BOLTON & MENK
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March 26th, 2025

RE: Hoffman Road Sanitary Sewer and Watermain Extension
Mesenbrink Construction
Project No.: 0M1.128460

Project Background

Mesenbrink Construction is proposing a mixed-use development as part of the Hoffman Road Sanitary Sewer and Watermain Extension project in Mankato, MN. The project will include the extension of the sanitary sewer system with Hoffman Road from CSAH 12 to 211th lane, approximately halfway to 594th Avenue. The extension will immediately service approximately 69 acres of the proposed development.

One of the main purposes of this localized sewershed study is to amend a portion of the 2008 Mankato Sanitary Sewer Master Plan, which has since become largely out of date through numerous developments and sewer trunkline installations over almost two decades. The subject sanitary trunkline was originally intended to progress northeast along what is now CSAH 12 to service portions of the Groh Farm Subdivision(s) and some still unannexed property. The Groh Farm Subdivision is adequately serviced by a trunkline originating from Adams Street and the unannexed property has access to smaller localized sanitary systems. The logical path forward for the subject trunkline is to progress eastward with the extension of Hoffman Road and to serve additional property beyond the current project limits. The current Mankato Land Use Map, last updated in 2022, is referenced but some deviations are assumed in this study to be more realistic with actual anticipated development and to properly analyze the sanitary capacity.

Existing Conditions

The sanitary sewer is currently extended to County Road 12 along Hoffman Road. At the roundabout, the sanitary sewer will extend east to serve new development. The trunk pipe size along Hoffman Road is an 18” pipe and is relatively deep. The city wishes to elevate that pipe to manage construction costs and the depth of future services. The Sanitary Sewer Master Plan (2008) defines the anticipated future service areas. However, modifications to the regional sewershed have been made to align with the extension of Hoffman Road and its potential service limits and to better reflect changes that have occurred over time due to other developments.

Within the future development delineation, there are approximately 47 acres of scattered wetlands which are assumed to remain as their existing land use and will not be developed in the future. A 55-acre solar farm and its access road located off 594th Avenue will assume to be redeveloped in this study to provide conservative pipe sizing for the proposed sanitary sewer.

Proposed Developments

The development along Hoffman Road, just east of County Road 12, is currently being proposed. It will include 44 acres of single family residential, 22 acres of high density residential, and 3 acres of commercial area. Sewer services within the development area will tie into the regional sanitary sewer trunk line along Hoffman Road. Refer to Exhibit 2 for a map describing the proposed and future sewer service area.

The future developments served by the sanitary sewer are split into two areas by a low-lying wetland. Its land use is proposed to be low density residential and mixed-use based on the city's land use map (2022, see Exhibit 1). Sewersheds were delineated, assuming only gravitational flow, to the identified leads in the proposed development and the assumed connection point for any future developments. If areas outside of this sewershed require future service, then lift stations may be required and an upsize to proposed pipe in Hoffman Road and its future extension.

The 55-acre solar farm is assumed to be redeveloped with primarily single family residential and 5-acre area of mixed-use development.

Pipe Capacity Analysis

Modeling was completed using the Autodesk Storm and Sanitary Analysis (SSA) with peak flows determined by area and projected land use. Low density residential peak flows estimate 2.5 people per household with an average flow of 100 gallons per day (gpd) per person, for a total of 250 gpd per residential lot. Future development areas with projected low density residential land use will assume ¼ acre lots. See Table 1 for assigned values of the peak flow rate assumptions for the proposed development and Table 2 for the future development area.

Table 1. Summary of Assumed Peak Flow Rates

Land Use	Peak Flow Rate
Low Density Residential	250 gpd/lot
High Density Residential	2,700 gdp/acre
Commercial	1,000 gdp/acre

Table 2. Summary of Assumed Future Discharge per Land Use

Land Use	Area	Peak Flow Rate	Baseflow Discharge
Eastern Future Gravity Service			
Low Density Residential	325 acres	1,000 gpd/acre	325,000 gpd
Mixed-Use	97 acres	1,500 gdp/acre	145,500 gpd
Wetlands	44 acres	0 gdp/acre	0 gpd
Total	**456 acres**	**-**	**470,500 gpd**
Northern Future Gravity Service			
Low Density Residential	43 acres	1,000 gpd/acre	43,000 gpd
Total	**506 acres**	**-**	**456,000 gpd**

The proposed sanitary sewer is primarily 15-inches in diameter with an 18-inch pipe connecting the proposed sewer to the existing network. The sewer is buried 25-35 feet at a consistent slope of 0.15 percent at the top of the run and 0.20 percent near the end of the run. The last two pipes in the proposed network are graded to connect the proposed pipe to the lower, existing sanitary sewer's elevation, thus generally have a larger slope.

Pipe sizes are designed to meet the proposed and future baseflow discharge with an applied peaking factor based on average pipe flows. The limiting peaking factor for the proposed sewer is 3.2, meaning the proposed network can handle 3.2 times the baseflow rate, see calculations in Exhibit 3. A typical safety factor is 3, therefore the proposed sewer has the capacity to carry the proposed and expected future flows.

Please contact me if you have any questions or need additional information at 651.724.0404 or Timothy.Olson@bolton-menk.com.

Sincerely,

Bolton & Menk, Inc.

Timothy J. Olson, PE, CFM
Water Resource Project Manager

City of Mankato
Land Use Plan

Land Use Classifcation

Class

- Central Business District
- Civic / Institutional
- Commercial
- Heavy Industrial
- High Density Residential
- Highway Commercial
- Industrial Commercial
- Lifestyle Center Commercial
- Light Industrial
- Low Density Residential
- Medium Density Residential
- Mixed Office Commercial
- Mixed Residential / Retail
- Neighborhood Commercial
- Office / Tech Flex Space
- Office Industrial Campus
- Office Residential
- Parks-Open Space
- Public-Semi Public

Parcel

- Boundary
- ND — Neighborhood Node

Mankato

- City Limits

November 2022

0 0.5 1 2 Miles

Project Sewershed

Mankato Airport

Map Disclaimer –
The Land Use Map of the city of Mankato represents the current land use designations as the date indicated on the left-hand side of the map. The map displays the general land use areas. Contact Community Development staff at 507 387-8611 for official land use of specific areas.

City of Mankato
Leading the way...
Kurt D. Klinder, GISP
GIS Coordinator

Mesenbrink Development
Manakto, MN

Exhibit 2: Proposed Sewersheds
March 2025

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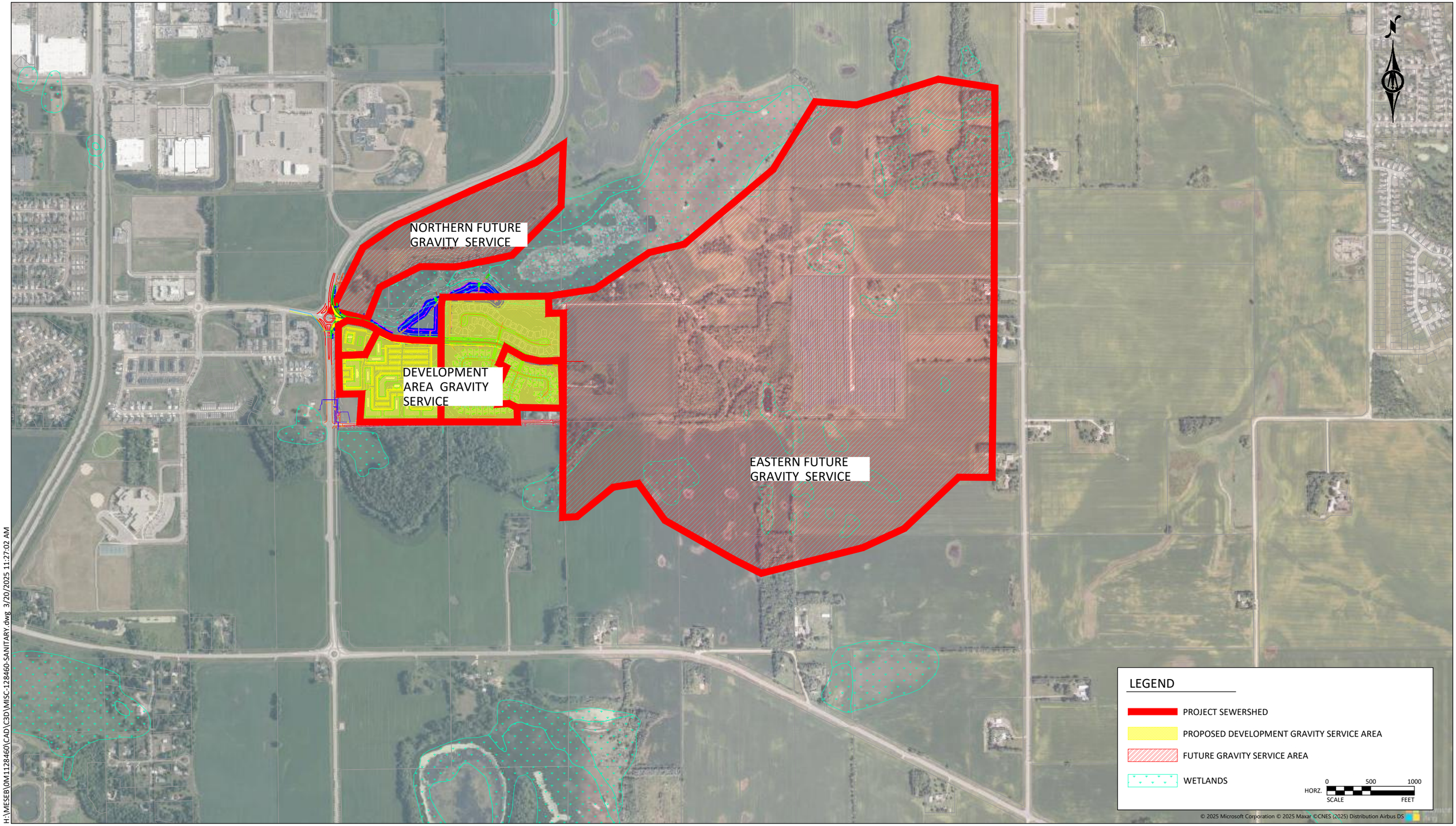

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Exhibit 3: Proposed Peaking Factor										
Node ID #		Base Flow		Size	Slope	Capacity		Peaking	Peak Flow	
From	To	(gpm)	(MGD)	(in)	(%)	(gpm)	(MGD)	Factor	(gpm)	(MGD)
S-1	EX SAN	417.64	0.60	18	0.12	1634.58	2.35	3.91	1,635	2.35
S-2	S-1	389.48	0.56	15	3.24	5222.45	7.52	13.41	5,222	7.52
S-3	S-2	389.52	0.56	15	0.20	1307.76	1.88	3.36	1,308	1.88
S-4	S-3	390.91	0.56	15	0.20	1299.32	1.87	3.32	1,299	1.87
S-5	S-4	391.64	0.56	15	0.20	1306.91	1.88	3.34	1,307	1.88
S-6	S-5	350.91	0.51	15	0.15	1122.48	1.62	3.20	1,122	1.62
S-7	S-6	350.76	0.51	15	0.15	1123.22	1.62	3.20	1,123	1.62
S-8	S-7	351.32	0.51	15	0.15	1123.09	1.62	3.20	1,123	1.62
S-9	S-8	335.91	0.48	15	0.15	1124.11	1.62	3.35	1,124	1.62
S-10	S-9	336.08	0.48	15	0.15	1122.84	1.62	3.34	1,123	1.62
S-11	S-10	331.84	0.48	15	0.15	1123.92	1.62	3.39	1,124	1.62
S-12	S-11	332.82	0.48	15	0.15	1122.54	1.62	3.37	1,123	1.62
S-13	S-12	327.03	0.47	15	0.15	1122.92	1.62	3.43	1,123	1.62