

# **Facilities Plan for the Central Lift Station and Attenuation Basin**

## **Executive Summary**

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### **Project Summary**

Foth Infrastructure & Environment, LLC (Foth) was retained by the Caledonia Utility District (CUD) to prepare a facilities plan for the Central Lift Station and Attenuation Basin. The Central Lift Station was installed in 1987 and serves the eastern portion of the CUD, generally bounded by 3 Mile Road to the south, 7 Mile Road to the north, Lake Michigan to the east, and the Union Pacific Railroad and STH 31 to the west. The lift station pumps wastewater through a 30-inch force main to the Racine Water and Wastewater Utility (RWWU) collection system for further conveyance and treatment. Future growth within the Central Lift Station Sewer Service Area (SSA) will increase wastewater flows to the lift station, however, flow allocations to the RWWU remain unchanged. Additionally, elements of the lift station have reached the end of their service life. A facilities plan must be approved by the Wisconsin Department of Natural Resources (WDNR) prior to completing design.

### **Purpose**

The purpose of the facilities plan is to identify components of the existing lift station that are in need of rehabilitation and to recommend designs for flow attenuation and safety site conveyance. Flow attenuation involves on-site storage of wastewater flows in excess of the allowable flow to the RWWU collection system, and is commensurate with the findings of the recently completed RWWU Facilities Plan. Safety site conveyance involves routing flow above the allowable flow to the RWWU to a surface water outfall once the storage system is full or filling at capacity. This document facilitates a review by the WDNR with respect to applicable sections of the Wisconsin Administrative Code.

### **Scope**

The following tasks were completed as a part of this facilities plan and are necessary to evaluate potential alternatives and develop a summary of the recommended improvements:

- ◆ Review historical flow data.
- ◆ Review current land use and development within the sewer service area.
- ◆ Summarize current flows for average and peak hour conditions.
- ◆ Provide a general description of the sewer service area.
- ◆ Perform endangered species and historical/archeological reviews of the site.
- ◆ Summarize design criteria for the existing lift station.
- ◆ Estimate future growth within the sewer service area.
- ◆ Develop future flow projections for average and peak hour conditions.
- ◆ Use a computer model of the sewer system to determine design storm hydrographs.



- ◆ Analyze the capacity of existing infrastructure with respect to future flows.
- ◆ Evaluate lift station, attenuation basin, and safety site system alternatives.
- ◆ Perform a total present worth analysis for the proposed alternatives.
- ◆ Provide recommendations for rehabilitation of the existing lift station.
- ◆ Develop a capital cost estimate for recommended improvements.
- ◆ Prepare an implementation schedule for the project.
- ◆ Determine the parallel cost percentage for the Clean Water Fund loan.

## Conclusions

Based on the findings of this report, the following is a summary of conclusions for the Central Lift Station and Attenuation Basin:

- ◆ No endangered resources were found within the site boundaries that required follow-up actions.
- ◆ The existing lift station site was not found to be an area of historical or archeological significance.
- ◆ Wastewater flows are anticipated from primarily residential development in the sewer service area, with some minor contributions from commercial and governmental and institutional development.
- ◆ The projected design average annual flow rate is 4.5 MGD.
- ◆ The projected design peak hour flow rate is 27.3 MGD.
- ◆ The modeled 2040 5-Year 6-Hour Storm peak instantaneous flow rate is 27.9 MGD.
- ◆ The modeled 2040 5-Year 12-Hour Storm produces the greatest required storage volume, which is 3.6 MG.
- ◆ The modeled 2040 100-Year 24-Hour Storm peak instantaneous flow rate is 35.0 MGD.
- ◆ The existing north 36-inch sewer is of adequate size for continued use with 2040 flows, however the existing south 21-inch sewer will surcharge under the same conditions.
- ◆ The existing lift station wet well is of adequate size for continued use with 2040 flows.
- ◆ The existing wastewater pumps are suitable for continued use during 2040 flows.
- ◆ The existing force main is of adequate size for continued use during 2040 flows.
- ◆ The existing storm sewer does not have sufficient available capacity for use as a safety site conveyance pipe.
- ◆ The most cost effective attenuation basin design is a covered concrete basin with consecutive channels and an above grade, pumped in, gravity out layout.
- ◆ The most cost effective combined alternative is Alternative B, which consists of a new attenuation basin and reconfiguration of the existing lift station to address all pumping operations. However, Alternative A2, which consists of a new attenuation basin and attenuation pumping station with no modifications to the existing lift station pumps, is within 10-percent of Alternative B on a 20-year total present worth basis and can therefore be considered of equal cost.

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- ◆ The most cost effective safety site alternative is the Pressure Conveyance Alternative.
- ◆ The total capital cost of the recommended improvements is estimated to be \$22,460,000.
- ◆ The RWWU WWTP will receive flows from the Central Lift Station. It is capable of treating the type of wastewater that is expected. Flow allocations to the WWTP will not change through the year 2040.
- ◆ The project may be funded through the Clean Water Fund loan program, with payments made using user charge system revenue.
- ◆ The parallel cost percentage for the recommended improvements is 100%.

### **Recommendations**

In accordance with the previously identified conclusions, the following is a summary of recommendations for the Central Lift Station and Attenuation Basin:

- ◆ The 21-inch interceptor discharging into the lift station from the south catchment should be evaluated for I/I and upsized for future flows.
- ◆ The recommended global alternative is the Existing Lift Station Rehabilitation and On-Site Storage Alternative.
- ◆ The recommended on-site storage alternative is the Covered Concrete Attenuation Basin Alternative.
- ◆ The recommended attenuation basin channel configuration alternative is the Consecutive Channel Alternative.
- ◆ The recommended attenuation basin layout alternative is the Above Grade, Pumped In, Gravity Out Layout Alternative.
- ◆ The recommended combined alternative is Alternative A2, which consists of a new attenuation basin and attenuation pumping station with no modifications to the existing lift station pumps.
- ◆ The recommended safety site conveyance alternative is the Pressure Conveyance Alternative.
- ◆ The existing lift station pumps and piping should be retained for continued use.
- ◆ The existing lift station structure should be retained for continued use.
- ◆ The new attenuation basin and pumping station should be constructed on the existing lift station site.
- ◆ Do not phase construction of the attenuation basin or attenuation pumping station.
- ◆ Phase construction of the safety site force main according to future trends in peak flow.
- ◆ Perform a condition assessment and capacity analysis for the existing large pumps.
- ◆ The existing lift station should be rehabilitated to facilitate continued use, including replacement of the electrical and controls systems and standby generator.
- ◆ Provide miscellaneous repairs to the existing lift station building and support systems as needed based on the condition of items to be retained.

- ◆ Submit the facilities plan to the WDNR for review and approval in November 2021.
- ◆ Hold a public hearing for the project in January 2022.
- ◆ Start design of the Central Lift Station and Attenuation Basin improvements in March 2022.
- ◆ Start construction of the Central Lift Station and Attenuation Basin improvements in March 2023.
- ◆ Complete construction of the Central Lift Station and Attenuation Basin improvements by September 2024.