated to be adversely affected with respect to the proposed work. The State and National Registers were reviewed for archaeological and historical sites located within the Project Area and did not note any additional sites to those listed in the SHAARD GIS. No information related to Native American archaeology was noted in either database. The U.S. Fish and Wildlife National Wetlands Inventory were reviewed to identify wetlands areas located within the Planning Area. There are numerous wetlands located within the Planning Area. A regulated waters delineation will be performed to ensure project components remain outside of wetland boundaries, if required. No wetlands are anticipated to be impacted.

25. WHAT SURFACE WATERS EXIST IN THE PLANNING AREA?

a. The major surface waters in the Planning Area include 14-Mile Creek, Silver Creek, Sugar Run, Sinking Run, Dry Branch, Big Branch, Yankee Creek, and numerous unnamed tributaries. None of these waterbodies are listed on Indiana's

Natural, Scenic and Recreational Rivers and Stream. No streams within the Planning Area are designated as Waters of High Quality, or Exceptional Use Streams. There are several proposed stream crossings for the project. 14-Mile Creek is listed on Indiana's Outstanding Rivers List and may require utility crossing for proposed projects. 14- Mile Creek, Silver Creek, Sugar Run, Sinking Run, Dry, Branch, Big Branch, and Yankee Creek are identified on IDEM's 303 (d) List of Impaired Waters, a list which identifies streams that do not meet water quality standards. All 303(d) listed waters in the Planning Area are impaired for E. coli. Additionally, Silver Creek is impaired for dissolved oxygen.

26. WHAT CONSIDERATIONS ARE PRESENT REGARDING GROUNDWATER, FLOODWATER/FLOODPLAIN, PLANTS AND ANIMALS, AND SOIL IN THE PLANNING AREA?

a. The USDA-NRCS has published measured depth to water table data for the Planning Area. The depth to the water table in the Planning Area varies significantly, from 0 cm to greater than 200 cm. A geotechnical investigation should be performed during design to determine effects of groundwater on any new structures proposed. Construction activities are not anticipated to cause long-term detriment to the groundwater table of local wells. No sole source aquifers will be affected by the project. FEMA completes comprehensive flood studies for the Planning Area. These studies use standard hydrologic and hydraulic computer models to find out the potential flooding from each riverine flooding source. Floodways should be taken into consideration in the planning of any project. Due to accessibility, operations, maintenance and safety issues, new facilities should avoid floodways where possible.

b. Portions of proposed improvements are within floodplains. The design of the project will comply with FIRMS requirements, if required. Project elements will take place on disturbed and undisturbed land. It is unlikely that rare and endangered species will be disturbed by construction due to the location of their living environments relative to anticipated project sites. Mitigation measures cited in any letters received from the Indiana DNR and the U.S. Fish and Wildlife Service will be implemented. The hydric soils maps for the Planning Area are shown in Figures 1-10A to 1-10P of the PER. The soils in the Planning Area consist mainly of "AddA" "Avonburg silt loam, 0-2% slopes," "NaaB2" "Nabb silt loam, 2-6% slopes, eroded," and "CkkB2" "Cincinnati silt loam, 2 -6% slopes, eroded. Construction projects proposed as part of this report are not expected to have any detrimental, long-term impacts on soils. Short-term impacts associated with material and equipment transport and installation activities are expected. These impacts can be mitigated through the use of appropriate techniques for erosion control and surface restoration during and following construction. Backfill material for the project will be obtained from a commercially operated facility, if required. Soil excavated during construction suitable for bedding and backfill will be reused upon approval of the Engineer and Owner. Excavated soils will be placed in specific locations during backfill and excavation operations, with any excess spoils removed and disposed of at a proper storage location. Proper erosion and sediment controls will be implemented around borrow storage locations.

27. WHAT POTENTIAL IMPACTS ON FARMLAND, LOCAL GEOLOGY, AND AIR QUALITY EXIST?

a. The Planning Area consists mainly of areas classified as "all areas are prime farmland", "prime farmland if drained", or "not prime farmland" as shown in Figures 1-11A through 1-11Q of the PER. The majority of improvements will be located on land classified as "all areas are prime farmland" or "prime farmland if drained"; however, the majority of these improvements will take place on developed land or land otherwise not in agricultural use. Air quality impacts from the proposed project will be evaluated for conformance with applicable Rules under Title 326 Articles 1, 2, 6, 7, and 8 of the Federal 1990 Clean Air Act Amendments. To minimize non-conformance with 326 IAC 6-4, "Fugitive Dust Emissions", reasonable and proper construction techniques and clean up practices will be provided. In addition, surface wetting practices will be utilized to control dust emissions where required. 326 IAC 6-4-6(3) provides for an exemption to the rule "…from construction or demolition activity where every reasonable precaution has been taken in minimizing fugitive dust emissions". Exhausts of construction equipment will be required to have mufflers for noise and air pollution abatement. Title III of the Clean Air Act calls for a program to prevent the accidental releases of hazardous air pollutants from facilities. We do not anticipate use of chemicals in the project that may release hazardous air pollutants as defined by EPA's Hazardous Air Pollutant Listing. If potential hazardous air pollutants are used on the project, we will require monitoring, record keeping, reporting, and vapor recovery, secondary containment, design, equipment, work practices and operation according to Federal Standards. The proposed project's construction and operation will neither create nor destroy open space and recreational opportunities and will not affect the Lake Michigan Coastal Zone or National Natural Landmarks.

28. WHAT MITIGATION MEASURES/PREVENTATIVE MEASURES WILL BE TAKEN?

a. The majority of the environmental impacts will occur during construction of the proposed improvements. These issues will be temporary since no significant impacts to environmental, historical, or other resources are involved. These temporary impacts include the potential for noise, dust, and construction site erosion. Provisions will be included in the construction specifications to limit such problems and to provide erosion control in accordance with current state standards. The work is expected to be completed during normal working hours, restricting any work-related nuisances to those hours. All construction equipment will be required to have mufflers to reduce noise pollution. Reasonable and proper construction techniques and clean up practices will be required by the contractor to reduce dust emissions. Proper surface wetting practices will be required. MON, through the authority of its board, planning commission or other means, will ensure that future development, as well as future water infrastructure projects, will not adversely affect wetlands; wooded areas; steep slopes; archaeological, historical, and structural resources; or other sensitive environmental resources. MON will require new development and infrastructure projects to be constructed within the guidelines of the U.S. Fish and Wildlife Service, IDNR, IDEM, and other environmental authorities.

29. PLEASE DESCRIBE THE EFFORTS TO INVOLVE THE COMMUNITY SERVED BY MON IN THE PROJECT PLANNING PROCESS.

a. Project planning should help the community develop an understanding of the need for the project, the utility operational service levels required, and funding and revenue strategies to meet these requirements. To engage the community regarding the project, a public meeting was held on August 8, 2023, which was a forum for presenting the major elements of this project, as well as the benefits to the community. The Public Hearing Notice, sign-in sheet, and meeting minutes are included in Appendix I of the PER. The signed SRF Resolutions are included in Appendix H of the PER. A Public Hearing was held; the Public Hearing Notice was published; the Publisher's Affidavit from the newspaper of the Public Hearing Notice was received; MON notified contract customers, significant users, and/or rate payers of the Public Hearing; the PER was available for review for 10-days before the hearing; the Resolutions were signed; the sign-in sheet and minutes/transcript from the public hearing were obtained; comments from the public were obtained; mailing labels were prepared for Public Hearing attendees, the County Drainage Board, the County Health Department, the planning Commission, Local Media outlets, and any customer communities.

30. PLEASE SUMMARIZE YOUR FINDINGS WITH REGARD TO THE EXISTING FACILITIES.

a. MON was originally created in 1965 and currently serves 2,506 customers. A general layout of MON's water infrastructure is depicted in Figure 2-1 of the Preliminary Engineering Report. Table 2-2 of the Preliminary Engineering Report summarizes MON's historical improvement projects. The majority of the system's supply is purchased from the Stucker Fork Conservancy District and conveyed through a 12" transmission main. In emergency conditions water can be purchased from Indiana American Water through a booster station connected by a six-inch water main with asbestos cement pipe. A breakdown of the total volume of water purchased for 2021 and 2022 from each of the sources is broken down in Table 2-1. Water is conveyed to the distribution system by distribution mains, which vary in size from two to twelve inches in diameter.

b. The total length of pipe within the entire system is approximately 709,600 LF. The oldest water mains within the distribution system are assumed to have been installed in the late 1960s. The typical life expectancy of pressurized water pipe is approximately 40-50 years, depending on soil condition, water chemistry, etc. The oldest water mains in the system may be beyond their useful life. MON is connected to the Stucker Fork Conservancy District where the majority of purchased water is sourced. The Stucker Fork Conservancy District is connected to the Marysville Elevated Storage Tank. The Indiana American Water is connected from the southern end of the distribution system from Charlestown. The average operating pressure of the distribution system is approximately 75 psi. Pipe material varies within the entirety of the Town's distribution system. Material primarily includes SDR-21 and SDR-26 PVC, SCH 30 PVC, and asbestos cement pipe. An optimally designed distribution system should include looping connections and the fewest possible dead-end mains. Eliminating dead ends improves water quality by eliminating or reducing stagnation and improving overall movement throughout the system. Ten States Standards emphasize the practicality of eliminating dead ends to increase fire flow capabilities and sustain water quality.

31. PLEASE DESCRIBE THE NEEDS FOR HYDRANT REPLACEMENT AND VALVE ADDITIONS AND REPLACEMENTS AND CUSTOMER SERVICE METER REPLACEMENTS.

a. The oldest hydrants and valves were installed in the late 1960s and have been installed consistently throughout the years since then. In the existing distribution system, there are approximately 83 hydrants and 158 isolation valves. Out of the existing isolation valves, 135 are located on water mains that are four-inch in diameter or smaller. Out of the existing hydrants there are 74 that are located on water mains that are four-inch in diameter or smaller. Older valves and hydrants are more susceptible to leaking, which increases potential system water loss, and subsequent reduction in utility revenue. Proper maintenance schedules of valves and hydrants typically include regular exercising so that interior glands and seals do not dry and tear. Additionally, the typical useful life of isolation valves and hydrants is approximately 55 years. Large sections of the water utility were added as part of a 1967 water improvements projects, with minor improvements and additions until current day. As a result, a large number of valves and hydrants are approximately 56 years old and have surpassed their useful lives. The spacing between many of the hydrants is also far above IDEM recommended standards. It is recommended that outdated valves and hydrants be assessed and replaced based on existing condition, operability, and criticality in the system. Additional consideration should be given to upsizing water mains to six-inches in order to provide adequate emergency fire flow and maintain system residual pressures more reliably. Services meters throughout the service area consist primarily of Neptune T-10 water meters which distributes data by radio frequency. The meters were installed starting in 2012-2017. Approximately 150 meters were replaced in 2022 and there is a plan to replace 288 meters in 2024.

32. WHAT STORAGE TANKS ARE CURRENTLY IN USE?

a. MON currently utilizes 75,000-gallon and 250,000-gallon elevated storage tanks. The 75,000-gallon Elevated Storage Tank was last serviced in 2012 and the 250,000-gallon Elevated Storage Tank was last serviced in 2017.

33. WHAT IS THE FINANCIAL STATUS OF THE EXISTING FACILITY?

a. It is important that municipal water user fees and charges be examined annually, or at least every other year, to ensure that they are capable of recovering all direct and indirect costs of service. Any unfavorable balances in cost recovery should be highlighted in the budget documents and addressed promptly. Rate adjustments for utility operation are commonly based on a 3-5 year financial plan. Capital improvements projects which could affect related municipal operations should be reviewed and prioritized on a coordinated basis. Tables 2-6 of the Preliminary Engineering Report presents the current schedule of rates and charges for MON's Utility Services. Based on 2022 operating records, MON currently has the income of approximately $937,638 and operating and maintenance expenses of $997,023. Based on billing records for the second half of 2021, the MON has the following total flow per residential customer as shown in Table 2- 9 of the Preliminary Engineering Report. This estimate was divided by the total number of residential connections during that period of time to get the average demand per residential connection. In Table 2-10 of the Preliminary Engineering Report the total commercial and public government demands for that time period were then divided by the average demand per residential connection to determine the total number of Equivalent Dwelling Units. A summary of the total number of EDUs is included in Table 2-1 of the Preliminary Engineering Report.

34. WHAT ARE THE CURRENT POPULATION TRENDS IN THE PLANNING AREA?

a. MON currently is expecting an increase in population growth during the 20-year planning period. A community near Charlestown is considering joining which will increase the demand for the system. Ensuring sufficient capacity for the potential growth for residential population and potential future connections is pertinent to provide adequate service in the future. Population projections developed for planning purposes must be reasonable. Since population projections are generally based upon a series of assumptions there is a need for careful analysis of the past. Population trends are generally not static; therefore, they should be reevaluated periodically as local conditions change, and as new information and trends develop. Change in an area's demographics is generally the result of three major facets of human activity: births, deaths, and migration. Migration is the most important factor, and the population change attributed to migration depends on a number of forces which are difficult to predict. People move in or out of an area for a variety of reasons, such as economic conditions, employment opportunities, housing affordability, and related factors. Employment opportunity is a foremost consideration and is usually a function of local resources and the regional economy. The simplest and most common way of predicting the future population of an area is by examining the past. Population trends provide a frame of reference with regard to how the population of an area has historically changed and how it could possibly change in the future.

b. U.S. Census Bureau historical population data provided on STATS website for Clark and Scott County has been utilized. Indiana STATS also provides population projections for Indiana Counties out to the year 2050. For the purposes of this report, population projections to the year 2043 will be used to represent the 20-year planning period. Table 3-1 of the Preliminary Engineering Report presents historical trends for Clark and Scott County since 1900. Based on the U.S. Census population data above, in the past 10 years, since 2010, historic population trends in Clark County have increased by 9.85% and trends in Scott County have increased by 0.84%. Since the majority of the Water Corporation falls under Clark County, and the projection values provide a more conservative estimate of population projects, the Clark County projection values and information provided by the Utility will be used to represent the projected population growth of the population served by MON. Indiana STATS provides population projections to the year 2050, as previously mentioned, for the County but not for the Unincorporated Communities. The data shows a continual population increase for Clark County. The data shows an increase in population of approximately 11.3%.

c. Based on the Clark County projected population and information provided by the Utility, the population served by the Corporation is projected to increase by approximately 20.5 % over the planning period. Census historic population and population projections are shown in Figure 3-1 of the Preliminary Engineering Report below. The current utility serves 12 commercial connections and 5 public authority connections. It is anticipated that there will not be any significant changes in commercial or public authority connections over the 20-year design period. As a result, demands attributed to commercial and public authority are projected to remain the same. Overall projected consumption for the Communities is anticipated to increase by approximately 20.5%.

d. A peaking factor of 1.5 will be used to determine peak day consumption. Ten States Standards: "The minimum working pressure in the distribution system shall be 35 psi and the normal working pressure should be approximately 60-80 psi." "The minimum storage capacity for systems not providing fire protection shall be equal to the average daily consumption… fire flow requirements established by the appropriate state insurance services office should be satisfied where fire protection is provided" Typical operating pressures in the system are between 49 and 68 psi. Smaller communities tend to have a lower operating pressure than 60 psi due to infrastructure limitations. Over the 20-year planning period, residential and industrial growth is anticipated. Evaluations of storage capacity for existing and projected conditions are provided in Table 3-4 and Table 3-5 of the Preliminary Engineering Report. It is anticipated there will be a storage deficit of approximately 190,000-gallons based on the projected future demand in 2043. When including the storage that is necessary to achieve adequate fire flow, the storage deficit becomes approximately 356,000-gallons based on the projected future demand in 2043. Adding pumping capacity would not alleviate the issues, and a new treatment plant would be largely oversized for the existing utilities needs. Additionally, the required pumping capacity greatly exceeds the existing consumption agreements with the Stucker Fork Water Utility and Indiana American Water Utility. An additional tank is recommended in the future.

35. HOW WAS HYDROLOGIC MODELING CONSIDERED?

a. The analyses performed in this study, and all subsequent recommendations for system improvements are based upon industry standards and performance guidelines set forth by the Indiana Department of Environmental Management , the American Water Works Association, the Insurance Services Office , and the Ten States Standards for Waterworks. Basic operational guidelines are as follows:

1) The distribution system must be capable of meeting the average daily flow demand conditions while maintaining working pressures of approximately 60 to 80 psi throughout the system.

2) In no portion of the distribution system should the average working pressure be less than 35 psi.
3) The system shall provide a minimum residual pressure of 20 psi at ground level at all points within the distribution system under all flow demand scenarios.
4) The distribution system should be capable of providing recommended fire flow volumes while also meeting maximum daily demand conditions and maintaining minimum operating pressures of 20 psi throughout the system.

It is recommended that storage capacity should at least equal to the average daily consumption. For fire protection, the total volume required by a fire flow scenario in addition to average demand should be provided through a combination of storage and direct pumping capability. The water system is represented as a network of the storage facilities, pumping facilities, water supply source, piping segments, and customer demands within the distribution system. Fixed head values, anticipated flow demands, and ground elevations are appropriately entered, resulting in a network matrix which allows an iterative hydraulic analysis of flows and pressures throughout the distribution system. The anticipated flow demands are evenly distributed across all system nodes; nodes are defined as areas in the system where pipe segments join. The demand associated with a hydraulic pattern mimicking typical residential use over a 24-hour period. All major system elements can be simulated, such as pumps, storage tanks, piping, flow control and regulating valves. An extended period simulations was evaluated under various operating conditions to determine the resulting hydraulic grade elevations and operating pressures throughout the system. The following assumptions were utilized in the preparation of the system model:

- A Hazen-Williams roughness coefficient of 150 for new PVC pipe.

-Ground elevations for the system nodes were determined using Google Earth Pro elevational profiles.

-Operating water levels in elevated storage tanks were set at approximately 95% of full capacity.

The model was developed using the following steps:

Step 1. 2021 and 2022 water consumption records were provided by the Town. Demand was evenly distributed across customer meters throughout the system. Demand associated with each customer meter was calibrated and diverted to the closest junction relative to the position of the customer meters. Daily consumption data was unavailable, so daily production data were utilized to estimate the peaking factor. The peaking factor was determined using daily production data from 2020-2023. The calculated peaking factor was determined to be 1.95. IAC standards require a peaking factor of 2.5, if the calculated peaking factor is less. Therefore, the IAC Standard peaking factor of 2.5 was utilized.

Step 2. ISO collected on June 1, 2021 was used to calibrate the model using the "Darwin Calibration Tool". This tool calibrate the model using the static pressure data and measured flows to vary specified parameters and achieve the existing test data. Calibration is check to ensure parameter variation accurately reflects existing system conditions and is exported into the model for usage. When the above steps were complete, the model estimated a total demand equal to 100% of the consumption reported by the Marysville for June 1st, 2021. Additionally system pressures according to the ISO report, are between 60 and 85 psi. Noted system pressures were determined to be within a reasonable margin of error of approximately ±5 psi.

Step 3. Additional demand increases were distributed evenly amongst each connection based on the calculations presented under the Reasonable Growth earlier in this section. After data was entered into the model, simulations were run to test a variety of conditions for both the present and future conditions of the system. These modeling results are important for determining whether the hydraulic characteristics and capacity of the system are adequate to meet the daily demands and minimum system pressure recommendations. Inadequate system capacity may result if low pressures occur during peak water use in areas where pressures are satisfactory during off-peak periods. In addition to running the model under average flow conditions, the model was run with demands representing peak hourly conditions as shown above. Two modeling simulations were evaluated as follows:

- Scenario 1 – Existing System with 72-hr Hydraulic Demand
- Scenario 2 – 20-yr System w/ 72-hr Hydraulic Demand

Each scenario was evaluated for four different alternatives as follows:

1) 200,000-Gallon Tank, Existing 4-inch Transmission Main
2) 200,000-Gallon Tank, New 8-inch Transmission Main
3) 350,000-Gallon Tank, Existing 4-inch Transmission Main
4) 350,000-Gallon Tank, New 8-inch Transmission Main

Results for the following simulations are given as a range of pressures for the southeast section of system adjacent to the proposed tank location. The improved storage tank capacity provided sufficient system pressures with the new looped eight-inch looped transmission main. During existing peak flow conditions, system pressures decreased below IAC allowable limits of 25 psi. The existing distribution system also utilizes emergency connections from the Charlestown Water Utility when the Stucker Fork Water Utility is unable to provide drinking water. The above alternatives were modeled with water supply coming primarily from the Charlestown Water Utility emergency connections. System pressures were above IAC limits of 25 psi for the storage alternatives that did not utilize the looping. Lower system pressures primarily in water mains receiving flow from smaller diameter water mains. Additionally, the projected system demands allocate demand in developing areas, leading to concentrated demand reducing pressures in other sections of the distribution system.

36. WHAT IMPROVEMENTS ARE TO BE INCLUDED IN PHASE 1A OF THE WATER UTILITY EXTENSION RECOMMENDED PROJECT?

a. The Phase 1A improvements include construction of a new 300,000-Gal elevated storage tank to meet the projected average daily demand of the Utility through the end of the Planning Period. The new tank would be installed along S.R. 160, approximately one-third of a mile south of Hansberry Rd. on a parcel of land currently owned by the Utility. The storage tank controls will be integrated with the existing control system. The proposed tank site will be furnished with a gravel drive and security fencing around the perimeter of the storage tank. The Phase 1A improvements will also include new booster station pumps with a VFD and a Mission Cellular remote monitoring system.

37. WHAT IMPROVEMENTS ARE TO BE INCLUDED IN PHASE 1B OF THE WATER UTILITY EXTENSION RECOMMENDED PROJECT?

a. The Phase 1B improvements include a new eight-inch water main loop that connects the existing two-inch master meter on Charlestown-Memphis Rd to the intersection of Opossum Rd and S.R. 160. This new eight-inch water main will provide a sufficiently sized water main to support a future connection with Indiana American Water at Charlestown and provide an alternative supply source to the twelve -inch connection with the Stucker Fork Conservancy. This project includes approximately 26,600 LF of new eight-inch water main along the connecting roads. It is anticipated that this water main will cross several waterways and would be located primarily in rural sections of the service area.

38. HOW SOON WILL THE WATER UTILITY EXTENSION PROJECT BE COMPLETED?

a. The proposed schedule for completion of the project anticipates a completion date in September 2025. Completion of the project is likely contingent on the issuance of several permits, including an INDOT Right-of-Way (ROW) Permit, a County ROW Permit, an IDEM Construction Permit, and an IDNR Floodway Permit.

39. WHAT SUSTAINABILITY CONSIDERATIONS EXIST?

a. Overall utility water loss will be decreased, and water quality and pressure will improve. Customer demands will be achieved during an emergency situation. The new elevated storage tank will provide sufficient system pressures to customers during emergency fire events. The new eight-inch water main will provide increased water quality and overall pressures to the new customers, while addressing local emergency fire flow requirements.

40. WHAT IS THE TOTAL COST OF THE PROJECT?

a. The total production cost for Phases 1A and 1B is $9,485,200. There is a savings of approximately $387,000 if Phases 1A and 1B are combined into a single project.

41. WHAT IS MON'S ANNUAL OPERATING BUDGET AND INCOME?

a. MON's total additional anticipated annual O&M&R cost is $29,985. MON's total water utility income is $937,638.00.

42. HOW WILL THE PROJECT BE FINANCED?

a. For planning purposes, it is assumed the project will be funded through a low interest loan.

43. WHAT CONSIDERATIONS EXIST FOR CAPITAL IMPROVEMENTS?

a. The Utility contains a large number of undersized two-, three-, and four-inch water mains in the distribution system. The cost for total replacement is significant and unfeasible. It is recommended that the Utility implement an annual capped allowance of $300,000 into the water usage rates in order to provide funds for upsizing water mains. Additional consideration will be needed to accommodate changes in chlorine residual prior to upsizing existing water mains.

44. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS.

a. Water supply infrastructure is one of the critical elements which help to define the quality of life within a community. The recommended Phase 1 Improvements Project will ensure MON can continue to maintain their water utility as an adequate and reliable source for existing and future customers. Existing undersized and asbestos cement water lines can undermine water quality within the distribution system. Proper flushing can mitigate issues associated with long water mains with low demand, but do not address the issues associated with hydrant flow and low residual pressure. The new storage tank will assist in addressing emergency flow for the distribution system, when the Stucker Fork Water Utility is unable to provide water. The booster station improvements will also reduce the risk of water main breaks. These improvements will provide and improve the reliability and sustainability of the existing distribution system. The Phase 1 Improvements Project detailed in this report will have to be implemented in a manner that minimizes interruption to the customers. The improvements recommended herein have been prioritized to reduce the overall operational costs and ensure the existing process equipment can be used throughout their expected service lives.

VERIFICATION

I hereby affirm, under the penalties of perjury, that the foregoing statements are true and correct to the best of my knowledge and belief.

Robert Bellucci, PE

Respectfully Submitted By:

/s/ *Darren A. Craig* ____________________________________

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing has been electronically served upon the following via e-mail, the agreed method of service for this proceeding, on September 29, 2023:

Indiana Office of the Utility Consumer Counselor
115 West Washington Street, Suite 1500 South
Indianapolis, IN 46204

/s/ *Darren A. Craig* ________________________

Darren A. Craig