TETRA TECH, INC.

INTEROFFICE MEMORANDUM

TO: Howard Fink, Northfield Township Manager

FROM: Brian Rubel

DATE: October 27, 2014

SUBJECT: Wastewater Capacity Summary

BACKGROUND

Northfield Township provides wastewater treatment services for portions of Northfield and Green Oak Township. This memo is prepared to summarize some key items related to wastewater treatment, in general, and sewer capacity in the southern part of the sewer system. The information within this memo comes from both past studies and more recent calculations of system capacity.

WASTEWATER TREATMENT CAPACITY

The Township owns and operates a tertiary (3-stage) wastewater treatment plant (abbreviated WWTP). The Township possesses a permit from the Michigan Department of Environmental Quality (MDEQ) to discharge wastewater to the Horseshoe Lake Drain. That permit allows the present plant to discharge 1.3 million gallons of wastewater per day (abbreviated mgd). The permit also provides provisions for Northfield to expand the WWTP up to 3.0 mgd should an expansion be desired.

Present flows average between 0.6 to 0.7 mgd. However, flows during the morning and evening arrive at a higher rate and during nighttime at a lower rate. During wet weather, the flows into the plant increase due to the infiltration of groundwater and the inflow of stormwater (abbreviated as I/I).

The difference between 0.7 mgd and the plant capacity of 1.3 mgd indicates the WWTP has capacity remaining during dry weather to serve new connections. Tetra Tech believes Northfield Township could add up to 1,900 residential equivalent user (abbreviated REUs with one REU being equivalent to one single family home) connections before the MDEQ would request the WWTP to be expanded. However, it is a legal and policy matter to determine how many of these 1,900 REUs may have been previously allocated to either Green Oak Township or the North Territorial SAD.

During large storms, WWTP Superintendent Hardesty reports that the incoming flows can exceed 3 mgd. Above a peak rate of 2 mgd, the WWTP staff must bypass some treatment processes due to capacity limitations. Bypass of treatment processes are not desired and create a risk that the permit limits may not be met. Thus, any significant new development will increase the flows during wet weather and make effective treatment more challenging.

It is subjective as to what a significant development may be. Wastewater from a few new homes would be immeasurable at the WWTP. It is my opinion that after about 100 new homes, an increase in flow would be noticeable and measurable at the WWTP and create additional operational challenges.

Northfield Township has long considered constructing a storage basin at the WWTP. The purpose of the storage basin would be to capture wet weather flows and return the water to the WWTP after the storm. Tetra Tech has records that show as early as 1988 a storage basin was discussed. However, a storage basin has never been constructed.

During development interest in 2005, the Township requested Tetra Tech to prepare a cost opinion for a plant expansion (to a capacity of 2.25 mgd) and construction of a storage basin. The opinion of cost for that improvement was $12.7 million. Given the age of this opinion and changes to state law regarding the sizing of storage basins, the cost would be significantly larger today.

Due to the observed wet weather restrictions at the WWTP, Tetra Tech suggests that the Township again consider construction of a storage basin concurrent with significant development. A plant expansion would not be immediately needed to serve new development unless the research shows the available dry weather capacity has been reserved for Green Oak and special assessment districts.

NORTH TERRITORIAL SPECIAL ASSESSMENT DISTRICT

The existing North Territorial Special Assessment District (SAD) was constructed in year 2000 and consists of a collection sewer, pump station, and 12-inch diameter force main to Eight Mile Road. These facilities were sized to accommodate the approximately 1,500 REUs that were projected to be constructed within the SAD limits. Current connections are far below this number as little development within the SAD has occurred.

The pump station and force main were not sized for additional connections beyond the limits of the SAD. It was assumed that future growth would construct pump station improvements including parallel force main(s). An opinion of cost was prepared in 2003 that places a value of $2.28 million on the next improvement. The cost will be larger in today's dollars.

Given the sparse density of development within the existing SAD, the existing North Territorial Pump Station and existing force main can accommodate growth until the number of REUs reaches 1,500. However, Tetra Tech suggests that significant new developments contribute funds toward constructing the pump station and force main improvements that will eventually be needed as well as the cost of the storage basin at the WWTP.

SUMMARY OF KEY THRESHOLDS

Total REUs	Need
100 or more additional (anywhere in Township)	Raise funds for WWTP storage
100 or more additional (North Territorial area)	Raise funds for new pump station and force main
1,500 or more total (North Territorial area)	Construct pump station and force main improvements
1,900 additional (anywhere in Township)*	Construct WWTP expansion

*assuming capacity has not been reserved for Green Oak Township or other users

There are negligible current connections to North Territorial Pump Station (fewer than 100) thus an additional number of REUs is approximately the same number as the total number of REUs. To illustrate the use of the table with just one example, if 1,500 REUs of development demand materializes tributary to the North Territorial

Pump Station and 400 REUs materialize elsewhere in the system, Northfield Township would need to initiate all of the items listed in the above table.

NORTHFIELD TOWNSHIP SEWER SYSTEM CAPACITY SUMMARY

NORTH TERRITORIAL SERVICE AREA

CAPACITY/DEMAND	NEED	REFERENCE
Any significant new development (say 100 REUs)	Equalization Basin	Operator Observation
Above 1,522 REUs and Below 3,044 REUs	New NT Pump and Force Main	2003 Sewer Study
Additional 1,923 REUs	WWTP Expansion	85% of ex. 1.3 mgd capacity
Above 3,044 REUs	New NT Pump Station	2003 Sewer Study

NOTES

Given that the North Territorial SAD Is not built-out, new connections could occur as long as provisions are in place to collect connection fees needed to repay the costs of future infrastructure.

Existing North Territorial SAD design basis was 1,522 REUs

Sizing of needed WWTP facilities requires extensive analysis and new cost opinions since 2002

EQ basin sizing and WWTP expansion are interrelated. Doing both simultaneously will lower project costs.

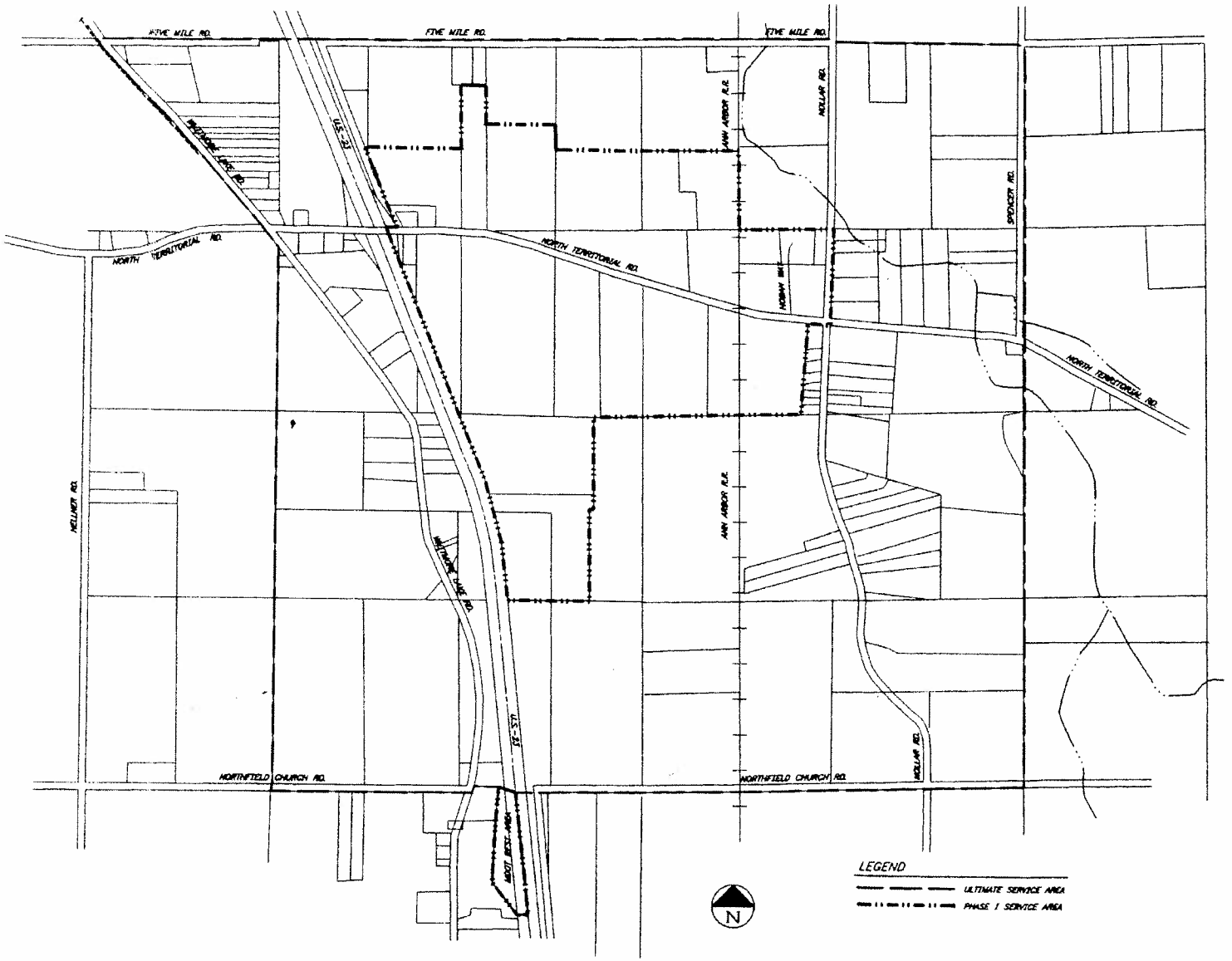

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FIGURE 1

NORTHFIELD TOWNSHIP, WASHTENAW COUI
NORTH TERRITORIAL SANITARY SEWER
BASIS OF DESIGN
SERVICE AREA

NORTHFIELD TOWNSHIP WWTP CAPACITY TIMELINE

DATE	EVENT
1961	WWTP Constructed
1975	WWTP Expanded
1983	WWTP Expanded
1988	WWTP Expanded. **Equalization storage proposed but not built.**
1993	WWTP Expanded
1998	WWTP Expanded
1998	North Territorial SAD conceived to serve Phase I development only
2000	North Territorial SAD Phase I constructed
2001	Very brief wet weather study. Recommendations not implemented
2002	Brief sewer capacity report funded by developer. Reiterates need for major capital improvements to support growth near North Territorial
2005	WWTP expansion and **equalization storage** discussed for growth. Neither project proceeds.

WWTP CAPACITY SUMMARY

Average flow	0.6 to 0.7 million gallons/day (mgd)
Rated capacity (sustained) in permit	1.3 mgd
Peak flow observed	>3 mgd
Peak flow capacity	2.0 to 2.5 mgd

MDEQ requires accommodating 3.9-inch storm without bypassing treatment

NORTHFIELD TOWNSHIP WWTP SAMPLE HYDROGRAPH