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## FIGURES

Figure 1– Existing MCES Sanitary Sewer System
Figure 2-5 – Existing and Future Sanitary Sewer Improvements
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## ATTACHMENTS

Attachment 1 – Sanitary Sewer Maintenance Policy and ERU Calculations
Attachment 2 – City's Code Regulating Individual On-Site Sewage Treatment Systems
Attachment 3 – List of known Non-Compliant ISTS Systems
Attachment 4 – Water Supply Plan
Attachment 5 – CIP Costs
Attachment 6 – Local Surface Water Management Plan

# WASTEWATER

At the publish date of the 2008 Comprehensive Plan the City of East Bethel was pursuing alternatives that would allow for the implementation of municipal water and sanitary sewer within portions of the community experiencing development pressures. More specifically, the areas along the Trunk Highway 65 corridor as well as Viking Boulevard (County Road 22). These areas are becoming more and more desirable to land developers.

The City was working with the Metropolitan Council Environmental Services (MCES) to assist in examining the most appropriate location(s), treatment systems, and potential costs to construct the necessary facilities to support existing and future development. The Metropolitan Council contracted with a consulting firm to further assess these and other municipal service elements; an initial report was available in February 2006.

The City contracted with a consulting firm to study the feasibility of construction the first phase of the proposed municipal sewer collection and distribution system. The Phase 1 Project included the general area south of Viking Boulevard and west of Trunk Highway 65. The report was first available in September 2010.

The City of East Bethel and the MCES did move forward with the construction of the Phase 1 Utility Project in 2011. The MCES also constructed a Regional Water Reclamation Facility (Facility) that went online in 2014.

## Municipal Treatment and Wastewater Collection

### Treatment Facilities

In addition to the MCES Facility, there is one community wastewater treatment plant (WTP) within the City boundaries, known as Village Green. The City did own and operate the Castle Towers WTP until 2014. The Castle Towers WTP has since been decommissioned.

#### The MCES Facility

The Facility is a water reclamation plant that provides tertiary treatment and disinfection of wastewater, followed by distribution of treated effluent to two separate subsurface infiltration sites. The facility is designed to treat an average wet weather flow of 470,000 gallons per day. Each infiltration site is designed to receive up to 410,000 gallons per day on an annual average basis. This is a Class B facility.

The facility includes influent pumping, fine screening and grit removal, one set of biological treatment tanks with a five-stage biological nutrient removal system, two membrane biological reactor units for tertiary treatment, chemical addition capability, ultraviolet disinfection, back-up chlorination, and pumping and conveyance facilities. Residual biosolids from the plant are periodically removed and delivered to another MCES plant for further treatment and disposal. The facility has back-up equipment and procedures to ensure reliability of the treatment process.

The facility's two infiltration sites consist of multi-celled grass-covered earthen basins and the associated distribution system consisting of underground 16-inch and 10-inch pipe that carries water year-round to both

sites for distribution of the treated effluent. Each site is designed to confine multiple cells in shallow, soil-covered basins with granular material at the bottom to facilitate delivery of the treated effluent through the unsaturated zone. Both infiltration sites have a piezometer, in the middle of each site to measure elevations, and to serve as observation ports for the piping. The sites also have a network of eight monitoring wells to determine if there are changes in ground water quality or elevations. The treated effluent is delivered to the two sites to optimize cell performance based on the operational requirements to control the mound height and maintain an unsaturated zone above the water table.

Some of the facility's treated effluent may be used for reuse activities. Effluent that meets the limits and monitoring requirements outlined in Waste Stream Stations WS005 and WS006 may be reused for the corresponding activities described for Disinfected Tertiary 2.2 Effluent and Disinfected Secondary 23 Effluent in the Municipal Wastewater Reuse factsheet found on the MPCA website (www.pca.state.mn.us). If the facility proposes reuse for an activity not listed in the fact sheet, a request must be made to the MPCA describing the activity. Future reuse activities that include the construction of permanent piping systems to distribute the treated effluent to users may require a major permit modification. However, at this time the MCES is only conveying effluent to the two subsurface disposal sites.

### Village Green WTP

The Village Green WTP is a privately-owned Class C facility. The facility treats wastewater from a mobile home community. Its treatment consists of an aeration tank, final clarifier, and a chlorine contact tank. The disposal is a subsurface disposal through a rapid infiltration basin. This plant is permitted for 30,000 gallons per day. The location of the Village Green WTP is shown on Figure 5.

### Castle Towers WTP

The Castle Towers Wastewater Treatment Plant was a Class B facility which was recently decommissioned by the City. This facility treated wastewater from the Castle Tower mobile home community and the Whispering Aspen plat, which consists of single-family residents. The plant treatment consisted of a mechanical component, sand filters, a polishing pond, and sludge drying beds. The disposal was a surface water disposal into Minard Lake. This plant was permitted for 120,000 gallons per day. The wastewater that was previously treated at the Castle Towers WTP is now collected by gravity and discharged to Lift Station No. 2. The lift Station No. 2 forcemain conveys the wastewater to the MCES collection system at Viking Boulevard.

### Cedar Creek and East Bethel Community School

The school district has a Class D wastewater facility that services Cedar Creek Community School and East Bethel Community School. Its treatment consists of a trench system with monitoring wells. This plant is permitted for 15,000 gallons of water per day.

## Projected Flows to the Facilities

Projected wastewater flows to the MCES Facility, the Village Green Facility and the Cedar Creek/East Bethel Community School are presented in the table below. Projected flows for the MCES Facility are based on the Metropolitan Council population forecasts. Based on the Metropolitan Council population projections, it is estimated that East Bethel will service 3,005 households with its municipal sewer system by 2040. The City anticipates the growth in three separate areas as shown and labeled on Figure 2 as Growth Area A, Growth Area B and Growth Area C.

| PROJECTED WASTEWATER FLOWS TO MCES FACILITY | | | | | |
|---|---|---|---|---|---|
| Year | Population Served by Municipal Sewer | Households Served by Municipal Sewer | Employment Served by Municipal Sewer | Average Annual Flow (MGD) | Peak Month Flow (MGD) |
| 2010 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 1,100 | 427 | 1,033 | 0.12 | 0.41 |
| 2030 | 3,500 | 1,331 | 1,258 | 0.36 | 1.28 |
| 2040 | 7,380 | 3,000 | 2,000 | 0.82 | 2.88 |

| PROJECTED WASTEWATER FLOWS TO VILLAGE GREEN FACILITY | | | | | |
|---|---|---|---|---|---|
| Year | Population Served by CSTS | Households Served by CSTS | Employment Served by CSTS | Average Annual Flow (MGD) | Peak Month Flow (MGD) |
| 2010 | 430 | 150 | 4 | 0.025 | 0.030 |
| 2020 | 430 | 150 | 4 | 0.025 | 0.030 |
| 2030 | 430 | 150 | 4 | 0.025 | 0.030 |
| 2040 | 430 | 150 | 4 | 0.025 | 0.030 |

| PROJECTED WASTEWATER FLOWS TO CEDAR CREEK/EAST BETHEL SCHOOL | | | | | |
|---|---|---|---|---|---|
| Year | Population Served by CSTS | Households Served by CSTS | Employment Served by CSTS | Average Annual Flow (MGD) | Peak Month Flow (MGD) |
| 2010 | 0 | 0 | 50 | 0.011 | 0.012 |
| 2020 | 0 | 0 | 50 | 0.011 | 0.012 |
| 2030 | 0 | 0 | 50 | 0.011 | 0.012 |
| 2040 | 0 | 0 | 50 | 0.011 | 0.012 |

## Collection System

Both MCES and East Bethel own and operate wastewater collection systems within East Bethel. The existing MCES collection system is shown on Figure 1. The City's existing and proposed collection system is shown on Figures 2 through 5. Proposed system improvements are discussed on Page 8.

## New Community or Cluster Treatment Systems

The City of East Bethel will allow for development consistent with providing a public sanitary sewer collection, treatment, and disposal system to serve the areas within the corporate boundary. Community or cluster wastewater treatment systems may be considered when municipal sanitary sewer collection systems are not readily accessible. The community or cluster systems will provide for easier future connections at a lower overall economic impact. All privately owned wastewater systems will be required to procure all regulating agency approvals. It is anticipated that these systems would be privately owned and operated.

## Infiltration/Inflow (I/I) Criteria

East Bethel's collection system is less than six years old. The design and construction of new sewers and the connection of new buildings to the sewer system in East Bethel will meet the industry standards for tightness and minimize the entry of I/I into the collection system.

The City of East Bethel standards meet the State of Minnesota requirements. All new sewers are designed and installed so leakage into the sewer is less than 100 gallons per day per inch-diameter per mile of sewer. To ensure compliance with this standard, the City of East Bethel requires on-site construction observation during construction and verification testing prior to acceptance of the public improvements. Certification by a professional engineer that new facilities are installed in accordance with all specifications is also required. Records of these certifications will be maintained by the City.

To ensure that all municipal utilities are properly constructed and meet all state, federal, and local requirements, the City of East Bethel has prepared an Engineering Manual that addresses the material and workmanship that will be required for all municipal improvements. The Engineering Manual was adopted by City Council on March 2, 2005. The Engineering Manual requires that all sanitary sewer facilities and water work be designed to conform to the "10 State Standards" and be constructed in accordance with City Engineers Association of Minnesota Standard Specification except as modified by specific City of East Bethel requirements.

The connection of building laterals to the local sewer system will be permitted by the building department. A licensed plumber shall certify that the connection was made in accordance with the building code.

## Ordinances

East Bethel has adopted an ordinance that prohibits the connection of roof leaders, foundation drain tile, and sump pumps from new construction to the sanitary sewer system. Section 74-197 of the City Code states the following:

The City reserves the right to regulate the disposal of any waste through the sanitary sewer system both in quantity and character.

(1) No person shall discharge or cause to be discharged any stormwater, surface water, groundwater, roof runoff, subsurface drainage, cooling water or unpolluted industrial process waters to any sanitary sewer.

(2) Stormwater and all other unpolluted drainage shall be discharged to such sewers as are specifically designed as storm sewers or to a natural outlet approved by the City Administrator to a storm sewer or natural outlet.

## Maintenance Program

East Bethel has developed a Sanitary Sewer Maintenance Policy, which includes an ongoing sewer cleaning and inspection program as part of the routine maintenance of the collection system. I/I sources are often identified during inspection and include open and leaking sewer joints, cracked pipes, missing joint gaskets, pick holes in manhole covers, and offset manhole frames. A copy of the policy is included as Attachment 1.

## Individual Sewage Treatment

The majority of wastewater disposal in the City is by individual on-site systems. The existing sanitary sewer systems consist of septic tanks, dry wells and drain fields, and other on-site treatment systems, the exact combination of which is not summarized.

Many of the ISTS systems in the proposed municipal service area were old and previous reports indicate a number of systems were both failing and/or are non-conforming systems. Specifically, the southern portion of the City currently includes areas that have both higher ground water elevations and poorer soils, making construction of new systems both difficult and expensive.

In the last 5 years the existing businesses south of Viking Boulevard and west of Trunk Highway 65 have abandoned their ISTS systems and connected to the City system. With the construction of a new service road between 187$^{th}$ Lane and Viking Boulevard in 2017, along with the extension of trunk sewer facilities, the Our Saviors Church campus will be connecting to the sewer and water systems in 2018. The City is currently in the process of completing construction plans to extend services on the east side of Trunk Highway 65. This project will provide City sewer and water service to all the existing businesses between 184$^{th}$ Avenue and 187$^{th}$ Lane.

The Coon Lake Area is a heavily developed lakeshore area with older homes and smaller platted lots. Reconstruction of existing systems is limited based on the availability of adequate lands, high water table, and general terrain of the area. The City recently sponsored a project to assist with the replacement of the ISTS system in the Coon Lake area.

The City of East Bethel has adopted, by reference and as amended, the Individual Sewage Treatment Standards of the Minnesota Pollution Control Agency, cited as Minnesota Rules 7080 and 7081. This section of the City's Code outlines restrictions and requirements for the evaluation of treatment sites and the installation, construction, and maintenance of individual sewage treatment systems. The City's Code regulating Individual On-site Sewage Treatment Systems is included in Attachment 2. Attachment 3 provides a list of the known non-complaint ISTS systems.

### Projected Flows to Individual Sewage Treatment Systems

Projected wastewater flows to Individual Sewage Treatment Systems (ISTS) are presented in the table below. Projected flows are based on the Metropolitan Council population forecasts.

| PROJECTED WASTEWATER FLOWS TO ISTS | | | | |
|---|---|---|---|---|
| Year | Population Served by ISTS | Households Served by ISTS | Employment Served by ISTS | Average Annual Flow (MGD) |
| 2010 | 11,196 | 3,910 | 1,069 | 1.07 |
| 2020 | 10,870 | 4,123 | 613 | 1.13 |
| 2030 | 11,470 | 4,519 | 638 | 1.23 |
| 2040 | 10,590 | 4,250 | 146 | 1.16 |

## Policies

### Policy 1

It is the policy of the City of East Bethel to prevent and eliminate infiltration and inflow problems within the sanitary sewer system.

### Policy 2

It is the policy of the City of East Bethel to extend and upgrade its sanitary sewer collection system in a staged manner consistent with the staged growth plan of the City.

### Policy 3

It is the policy of the City of East Bethel to provide a sanitary sewer collection system within the City's boundary consistent with the staged growth plan.

### Policy 4

It is the policy of the City of East Bethel to provide a sanitary sewer collection system for all areas considered for annexation.

## MUNICIPAL WATER SERVICE

The City of East Bethel water distribution system currently has 62 residential connections and 15 Commercial connections. The average day (AD) demand is approximately 40,000 gallons. The City's existing and proposed municipal water system improvements are shown on Figure 6 through 8.

East Bethel currently has two separate public water supply and distribution systems. One system is on the north end of the City and the other system is on the south end of the City. The north system is shown on Figure 6 and the south system is shown on Figure 8. These systems currently provide municipal water service to the customers previously discussed. All other residential and non-residential properties are served by private wells.

The table below summarizes the estimated storage and water supply needs through 2040 broken out by growth area.

| DESCRIPTION | AREA A | AREA B | AREA C |
|---|---|---|---|
| Required Fire Flow (gpm) | 2,500 | 2,500 | 2,500 |
| Fire flow Duration (hrs) | 3 | 3 | 3 |
| Total Fire Flow Demand (gals) | 450,000 | 450,000 | 450,000 |
| Peak Day Demand (mgd) | 1.12 | 2.46 | 3.03 |
| Peak Day Demand (gpm)[1] | 930 | 2053 | 2525 |
| 3-hour Peak Day Demand (gals) | 167,457 | 369,551 | 454,566 |
| 20% Reserve (gals)[2] | 223,276 | 492,734 | 606,088 |
| Total Water Required (gals)[3] | 840,732 | 1,312,285 | 1,510,654 |
| Total Number of Wells Needed | 4 | 6 | 5 |
| Number of Existing Wells | 2 | 0 | 2 |
| Total Number of New Wells Needed | 2 | 6 | 3 |
| Total Firm Pumping Rate (gpm)[4] | 2,100 | 3,500 | 2,800 |
| Total Firm Pumping 3 hour event (gals) | 378,000 | 630,000 | 504,000 |
| Total Storage Required[5] | 462,732 | 682,285 | 1,006,654 |
| Existing Storage Available (gals) | 0 | 0 | 500,000 |
| Storage Tank Construction (gals) | 500,000 | 750,000 | 500,000 |

[1]Peak day demand rate based on 20-hour day.

[2]Reserve is 20% of peak day demand volume.

[3]Total water required = total fire flow demand + 3-hour peak day demand + 20% reserve.

[4]Projected firm well capacity based on all wells in service except the highest capacity well.

[5]Total storage required = total water required - total firm pumping 3-hour event.

## System Improvements

Proposed system improvements are discussed below.

## East Bethel Policies

It is the policy of the City of East Bethel to fulfill Minnesota Statutes Section 103G.291, which requires cities with a municipal water supply system to develop a Water Supply Plan. The City of East Bethel's Water Supply Plan is currently under review by the Minnesota Department of Natural Resources. The Water Supply Plan is included as Attached 4.

## PROPOSED SYSTEM IMPROVEMENTS

This Section summarizes the sewer and water trunk facilities needed in the 2040 growth areas. Trunk sizes and facility improvements are designed to handle the 2040 growth areas when they are fully developed. The estimated ERU's at full development are included in Attachment No. 1.

### Growth Area A

Growth Area A is generally between 237th Avenue and the north City limit. A portion of this area is currently served by city sewer and water. The current service area includes the Castle Towers mobile home park and the Whispering Aspen plat. This area has 2 existing wells and 2 existing lift stations. Water treatment is limited to chlorine, fluoride, and the addition of polyphosphate.

#### Existing Capacity

Lift Station 1 exclusively services the Castle Towers Mobile Home Park. Lift Station 1 discharges to Lift Station 2 via force main and gravity sewer. Existing Lift Station 2 will service Growth Area A. The construction of this lift station was initiated to allow for the decommissioning of the Castle Towers WTP. This lift station discharges at Viking Boulevard through a 10-inch force main which is shown on Figure 3.

#### 2040 Capacity Needs

The immediate need for this area is water storage. The system currently operates with two pneumatic tanks which provide negligible storage. As shown on the table in Section 2.0, it is estimated that this area will require 2 additional wells and 500,000 gallons of storage when fully developed. The capacity of Lift Station 2 is currently limited by the force main size. The lift station capacity is approximately 650 gpm. It is anticipated that an additional force main will be constructed to provide the fully developed capacity of 1,000 gpm. The additional forcemain will also significantly increase the system reliability by providing a redundant pipe.

### Growth Area B

Growth Area B is generally between 207th Avenue and 225th Avenue. This area is not currently served by city sewer and water.

#### Existing Capacity

There are no existing City sewer and water improvements in this area.

### 2040 Capacity Needs

As shown on the table in Section 2.0, it is anticipated that this area will require 6 wells and 750,000 gallons of storage when fully developed. Lift Station 3 and 4 are proposed to service the north portion of Growth Area B. The estimated capacity required for Lift Stations 3 and 4 are 500 gpm and 600 gpm respectively. The remaining area could be serviced by extending the gravity sewer trunk that is currently just south of Viking Boulevard. Although it is technically feasible to extend the gravity line from Viking Boulevard, it may be more cost effective to construct Lift Station 5, either as a temporary or permanent facility, to provide Growth Area B with sewer service. Additional study will be required to determine the most cost-effective solution for providing this area with sewer service. The initial estimated design capacity for Lift Station 5, assuming it will also collect waste from Lift Stations 1-4, is 3,100 gpm.

## Growth Area C

Growth Area C is generally between the south City limit to ¼ mile north of Viking Boulevard. A portion of this area is currently serviced by sewer and water. The current service area is general south of Viking Boulevard and west of Trunk Highway 65. This area has 2 existing wells, one 500,000-gallon elevated storage tank, and one water treatment plant. Waste water treatment is provided by the MCES Facility.

### Existing Capacity

The capacity of the two existing wells and the existing water treatment plant are 1,400 gpm and 1,000 gpm respectively. As previously discussed, there is also a 500,000-gallon elevated water storage tank. The current capacity of the MCES Facility is approximately 470,000 gallons per day.

### 2040 Capacity Needs

Other than extending trunk sewer and water facilities to expand the service area, Growth Area C does not have any immediate capacity needs. As shown on the table in Section 2.0 it is estimated that this area will require 3 new wells and 500,000 gallons of additional water storage when fully developed.

## Capital Improvement Costs

East Bethel has estimated the capital improvement costs for each growth area. Costs for three scenarios were reviewed. The three scenarios were as follows:

Scenario 1 – Street, trunk sewer and trunk water improvements and water treatment.

Scenario 2 – Trunk sewer and trunk water improvements without street improvements.

Scenario 3 – Trunk sewer and trunk water improvements without street improvements or water treatments.

The total cost for each scenario is summarized below:

| DESCRIPTION | GROWTH AREA A | GROWTH AREA B | GROWTH AREA C | TOTAL |
|---|---|---|---|---|
| Scenario 1 | $20,964,000 | $42,277,000 | $21,432,000 | $84,673,000 |
| Scenario 2 | $16,869,000 | $35,647,000 | $17,402,000 | $69,918,000 |
| Scenario 3 | $10,109,000 | $24,337,000 | $11,552,000 | $45,998,000 |

Detailed cost estimates are included in Attachment 5.

## SURFACE WATER MANAGEMENT

The City of East Bethel is located within the borders of the Upper Rum River and Sunrise River Watershed Management Organizations. The City of East Bethel last updated their Local Surface Water Management Plan (LSWMP) in April 2011. The Upper Rum River Watershed Management Organization (URRWMO) had their Watershed Management Plan approved by Board of Water and Soil Resources (BWSR) on April 25, 2007. The URRWMO is currently working on their 2017-2018 Water Management Plan. A draft of this plan is currently being reviewed by BWSR. The Sunrise River Watershed Management Organization (SRRWMO) had their Watershed Management Plan approved by BWSR in the Year 2010. The City of East Bethel has 2 years to update their Local Water Management Plan once the WMO plans are updated and approved by the BWSR. The URRWMO's and SRRWMO Watershed Management Plan's require member communities to adopt and implement the Plan's requirements.

### East Bethel Local Surface Water Management Plan

The East Bethel Local Water Management Plan (Plan) includes the elements required by the URRWMO, SRRWMO and the Metropolitan Council. Minnesota Statute 103B and the resulting Minnesota Rules Chapter 8410 guided the requirements of the Plan. The Plan includes procedures to protect, preserve, and use natural surface and groundwater storage and retention systems while minimizing public capital expenditures needed to correct flooding and water quality problems. The Plan identifies means to effectively protect and improve surface and groundwater quality in East Bethel. It also establishes more uniform local policies and official controls for surface and groundwater management. Procedures are included to prevent erosion of soils into surface water systems, promote groundwater recharge, protect and enhance fish and wildlife habitat and water related recreational facilities, and to secure other benefits associated with the proper management of surface and groundwater. A copy of the Current East Bethel Local Water Management Plan is included as Attachment 6.

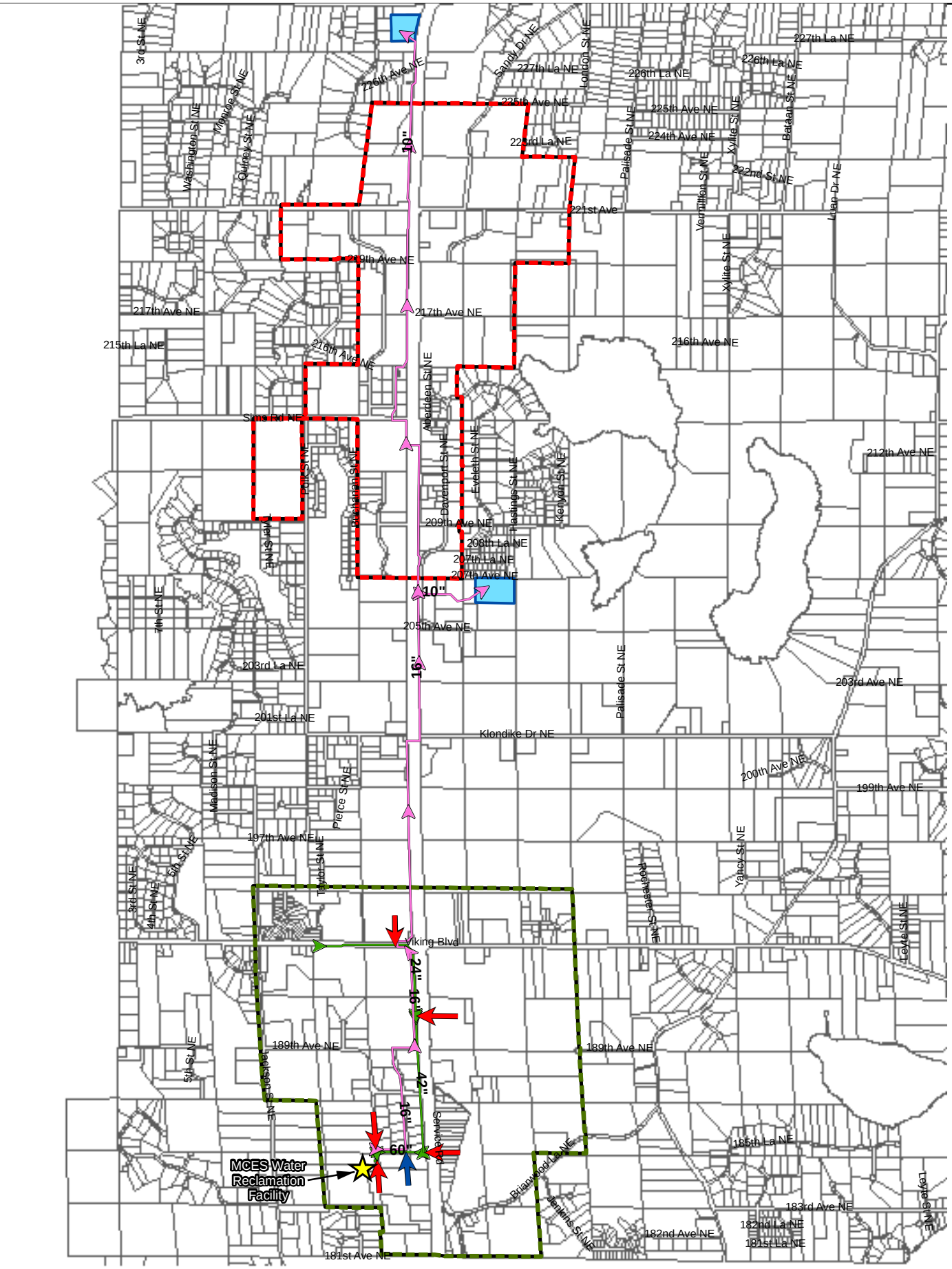
### Impaired Waters

East Bethel has three water bodies on the 303d Impaired Waters List. The water bodies include Coon Lake, Cedar Creek and Crooked Brook. Coon Lake is impaired for mercury, Cedar Creek for escherichia coli and Crooked Brook for dissolved oxygen. The TMDL study is complete for Coon lake and the target dates for completion of the TMDL for Cedar Creek and Crooked Brook are 2018 and 2027, respectively.

## Groundwater Protection

The City recognizes the importance of groundwater sensitivity and has established environmental protection policies that will enhance protection of groundwater in the City and the region. The City will ensure protection of local groundwater through implementation of its Local Water Management Plan, its ordinances regulating private on-site sewage treatment systems, its Water Supply Plan, its Wellhead Protection Plan, and its other applicable Ordinances.

# FIGURES




East Bethel
City of

**Figure 1**

**Existing MCES System**

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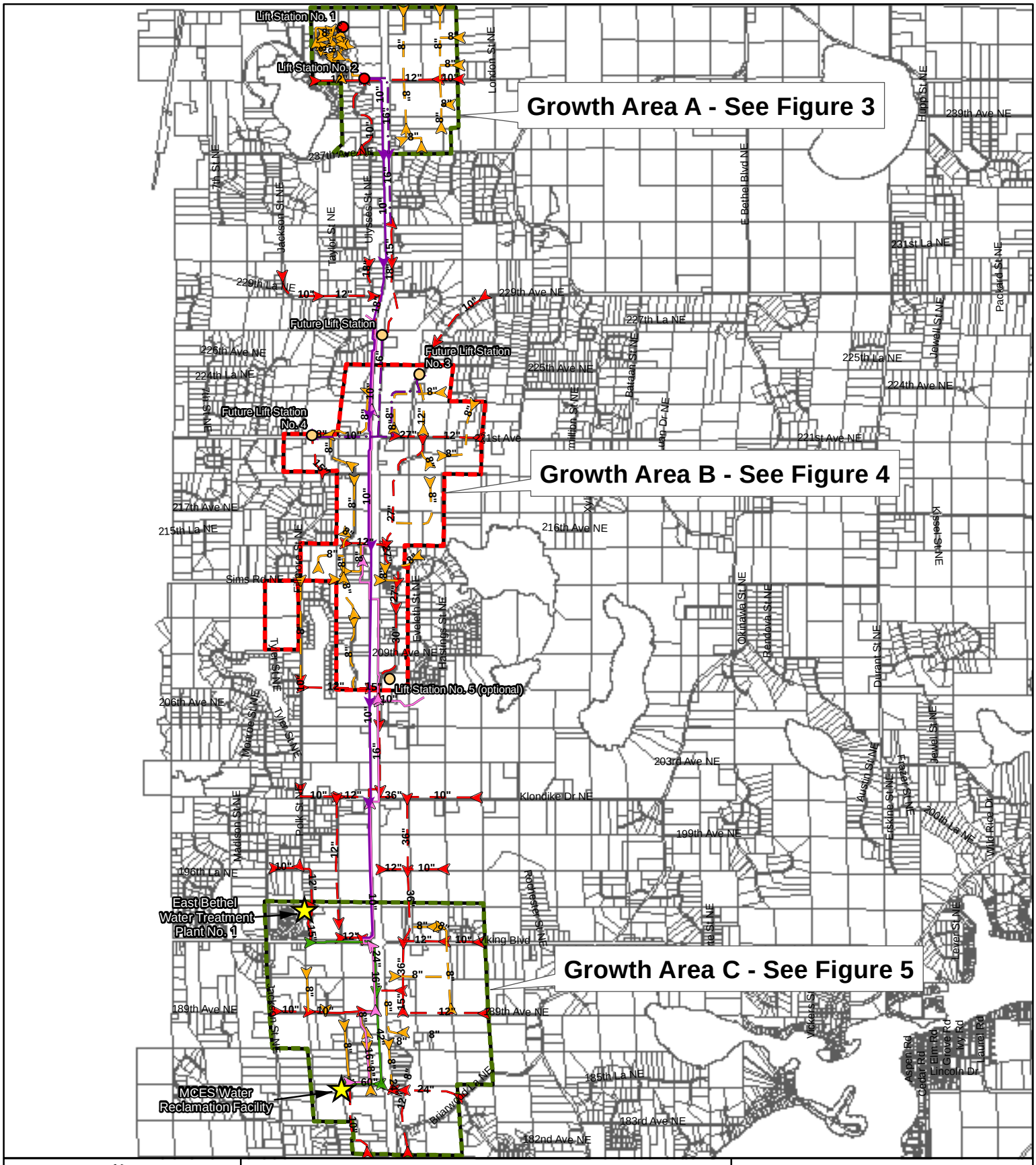


**Figure 2**
**2040 Comprehensive Sewer Plan**

East City of Bethel

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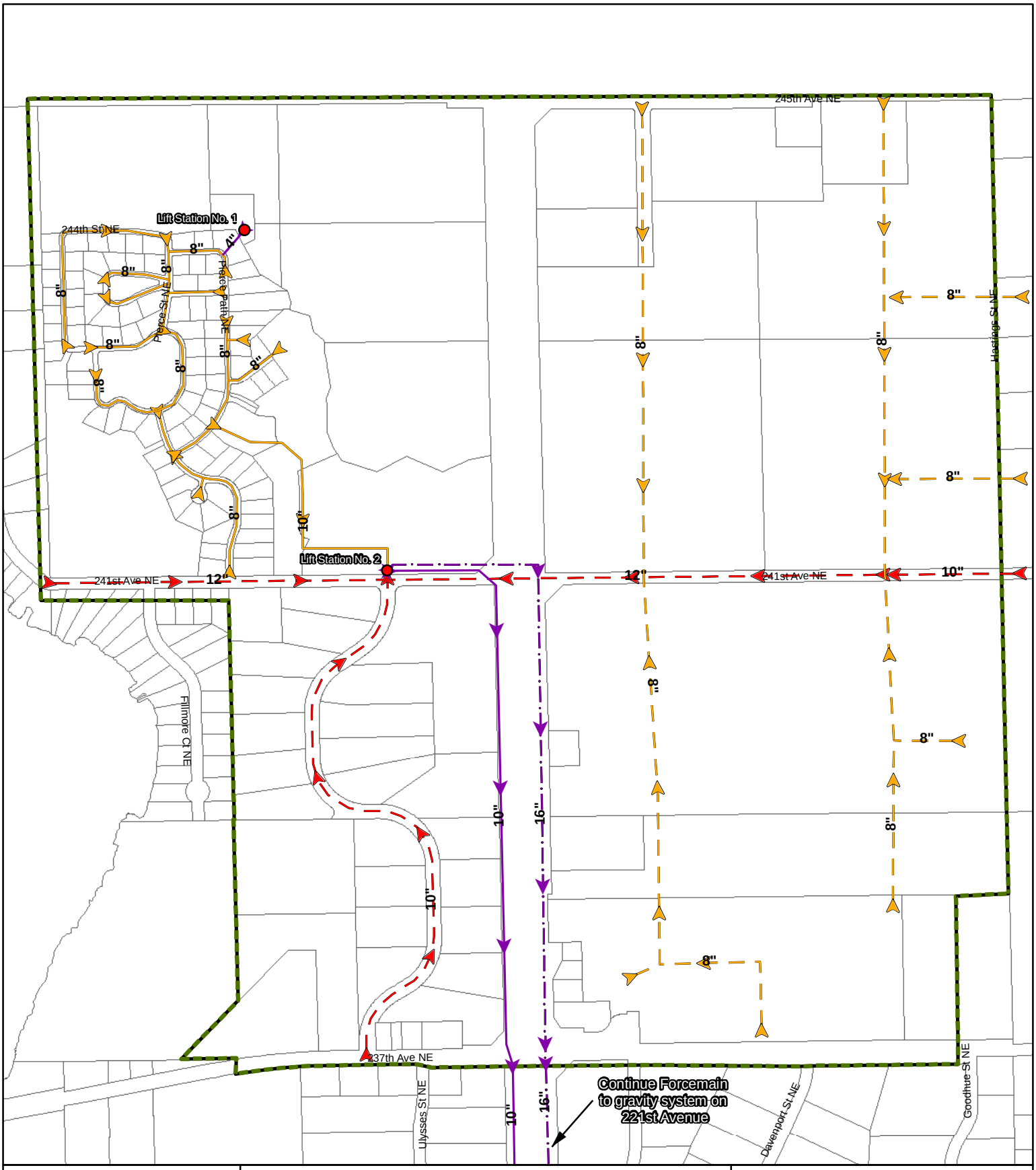


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Hakanson Anderson

**Legend**

- Existing City Sewer Trunk
- Proposed City Sewer Trunk
- Existing City Sewer Lateral
- Proposed City Sewer Lateral
- Existing City Sewer Forcemain
- Proposed City Sewer Forcemain
- MCES Reclaimed Water Forcemain
- MCES Sewer Trunk
- Existing Lift Station
- Future Lift Station
- 2030 MUSA
- 2040 MUSA

**Figure 3**
**2040 Comprehensive Sewer Plan**
**Growth Area - A**

East Bethel
City of

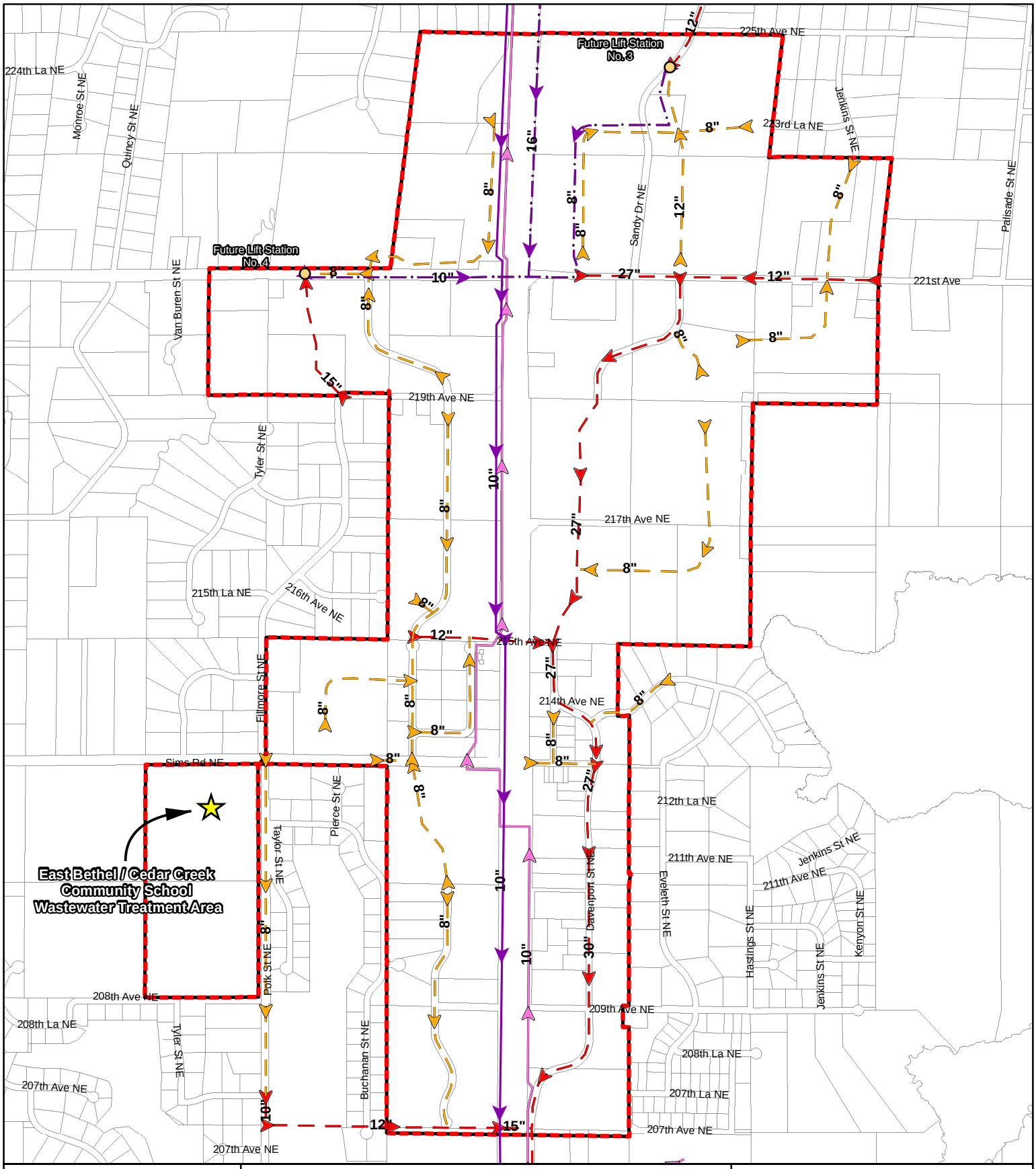
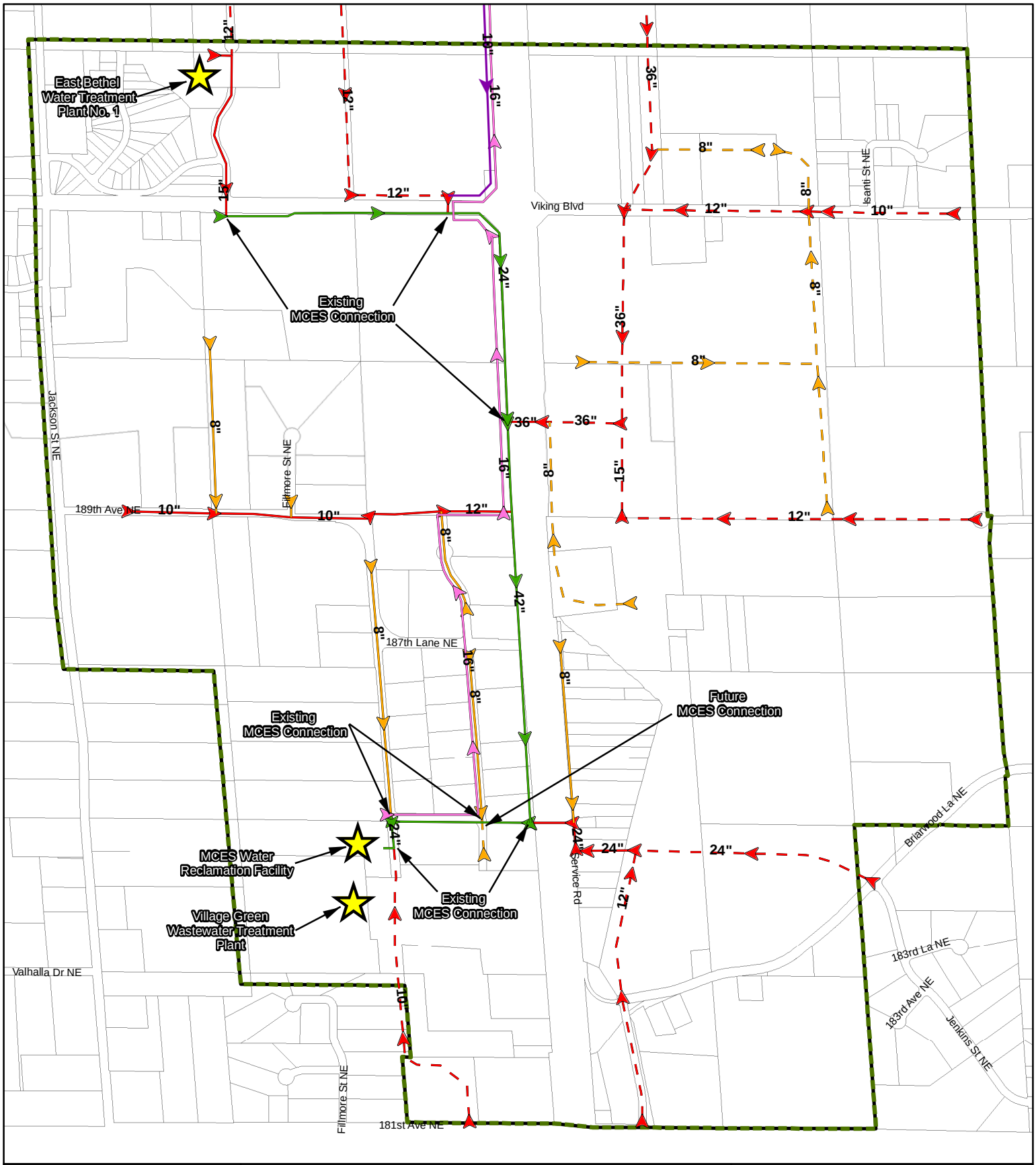



**Figure 4**
**2040 Comprehensive Sewer Plan**
**Growth Area - B**

East Bethel

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0 750 1,500

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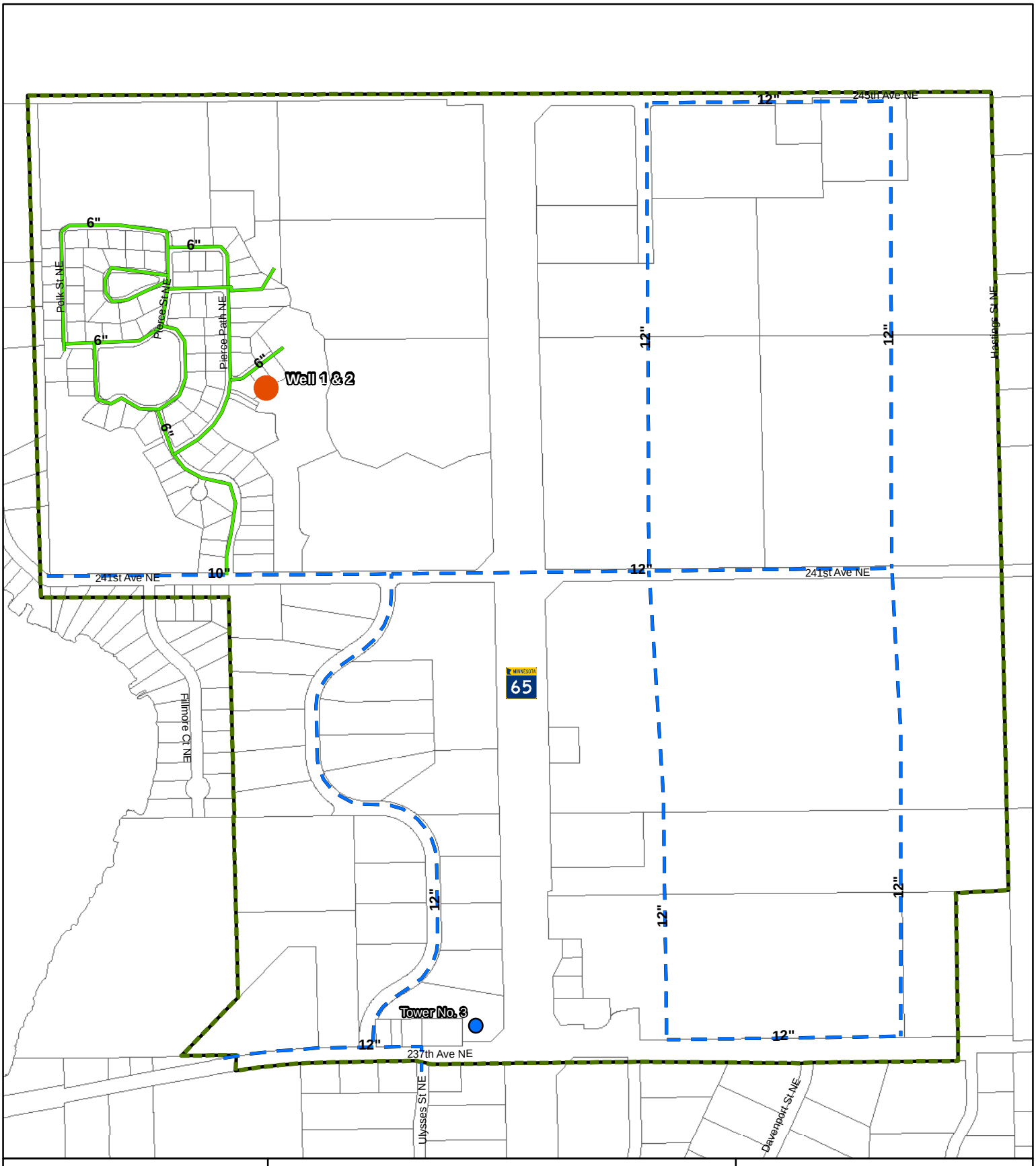
Hakanson Anderson

**Legend**

- Existing City Sewer Trunk
- Proposed City Sewer Trunk
- Existing City Sewer Lateral
- Proposed City Sewer Lateral
- Existing City Sewer Forcemain
- Proposed City Sewer Forcemain
- MCES Reclaimed Water Forcemain
- MCES Sewer Trunk
- Existing Lift Station
- Future Lift Station
- 2030 MUSA
- 2040 MUSA

**Figure 5**
**2040 Comprehensive Sewer Plan**
**Growth Area - C**

East Bethel

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## Legend

- Existing City Watermain Lateral
- Existing City Watermain Trunk
- Proposed City Watermain Trunk
- Proposed Water Tower
- Existing Water Tower
- Parcels
- 2030 MUSA
- 2040 MUSA
- Existing Well

**Figure 6**
**2040 Comprehensive Watermain Plan**
**Growth Area - A**

East Bethel City of

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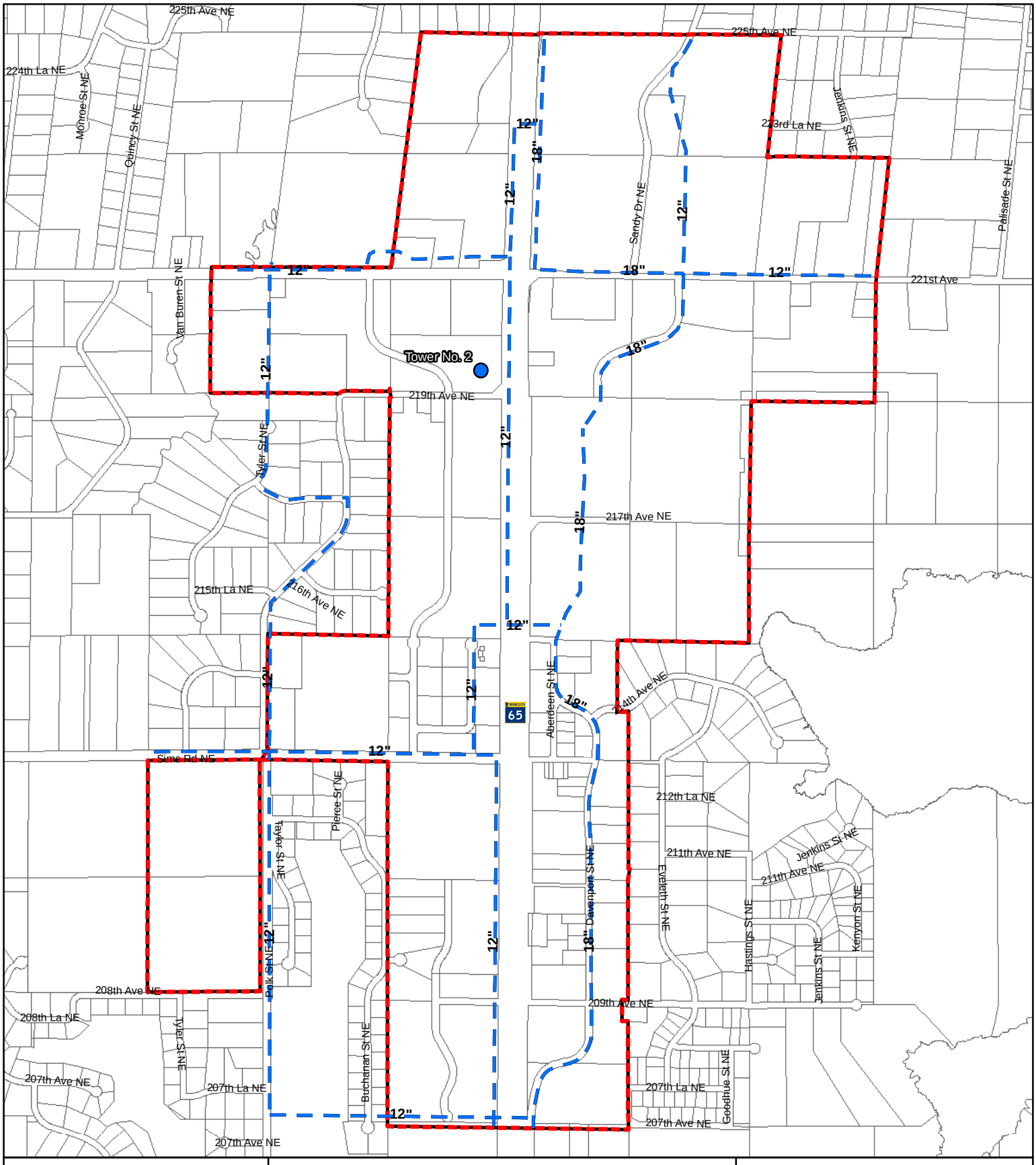


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0 800 1,600

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## Legend

- Existing City Watermain Lateral
- Existing City Watermain Trunk
- Proposed City Watermain Trunk
- Proposed Water Tower
- Existing Water Tower
- Parcels
- 2030 MUSA
- 2040 MUSA
- Existing Well

**Figure 7**
**2040 Comprehensive Watermain Plan**
**Growth Area - B**

East Bethel

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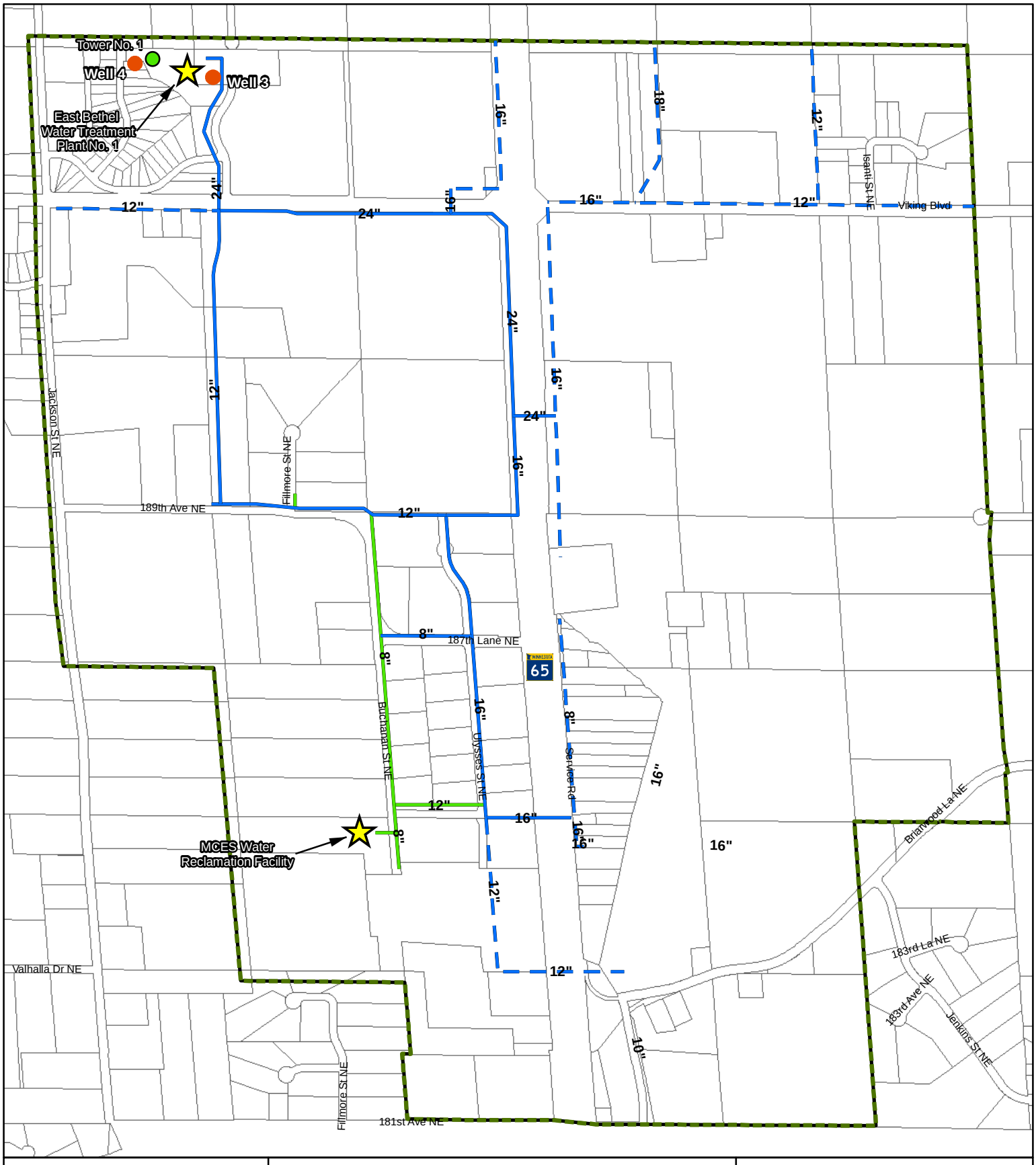


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Hakanson Anderson

## Legend

- Existing City Watermain Lateral
- Existing City Watermain Trunk
- Proposed City Watermain Trunk
- Proposed Water Tower
- Existing Water Tower
- Parcels
- 2030 MUSA
- 2040 MUSA
- Existing Well

**Figure 8**
**2040 Comprehensive Watermain Plan**
**Growth Area - C**

East Bethel City of

K:\cad_eng\PROJECTS\GIS\EB901\2018\2040 Comprehensive Plan\Figure 8.mxd

# ATTACHMENT 1

## Sanitary Sewer Maintenance Policy and ERU Calculations

# Sanitary Sewer Maintenance Policy

## 1. Purpose

It is the policy of the City of East Bethel to comply with all applicable state and federal regulatory requirements.

The City intends to provide effective and efficient maintenance to its sanitary sewer system by evaluating political, social, safety, and economic concerns, among others. Procedures identified in this policy are intended to maintain the sanitary sewer system to prevent sewer backups. These procedures, when implemented, may also extend the service life of various components of the sanitary sewer system.

The City has 7353 feet of public sanitary sewer mains, 49 manholes and 2 lift stations within the Castle Towers Waste Water Treatment service area. The City also has 6897 feet of public sanitary sewer mains, 24 manholes and 32,276 feet of force main within the Metropolitan Council Environmental Services Waste Water Treatment Plant service area.

Procedures identified in this policy are intended to maintain the City's sanitary sewer system to prevent sewer backups and to extend the life of the system. The City has developed and implemented this policy that takes into consideration public safety, the City's budget and personnel, environmental concerns, and the cost of implementation versus the benefit to be achieved. The City will use its employees, equipment and/or private contractors to provide this service.

While the City fully intends to meet the guidelines established in this policy, there may be times when this is not feasible. Issues including, but not limited to, budget constraints, critical equipment failure, or weather and other emergencies may prevent the City from meeting the guidelines established herein. The Public Works Manager may override provisions established within this policy. Deviations from the goals established in this policy will be documented.

The City will use this policy to guide any sanitary sewer maintenance activities to be provided by a contractor or a party other than the City.

## 2. Routine Maintenance and Inspection Goals

### A. Sanitary Sewer Mains

Scope of City's Responsibility - The City will maintain the components of the public sanitary sewer system. This includes sanitary sewer mains, manholes, lift stations, waste water treatment plants, and other components. Private property owners are responsible for the maintenance of sanitary sewer components from their property up to and including the connection to the public system.

Schedule – The City's goal is to inspect and maintain the components of its sanitary sewer system on a regular basis.

Equipment – The equipment used to perform maintenance will depend upon the equipment available and its effectiveness as determined by qualified staff.

Television Inspection – The City's sanitary sewer mains will be inspected routinely by television. Sanitary sewer mains in a new development must be televised before said mains are turned over to the City. Television inspection may also be used to inspect the system where there are possible problems. In addition, the City may require any main near a construction site to be televised before and after the construction (i.e., near blasting, digging, street maintenance or reconstruction, other activities that might disrupt the main, etc.)

Visual recordings of sewer main televising will be required of any vendor performing this service for the City. A written report summarizing and interpreting the findings of the televising will also be required. These records will be kept by the City for a minimum of 12 years.

### B. Sanitary Sewer Lift Stations

The City maintains lift stations using specific maintenance that is reasonable and recommended. The number of lift stations, location, date of installation, and capacity of each lift station is kept on record. Maintenance for each lift station is reflected in Standard Operating Procedures (SOP) and Standard Maintenance Procedures (SMP).

Components of SOP and SMP include:

- Easy availability of original manuals with manufacturers' recommended maintenance schedules for all lift station equipment
- Operating procedures for manipulating pump operations (manually or automatically) during wet weather to increase in-line storage of wet weather flows
- Setting wet well operating levels to limit pump start/stops
- Cleaning wet well
- Calibrating flow meters or conducting draw down tests
- Regular rotation of lead, lag, and backup pumps
- Regular inspections of lift station, alarm systems and electrical components
- Maintenance of operation logs and general records for all lift station activities, including inspections
- Clean force mains
- Identify problem areas/components

## 3. Inflow and Infiltration

Inflow and infiltration occur when clear water gets into the sanitary sewer system. This may occur through cracks or leaks in the sewer pipes and manholes or through sump pumps incorrectly connected to the sanitary sewer system. Inflow and infiltration can lead to backups, overflows and unnecessary and expensive treatment of clear water.

City employees will periodically inspect manholes to identify any that contribute to this problem. Sanitary sewer mains will be maintained and inspected pursuant to the City's Sanitary Sewer Maintenance Policy.

## 4. Personnel Responsibilities and Requirements

### A. Exercise of Professional Judgment

It is expected that City employees, in accordance with their job duties and responsibilities, will exercise their professional judgment in the implementation of this policy. Further, it is expected that in emergency situations (see Emergency Response Policy) City employees will be required to exercise their discretion and weigh political, social, and economic considerations including but not limited to public and employee safety, the potential for damage to private property and the City sanitary sewer system, and environmental concerns.

### B. Training and Education

The City will provide training to employees responsible for maintenance of and emergency response to issues with the sanitary sewer system. Training of employees will include education necessary to earn and maintain appropriate operator certifications. Training will also address standard operating procedures, proper use of equipment, emergency response and other topics required by state and federal regulatory agencies.

### C. Work Schedule

Full-time City employees in the Public Works Department will be expected to work eight-hour shifts. In emergencies, employees may be required to work in excess of eight hours. Budget and safety concerns may limit the length of time an employee is permitted to work.

### D. Weather Conditions

Regular sewer maintenance operations will be conducted only when weather conditions do not endanger the City employees and equipment. Factors that may delay sewer maintenance operations include, but are not limited to: severe cold, severe heat, flooding, rain, snow and other severe weather events.

# 5. Documentation

The City will document all of its inspection and maintenance activities and emergency responses for its sanitary sewer system. The City will also document circumstances that limit its ability to comply with this policy. A report should be prepared periodically for the purpose of evaluating maintenance activities and for determining goals for the future. These records will be kept in accordance with the City's records retention schedule.

# 6. Public Education

Periodically, the City will inform residents of their responsibilities related to sanitary sewer service from the City of East Bethel.

# 7. Other Sanitary Sewer System Policies

The City has a number of other policies and/or ordinances that are important to the ongoing operation of the City's sanitary sewer system. The following documents are available on the City's web site and in the public works department.

- Sanitary Sewer Emergency Response Policy
- Sanitary Sewer Ordinance

## Area A

| Land Use Category | Net Area (Acres) | ERU's per Acre | Total ERU'S |
|---|---|---|---|
| Low Density Residental | 128 | 3 | 382.8 |
| Medium Density Residental | 92 | 7.5 | 686.475 |
| Light Industrial | 153 | 1 | 153.25 |
| Medium Industrial | 149 | 2 | 298.62 |
| Commercial | 0 | 4 | 0 |
| Mixed Use | 22 | 5 | 110 |
| Public | 0 | 3 | 0 |
| Park/ Natural Area | 2 | 0 | 0 |
| | | **Subtotal** | **1,631** |

## Area B

| Land Use Category | Net Area (Acres) | ERU's per Acre | |
|---|---|---|---|
| Low Density Residental | 40 | 3 | 121.2 |
| Medium Density Residental | 28 | 7.5 | 208.35 |
| Light Industrial | 94 | 1 | 94.23 |
| Medium Industrial | 0 | 2 | 0 |
| Commercial | 274 | 4 | 1095.08 |
| Mixed Use | 368 | 5 | 1840 |
| Public | 78 | 3 | 233.76 |
| Park/ Natural Area | 0 | 0 | 0 |
| | | **Subtotal** | **3,593** |

## Area C

| Land Use Category | Net Area (Acres) | ERU's per Acre | |
|---|---|---|---|
| Low Density Residental | 89 | 3 | 265.8 |
| Medium Density Residental | 155 | 7.5 | 1162.125 |
| Light Industrial | 95 | 1 | 95.43 |
| Medium Industrial | 0 | 2 | 0 |
| Commercial | 110 | 4 | 438 |
| Mixed Use | 469 | 5 | 2345 |
| Public | 34 | 3 | 101.94 |
| Park/ Natural Area | 0 | 0 | 0 |
| | | **Subtotal** | **4,408** |

| | |
|---|---|
| **Total ERU'S** | **9,632** |

# ATTACHMENT 2

## City's Code Regulating Individual On-Site Sewage Treatment Systems

# ARTICLE II. - SEWAGE TREATMENT[1]

Footnotes:

--- (**1**) ---

**Editor's note—** Ord. No. 50, Second Series, adopted Nov. 5, 2014, amended Art. II in its entirety to read as herein set out. Former Art. II, §§ 74-19—74-42, pertained to similar subject matter, and derived from Ord. No. 61F, §§ 1—10, adopted Feb. 16, 2005; Ord. No. 61G, §§ 1—11, adopted Oct. 18, 2006.

## Sec. 74-19. - Purpose and intent.

The purpose of the sewage and wastewater treatment and disposal standards shall be to provide minimum standards for and regulation of Subsurface Sewage Treatment Systems (SSTS) and septage disposal, including the proper location, design, construction, operation, maintenance and repair to protect surface water and groundwater from contamination by human sewage and waterborne household and commercial waste; to protect the public's health and safety, and eliminate or prevent the development of public nuisances pursuant to the authority granted under Minnesota Statutes §§ 145A.05, 115.55 and Minnesota Rules chapter 7080 through 7083 as amended, that may pertain to sewage and wastewater treatment in the city.

(Ord. No. 50, Second Series, 11-5-2014)

## Sec. 74-20. - Applicability.

This article shall apply to those sites, properties or facilities which are licensed, permitted, or otherwise regulated by city ordinance, and/or located within the city.

(Ord. No. 50, Second Series, 11-5-2014)

## Sec. 74-21. - Authority.

The ordinance from which this article is derived is adopted pursuant to the authorization contained in Minn. Stats. §§ 145A.05, 115.55, and Minnesota Administrative Rules Chapter 7082.

(Ord. No. 50, Second Series, 11-5-2014)

## Sec. 74-22. - Administration.

This article shall be administered by the city building department. The term "department" where used in this article, means the city building department.

(Ord. No. 50, Second Series, 11-5-2014)

## Sec. 74-23. - Minnesota rules adopted.

Minnesota Administrative Rules Chapters 7080 through 7083, along with any future amendments relating to subsurface sewage treatment systems, are hereby adopted by reference and made a part of this article as if fully set forth herein.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-24. - System abandonment.

Septic tanks that are no longer intended to be used must be abandoned. Septic tanks must be pumped and removed, crushed, or filled in with sand. A septic system, or component thereof, that is no longer intended to be used must also be abandoned in accordance with Minnesota [Administrative] Rules Chapter 7080.2500. The contractor must also fill out a Minnesota SSTS abandonment reporting form and submit a copy to the city.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-25. - Enforcement.

(a) Violation of any condition imposed by the city on a license, permit or variance, or any false statement shall be guilty of a misdemeanor, punishable as provided in section 1-14.

(b) Work conducted without a permit or inspections shall be deemed an Imminent Public Health and Safety Threat and shall be discontinued within 24 hours. Any person performing SSTS work, or installed an SSTS without the required permit shall be guilty of a misdemeanor, punishable as provided in section 1-14.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-26. - Permits.

(a) No person shall install, alter, or extend any sewage treatment system in the city without first applying for and obtaining a permit from the building department and, at the same time, paying a fee as listed in the fee schedule determined by resolution by the city council. When all the requirements are met a permit will be issued. Such permit shall be valid for a period of 12 months from the date of issuance.

(b) Work on a septic system shall only be performed by a Minnesota certified SSTS person with the appropriate business license. Any person performing work on a septic system without the required licenses or in violation of this article is guilty of a misdemeanor, punishable as provided in section 1-14.

(c) Permit fee shall be doubled for any work conducted without first obtaining a permit.

(d) A full septic design meeting the requirements of Minnesota [Administrative Rules] Chapter 7080 or Chapter 7081 must be submitted before a building permit for new construction is approved. The septic design and house plans must indicate the same number of bedrooms. In the event there is a discrepancy in the number of bedrooms, the building permit will not be issued until the discrepancy is resolved to the satisfaction of the building department.

(e) Permit applications for new and replacement SSTS shall include a management plan for the owner that includes a schedule for septic tank maintenance.

(f) When weather does not allow a full site evaluation to be completed, a design of the worst case scenario shall be submitted. Worst case scenario shall be a mound system, septic tanks and lift station. When weather permits, a full site evaluation and a new design may be submitted to the building department for review.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-27. - Operating permit.

An operating permit shall be required of all owners of new holding tanks, type IV and V systems; MSTS and other SSTS that the department has determined requires operational oversight. Application for an operating permit shall be made on a form provided by the department or by the state. The owner of holding tanks installed after the effective date of this article shall provide the department with a copy of a contract with a licensed sewage maintenance business for monitoring and removal of holding tank contents.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-28. - Treatment required.

All sewage generated, in unsewered areas shall be treated and dispersed by an approved SSTS or a system permitted by the Minnesota Pollution Control Agency.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-29. - Soil treatment area.

For lots platted after April 1, 1996, a design shall locate space for two soil treatment areas. All lots platted after January 1, 1998, shall have a tested soil treatment area suitable for two type I systems (standard systems) as defined by Minnesota [Administrative] Rules Chapter 7080 and 7081. The area must be large enough to accommodate two systems. The area shall be at least 5,000 square feet for each system unless approved by the building official, and must be protected by fencing to keep construction traffic off.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-30. - Type I systems (standard systems).

(a) Type I systems shall take priority for new construction and on upgrades where those systems can be reasonably installed.

(b) Type I systems shall be defined as systems constructed in unaltered soils and are trenches, pressure beds, at-grades, or mound systems.

(c) Type I systems shall be designed according to Minnesota [Administrative Rules Chapter] 7080.2200.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-31. - Type II systems.

(a) Floodplain areas MN [Minnesota Administrative Rules Chapter] 7080.2270.

(b) Privies MN [Minnesota Administrative Rules Chapter] 7080.2280.

(c) Holding tanks MN [Minnesota Administrative Rules Chapter] 7080.2290.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-32. - Type III systems.

As defined in Minnesota Chapter 7080.2300.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-33. - Type IV systems.

As defined in Minnesota [Administrative Rules] Chapter 7080.2350. Type IV systems shall be designed by a Minnesota SSTS certified intermediate designer (less than 2,500 gpd) or advanced designer.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-34. - Type V systems.

As defined in Minnesota [Administrative Rules] Chapter 7080.2400. Type V systems shall be designed by a Minnesota SSTS certified advanced designer with a licensed professional engineer.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-35. - Inspections.

The permittee shall notify the city prior to the completion and covering of the subsurface sewage treatment system (SSTS). The installation and construction of the SSTS shall be in accordance with the permit requirements and the approved design. Inspections will be made during the construction of the SSTS to assure that the system has been constructed per approved design.

(1) A test pit is required to verify the depth of redoximorphic features prior to the installation of the drainfield. The pit shall be provided by the contractor. The test pit must be wide enough to allow a safe environment for the inspector. The pit shall also be in a location approved by the inspector.

(2) The inspector shall verify soil separation between the bottom of the drainfield and any restrictive layer, water table or redoximorphic features.

(3) No part of the system shall be covered until it has been inspected and approved by the inspector, unless prior arrangements have been made.

(4) Proposals to alter the permitted construction will require an amended design be submitted to the building department for review.

(5) It shall be the responsibility of the property owner or authorized agent to schedule an inspection on the workday preceding the day inspection is desired.

(6) The installer shall complete a signed as-built drawing indicating the location and setbacks of all tanks and soil treatment area. The location of the manhole covers on the septic tanks must be noted by measuring from two points of the structure to the center of the cover. As-built must be submitted to the city inspector at the time of inspection.

(7) If proper notice is given and the inspector does not appear for an inspection within two hours after the time is set, the installer may complete the installation. The installer shall then file a signed as-built, including photographs of the system prior to covering, with the city within five working days. The as-built shall include a certified statement that the work was installed in accordance with the approved design and permit conditions, and that it was free from defects.

(8) Upon satisfactory completion and final inspection of the system, the inspector shall issue a certificate of compliance. If upon inspection the inspector discovers that any part of the system is not constructed in accordance with the minimum standards provided in this article, the inspector shall give the applicant written notification describing the defects. The applicant shall

be responsible for the correction or elimination of all defects, and no system shall be placed or replaced in service until all defects have been corrected or eliminated.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-36. - Compliance.

No person shall cause or permit the location, construction, alteration, extension, conversion, operation, or maintenance of a subsurface sewage treatment system, except in full compliance with the provisions of this article.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-37. - Prohibited systems.

Graveless pipe, drip systems and warrantee systems are prohibited within the city.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-38. - Conflict resolution.

Subsurface sewage treatment systems regulated under this article, conflicts and other technical disputes over new construction, replacement, and existing systems will be reviewed by the building official. Soils conflicts will be resolved following [Minnesota Administrative Rules Chapter] 7082.0700 Subp. 5.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-39. - Operation guarantee.

Neither the issuance of a permit nor the inspection of a system shall constitute any warranty or guarantee of operation of the system.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-40. - Minimum qualification.

Site evaluation, system design, installation, construction, alteration, extension, repair, inspection, and system pumping and servicing shall be performed by Minnesota Pollution Control Agency licensed SSTS businesses or qualified employees of this city. Any work performed on a septic system without the required licenses or permits is in violation of this article and is guilty of a misdemeanor, punishable as provided in section 1-14.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-41. - Site evaluation and design requirements.

The following are site evaluation and design requirements for septic systems:

(1) Minnesota SSTS Rules must be followed.

(2) At least one additional bedroom shall be added in the design of a septic system with an unfinished basement.

(3) Minimum of three soil borings are to be conducted within the primary treatment area, and one soil borings in the secondary treatment area.

(4) Minimum of one percolation test is to be conducted within the primary treatment area. The percolation test shall be conducted near the center of the drainfield location.

(5) The designer shall include the direction and percent of slope on site evaluation, along with elevation of the drainfield.

(6) For lots platted after April 1, 1996, a design shall locate space for a second soil treatment area.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-42. - Minimum septic tank capacity for dwellings, and pump tank sizes, and other tank requirements.

(a) Septic tank capacity for dwellings must be sized according to MPCA 7080.1930 Table V.

(b) 4 or more bedrooms also require two compartments, or multiple tanks.

(c) Pressurized systems require a separate 1,000 gallon pump tank.

(d) The pump tank may be reduced in size by 50 percent if approved by the building official. Reduction in size will not be permitted due to financial reasons.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-43. - Sewer pipe.

The building sewer pipe extending from the house to the tank shall not be less than four inches in diameter and must meet the strength requirements of Schedule 40 plastic pipe, and no 90 degree ells shall be permitted. The pipe shall be supported or sleeved in such manner so that there is no deflection during backfilling or settling of the soil. Schedule 40 plastic pipe is also required from the septic tank to another tank or to the distribution medium.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-44. - Setback requirements.

Setback from buildings, property lines and wells shall be in accordance with the requirements of Minnesota [Administrative] Rules Chapter 7080.2150.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-45. - Setback reduction.

Setback from detached accessory buildings or garages with no basements, on the same property may be reduced by 50 percent if approved by the building official.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-46. - Variances.

(a) Variances for setback to a property line must be approved by the city council.

(b) Variances for holding tanks are required by the city council except for the replacement of an existing holding tank.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-47. - Septic tank maintenance.

(a) The owner of an individual sewage treatment system or the owner's agent shall regularly, but in no case less frequently than every three years measure or remove the accumulations of floating materials at the top of each septic tank, along with the sludge, which includes the solids denser than water. Whenever the top of the sludge layer is less than 12 inches below the bottom of the outlet baffle, or the bottom of the scum layer is less than three inches above the bottom of the bottom of the outlet baffle, the owner or the owner's agent shall have the tank pumped. Pumping of the tank must be completed by a MPCA certified pumper.

(b) Failure to have the septic tanks cleaned when the system is found to require cleaning shall be cause for the city to provide for the cleaning service, and provide the property owner with an advance notification of the date the system will be cleaned. The cost of this service shall be assessed to the property owner.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-48. - Compliance inspection.

An SSTS compliance inspection is required:

(1) For a new or replacement SSTS.

(2) Before the sale or property transfer within the city.

(3) When adding a bedroom.

(4) When a parcel having an existing system undergoes development, subdivision, or split.

(5) In shoreland management areas: When a building permit is required for building, remodeling, alterations, additions or a variance is received in a shoreland management area (any part of the property within the shoreland management area) between December 1st and May 1st the city may issue a permit or variance immediately with the requirement that a compliance inspection be completed by June 1st and the applicant submits a certificate of compliance within 15 days. If a system is deemed noncompliant and is not an imminent public health threat, a property owner has ten months to bring the system into compliance. If the owner fails to get a compliance inspection on the septic system or to bring the system into compliance after the required ten months after receiving notice of a failing system, the owner is in violation of city ordinance and is guilty of a misdemeanor and must bring the septic system into compliance. If the owner does not bring the septic system into compliance within the time required by code, a stop work order will be posted and no work or inspections for the building will be permitted until the septic system is brought into compliance.

(6) If an existing system (constructed prior to April 1, 1996) is not an immediate public health threat, the tank is watertight and provides at least two feet of soil separation, the system does not need to be upgraded, repaired or replaced or its use discontinued, as long as the system is not located in the shoreland area, wellhead protection areas (200 feet from any public water supply well, that is any well serving 25 persons or more for 60 days of the year) or serving as a food, beverage, or lodging establishment. The three foot rule applies in those circumstances with the 15 percent reduction in separation permitted by this article.

(7) Certificates of compliance or notices of noncompliance shall be issued on the state pollution control agency's (MPCA) inspection form for existing septic systems. Copies shall be provided to the property owner and city within 15 days.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-49. - Allowable reduction for existing systems.

Compliance inspection; 15 percent vertical separation reduction. Minnesota Administrative Rules 7080.1500, subp. 4D is amended to allow 15 percent reduction of vertical separation (separation distance no less than 30.6 inches) may be determined to be compliant for existing systems to account for settling and variable interpretations. The 15 percent reduction is permitted on all septic system constructed after April 1, 1996.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-50. - Failing septic systems and septic systems which pose an imminent public health threat.

(a) A failing SSTS that is failing to protect groundwater shall be upgraded, replaced or its use discontinued within ten months. The building department will give consideration to weather conditions as it applies to compliance dates. If the system is not upgraded or replaced within ten months and can't be installed due to weather conditions, then money shall be placed in escrow until a new system can be installed or repairs can be made. A septic design by a certified septic professional must be submitted to the building department for review, and a permit issued prior to any repair, except for restriction of discharge.

(b) Any SSTS which poses an imminent threat to public health and safety shall be brought into compliance with this article within a period of 90 days. Discharge from the tank must be restricted immediately and regular pumping of the tanks by a MPCA licensed septic professional must be done to prevent the discharge of effluent until the repairs are made. If the system is not upgraded or replaced within 90 days and can't be installed due to weather conditions, then money shall be placed in escrow until a new system can be installed or repairs can be made. A septic design by a certified septic professional must be submitted to the building department for review, and a permit issued prior to any repair, except for restriction of discharge.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-51. - Escrow for a new or replacement septic system.

From December 1st through May 1stescrow for a new or replacement septic system may be held at 125 percent of the cost of a new septic system. At least two septic system bids are required to determine the cost of a new or replacement system; the larger of the two bids must be used to determine the escrow amount.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-52. - Change in use or condition of the system has changed or been altered.

A certificate of compliance may be voided if, subsequent to the issuance of the certificate, the use of the premises or condition of the system has changed or been altered.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-53. - Holding tanks.

(a) Holding tanks shall not be used as a sanitary system for new residential construction or for improvements greater than 50 percent of the assessed value of the structure at the time of the application for the improvement. Subsequent improvements shall count towards the 50 percent value limit for improvement.

(b) Holding tanks shall only be used as a corrective action for sewage disposal for preexisting uses when a standard treatment system or other systems cannot be installed.

(c) Holding tanks must have a visual or audio alarm for the prevention of overflow.

(d) The homeowner of a holding tank shall provide the building department a copy of a contract with a licensed sewage maintenance business for monitoring and removal of the holding tank contents.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-54. - Floodplain.

An SSTS shall not be located in a floodway or floodplain. The location within the flood fringe is permitted, provided that the design complies with this article and all rules and statutes.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-55. - Class V injection wells.

All owners of new or replacement SSTS that are considered to be Class V injection wells, as defined in the Code of Federal Regulations, title 40, part 144, are required by the Federal Government to submit SSTS inventory information to the Environmental Protection Agency.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-56. - Septage disposal.

No person shall dispose the contents of any septic tank, privy, or cesspool in any manner within the city without a site evaluation conducted by a city inspector and written permission from the department.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-57. - Prohibit surface discharge.

Surface discharge of sewage from SSTS is prohibited. Unless issued a national pollution discharge elimination system permit by the MPCA.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-58. - Subject to change.

The requirements of this article are intended to be comparable to the environmental protection agency (EPA), Minnesota pollution control agency (MPCA), and the Minnesota department of health (MDH) standards. Should this article differ from other agency standards or should EPA, MPCA, or MDH standards change, the more strict standards shall apply. Any fee pertaining to this article may be changed by resolution of the city council.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-59. - Misdemeanor.

Any person who fails to comply with the provisions of this article may be charged with a misdemeanor and upon conviction thereof, shall be punished therefore as provided in section 1-14 of the City Code. A separate offense shall be deemed committed upon each day during or on which a violation occurs or continues.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-60. - Injunctive relief.

In the event of a violation or a threat of violation of this article, the department may institute appropriate actions or proceedings to include injunctive relief to prevent, restrain, correct, or abate such violations or threatened violations; and the city attorney may institute a civil action.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-61. - Civil action.

In the event of a violation of this article, the city may institute appropriate actions or proceedings to include injunctive relief to prevent, restrain, correct, or abate such violations, or threatened violations, and the city attorney may institute such action.

(Ord. No. 50, Second Series, 11-5-2014)

Sec. 74-62. - Effective date.

This article shall be effective immediately upon passage by the city council.

(Ord. No. 50, Second Series, 11-5-2014)

Secs. 74-63—74-66. - Reserved.

# ATTACHMENT 3

## List of known Non-Complaint ISTS Systems

# Non-Compliant ISTS

| CASE # | DATE OPENED | COMPLIANCE ISSUE | PIN NUMBER |
|---|---|---|---|
| ST2018-00006 | 1/18/2018 | SEPTIC | 103323230008 |
| ST2018-00005 | 1/18/2018 | SEPTIC | 253323130051 |
| ST2018-00004 | 1/18/2018 | SEPTIC | 253323120006 |
| ST2018-00003 | 1/18/2018 | SEPTIC | 243323420016 |
| ST2018-00002 | 1/18/2018 | SEPTIC | 363323120027 |
| ST2018-00001 | 1/18/2018 | SEPTIC | 303323240007 |
| ST2017-00004 | 6/8/2018 | SEPTIC | 363323240319 |
| ST2017-00001 | 3/6/2017 | SEPTIC | 343323410002 |
| ST2016-00029 | 11/15/2016 | SEPTIC | 363323230172 |
| ST2016-00025 | 9/8/2016 | SEPTIC | 363323240012 |
| ST2016-00006 | 3/10/2016 | SEPTIC | 363323240003 |
| ST2015-00026 | 9/30/2015 | SEPTIC | 343323410004 |
| ST2016-00023 | 9/3/2015 | SEPTIC | 363323210294 |
| ST2015-00012 | 4/8/2015 | SEPTIC | 363323120128 |
| SI2018-00002 | 1/18/2018 | SEPTIC | 333323410011 |
| SI2018-00001 | 1/18/2018 | SEPTIC | 333323340019 |
| SI2016-00007 | 7/28/2016 | SEPTIC | 293423410001 |

# ATTACHMENT 4

## Water Supply Plan

Complete Table 1 with information about the public water supply system covered by this WSP.

**Table 1. General information regarding this WSP**

| Requested Information | Description |
|---|---|
| DNR Water Appropriation Permit Number(s) | **1014-1049** |
| Ownership | ☒ Public or ☐ Private |
| Metropolitan Council Area | ☒ Yes or ☐ No (and county name) |
| Street Address | **2241 221st Ave NE** |
| City, State, Zip | **East Bethel, MN 55011** |
| Contact Person Name | Nate Ayshford |
| Title | Public Works Manager |
| Phone Number | 763-367-7876 |
| MDH Supplier Classification | Municipal |

# PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and availability. Information summarized in Part 1 can be used to develop Emergency Preparedness Procedures (Part 2) and the Water Conservation Plan (Part 3). This data is also needed to track progress for water efficiency measures.

## A. Analysis of Water Demand

Complete Table 2 showing the past 10 years of water demand data.

- Some of this information may be in your Wellhead Protection Plan.
- If you do not have this information, do your best, call your engineer for assistance or if necessary leave blank.

If your customer categories are different than the ones listed in Table 2, please describe the differences below:

**Table 2. Historic water demand (see definitions in the glossary after Part 4 of this template)**

| Year | Pop. Served | Total Connections | Residential Water Delivered (MG) | C/I/I Water Delivered (MG) | Water used for Non-essential | Wholesale Deliveries (MG) | Total Water Delivered (MG) | Total Water Pumped (MG) | Water Supplier Services | Percent Unmetered/ Unaccounted | Average Daily Demand (MGD) | Max. Daily Demand (MGD) | Date of Max. Demand | Residential Per Capita Demand (GPCD) | Total per capita Demand (GPCD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 44 | 15 | | | | | | | | | | | | | |
| 2006 | 79 | 27 | | | | | | | | | | | July | | |
| 2007 | 121 | 41 | 3,042,100 | | | | 3,042,100 | | | | 8,334 | 16,668 | July | 68 | 68 |
| 2008 | 123 | 42 | 2,403,200 | | | | 2,403,200 | 3,143,306 | | 24% | 6,584 | 13,168 | July | 54 | 54 |
| 2009 | 123 | 42 | 2,247,400 | | | | 2,247,400 | 3,509,369 | | 46% | 6,157 | 12,314 | July | 50 | 50 |
| 2010 | 123 | 42 | 2,038,820 | | | | 2,038,820 | 4,348,835 | | 53% | 5,586 | 11,172 | July | 45 | 45 |
| 2011 | 123 | 42 | 1,678,600 | | | | 1,678,600 | 3,071,619 | | 45% | 4,600 | 9,200 | July | 37 | 37 |
| 2012 | 123 | 42 | 1,766,000 | | | | 1,766,000 | 4,178,347 | | 68% | 4,838 | 9,676 | July | 39 | 39 |
| 2013 | 126 | 43 | 2,953,590 | 1,095,594 | | | 4,049,184 | 7,189,347 | | 44% | 11,094 | 22,188 | July | 88 | 88 |
| 2014 | 174 | 59 | 1,931,891 | 2,613,622 | | | 4,545,513 | 10,357,583 | | 65% | 12,453 | 24,906 | July | 71 | 71 |
| 2015 | 203 | 69 | 2,335,891 | 4,635,031 | | | 6,970,922 | 10,875,4351 | | 46% | 19,098 | 38,196 | July | 94 | 94 |
| Avg. 2010-2015 | 145 | 49 | | | | | 3,508,173 | 6,510,300 | | 58% | 9,611 | 19,222 | July | 62 | 62 |

**MG –** Million Gallons **MGD –** Million Gallons per Day **GPCD** – Gallons per Capita per Day

See Glossary for definitions

Complete Table 3 by listing the top 10 water users by volume, from largest to smallest. For each user, include information about the category of use (residential, commercial, industrial, institutional, or wholesale), the amount of water used in gallons per year, the percent of total water delivered, and the status of water conservation measures.

**Table 3. Large volume users**

| Customer | Use Category (Residential, Industrial, Commercial, Institutional, Wholesale) | Amount Used (Gallons per Year) | Percent of Total Annual Water Delivered | Implementing Water Conservation Measures? (Yes/No/Unknown) |
|---|---|---|---|---|
| 1 METROPOLITAN COUNCIL | INDUSTRIAL | 4,696,718 | 67% | UNKNOWN |
| 2 EAST BETHEL MOVIE THEATER | COMMERCIAL | 616,662 | 9% | YES |
| 3 RIVER COUNTRY COOPERATIVE | COMMERCIAL | 392,012 | 6% | YES |
| 4 DESIGNING EARTH CONTRACTING | COMMERCIAL | 152,962 | 2% | YES |
| 5 AGGRESSIVE HYDRAULICS | INDUSTRIAL | 116,969 | 1.6% | YES |
| 6 SHAW TRUCKING | COMMERCIAL | 65,420 | .9% | YES |
| 7 NUSS TRUCK AND EQUIPMENT | COMMERCIAL | 55,856 | .8% | YES |
| 8 NORTHBOUND WOODWORKS | COMMERCIAL | 52,961 | .7% | YES |
| 9 CLASSIC CONSTRUCTION | COMMERCIAL | 52,341 | .7% | YES |
| 10 JP INVESTMENTS | COMMERCIAL | 24,259 | .4% | YES |

## B. Treatment and Storage Capacity

Complete Table 4 with a description of where water is treated, the year treatment facilities were constructed, water treatment capacity, the treatment methods (i.e. chemical addition, reverse osmosis, coagulation, sedimentation, etc.) and treatment types used (i.e. fluoridation, softening, chlorination, Fe/MN removal, coagulation, etc.). Also describe the annual amount and method of disposal of treatment residuals. Add rows to the table as needed.

**Table 4. Water treatment capacity and treatment processes**

| Treatment Site ID (Plant Name or Well ID) | Year Constructed | Treatment Capacity (GPD) | Treatment Method | Treatment Type | Annual Amount of Residuals | Disposal Process for Residuals | Do You Reclaim Filter Backwash Water? |
|---|---|---|---|---|---|---|---|
| Treatment Plant 1 | 2012 | 1,200,000 | Pressure Filtration | Fe/Mn removal, chlorination, fluoridation | NA | Backwash to sediment pond | No |
| | | | | | | | |

| Treatment Site ID (Plant Name or Well ID) | Year Constructed | Treatment Capacity (GPD) | Treatment Method | Treatment Type | Annual Amount of Residuals | Disposal Process for Residuals | Do You Reclaim Filter Backwash Water? |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Total | NA | 1,200,000 | NA | NA | | NA | |

Complete Table 5 with information about storage structures. Describe the type (i.e. elevated, ground, etc.), the storage capacity of each type of structure, the year each structure was constructed, and the primary material for each structure. Add rows to the table as needed.

**Table 5. Storage capacity, as of the end of the last calendar year**

| Structure Name | Type of Storage Structure | Year Constructed | Primary Material | Storage Capacity (Gallons) |
|---|---|---|---|---|
| 1 | Elevated storage | 2012 | Steel | 500,000 |
| 2 | Ground storage | 1987 | Steel | 16,000 |
| 3 | Other - | | | |
| Total | NA | NA | NA | |

### Treatment and storage capacity versus demand

It is recommended that total storage equal or exceed the average daily demand.

Discuss the difference between current storage and treatment capacity versus the water supplier's projected average water demand over the next 10 years (see Table 7 for projected water demand):

Projected average demand in ten years is expected to be 0.13 MGD, which is significantly below the current storage and treatment capacity of the system.

## C. Water Sources

Complete Table 6 by listing all types of water sources that supply water to the system, including groundwater, surface water, interconnections with other water suppliers, or others. Provide the name of each source (aquifer name, river or lake name, name of interconnecting water supplier) and the Minnesota unique well number or intake ID, as appropriate. Report the year the source was installed or established and the current capacity. Provide information about the depth of all wells. Describe the status of the source (active, inactive, emergency only, retail/wholesale interconnection) and if the source facilities have a dedicated emergency power source. Add rows to the table as needed for each installation.

Include copies of well records and maintenance summary for each well that has occurred since your last approved plan in **Appendix 1.**

**Table 6. Water sources and status**

| Resource Type (Groundwater, Surface water, Interconnection) | Resource Name | MN Unique Well # or Intake ID | Year Installed | Capacity (Gallons per Minute) | Well Depth (Feet) | Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection)) | Does this Source have a Dedicated Emergency Power Source? (Yes or No) |
|---|---|---|---|---|---|---|---|
| Groundwater | Well 3 | 782113 | 2011 | 500 | 347 | Active | Yes |
| Groundwater | Well 4 | 782114 | 2011 | 500 | 345 | Active | Yes |
| Groundwater | Well 1 | 431637 | 1987 | 600 | 480 | Active | No |
| Groundwater | Well 2 | 773539 | 2010 | 600 | 286 | Active | No |
| | | | | | | | |

### Limits on Emergency Interconnections

Discuss any limitations on the use of the water sources (e.g. not to be operated simultaneously, limitations due to blending, aquifer recovery issues etc.) and the use of interconnections, including capacity limits or timing constraints (i.e. only 200 gallons per minute are available from the City of Prior Lake, and it is estimated to take 6 hours to establish the emergency connection). If there are no limitations, list none.

Well 1 exceeds allowable radium limits. Well 2 is blended with Well 1 to meet radium requirements.

## D. Future Demand Projections – *Key Metropolitan Council Benchmark*

### Water Use Trends

Use the data in Table 2 to describe trends in 1) population served; 2) total per capita water demand; 3) average daily demand; 4) maximum daily demand. Then explain the causes for upward or downward trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

The system serviced by Wells 3 and 4 has only been in service for 2 years. 14 commercial connections with expected residential and commercial growth to occur in a focused area along the TH 65 corridor near County Highway 22. The system serviced by Wells 1 and 2 has 50 residential homes in one development. The non-metered water use is associated with system flushing and operations to prevent freezing. Trend analysis is difficult with only a couple of years worth of data. Water demand increases during summer months for landscape irrigation. Many of the commercial customers were allowed to use their private well for landscape irrigation provided there were no cross connections which keeps demand on the municipal system down. Residential irrigation is limited by tiered water rates.

Use the water use trend information discussed above to complete Table 7 with projected annual demand for the next ten years. Communities in the seven-county Twin Cities metropolitan area must also include projections for 2030 and 2040 as part of their local comprehensive planning.

Projected demand should be consistent with trends evident in the historical data in Table 2, as discussed above. Projected demand should also reflect state demographer population projections and/or other planning projections.

**Table 7. Projected annual water demand**

| Year | Projected Total Population | Projected Population Served | Projected Total Per Capita Water Demand (GPCD) | Projected Average Daily Demand (MGD) | Projected Maximum Daily Demand (MGD) |
|---|---|---|---|---|---|
| 2016 | 11,761 | 220 | 75 | .02 | .04 |
| 2017 | 11,921 | 385 | 75 | .03 | .06 |
| 2018 | 12,081 | 549 | 75 | .04 | .08 |
| 2019 | 12,241 | 714 | 75 | .05 | .10 |
| 2020 | 12,400 | 879 | 75 | .07 | .14 |
| 2021 | 12,560 | 1044 | 75 | .08 | .16 |
| 2022 | 12,760 | 1208 | 75 | .09 | .18 |
| 2023 | 12,910 | 1373 | 75 | .10 | .20 |

| Year | Projected Total Population | Projected Population Served | Projected Total Per Capita Water Demand (GPCD) | Projected Average Daily Demand (MGD) | Projected Maximum Daily Demand (MGD) |
|---|---|---|---|---|---|
| 2024 | 13,070 | 1538 | 75 | .12 | .24 |
| 2025 | 13,230 | 1702 | 75 | .13 | .26 |
| 2030 | 15,400 | 4,161 | 75 | .32 | .64 |
| 2040 | 18,400 | 7,161 | 75 | .54 | 1.08 |

**GPCD** – Gallons per Capita per Day **MGD** – Million Gallons per Day

### Projection Method

Describe the method used to project water demand, including assumptions for population and business growth and how water conservation and efficiency programs affect projected water demand:

Projections are based on 580 ERU's by 2025. Population served is based on 2.94 residents per household (per ERU). Average day demand is based on the estimated population times the 75 gpcd. Maximum day demand is based on a peaking factor of 2.0. Projected demand is based on average demand plus estimated irrigation demand. Population estimates are based on the Met Council 2040 Plan.

## E. Resource Sustainability

### Monitoring – *Key DNR Benchmark*

Complete Table 8 by inserting information about source water quality and quantity monitoring efforts. List should include all production wells, observation wells, and source water intakes or reservoirs. Add rows to the table as needed. Find information on groundwater level monitoring program at: http://www.dnr.state.mn.us/waters/groundwater_section/obwell/index.html

**Table 8. Information about source water quality and quantity monitoring**

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| Well No. 3 - 782113 | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☒ continuous<br>☐ hourly<br>☐ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☐ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| Well No. 4 - 782114 | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☒ continuous<br>☐ hourly<br>☐ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☐ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| Monitoring Well No. 1 - 782121 | ☐ production well<br>☒ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☐ routine water utility sampling<br>☒ other | ☐ continuous<br>☒ hourly<br>☐ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☐ SCADA<br>☐ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| Monitoring Well No. 2 - 783647 | ☐ production well<br>☒ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☐ routine water utility sampling<br>☒ other | ☐ continuous<br>☒ hourly<br>☐ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☐ SCADA<br>☐ grab sampling<br>☐ steel tape<br>☐ stream gauge |

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| Monitoring Well No. 3 | ☐ production w<br>☒ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☐ routine water utility sampling<br>☒ other | ☐ continuous<br>☒ hourly<br>☐ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☐ SCADA<br>☐ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| Well No. 1 - 431637 | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☐ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| Well No. 2 - 773539 | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☐ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☐ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |

## Water Level Data

A water level monitoring plan that includes monitoring locations and a schedule for water level readings must be submitted as **Appendix 2**. If one does not already exist, it needs to be prepared and submitted with the WSP. Ideally, all production and observation wells are monitored at least monthly.

Complete Table 9 to summarize water level data for each well being monitored. Provide the name of the aquifer and a brief description of how much water levels vary over the season (the difference between the highest and lowest water levels measured during the year) and the long-term trends for each well. If water levels are not measured and recorded on a routine basis, then provide the static water level when each well was constructed and the most recent water level measured during the same season the well was constructed. Also include all water level data taken during any well and pump maintenance. Add rows to the table as needed.

Provide water level data graphs for each well in **Appendix 3** for the life of the well, or for as many years as water levels have been measured. See DNR website for Date Time Water Level
http://www.dnr.state.mn.us/groundwater/hydrographs.html

**Table 9. Water level data** See Appendix 3

| Unique Well Number or Well ID | Aquifer Name | Seasonal Variation (Feet) | Long-term Trend in water level data | Water level measured during well/pumping maintenance |
|---|---|---|---|---|
| Well No. 3 - 782113 | QBAA-Quaternary Buried Artesian Aquifer | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:____<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| Well No. 4 - 782114 | MTPL-Multiple | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:____<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| Monitoring Well No. 1 – 782121 | Wonewoc | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:____<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| Monitoring Well No. 2 – 783647 | MTPL – Multiple | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:____<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| Monitoring Well No. 3 | Shallow Groundwater | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:____<br>MM/DD/YY:____<br>MM/DD/YY:____ |

## Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark*

Complete Table 10 by listing the types of natural resources that are or could be impacted by permitted water withdrawals. If known, provide the name of specific resources that may be impacted. Identify what the greatest risks to the resource are and how the risks are being assessed. Identify any resource protection thresholds – formal or informal – that have been established to identify when actions should be taken to mitigate impacts. Provide information about the potential mitigation actions that may be taken, if a resource protection threshold is crossed. Add additional rows to the table as needed. See glossary at the end of the template for definitions.

Some of this baseline data should have been in your earlier water supply plans or county comprehensive water plans. When filling out this table, think of what are the water supply risks, identify the resources, determine the threshold and then determine what your community will do to mitigate the impacts.

Your DNR area hydrologist is available to assist with this table.

For communities in the seven-county Twin Cities metropolitan area, the *Master Water Supply Plan Appendix 1 (Water Supply Profiles*, provides information about potential water supply issues and natural resource impacts for your community.

**Table 10. Natural resource impacts**

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☒ River or stream | Cedar Creek | ☒ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☒ Monitoring<br>☐ Aquifer testing<br>☐ WRAPS or other watershed report<br>☒ Proximity (<1.5 miles)<br>☐ Other: _____ | ☒ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ No data available<br>☐ Other: _____ | ☒ Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☒ Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☐ Calcareous fen | None | ☒ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐ WRAPS or other watershed Report<br>☒ Proximity (<5 miles)<br>☐ Other: _____<br>☐ Other: ___ | ☒ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☒ Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☒ Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☐ Lake | None | ☒ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☒Proximity (<1.5 miles)<br>☐ Other: _____<br>☐ Other: ___ | ☒ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☒Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☒Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☒ Wetland | See Map in Appendix 2. | ☐ None anticipated<br>☒ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☒ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☐Proximity (<1.5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☒ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☒ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☒ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☐ Trout stream | None | ☒ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☒Proximity (< 5 miles)<br>☐ Other: _____ | ☒ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☒Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☒Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☒ Aquifer | • MTPL<br>• QBAA | ☐ None anticipated<br>☒ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☒ Monitoring<br>☐ Aquifer testing<br>☐Proximity (obwell < 5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☒ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☒ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☒ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

* Examples of thresholds: a lower limit on acceptable flow in a river or stream; water quality outside of an accepted range; a lower limit on acceptable aquifer level decline at one or more monitoring wells; withdrawals that exceed some percent of the total amount available from a source; or a lower limit on acceptable changes to a protected habitat.

### Wellhead Protection (WHP) and Surface Water Protection (SWP) Plans

Complete Table 11 to provide status information about WHP and SWP plans.

- The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.
- The City of East Bethel is working with the Minnesota Department of Health and MN Rural water to develop its Wellhead Protection Plan. Part 1 is complete and Part 2 should be complete in 2018.

**Table 11. Status of Wellhead Protection and Surface Water Protection Plans**

| Plan Type | Status | Date Adopted | Date for Update |
|---|---|---|---|
| WHP | ☒ In Process<br>☐ Completed<br>☐ Not Applicable | | |
| SWP | ☐ In Process<br>☐ Completed<br>☒ Not Applicable | | |

## F. Capital Improvement Plan (CIP)

Please note that any wells that received approval under a ten-year permit, but that were not built, are now expired and must submit a water appropriations permit.

### Adequacy of Water Supply System

Complete Table 12 with information about the adequacy of wells and/or intakes, storage facilities, treatment facilities, and distribution systems to sustain current and projected demands. List planned capital improvements for any system components, in chronological order. Communities in the seven-county Twin Cities metropolitan area should also include information about plans through 2040.

The assessment can be the general status by category; it is not necessary to identify every single well, storage facility, treatment facility, lift station, and mile of pipe.

Please attach your latest Capital Improvement Plan as **Appendix 4**.

**Table 12. Adequacy of Water Supply System**

| System Component | Planned action | Anticipated Construction Year | Notes |
|---|---|---|---|
| Wells/Intakes | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |
| Water Storage Facilities | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |

| System Component | Planned action | Anticipated Construction Year | Notes |
|---|---|---|---|
| Water Treatment Facilities | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |
| Distribution Systems (pipes, valves, etc.) | ☐ No action planned - adequate<br>☐ Repair/replacement<br>☒ Expansion/addition | 2017 | |
| Pressure Zones | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |
| Other: | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |

## Proposed Future Water Sources

**N/A**

Complete Table 13 to identify new water source installation planned over the next ten years. Add rows to the table as needed.

**Table 13. Proposed future installations/sources**

| Source | Installation Location (approximate) | Resource Name | Proposed Pumping Capacity (gpm) | Planned Installation Year | Planned Partnerships |
|---|---|---|---|---|---|
| Groundwater | Sec 8 T. 33 R. 23 | Mt Simon | 900 | 2030+ | |
| Surface Water | | | | | |
| Interconnection to another supplier | | | | | |

## Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? Yes ☐ No ☒

For metro communities, will you need alternative water sources by the year 2040? Yes ☐ No ☒

**If you answered yes for either question, then complete table 14. If no, insert NA.**

**N/A**

Complete Table 14 by checking the box next to alternative approaches that your community is considering, including approximate locations (if known), the estimated amount of future demand that could be met through the approach, the estimated timeframe to implement the approach, potential partnerships, and the major benefits and challenges of the approach. Add rows to the table as needed.

For communities in the seven-county Twin Cities metropolitan area, these alternatives should include approaches the community is considering to meet projected 2040 water demand.

**Table 14. Alternative water sources**

| Alternative Source Considered | Source and/or Installation Location (approximate) | Estimated Amount of Future Demand (%) | Timeframe to Implement (YYYY) | Potential Partners | Benefits | Challenges |
|---|---|---|---|---|---|---|
| ☐ Groundwater | | | | | | |
| ☐ Surface Water | | | | | | |
| ☐ Reclaimed stormwater | | | | | | |
| ☐ Reclaimed wastewater | | | | | | |
| ☐ Interconnection to another supplier | | | | | | |

# Part 2. Emergency Preparedness Procedures

The emergency preparedness procedures outlined in this plan are intended to comply with the contingency plan provisions required by MDH in the WHP and SWP. Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failings, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. Municipalities that already have written procedures dealing with water emergencies should review the following information and update existing procedures to address these water supply protection measures.

## A. Federal Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, (Public Law 107-188, Title IV- Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan.

**Do you have a federal emergency response plan?** Yes ☒ No ☐

**If yes, what was the date it was certified? June 2015**

Complete Table 15 by inserting the noted information regarding your completed Federal Emergency Response Plan.

**Table 15. Emergency Preparedness Plan contact information**

| Emergency Response Plan Role | Contact Person | Contact Phone Number | Contact Email |
|---|---|---|---|
| Emergency Response Lead | FIRE CHIEF DUCHARME | 763-367-7886 | MARK.DUCHARME@CI.EAST-BETHEL.MN.US |
| Alternate Emergency Response Lead | JACK DAVIS, CITY ADMINISTRATOR | 763-367-7850 | JACK.DAVIS@CI.EAST-BETHEL.MN.US |

## B. Operational Contingency Plan

All utilities should have a written operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance.

**Do you have a written operational contingency plan?** Yes ☐ No ☒

At a minimum, a water supplier should prepare and maintain an emergency contact list of contractors and suppliers.

## C. Emergency Response Procedures

Water suppliers must meet the requirements of MN Rules 4720.5280 . Accordingly, the Minnesota Department of Natural Resources (DNR) requires public water suppliers serving more than 1,000 people to submit Emergency and Conservation Plans. Water emergency and conservation plans that have been

approved by the DNR, under provisions of Minnesota Statute 186 and Minnesota Rules, part 6115.0770, will be considered equivalent to an approved WHP contingency plan.

### Emergency Telephone List

Prepare and attach a list of emergency contacts, including the MN Duty Officer (1-800-422-0798), as **Appendix 5**. A template is available at www.mndnr.gov/watersupplyplans

The list should include key utility and community personnel, contacts in adjacent water suppliers, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list and date it. Thereafter, update on a regular basis (once a year is recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the Emergency Manager for that community. Responsibilities and services for each contact should be defined.

### Current Water Sources and Service Area

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

**Do records and maps exist?** Yes ☒ No ☐

**Can staff access records and maps from a central secured location in the event of an emergency?**

Yes ☒ No ☐

**Does the appropriate staff know where the materials are located?**

Yes ☒ No ☐

### Procedure for Augmenting Water Supplies

Complete Tables 16 – 17 by listing all available sources of water that can be used to augment or replace existing sources in an emergency. Add rows to the tables as needed.

In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Municipalities are encouraged to execute cooperative agreements for potential emergency water services and copies should be included in **Appendix 6**. Outstate Communities may consider using nearby high capacity wells (industry, golf course) as emergency water sources.

WSP should include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MDH are required for interconnections or the reuse of water.

**Table 16. Interconnections with other water supply systems to supply water in an emergency**

| Other Water Supply System Owner | Capacity (GPM & MGD) | Note Any Limitations On Use | List of services, equipment, supplies available to respond |
|---|---|---|---|
| FIRE STATION #1 | 300 GPM | | |
| | | | |
| | | | |
| | | | |
| | | | |

**GPM – Gallons per minute MGD – million gallons per day**

**Table 17. Utilizing surface water as an alternative source**

| Surface Water Source Name | Capacity (GPM) | Capacity (MGD) | Treatment Needs | Note Any Limitations On Use |
|---|---|---|---|---|
| N/A | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

## Allocation and Demand Reduction Procedures

Complete Table 18 by adding information about how decisions will be made to allocate water and reduce demand during an emergency. Provide information for each customer category, including its priority ranking, average day demand, and demand reduction potential for each customer category. Modify the customer categories as needed, and add additional lines if necessary.

Water use categories should be prioritized in a way that is consistent with Minnesota Statutes 103G.261 (#1 is highest priority) as follows:

1. Water use for human needs such as cooking, cleaning, drinking, washing and waste disposal; use for on-farm livestock watering; and use for power production that meets contingency requirements.
2. Water use involving consumption of less than 10,000 gallons per day (usually from private wells or surface water intakes)

3. Water use for agricultural irrigation and processing of agricultural products involving consumption of more than 10,000 gallons per day (usually from private high-capacity wells or surface water intakes)
4. Water use for power production above the use provided for in the contingency plan.
5. All other water use involving consumption of more than 10,000 gallons per day.
6. Nonessential uses – car washes, golf courses, etc.

Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Lower priority uses will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. Water use for lawn sprinkling, vehicle washing, golf courses, and recreation are legislatively considered non-essential.

**Table 18. Water use priorities**

| Customer Category | Allocation Priority | Average Daily Demand (GDP) | Short-Term Emergency Demand Reduction Potential (GPD) |
|---|---|---|---|
| Residential | 1 | 800,100 | |
| Institutional | 4 | 25,400 | |
| Commercial | 2 | 254,000 | |
| Industrial | 3 | 190,500 | 190,500 |
| Irrigation | 5 | 515,000 | 515,000 |
| Wholesale | NA | | |
| Non-Essential | 6 | | |
| TOTAL | NA | 1,785,000 | 705,515 |

**GPD** – Gallons per Day

***Tip: Calculating Emergency Demand Reduction Potential***

The emergency demand reduction potential for all uses will typically equal the difference between maximum use (summer demand) and base use (winter demand). In extreme emergency situations, lower priority water uses must be restricted or eliminated to protect priority domestic water requirements. Emergency demand reduction potential should be based on average day demands for customer categories within each priority class. Use the tables in Part 3 on water conservation to help you determine strategies.

Complete Table 19 by selecting the triggers and actions during water supply disruption conditions.

**Table 19. Emergency demand reduction conditions, triggers and actions (Select all that may apply and describe)**

| Emergency Triggers | Short-term Actions | Long-term Actions |
|---|---|---|
| ☐ Contamination<br>☐ Loss of production<br>☐ Infrastructure failure<br>☒ Executive order by Governor<br>☐ Other: _____ | ☐ Supply augmentation through ____<br>☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Water allocation through____<br>☐ Meet with large water users to discuss their contingency plan. | ☐ Supply augmentation through ____<br>☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Water allocation through____<br>☐ Meet with large water users to discuss their contingency plan. |

## Notification Procedures

Complete Table 20 by selecting trigger for informing customers regarding conservation requests, water use restrictions, and suspensions; notification frequencies; and partners that may assist in the notification process. Add rows to the table as needed.

**Table 20. Plan to inform customers regarding conservation requests, water use restrictions, and suspensions**

| Notification Trigger(s) | Methods (select all that apply) | Update Frequency | Partners |
|---|---|---|---|
| ☒ Short-term demand reduction declared (< 1 year) | ☒ Website<br>☒ Email list serve<br>☐ Social media (e.g. Twitter, Facebook)<br>☒ Direct customer mailing,<br>☐ Press release (TV, radio, newspaper),<br>☐ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | ☐ Daily<br>☐ Weekly<br>☒ Monthly<br>☐ Annually | |
| ☒ Long-term Ongoing demand reduction declared | ☒ Website<br>☒ Email list serve<br>☐ Social media (e.g. Twitter, Facebook)<br>☒ Direct customer mailing,<br>☐ Press release (TV, radio, newspaper),<br>☐ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | ☐ Daily<br>☐ Weekly<br>☒ Monthly<br>☐ Annually | |
| ☒ Governor's critical water deficiency | ☒ Website<br>☒ Email list serve | ☒ Daily<br>☐ Weekly | |

| Notification Trigger(s) | Methods (select all that apply) | Update Frequency | Partners |
|---|---|---|---|
| declared | ☐ Social media (e.g. Twitter, Facebook)<br>☐ Direct customer mailing,<br>☒ Press release (TV, radio, newspaper),<br>☐ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | ☐ Monthly<br>☐ Annually | |

## Enforcement

Prior to a water emergency, municipal water suppliers must adopt regulations that restrict water use and outline the enforcement response plan. The enforcement response plan must outline how conditions will be monitored to know when enforcement actions are triggered, what enforcement tools will be used, who will be responsible for enforcement, and what timelines for corrective actions will be expected.

Affected operations, communications, and enforcement staff must then be trained to rapidly implement those provisions during emergency conditions.

***Important Note:***

Disregard of critical water deficiency orders, even though total appropriation remains less than permitted, is adequate grounds for immediate modification of a public water supply authority's water use permit (2013 MN Statutes 103G.291)

**Does the city have a critical water deficiency restriction/official control in place that includes provisions to restrict water use and enforce the restrictions? (This restriction may be an ordinance, rule, regulation, policy under a council directive, or other official control)** Yes ☒ No

If yes, attach the official control document to this WSP as **Appendix 7**.

If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

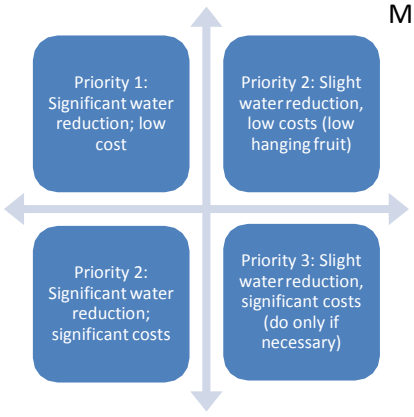
**Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions?** Yes ☒ No ☐

**If yes, cite the regulatory authority reference: Emergency Preparedness Plan_____.**

**If no, who has authority to implement water use restrictions in an emergency?**

| |
|---|
| |

# PART 3. WATER CONSERVATION PLAN




Minnesotans have historically benefited from the state's abundant water supplies, reducing the need for conservation. There are however, limits to the available supplies of water and increasing threats to the quality of our drinking water. Causes of water supply limitation may include: population increases, economic trends, uneven statewide availability of groundwater, climatic changes, and degraded water quality. Examples of threats to drinking water quality include: the presence of contaminant plumes from past land use activities, exceedances of water quality standards from natural and human sources, contaminants of emerging concern, and increasing pollutant trends from nonpoint sources.

There are many incentives for conserving water; conservation:

- reduces the potential for pumping-induced transfer of contaminants into the deeper aquifers, which can add treatment costs
- reduces the need for capital projects to expand system capacity
- reduces the likelihood of water use conflicts, like well interference, aquatic habitat loss, and declining lake levels
- conserves energy, because less energy is needed to extract, treat and distribute water (and less energy production also conserves water since water is use to produce energy)
- maintains water supplies that can then be available during times of drought

It is therefore imperative that water suppliers implement water conservation plans. The first step in water conservation is identifying opportunities for behavioral or engineering changes that could be made to reduce water use by conducting a thorough analysis of:

- Water use by customer
- Extraction, treatment, distribution and irrigation system efficiencies
- Industrial processing system efficiencies
- Regulatory and barriers to conservation
- Cultural barriers to conservation
- Water reuse opportunities

Once accurate data is compiled, water suppliers can set achievable goals for reducing water use. A successful water conservation plan follows a logical sequence of events. The plan should address both conservation on the supply side (leak detection and repairs, metering), as well as on the demand side (reductions in usage). Implementation should be conducted in phases, starting with the most obvious and lowest-cost options. In some cases one of the early steps will be reviewing regulatory constraints to water conservation, such as lawn irrigation requirements. Outside funding and grants may be available for implementation of projects. Engage water system operators and maintenance staff and customers in brainstorming opportunities to reduce water use. Ask the question: "How can I help save water?"

## Progress since 2006

**Is this your community's first Water Supply Plan?** Yes ☒ No ☐

If yes, describe conservation practices that you are already implementing, such as: pricing, system improvements, education, regulation, appliance retrofitting, enforcement, etc.

Brand new system with leak detection on all water meters. Public education achieved through the City Newsletter. As demand increases, regulation and pricing will be used to help conserve water. The residential development is new homes and therefore, already include water conservation fixtures such as low flow toilets.

If no, complete Table 21 to summarize conservation actions taken since the adoption of the 2006 water supply plan.

**Table 21. Implementation of previous ten-year Conservation Plan**

**N/A**

| 2006 Plan Commitments | Action Taken? |
|---|---|
| Change water rates structure to provide conservation pricing | ☐ Yes<br>☐ No |
| Water supply system improvements (e.g. leak repairs, valve replacements, etc.) | ☐ Yes<br>☐ No |
| Educational efforts | ☐ Yes<br>☐ No |
| New water conservation ordinances | ☐ Yes<br>☐ No |
| Rebate or retrofitting Program (e.g. for toilet, faucets, appliances, showerheads, dish washers, washing machines, irrigation systems, rain barrels, water softeners, etc. | ☐ Yes<br>☐ No |
| Enforcement | ☐ Yes<br>☐ No |
| Describe other | ☐ Yes<br>☐ No |

**What are the results you have seen from the actions in Table 21 and how were results measured?**

**N/A**

## A. Triggers for Allocation and Demand Reduction Actions

Complete table 22 by checking each trigger below, as appropriate, and the actions to be taken at various levels or stages of severity. Add in additional rows to the table as needed.

**Table 22. Short and long-term demand reduction conditions, triggers and actions**

| Objective | Triggers | Actions |
|---|---|---|
| Protect surface water flows | ☐ Low stream flow conditions<br>☒ Reports of declining wetland and lake levels<br>☐ Other: _____ | ☐ Increase promotion of conservation measures<br>☒ Other: To be determined. |
| Short-term demand reduction (less than 1 year | ☐ Extremely high seasonal water demand (more than double winter demand)<br>☐ Loss of treatment capacity<br>☒ Lack of water in storage<br>☐ State drought plan<br>☐ Well interference<br>☐ Other: _____ | ☒ Adopt (if not already) and enforce the critical water deficiency ordinance to restrict or prohibit lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Supply augmentation through ____<br>☐ Water allocation through____<br>☐ Meet with large water users to discuss user's contingency plan. |
| Long-term demand reduction (>1 year) | ☐ Per capita demand increasing<br>☐ Total demand increase (higher population or more industry)Water level in well(s) below elevation of _____<br>☐ Other: _____ | ☒ Develop a critical water deficiency ordinance that is or can be quickly adopted to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Enact a water waste ordinance that targets overwatering (causing water to flow off the landscape into streets, parking lots, or similar), watering impervious surfaces (streets, driveways or other hardscape areas), and negligence of known leaks, breaks, or malfunctions.<br>☒ Meet with large water users to discuss user's contingency plan.<br>☐ Enhanced monitoring and reporting: audits, meters, billing, etc. |
| Governor's "Critical Water Deficiency Order" declared | ☒ Describe | ☒ See Section E in Appendix 7 |

## B. Conservation Objectives and Strategies – *Key benchmark for DNR*

This section establishes water conservation objectives and strategies for eight major areas of water use.

### Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10%

The Minnesota Rural Waters Association, the Metropolitan Council and the Department of Natural Resources recommend that all water uses be metered. Metering can help identify high use locations and times, along with leaks within buildings that have multiple meters.

It is difficult to quantify specific unmetered water use such as that associated with firefighting and system flushing or system leaks. Typically, water suppliers subtract metered water use from total water pumped to calculate unaccounted or non-revenue water loss.

**Is your five-year average (2005-2014) unaccounted Water Use in Table 2 higher than 10%?**

Yes ☒ No ☐

What is your leak detection monitoring schedule? (e.g. monitor 1/3rd of the city lines per year)

| |
|---|
| New system with leak detection on water meters. Monitoring schedule not yet developed. |

***Water Audits*** - are intended to identify, quantify and verify water and revenue losses. The volume of unaccounted-for water should be evaluated each billing cycle. The American Water Works Association (AWWA) recommends that ten percent or less of pumped water is unaccounted-for water. Water audit procedures are available from the AWWA and MN Rural Water Association www.mrwa.com . Drinking Water Revolving Loan Funds are available for purchase of new meters when new plants are built.

**What is the date of your most recent water audit? N/A**

**Frequency of water audits:** ☐ **yearly** ☐ **other (specify frequency) _____**
**Leak detection and survey:** ☐ **every year** ☐ **every other year** ☒ **periodic as needed Year last leak detection survey completed: ___**

If Table 2 shows annual water losses over 10% or an increasing trend over time, describe what actions will be taken to reach the <10% loss objective and within what timeframe

| |
|---|
| The City of East Bethel Water system is less than 5 years old with all meters having leak detection capabilities. Because of a low customer base, frequent flushing of the hydrants is required to keep water circulating in the system. As our customer base increases, which is expected with new development being planned, the amount of unmetered water will continue to decrease. The City will look for other, nonpotable uses of the flushed water. |

***Metering*** -AWWA recommends that every water supplier install meters to account for all water taken into its system, along with all water distributed from its system at each customer's point of service. An effective metering program relies upon periodic performance testing, repair, maintenance or replacement of all meters. AWWA also recommends that water suppliers conduct regular water audits to ensure accountability. Some cities install separate meters for interior and exterior water use, but some research suggests that this may not result in water conservation.

Complete Table 23 by adding the requested information regarding the number, types, testing and maintenance of customer meters.

**Table 23. Information about customer meters**

| Customer Category | Number of Customers | Number of Metered Connections | Number of Automated Meter Readers | Meter testing intervals (years) | Average age/meter replacement schedule (years |
|---|---|---|---|---|---|
| Residential | 55 | 55 | 55 | | 2 / 20 |
| Irrigation meters | | | | | ___ / ___ |
| Institutional | | | | | ___ / ___ |
| Commercial | 14 | 14 | 14 | | 1 / 20 |
| Industrial | | | | | ___ / ___ |
| Public facilities | | | | | ___ / ___ |
| Other | | | | | ___ / ___ |

| Customer Category | Number of Customers | Number of Metered Connections | Number of Automated Meter Readers | Meter testing intervals (years) | Average age/meter replacement schedule (years |
|---|---|---|---|---|---|
| TOTALS | 69 | 69 | 69 | NA | NA |

For unmetered systems, describe any plans to install meters or replace current meters with advanced technology meters. Provide an estimate of the cost to implement the plan and the projected water savings from implementing the plan.

N/A

**Table 24. Water source meters**

| | Number of Meters | Meter testing schedule (years) | Number of Automated Meter Readers | Average age/meter replacement schedule (years |
|---|---|---|---|---|
| Water source (wells/intakes) | 2 | | 2 | 2/20 |
| Treatment plant | | | | ___ /___ |

## Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD)

The 2002 average residential per capita demand in the Twin Cities Metropolitan area was 75 gallons per capita per day.

**Is your average 2010-2015 residential per capita water demand in Table 2 more than 75?** Yes ☐ No ☒

**What was your 2010 – 2015 five-year average residential per capita water demand? _62 g/person/day**

Describe the water use trend over that timeframe:

The system that is serviced by Wells 3 and 4 is two years old and only serves 14 connections in a commercial district. There is not enough info to establish trends. Residential per capita use that is serviced by Wells 1 and 2 has always been very low due to high water rates.

Complete Table 25 by checking which strategies you will use to continue reducing residential per capita demand and project a likely timeframe for completing each checked strategy (Select all that apply and add rows for additional strategies):

**Table 25. Strategies and timeframe to reduce residential per capita demand**

**N/A**

| Strategy to reduce residential per capita demand | Timeframe for completing work |
|---|---|
| ☐ Revise city ordinances/codes to encourage or require water efficient landscaping. | |
| ☐ Revise city ordinance/codes to permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use. Check with plumbing authority to see if internal buildings reuse is permitted | |
| ☐ Revise ordinances to limit irrigation. Describe the restricted irrigation plan: | |
| ☐ Revise outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements. | |
| ☐ Make water system infrastructure improvements | |
| ☐ Offer free or reduced cost water use audits) for residential customers. | |
| ☐ Implement a notification system to inform customers when water availability conditions change. | |
| ☐ Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.) | |
| ☐ Provide rebates or incentives to reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.) | |
| ☐ Identify supplemental Water Resources | |
| ☐ Conduct audience-appropriate water conservation education and outreach. | |
| ☐ Describe other plans | |

### Objective 3: Achieve at least a 1.5% per year water reduction for Institutional, Industrial, Commercial, and Agricultural GPCD over the next 10 years or a 15% reduction in ten years.

Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

Where possible, substitute recycled water used in one process for reuse in another. (For example, spent rinse water can often be reused in a cooling tower.) Keep in mind the true cost of water is the amount on the water bill PLUS the expenses to heat, cool, treat, pump, and dispose of/discharge the water. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment. Often reducing

water use also saves electrical and other utility costs. Note: as of 2015, water reuse, and is not allowed by the state plumbing code, M.R. 4715 (a variance is needed). However several state agencies are addressing this issue.

**Table 26. Strategies and timeframe to reduce institutional, commercial industrial, and agricultural and non-revenue use demand**

| Strategy to reduce total business, industry, agricultural demand | Timeframe for completing work |
|---|---|
| ☐ Conduct a facility water use audit for both indoor and outdoor use, including system components | |
| ☒ Install enhanced meters capable of automated readings to detect spikes in consumption | Completed |
| ☐ Compare facility water use to related industry benchmarks, if available (e.g., meat processing, dairy, fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.) | |
| ☐ Install water conservation fixtures and appliances or change processes to conserve water | |
| ☐ Repair leaking system components (e.g., pipes, valves) | |
| ☒ Investigate the reuse of reclaimed water (e.g., stormwater, wastewater effluent, process wastewater, etc.) | Continuous |
| ☐ Reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.) | |
| ☐ Train employees how to conserve water | |
| ☐ Implement a notification system to inform non-residential customers when water availability conditions change. | |
| ☐ Rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, industrial processes, water features, vehicle washing facilities, cooling tower makeup, and similar uses shall be approved by the commissioner. Proposed plumbing code 4714.1702.1 http://www.dli.mn.gov/PDF/docket/4714rule.pdf | |
| ☒ Describe other plans: Work with Work with bulk water users to capture water during flushing events. | |

## Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand

Include as **Appendix 8** one graph showing total per capita water demand for each customer category (i.e., residential, institutional, commercial, industrial) from 2005-2014 and add the calculated/estimated linear trend for the next 10 years.

Describe the trend for each customer category; explain the reason(s) for the trends, and where trends are increasing.

Based on limited data it appears that the current PCD is below the average for the Twin Cities Metropolitan area.

## Objective 5: Reduce Peak Day Demand so that the Ratio of Average Maximum day to the Average Day is less than 2.6

**Is the ratio of average 2005-2014 maximum day demand to average 2005-2014 average day demand reported in Table 2 more than 2.6?** Yes ☐ No ☒

**The East Bethel water SCADA system does not have the ability to meter daily use. Because our wells run once a week due to low demand, we are estimating the average maximum day to average day ratio at 2.0 based on tank level measurements during the hottest and driest summer measurements. Most of our customers utilize separate meters for irrigation or a separate well with no cross connections so irrigation increases are very low.**

**Calculate a ten year average (2005 – 2014) of the ratio of maximum day demand to average day demand:**
**N/A**

The position of the DNR has been that a peak day/average day ratio that is above 2.6 for in summer indicates that the water being used for irrigation by the residents in a community is too large and that efforts should be made to reduce the peak day use by the community.

It should be noted that by reducing the peak day use, communities can also reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells, new water towers which can be costly items.

## Objective 6: Implement a Conservation Water Rate Structure and/or a Uniform Rate Structure with a Water Conservation Program

### *Water Conservation Program*

Municipal water suppliers serving over 1,000 people are required to adopt demand reduction measures that include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction. These measures must achieve demand reduction in ways that reduce water demand, water losses, peak water demands, and nonessential water uses. These measures must be approved before a community may request well construction approval from the Department of Health or before requesting an increase in water appropriations permit volume (*Minnesota Statutes*, section 103G.291, subd. 3 and 4). Rates should be adjusted on a regular basis to ensure that revenue of the system is adequate under reduced demand scenarios. If a municipal water supplier intends to use a Uniform Rate Structure, a community-wide Water Conservation Program that will achieve demand reduction must be provided.

### *Current Water Rates*

Include a copy of the actual rate structure in **Appendix 9** or list current water rates including base/service fees and volume charges below.

Volume included in base rate or service charge: ☒ gallons or____cubic feet____other

Frequency of billing: ☒ Monthly ☐ Bimonthly ☐ Quarterly ☐ Other: _____

Water Rate Evaluation Frequency: ☒ every year ☐ every____years ☐ no schedule

Date of last rate change: 12-21-16

**Table 27. Rate structures for each customer category (Select all that apply and add additional rows as needed)**

| Customer Category | Conservation Billing Strategies in Use * | Conservation Neutral Billing Strategies in Use ** | Non-Conserving Billing Strategies in Use *** |
|---|---|---|---|
| Residential | ☒ Monthly billing<br>☒ Increasing block rates (volume tiered rates)<br>☐ Seasonal rates<br>☐ Time of use rates<br>☒ Water bills reported in gallons<br>☐ Individualized goal rates<br>☐ Excess use rates<br>☐ Drought surcharge<br>☐ Use water bill to provide comparisons<br>☒ Service charge not based on water volume<br>☐ Other (describe) | ☐ Uniform<br>☐ Odd/even day watering | ☐ Service charge based on water volume<br>☐ Declining block<br>☐ Flat<br>☐ Other (describe) |
| Commercial/ Industrial/ Institutional | ☒ Monthly billing<br>☒ Increasing block rates (volume tiered rates)<br>☐ Seasonal rates<br>☐ Time of use rates<br>☐ Water bills reported in gallons<br>☐ Individualized goal rates<br>☐ Excess use rates<br>☐ Drought surcharge<br>☐ Use water bill to provide comparisons<br>☒ Service charge not based on water volume<br>☐ Other (describe) | ☐ Uniform | ☐ Service charge based on water volume<br>☐ Declining block<br>☐ Flat<br>☐ Other (describe) |
| ☐ Other | | | |

*** Rate Structures components that may promote water conservation:**

- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Increasing block rates (also known as a tiered residential rate structure):** Typically, these have at least three tiers: should have at least three tiers.
    - The first tier is for the winter average water use.
    - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
    - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Seasonal rate:** higher rates in summer to reduce peak demands

- **Time of Use rates:** lower rates for off peak water use
- **Bill water use in gallons:** this allows customers to compare their use to average rates
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals. **Excess Use rates**: if water use goes above an agreed upon amount this higher rate is charged
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought
- **Use water bill to provide comparisons**: simple graphics comparing individual use over time or compare individual use to others.
- **Service charge or base fee that does not include a water volume** – a base charge or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate (e.g., an amount less than the average residential per capita demand for the water supplier for the last 5 years)
- **Emergency rates** -A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

****Conservation Neutral****

- **Uniform rate**: rate per unit used is the same regardless of the volume used
- **Odd/even day watering** –This approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****

- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last 5 years
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Provide justification for any conservation neutral or non-conserving rate structures. If intending to adopt a conservation rate structure, include the timeframe to do so:

| |
|---|
| |

## Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning

Development and redevelopment projects can provide additional water conservation opportunities, such as the actions listed below. If a Uniform Rate Structure is in place, the water supplier must provide a Water Conservation Program that includes at least two of the actions listed below. Check those actions that you intent to implement within the next 10 years.

**Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection**

| | |
|---|---|
| ☐ | Participate in the GreenStep Cities Program, including implementation of at least one of the 20 "Best Practices" for water |
| ☐ | Prepare a master plan for smart growth (compact urban growth that avoids sprawl) |
| ☐ | Prepare a comprehensive open space plan (areas for parks, green spaces, natural areas) |
| ☒ | Adopt a water use restriction ordinance (lawn irrigation, car washing, pools, etc.) |
| ☐ | Adopt an outdoor lawn irrigation ordinance |
| ☐ | Adopt a private well ordinance (private wells in a city must comply with water restrictions) |
| ☒ | Implement a stormwater management program |

| | |
|---|---|
| ☐ | Adopt non-zoning wetlands ordinance (can further protect wetlands beyond state/federal laws- for vernal pools, buffer areas, restrictions on filling or alterations) |
| ☐ | Adopt a water offset program (primarily for new development or expansion) |
| ☐ | Implement a water conservation outreach program |
| ☐ | Hire a water conservation coordinator (part-time) |
| ☐ | Implement a rebate program for water efficient appliances, fixtures, or outdoor water management |
| ☐ | Other |

**Objective 8: Tracking Success: How will you track or measure success through the next ten years?**

As stated below

***Tip: The process to monitor demand reduction and/or a rate structure includes:***

a) The DNR Hydrologist will call or visit the community the first 1-3 years after the water supply plan is completed.
b) They will discuss what activities the community is doing to conserve water and if they feel their actions are successful. The Water Supply Plan, Part 3 tables and responses will guide the discussion. For example, they will discuss efforts to reduce unaccounted for water loss if that is a problem, or go through Tables 33, 34 and 35 to discuss new initiatives.
c) The city representative and the hydrologist will discuss total per capita water use, residential per capita water use, and business/industry use. They will note trends.
d) They will also discuss options for improvement and/or collect case studies of success stories to share with other communities. One option may be to change the rate structure, but there are many other paths to successful water conservation.
e) If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

## A. Regulation

Complete Table 29 by selecting which regulations are used to reduce demand and improve water efficiencies. Add additional rows as needed.

Copies of adopted regulations or proposed restrictions or should be included in **Appendix 10** (a list with hyperlinks is acceptable).

**Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies**

| Regulations Utilized | When is it applied (in effect)? |
|---|---|
| ☐ Rainfall sensors required on landscape irrigation systems | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared Emergencies |
| ☒ Water efficient plumbing fixtures required | ☒ New development<br>☐ Replacement<br>☐ Rebate Programs |
| ☒ Critical/Emergency Water Deficiency ordinance | ☒ Only during declared Emergencies |

| Regulations Utilized | When is it applied (in effect)? |
|---|---|
| ☐ Watering restriction requirements (time of day, allowable days, etc.) | ☐ Odd/even<br>☐ 2 days/week<br>☐ Only during declared Emergencies |
| ☐ Water waste prohibited (for example, having a fine for irrigators spraying on the street) | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared Emergencies |
| ☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas) | ☐ New development<br>☐ Shoreland/zoning<br>☐ Other |
| ☐ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth) | ☐ New Development<br>☐ Construction Projects<br>☐ Other |
| ☐ Tree ratios (requiring a certain number of trees per square foot of lawn) | ☐ New development<br>☐ Shoreland/zoning<br>☐ Other |
| ☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation) | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared Emergencies |
| ☐ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates) | ☐ Describe |

## B. Retrofitting Programs

Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use, as well as energy costs. It is recommended that municipal water suppliers develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and appliances. Some water suppliers have developed partnerships with organizations having similar conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

### Retrofitting Programs

Complete Table 30 by checking which water uses are targeted, the outreach methods used, the measures used to identify success, and any participating partners.

**Table 30. Retrofitting programs (Select all that apply)**

| Water Use Targets | Outreach Methods | Partners |
|---|---|---|
| ☐ Low flush toilets,<br>☐ Toilet leak tablets,<br>☐ Low flow showerheads,<br>☐ Faucet aerators; | ☐ Education about<br>☐ Free distribution of<br>☐ Rebate for<br>☐ Other | ☐ Gas company<br>☐ Electric company<br>☐ Watershed organization |
| ☐ Water conserving washing machines,<br>☐ Dish washers,<br>☐ Water softeners; | ☐ Education about<br>☐ Free distribution of<br>☐ Rebate for<br>☐ Other | ☐ Gas company<br>☐ Electric company<br>☐ Watershed organization |
| ☐ Rain gardens,<br>☐ Rain barrels,<br>☐ Native/drought tolerant landscaping, etc. | ☐ Education about<br>☐ Free distribution of<br>☐ Rebate for<br>☐ Other | ☐ Gas company<br>☐ Electric company<br>☐ Watershed organization |

Briefly discuss measures of success from the above table (e.g. number of items distributed, dollar value of rebates, gallons of water conserved, etc.):

This system is new. A retrofitting program has not been established

## C. Education and Information Programs

Customer education should take place in three different circumstances. First, customers should be provided information on how to conserve water and improve water use efficiencies. Second, information should be provided at appropriate times to address peak demands. Third, emergency notices and educational materials about how to reduce water use should be available for quick distribution during an emergency.

### Proposed Education Programs

Complete Table 31 by selecting which methods are used to provide water conservation and information, including the frequency of program components. Select all that apply and add additional lines as needed.

**Table 31. Current and Proposed Education Programs**

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| Billing inserts or tips printed on the actual bill | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Consumer Confidence Reports | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Press releases to traditional local news outlets (e.g., newspapers, radio and TV) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Social media distribution (e.g., emails, Facebook, Twitter) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Presentations to community groups | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Staff training | How to identify water misuse. | 1 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Facility tours | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Displays and exhibits | Annual town hall meeting - general education on how to conserve and the benefits of conserving water. | 1 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community news letters | General education on how to conserve and the benefits of conserving water. | 1 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| Direct mailings (water audit/retrofit kits, showerheads, brochures) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Information kiosk at utility and public buildings | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Public service announcements | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Cable TV Programs | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Demonstration projects (landscaping or plumbing) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| K-12 education programs (Project Wet, Drinking Water Institute, presentations) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community events (children's water festivals, environmental fairs) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community education classes | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Water week promotions | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Website (include address) | General education on how to conserve and the benefits of conserving water. | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Targeted efforts (large volume users, users with large increases) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Notices of ordinances | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| Emergency conservation notices | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Other: | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

Briefly discuss what future education and information activities your community is considering in the future:

Developing a Critical Water Deficiency Ordinance that will be provided to customers and available on the City website. We will continue to update our residents, on private and public supplies, how to conserve water through our quarterly newsletter.

# Part 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES

Minnesota Statute 473.859 requires WSPs to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process.

Much of the information in Parts 1-3 addresses water demand for the next 10 years. However, additional information is needed to address water demand through 2040, which will make the WSP consistent with the Metropolitan Land Use Planning Act, upon which the local comprehensive plans are based.

This Part 4 provides guidance to complete the WSP in a way that addresses plans for water supply through 2040.

## A. Water Demand Projections through 2040

Complete Table 7 in Part 1D by filling in information about long-term water demand projections through 2040. Total Community Population projections should be consistent with the community's system statement, which can be found on the Metropolitan Council's website and which was sent to the community in September 2015.

Projected Average Day, Maximum Day, and Annual Water Demands may either be calculated using the method outlined in *Appendix 2* of the *2015 Master Water Supply Plan* or by a method developed by the individual water supplier.

## B. Potential Water Supply Issues

Complete Table 10 in Part 1E by providing information about the potential water supply issues in your community, including those that might occur due to 2040 projected water use.

The *Master Water Supply Plan* provides information about potential issues for your community in *Appendix 1 (Water Supply Profiles).* This resource may be useful in completing Table 10.

You may document results of local work done to evaluate impact of planned uses by attaching a feasibility assessment or providing a citation and link to where the plan is available electronically.

## C. Proposed Alternative Approaches to Meet Extended Water Demand Projections

Complete Table 12 in Part 1F with information about potential water supply infrastructure impacts (such as replacements, expansions or additions to wells/intakes, water storage and treatment capacity, distribution systems, and emergency interconnections) of extended plans for development and redevelopment, in 10-year increments through 2040. It may be useful to refer to information in the community's local Land Use Plan, if available.

Complete Table 14 in Part 1F by checking each approach your community is considering to meet future demand. For each approach your community is considering, provide information about the amount of

future water demand to be met using that approach, the timeframe to implement the approach, potential partners, and current understanding of the key benefits and challenges of the approach.

As challenges are being discussed, consider the need for: evaluation of geologic conditions (mapping, aquifer tests, modeling), identification of areas where domestic wells could be impacted, measurement and analysis of water levels & pumping rates, triggers & associated actions to protect water levels, etc.

## D. Value-Added Water Supply Planning Efforts (Optional)

The following information is not required to be completed as part of the local water supply plan, but completing this can help strengthen source water protection throughout the region and help Metropolitan Council and partners in the region to better support local efforts.

### Source Water Protection Strategies

**Does a Drinking Water Supply Management Area for a neighboring public water supplier overlap your community?** Yes ☐ No ☒

If you answered no, skip this section. If you answered yes, please complete Table 32 with information about new water demand or land use planning-related local controls that are being considered to provide additional protection in this area.

**Table 32. Local controls and schedule to protect Drinking Water Supply Management Areas**

| Local Control | Schedule to Implement | Potential Partners |
|---|---|---|
| ☒ None at this time | | |
| ☐ Comprehensive planning that guides development in vulnerable drinking water supply management areas | | |
| ☐ Zoning overlay | | |
| ☐ Other: | | |

### Technical assistance

From your community's perspective, what are the most important topics for the Metropolitan Council to address, guided by the region's Metropolitan Area Water Supply Advisory Committee and Technical Advisory Committee, as part of its ongoing water supply planning role?

- ☒ Coordination of state, regional and local water supply planning roles
- ☐ Regional water use goals
- ☐ Water use reporting standards
- ☐ Regional and sub-regional partnership opportunities
- ☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
- ☐ Others: _____

# GLOSSARY

**Agricultural/Irrigation Water Use -** Water used for crop and non-crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.

**Average Daily Demand -** The total water pumped during the year divided by 365 days.

**Calcareous Fen -** Calcareous fens are rare and distinctive wetlands dependent on a constant supply of cold groundwater. Because they are dependent on groundwater and are one of the rarest natural communities in the United States, they are a protected resource in MN. Approximately 200 have been located in Minnesota. They may not be filled, drained or otherwise degraded.

**Commercial/Institutional Water Use -** Water used by motels, hotels, restaurants, office buildings, commercial facilities and institutions (both civilian and military). Consider maintaining separate institutional water use records for emergency planning and allocation purposes. Water used by multi-family dwellings, apartment buildings, senior housing complexes, and mobile home parks should be reported as Residential Water Use.

**Commercial/Institutional/Industrial (C/I/I) Water Sold -** The sum of water delivered for commercial/institutional or industrial purposes.

**Conservation Rate Structure -** A rate structure that encourages conservation and may include increasing block rates, seasonal rates, time of use rates, individualized goal rates, or excess use rates. If a conservation rate is applied to multifamily dwellings, the rate structure must consider each residential unit as an individual user. A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

**Date of Maximum Daily Demand -** The date of the maximum (highest) water demand. Typically this is a day in July or August.

**Declining Rate Structure -** Under a declining block rate structure, a consumer pays less per additional unit of water as usage increases. This rate structure does not promote water conservation.

**Distribution System -** Water distribution systems consist of an interconnected series of pipes, valves, storage facilities (water tanks, water towers, reservoirs), water purification facilities, pumping stations, flushing hydrants, and components that convey drinking water and meeting fire protection needs for cities, homes, schools, hospitals, businesses, industries and other facilities.

**Flat Rate Structure -** Flat fee rates do not vary by customer characteristics or water usage. This rate structure does not promote water conservation.

**Industrial Water Use -** Water used for thermonuclear power (electric utility generation) and other industrial use such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

**Low Flow Fixtures/Appliances -** Plumbing fixtures and appliances that significantly reduce the amount of water released per use are labeled "low flow". These fixtures and appliances use just enough water to be effective, saving excess, clean drinking water that usually goes down the drain.

**Maximum Daily Demand -** The maximum (highest) amount of water used in one day.

**Metered Residential Connections -** The number of residential connections to the water system that have meters. For multifamily dwellings, report each residential unit as an individual user.

**Percent Unmetered/Unaccounted For -** Unaccounted for water use is the volume of water withdrawn from all sources minus the volume of water delivered. This value represents water "lost" by miscalculated water use due to inaccurate meters, water lost through leaks, or water that is used but unmetered or otherwise undocumented. Water used for public services such as hydrant flushing, ice skating rinks, and public swimming pools should be reported under the category "Water Supplier Services".

**Population Served -** The number of people who are served by the community's public water supply system. This includes the number of people in the community who are connected to the public water supply system, as well as people in neighboring communities who use water supplied by the community's public water supply system. It should not include residents in the community who have private wells or get their water from neighboring water supply.

**Residential Connections -** The total number of residential connections to the water system. For multifamily dwellings, report each residential unit as an individual user.

**Residential Per Capita Demand -** The total residential water delivered during the year divided by the population served divided by 365 days.

**Residential Water Use -** Water used for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Should include all water delivered to single family private residences, multi-family dwellings, apartment buildings, senior housing complexes, mobile home parks, etc.

**Smart Meter -** Smart meters can be used by municipalities or by individual homeowners. Smart metering generally indicates the presence of one or more of the following:

- Smart irrigation water meters are controllers that look at factors such as weather, soil, slope, etc. and adjust watering time up or down based on data. Smart controllers in a typical summer will reduce water use by 30%-50%. Just changing the spray nozzle to new efficient models can reduce water use by 40%.
- Smart Meters on customer premises that measure consumption during specific time periods and communicate it to the utility, often on a daily basis.
- A communication channel that permits the utility, at a minimum, to obtain meter reads on demand, to ascertain whether water has recently been flowing through the meter and onto the

premises, and to issue commands to the meter to perform specific tasks such as disconnecting or restricting water flow.

**Total Connections -** The number of connections to the public water supply system.

**Total Per Capita Demand -** The total amount of water withdrawn from all water supply sources during the year divided by the population served divided by 365 days.

**Total Water Pumped -** The cumulative amount of water withdrawn from all water supply sources during the year.

**Total Water Delivered -** The sum of residential, commercial, industrial, institutional, water supplier services, wholesale and other water delivered.

**Ultimate (Full Build-Out) -** Time period representing the community's estimated total amount and location of potential development, or when the community is fully built out at the final planned density.

**Unaccounted (Non-revenue) Loss -** See definitions for "percent unmetered/unaccounted for loss".

**Uniform Rate Structure -** A uniform rate structure charges the same price-per-unit for water usage beyond the fixed customer charge, which covers some fixed costs. The rate sends a price signal to the customer because the water bill will vary by usage. Uniform rates by class charge the same price-per-unit for all customers within a customer class (e.g. residential or non-residential). This price structure is generally considered less effective in encouraging water conservation.

**Water Supplier Services -** Water used for public services such as hydrant flushing, ice skating rinks, public swimming pools, city park irrigation, back-flushing at water treatment facilities, and/or other uses.

**Water Used for Nonessential Purposes -** Water used for lawn irrigation, golf course and park irrigation, car washes, ornamental fountains, and other non-essential uses.

**Wholesale Deliveries -** The amount of water delivered in bulk to other public water suppliers.

## Acronyms and Initialisms

**AWWA** – American Water Works Association

**C/I/I** – Commercial/Institutional/Industrial

**CIP** – Capital Improvement Plan

**GIS** – Geographic Information System

**GPCD** – Gallons per capita per day

**GWMA** – Groundwater Management Area – North and East Metro, Straight River, Bonanza,

**MDH** – Minnesota Department of Health

**MGD** – Million gallons per day

**MG** – Million gallons

**MGL** – Maximum Contaminant Level

**MnTAP** – Minnesota Technical Assistance Program (University of Minnesota)

**MPARS** – MN/DNR Permitting and Reporting System (new electronic permitting system)

**MRWA** – Minnesota Rural Waters Association

**SWP** – Source Water Protection

**WHP** – Wellhead Protection

## APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

**Appendix 1: Well records and maintenance summaries** – see Part 1C

**Appendix 2: Water level monitoring plan** – see Part 1E

**Appendix 3: Water level graphs for each water supply well** - see Part 1E

**Appendix 4: Capital Improvement Plan -** see Part 1E

**Appendix 5: Emergency Telephone List** – see Part 2C

**Appendix 6: Cooperative Agreements for Emergency Services** – see Part 2C

**Appendix 7: Municipal Critical Water Deficiency Ordinance** – see Part 2C

**Appendix 8: Graph showing annual per capita water demand for each customer category during the last ten-years** – see Part 3 Objective 4

**Appendix 9: Water Rate Structure** – see Part 3 Objective 6

**Appendix 10: Adopted or proposed regulations to reduce demand or improve water efficiency** – see Part 3 Objective 7

**Appendix 11: Implementation Checklist – summary of all the actions that a community is doing, or proposes to do, including estimated implementation dates –** see www.mndnr.gov/watersupplyplans

# Appendix 1

Well records and maintenance summaries

There have been no maintenance needs to the wells or pumps to date.

# Appendix 2

Water level monitoring plan

**Groundwater Monitoring Plan**
**DNR Permit No. 2014 – 1049**

**City of East Bethel**

The City will monitor water levels in Production Wells No. 3 and No. 4 using a pressure transducer. Data will be logged for each well with the SCADA system. Water level readings shall be collected hourly. Monthly hand measurements will be collected to calibrate the automated water level measurements. All water level measurements are to be recorded as depth to water from the top of casing and are to be recorded as decimal feet to the nearest 0.1-foot.

The City will monitor water levels in the following three Observation wells

- Monitoring Well No. 1 - MDH Unique #783647, a buried aquifer well (also called HA 1).
- Monitoring Well No. 2 - MDH Unique # 782121, a Wonewoc aquifer well (also called HA 5).
- Monitoring Well No. 3 - No Unique Number, a 20-foot water table well (also called HA 2).

All of these wells will be monitored using a pressure transducer/data logger. Water level readings shall be collected hourly in the wells. Monthly hand measurements will be collected to calibrate the automated water level measurements. All water level measurements are to be recorded as depth to water from the top of casing and are to be recorded as decimal feet to the nearest 0.1-foot.

Information about when the production wells are pumping and the pumped volume will be reported with the well water level data.

The data logger, hand measurements, and pumping data shall be submitted in electronic format to the DNR's Groundwater Coordinator (gwlevelcoor.dnr@state.mn.us) on a quarterly basis or upon request. The logger data set shall include a date/time stamp and water level measurement.

Production well and monitoring well data for each well, based on the DNR template, is attached.

## Ground Water Level Measurement Form for Production Well No. 3

| | |
|---|---|
| DNR Permit Number: | 2014 - 1049 |
| Permittee Name: | City of East Bethel |
| Permittee Well Number: | Production Well No. 3 |
| MDH Unique Well Number: | 782113 |
| Well Address: | 19458 Taylor Street NE, East Bethel, MN 55011 |
| Measuring Point Height Above Ground Surface (ft): | |
| Measuring Point Description | Top of casing |
| Method of measurement | SCADA/Pressure Transducer |

| **Date of Measurement (MM/DD/YYYY)** | **Time of Measurement (24 hour time)** | **Depth to water (feet)** |
|---|---|---|
| Start November, 2011 | Continous | |

## Ground Water Level Measurement Form for Production Well No. 4

| | |
|---|---|
| DNR Permit Number: | 2014 - 1049 |
| Permittee Name: | City of East Bethel |
| Permittee Well Number: | Production Well No. 4 |
| MDH Unique Well Number: | 782114 |
| Well Address: | 19458 Taylor Street NE, East Bethel, MN 55011 |
| Measuring Point Height Above Ground Surface (ft): | |
| Measuring Point Description | Top of casing |
| Method of measurement | SCADA/Pressure Transducer |

| **Date of Measurement (MM/DD/YYYY)** | **Time of Measurement (24 hour time)** | **Depth to water (feet)** |
|---|---|---|
| Start November, 2011 | Continous | |

## Ground Water Level Measurement Form for Monitoring Well No. 1

| | |
|---|---|
| DNR Permit Number: | 2014 - 1049 |
| Permittee Name: | City of East Bethel |
| Permittee Well Number: | Monitoring Well No. 1 - Data Logger 3923 |
| MDH Unique Well Number: | 782121 |
| Well Address: | 19458 Taylor Street NE, East Bethel, MN 55011 |
| Top of Casing Elevation: | 906.36 |
| Measuring Point Height Above Ground Surface (ft): | 2.34 |
| Measuring Point Description | Top of casing |
| Method of measurement | Pressure Transducer |

| **Date of Measurement (MM/DD/YYYY)** | **Time of Measurement (24 hour time)** | **Depth to water (feet)** |
|---|---|---|
| Start November, 2011 | Continous | |

## Ground Water Level Measurement Form for Monitoring Well No. 2

| | |
|---|---|
| DNR Permit Number: | 2014 - 1049 |
| Permittee Name: | City of East Bethel |
| Permittee Well Number: | Monitoring Well No. 2 - Data Logger 3931 |
| MDH Unique Well Number: | 783647 |
| Well Address: | 19458 Taylor Street NE, East Bethel, MN 55011 |
| Top of Casing Elevation: | 914.32 |
| Measuring Point Height Above Ground Surface (ft): | 3.75 |
| Measuring Point Description | Top of casing |
| Method of measurement | Pressure Transducer |

| **Date of Measurement (MM/DD/YYYY)** | **Time of Measurement (24 hour time)** | **Depth to water (feet)** |
|---|---|---|
| Start November, 2011 | Continous | |

## Ground Water Level Measurement Form for Monitoring Well No. 3

| | |
|---|---|
| DNR Permit Number: | 2014 - 1049 |
| Permittee Name: | City of East Bethel |
| Permittee Well Number: | Monitoring Well No. 3 - Data Logger 3828 |
| MDH Unique Well Number: | |
| Well Address: | 19458 Taylor Street NE, East Bethel, MN 55011 |
| Top of Casing Elevation: | 906.80 |
| Measuring Point Height Above Ground Surface (ft): | 4.31 |
| Measuring Point Description | Top of casing |
| Method of measurement | Pressure Transducer |

| **Date of Measurement (MM/DD/YYYY)** | **Time of Measurement (24 hour time)** | **Depth to water (feet)** |
|---|---|---|
| Start November, 2011 | Continous | |


East City of Bethel

**Legend**

- Monitoring Well
- Production Well

# City of East Bethel Well Monitoring Location Map

K:\cad_eng\PROJECTS\GIS\EB901\2018\Well Monitoring Map Exhibit 2.mxd

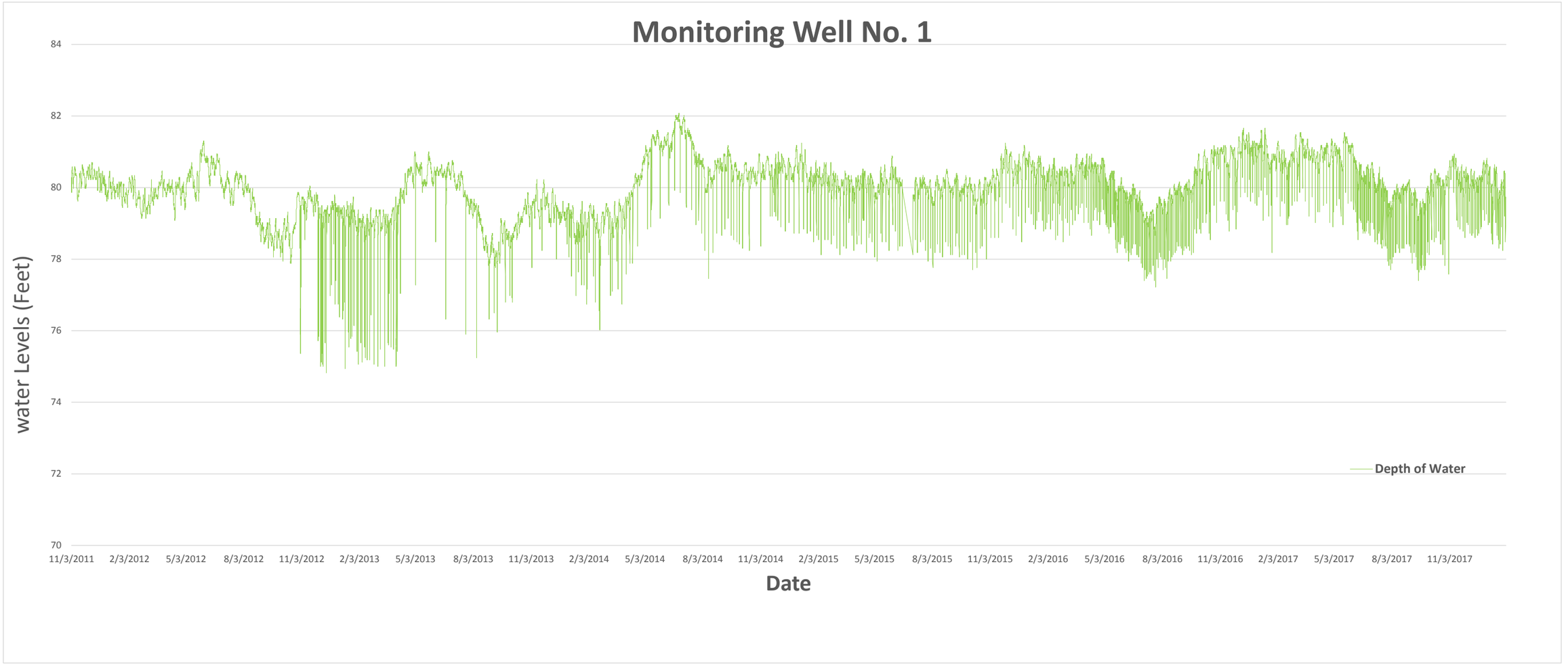

**Legend**

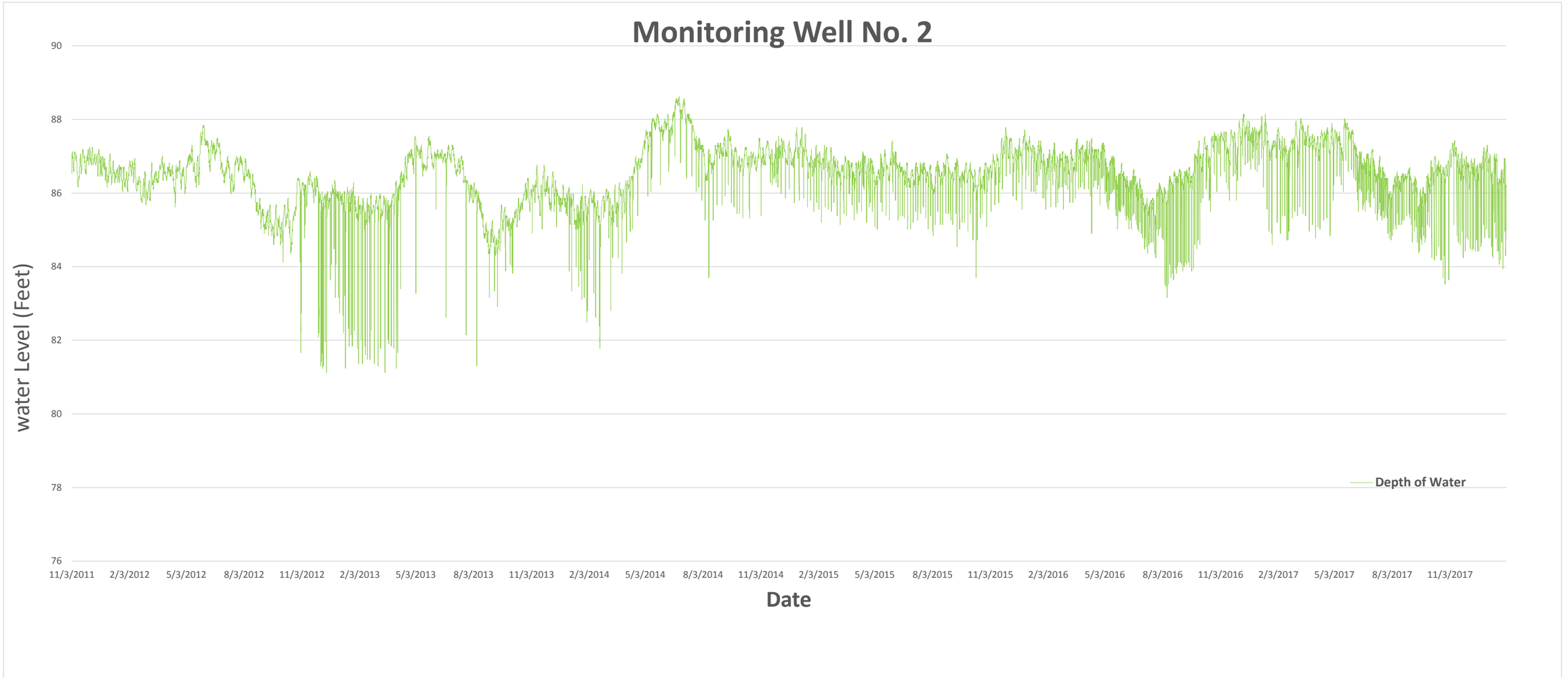
- Production Well
- 1.5 Mile Radius
- DNR Protected Water
- DNR Protected Watercourse
- NWI Wetlands
- City Watermain
- MCES Reclaimed Watermain

# City of East Bethel

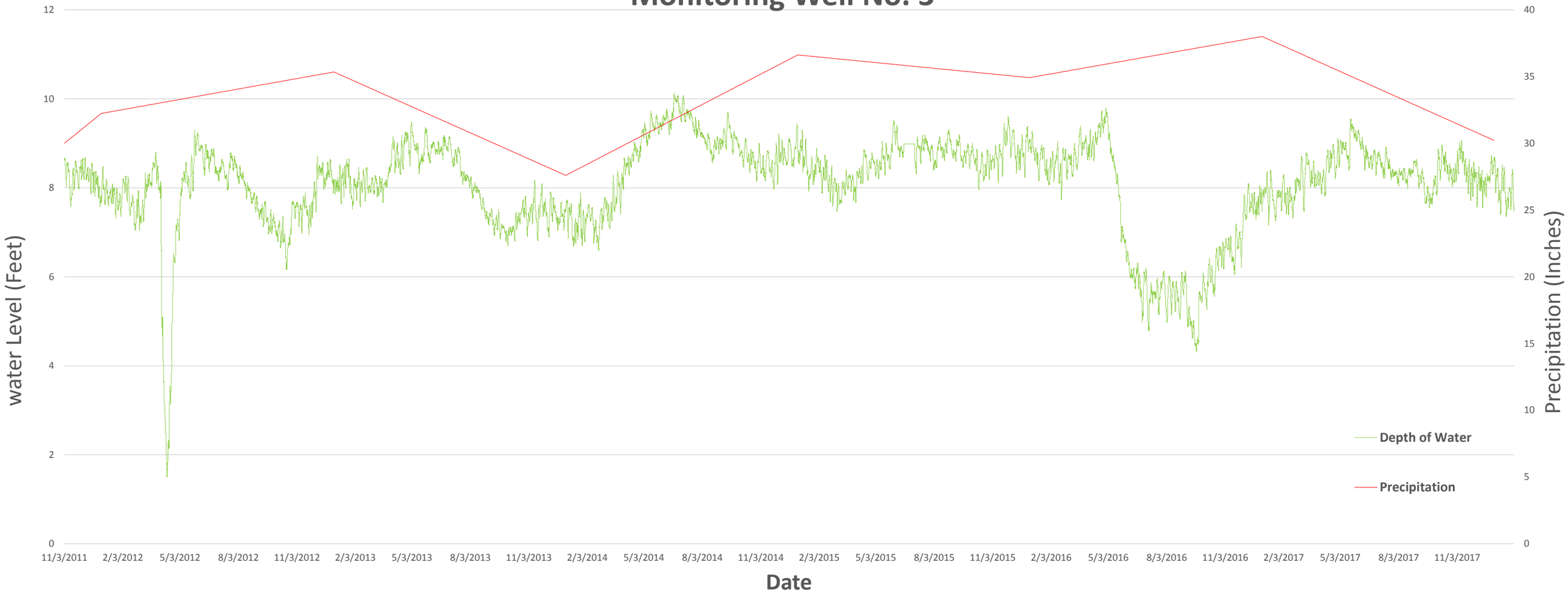
## Resource Location Map

K:\cad_eng\PROJECTS\GIS\EB901\2018\Well Monitoring Map.mxd


Monitoring Well No. 1
84
82
80
78
76
74
72
70
Levels (Feet)
water
11/3/2011
2/3/2012
5/3/2012
8/3/2012
11/3/2012
2/3/2013
5/3/2013
8/3/2013
11/3/2013
2/3/2014
5/3/2014
8/3/2014
11/3/2014
2/3/2015
5/3/2015
8/3/2015
11/3/2015
2/3/2016
5/3/2016
8/3/2016
11/3/2016
2/3/2017
5/3/2017
8/3/2017
11/3/2017
Date
Depth of Water


Monitoring Well No. 2
Depth of water (Feet)
90
88
86
84
82
80
78
76
11/3/2011
2/3/2012
5/3/2012
8/3/2012
11/3/2012
2/3/2013
5/3/2013
8/3/2013
11/3/2013
2/3/2014
5/3/2014
8/3/2014
11/3/2014
2/3/2015
5/3/2015
8/3/2015
11/3/2015
2/3/2016
5/3/2016
8/3/2016
11/3/2016
2/3/2017
5/3/2017
8/3/2017
11/3/2017
Date
Depth of Water

# Monitoring Well No. 3



# Appendix 3

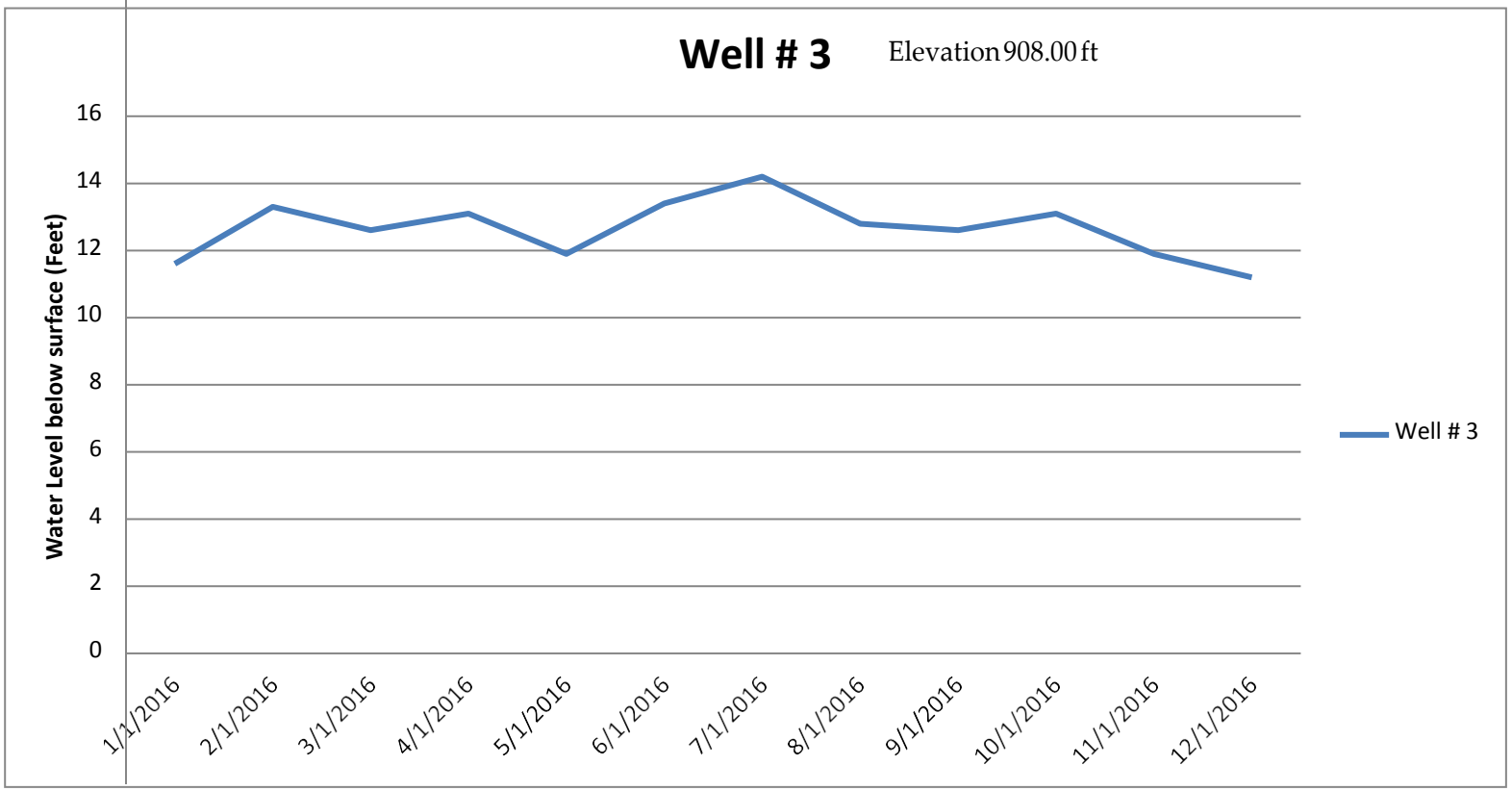
## Water level graphs for each water supply well

The City of East Bethel currently has a SCADA system that provide continuous monitoring of water levels. We are working with the MN DNR to incorporate a way for the data to be directly sent to the DNR. The DNR was looking into a grant opportunity to help with the costs associated with the technology updates.

The water levels are currently recorded daily and the water levels are checked manually monthly. The records will be sent to the DNR groundwater coordinator quarterly. Data from production well #4 is missing due to a faulty pressure transducer switch, but has been replaced and is currently measuring water levels accurately.

# Static Level of Wells

| Date | Well # 3 | Well # 4 |
|---|---|---|
| 1/1/2016 | 11.6 | |
| 2/1/2016 | 13.3 | |
| 3/1/2016 | 12.6 | |
| 4/1/2016 | 13.1 | |
| 5/1/2016 | 11.9 | |
| 6/1/2016 | 13.4 | |
| 7/1/2016 | 14.2 | |
| 8/1/2016 | 12.8 | |
| 9/1/2016 | 12.6 | |
| 10/1/2016 | 13.1 | |
| 11/1/2016 | 11.9 | |
| 12/1/2016 | 11.2 | 23.6 |



# Appendix 4

Capital Improvement Plan

There are plans to spend $800,00 to expand the south sewer and water system in 2017. No other expansions are planned in the next 5 years.

# Appendix 5

Emergency Telephone List

# City of East Bethel
## Water Emergency Telephone List

| Emergency Response Team | Name | Work Telephone | Alternate Telephone |
|---|---|---|---|
| Emergency Response Lead | Nate Ayshford | 763-367-7876 | 612-328-1529 |
| Alternate Emergency Response Lead | Jack Davis | 763-367-7850 | 612-715-1855 |
| Water Operator | Jeremiah Haller | 612-328-3927 | |
| Alternate Water Operator | Jason Hehir | 763-807-0779 | |
| Alternate Water Operator | Chad Citrowske | 763-439-9822 | |

| State and Local Emergency Response Contacts | Name | Work Telephone | Alternate Telephone |
|---|---|---|---|
| State Incident Duty Officer | Minnesota Duty Officer | 800/422-0798 Out State | 651-649-5451 Metro |
| County Emergency Director | Terry Stoltzman | 911 | 911 |
| National Guard | Minnesota Duty Officer | 800/422-0798 Out State | 651-649-5451 Metro |
| Mayor/Board Chair | Steve Voss | 651-308-0198 | |
| Fire Chief | Mark DuCharme | 763-367-7886 | 612-328-6833 |
| Sheriff | | | |
| Police Chief | | | |
| Ambulance | | | |
| Hospital | | | |
| Doctor or Medical Facility | | | |

| State and Local Agencies | Name | Work Telephone | Alternate Telephone |
|---|---|---|---|
| MDH District Engineer | | | |
| MDH | Drinking Water Protection | 651-201-4700 | |
| State Testing Laboratory | Minnesota Duty Officer | 800/422-0798 Out State | 651-649-5451 Metro |
| MPCA | | | |
| DNR Area Hydrologist | | | |
| County Water Planner | | | |

| Utilities | Name | Work Telephone | Alternate Telephone |
|---|---|---|---|
| Electric Company | Connexus Energy | 7633232600 | |
| Gas Company | | | |
| Telephone Company | | | |
| Gopher State One Call | Utility Locations | 800-252-1166 | 651-454-0002 |
| Highway Department | | | |

| Technical/Contracted Services/Supplies | Name | Work Telephone | Alternate Telephone |
|---|---|---|---|
| MRWA Technical Services | MN Rural Water Association | 800-367-6792 | |
| Well Driller/Repair | EH Renner and Sons | 763-427-6100 | |
| Pump Repair | | | |
| Electrician | | | |
| Plumber | | | |
| Backhoe | | | |
| Chemical Feed | | | |
| Meter Repair | | | |
| Generator | | | |
| Valves | | | |
| Pipe & Fittings | | | |
| Water Storage | | | |
| Laboratory | | | |
| Engineering firm | Hakanson Anderson | 763-427-5860 | |

# Appendix 6

Cooperative Agreements for Emergency Services

East Bethel is not adjacent to any other municipal water systems. They currently do not have any cooperative agreement.

# Appendix 7

## Municipal Critical Water Deficiency Ordinance

# ORDINANCE NO. 216

**AN ORDINANCE regulating nonessential water usage upon critical water deficiency as authorized by Minn. Stat. § 103G.291, subd. 1 and 2.**

The City Council of the City of East Bethel ordains:

## CHAPTER 74 – UTILITIES, Article V. – Regulating Waterworks and Sanitary Sewer, Division 2. – Water, Section 74-161. - Critical Water Deficiency Declaration

**(a) Purpose**. This ordinance establishes water conservation restrictions; and the plan will be in effect at any time the governor declares by executive order a critical water deficiency, pursuant to Minnesota Statutes section 103G.291.

**(b) Definitions.**
*Administrator* in statutory cities means the person assigned duties pursuant to Minn. Stat. § 412.151; or the city manager pursuant to Minn. Stat. § 412.601 – 412.751 or in charter cities as determined by city charter.
*Department* means the city water department.
*Emergency* means the declaration of a critical water deficiency by the governor.
*Irrigation* means the watering of shrubs, trees, sod, seeded areas, gardens, lawns, or any other outdoor vegetation, except outdoor vegetation utilized for agricultural purposes.
*Notification to public* means notification through local media, including interviews and issuance of news releases.
*Public water supplier* means the city or other entity that owns, manages, or operates a public water supply, as defined in Minn. Stat. § 144.382, subdivision 4.
*Reclaimed water* means water collected from rooftops, paved surfaces, or other collection devices and all water utilized more than once before re-entering the natural water cycle.
*Water recirculation system* means any system which enables a user to reuse water at least once prior to returning the water to the natural water cycle.

**(c) Application.**

(1) This ordinance applies to all customers of public water suppliers who own or control water use on any premises.
(2) No person shall make, cause, use, or permit the use of water received from a public water supply for residential, commercial, industrial, governmental, or any other purpose in any manner contrary to any provision in this ordinance.
(3) Mandatory emergency conservation measures shall be implemented based upon the declaration of a critical water emergency by the governor.

**(d) Declaration of critical water deficiency.** Upon the declaration of a critical water deficiency by the governor, the public water supplier shall immediately post notice of the emergency declaration at the usual meeting place of the city council, or the official city bulletin board. The city shall provide notification to the public as quickly as possible or through established water supply plans emergency response plans or procedures.

**(e) Mandatory emergency water conservation measures.** Upon declaration of a water emergency and notification to the public, the following mandatory restrictions upon nonessential water use shall be enforced:

(1) Outdoor irrigation of yards, gardens, golf courses, parklands, and other non-agricultural land, except for those areas irrigated with reclaimed water, is prohibited.

(2) Washing or spraying of sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas with water from any pressurized source, including garden hoses, except to alleviate immediate health or safety hazards, is prohibited.

(3) The outdoor use of any water-based play apparatus connected to a pressurized source is prohibited.

(4) Restaurants and other food service establishments are prohibited from serving water to their customers, unless water is specifically requested by the customer.

(5) Operation of outdoor misting systems used to cool public areas is prohibited.

(6) The filling of swimming pools, fountains, spas, or other exterior water features is prohibited.

(7) The washing of automobiles, trucks, trailers, and other types of mobile equipment is prohibited, except at facilities equipped with wash water recirculation systems, and for vehicles requiring frequent washing to protect public health, safety, and welfare.

**(f) Variances.** The City Administrator or their designee, is authorized to grant variances to this ordinance where strict application of its provisions would result in serious hardship to a customer. A variance may be granted only for reasons involving health or safety. An applicant may appeal the denial of a variance within five (5) days of the decision by submitting a written appeal to the City Administrator. The City Council shall hear the appeal at the next City Council meeting. The decision of the City Council is final.

**(g) Violation.**

(1) Violations shall be determined and cited by the City Administrator or his/her designee. A violator may appeal the citation within five (5) days of its issuance by submitting a written appeal to the City. The City Council shall hear the appeal at the next City Council meeting. The decision of the City Council is final. Violators may be granted an administrative waiver if evidence is provided that equipment failure was the cause of the violation. A letter from a qualified vendor or equipment invoice will be required to show proof of equipment failure.

(2) Upon discovery of a first violation, the violator shall be issued, either personally or by mail, a warning letter that sets forth the violation and which shall describe the remedy and fines for future violations.

(3) Upon subsequent violations at the same location, the violator shall be issued, either personally or by mail, a citation that sets forth the violation and shall describe the remedy. Fines shall be added to the monthly water bill of the owner or current occupant of the premises where the violation occurred. The imposition of the fine shall in no way limit the right of the City to pursue other legal remedies.

**(h) Enforcement.** The City Administrator or his/her designee is authorized to designate city employees or law enforcement personnel to enforce the provisions of this ordinance.

**(i) Severability.** If any provision of this ordinance or the application of any provision to a particular situation is held to be invalid by a court of competent jurisdiction, the remaining

portions of the ordinance and the application of the ordinance to any other situation shall not be invalidated.

**(j) Effective date.** This ordinance becomes effective from and after its passage and publication.

Passed by the City Council of East Bethel on_____, 2017.

Approved:

_____
Mayor

Attested:

_____
City Administrator

# Appendix 8

Graph showing annual per capita water demand for each customer category during the last ten-years

New system information not available.

# Appendix 9

## Water Rate Structure

**City of East Bethel**
**2017 Fee Schedule**

| | |
|---|---|
| **UTILITY OPERATION FEES** | |
| | |
| ***Water and Sewer - Access Charges*** | |
| WATER SYSTEM ACCESS CHARGE-WHISPERING ASPEN | $500 |
| SEWER SYSTEM ACCESS CHARGE-WHISPERING ASPEN | $3,350 |
| SEWER SYSTEM ACCESS CHARGE- MET COUNCIL | $3,185 |
| | |
| WATER SYSTEM ACCESS CHARGE-PHASE I WATER SYSTEM SERVICE AREA | $3,600 |
| SEWER SYSTEM ACCESS CHARGE-PHASE I SEWER SYSTEM SERVICE AREA | $2,000 |
| SEWER TRUNK CHARGE - PHASE 1 SEWER SYSTEM SERVICE AREA | $11,500 |
| (USERS WITH ERU >1 or NON-RESIDENTIAL CONNECTIONS) | |
| SEWER SYSTEM ACCESS CHARGE- MET COUNCIL | $3,185 |
| | |
| ***Water - Operational Charges*** | |
| **(1) Water use Charges - Residential (Whispering Aspen)** - Wells 1 and 2 | |
| BASE CHARGE | $18.77 PER MONTH |
| USAGE CHARGES: | |
| 0 - 2,000 GALLONS PER MONTH | $10.60 PER 1,000 GALLONS |
| 2,001 - 5,000 GALLONS PER MONTH | $12.72 PER 1,000 GALLONS |
| 5,001 - 10,000 GALLONS PER MONTH | $15.26 PER 1,000 GALLONS |
| OVER 10,000 GALLONS PER MONTH | $18.32 PER 1,000 GALLONS |
| | |
| **(2) Water Use Charges – Phase I Water System Service Area** - Wells 3 and 4 | |
| BASE CHARGE | $15.90 PER ERU PER MONTH |
| USAGE CHARGES: | |
| 0 - 10,000 GALLONS PER MONTH | $3.18 PER 1,000 GALLONS |
| OVER 10,000 GALLONS PER MONTH | $3.80 PER 1,000 GALLONS |
| | |
| ***Sewer - Operational Charges*** | |
| **(1) Sewer Treatment - Residential (Whispering Aspen)** | |
| BASE CHARGE | $6.13 PER MONTH |
| USAGE CHARGE | $6.30 PER 1,000 GALLONS |
| *(Residential based on water use during January)* | |
| | |
| **(2) Sewer Treatment – Phase I Sewer System Service Area** | |
| BASE CHARGE | $5.30 PER MONTH PER ERU |
| USAGE CHARGE | $5.05 PER 1,000 GALLONS |
| | |
| **(3) Sewer Treatment - Mobile Park (Greystone)** | |

# Appendix 10

## Adopted or proposed regulations to reduce demand or improve water efficiency

With a small customer base and new system designed for expansion, water use is needed to keep lines cleared out for proper clorine residual at the end user.

As the system expands and development occurs, the City will continue to work on water conservation measures.

Examples include odd/even watering days, tiered rate structure for commercial users, and reclaimed water irrigation.

# Appendix 11

Implementation Checklist – summary of all the actions that a community is doing, or proposes to do, including estimated implementation dates

**Appendix 11**
**Implementation Checklist**

| Activity Implemented | Activity or Action Item | Timeframe |
|---|---|---|
| **Actions to reduce residential per capita demand** | | |
| X | Make water system infrastructure improvements | Ongoing |
| X | Offer water use audits for residential customers (currently free). | Ongoing |
| X | Continue to update water rate structure to reward conservative water use. | Ongoing |
| X | Conduct audience-appropriate water conservation education and outreach. | Ongoing |
| **Actions to reduce total water demand** | | |
| **x** | Install enhanced meters capable of automated readings to detect spikes in consumption | 2016 |
| X | Implement a stormwater management program | Ongoing |
| | Implement a water conservation outreach program | Ongoing |
| | Revise Comprehensive Plan that guides development in vulnerable drinking water supply management areas and wellhead protection plan | 2018 |
| X | Perform Water Audit to track water usage and loss | Ongoing |

# ATTACHMENT 5

## CIP Costs

# TABLE 1

# Sanitary Sewer and Water Supply Estimate
# City of East Bethel

**Schedule "A" - Street and Storm Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | SUBGRADE PREPARATION | LF | $25.00 | 12,400 | $310,000.00 | 22,770 | $569,250.00 | 13,800 | $345,000.00 | 48,970 | $1,224,250.00 |
| 2 | AGGREGATE BASE CLASS 5 | TON | $18.00 | 25,404 | $457,270.67 | 46,649 | $839,681.70 | 28,272 | $508,898.00 | 100,325 | $1,805,851.00 |
| 3 | WEARING COURSE MIXTURE (B) | TON | $65.00 | 4,631 | $301,006.17 | 8,504 | $552,734.72 | 5,154 | $334,990.74 | 18,288 | $1,188,732.00 |
| 4 | NON WEARING COURSE MIXTURE (B) | TON | $64.00 | 5,789 | $370,469.14 | 10,630 | $680,288.89 | 6,442 | $412,296.30 | 22,860 | $1,463,055.00 |
| 5 | CONCRETE CURB & GUTTER DESIGN B618 | LF | $12.00 | 24,800 | $297,600.00 | 45,540 | $546,480.00 | 27,600 | $331,200.00 | 97,940 | $1,175,280.00 |
| 6 | RESTORATION | ACRE | $4,000.00 | 134.3 | $537,190.08 | 71.5 | $285,977.96 | 37.7 | $150,927.46 | 244 | $974,096.00 |
| 7 | STORM SEWER | LF | $70.00 | 12,400 | $868,000.00 | 22,770 | $1,593,900.00 | 13,800 | $966,000.00 | 48,970 | $3,427,900.00 |
| | **Total Schedule "A"** | Estimated Construction Cost | | | **$3,141,540** | | **$5,068,320** | | **$3,049,320** | | **$11,259,164.00** |
| | | Rounded cost | | | $3,150,000 | | $5,100,000 | | $3,100,000 | | $11,300,000 |

**Schedule "B" - Sanitary Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | 8" PVC SEWER PIPE | LF | $60.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 2 | 10" PVC SEWER PIPE | LF | $65.00 | 4,000 | $260,000.00 | 330 | $21,450.00 | 2,750 | $178,750.00 | 7,080 | $460,200.00 |
| 3 | 12" PVC SEWER PIPE | LF | $70.00 | 8,400 | $588,000.00 | 4,820 | $337,400.00 | 4,500 | $315,000.00 | 17,720 | $1,240,400.00 |
| 4 | 15" PVC SEWER PIPE | LF | $75.00 | 0 | $0.00 | 1,450 | $108,750.00 | 1,450 | $108,750.00 | 2,900 | $217,500.00 |
| 5 | 21" PVC SEWER PIPE | LF | $115.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 6 | 24" PVC SEWER PIPE | LF | $120.00 | 0 | $0.00 | 0 | $0.00 | 2,900 | $348,000.00 | 2,900 | $348,000.00 |
| 7 | 27" PVC SEWER PIPE | LF | $122.00 | 0 | $0.00 | 8,250 | $1,006,500.00 | 0 | $0.00 | 8,250 | $1,006,500.00 |
| 8 | 30" PVC SEWER PIPE | LF | $135.00 | 0 | $0.00 | 6,740 | $909,900.00 | 0 | $0.00 | 6,740 | $909,900.00 |
| 9 | 36" PVC SEWER PIPE | LF | $145.00 | 0 | $0.00 | 5,600 | $812,000.00 | 3,770 | $546,650.00 | 9,370 | $1,358,650.00 |
| 10 | DEWATERING | LF | $50.00 | 12,400.00 | $620,000.00 | 27,190.00 | $1,359,500.00 | 15,370.00 | $768,500.00 | 54,960 | $2,748,000.00 |
| 11 | FORCEMAIN | LF | $90.00 | 14,200 | $1,278,000.00 | 6,400 | $576,000.00 | 0 | $0.00 | 20,600 | $1,854,000.00 |
| 12 | JACKING | LF | $800.00 | 250 | $200,000.00 | 750 | $600,000.00 | 460 | $368,000.00 | 1,460 | $1,168,000.00 |
| 13 | LIFT STATION | EACH | $500,000.00 | 0 | $0.00 | 2 | $1,000,000.00 | 0 | $0.00 | 2 | $1,000,000.00 |
| 14 | PRECAST MANHOLE | EACH | $8,000.00 | 35 | $283,428.57 | 78 | $621,485.71 | 44 | $351,314.29 | 157 | $1,256,229.00 |
| | **Total Schedule "B"** | Estimated Construction Cost | | | **$3,229,430** | | **$7,352,990** | | **$2,984,970** | | **$13,567,379.00** |
| | | Rounded cost | | | $3,300,000 | | $7,400,000 | | $3,000,000 | | $13,600,000 |

**Schedule "C" - Watermain**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | TREATMENT | GPM | $2,500.00 | 2,100 | $5,250,000.00 | 3,500 | $8,750,000.00 | 1,800 | $4,500,000.00 | 7,400 | $18,500,000.00 |
| 2 | 6" WATERMAIN - PVC PIPE | LF | $26.00 | 1,210 | $31,460.00 | 3,090 | $80,340.00 | 1,410 | $36,660.00 | 5,710 | $148,460.00 |
| 3 | 10" WATERMAIN - PVC PIPE | LF | $32.00 | 6,250 | $200,000.00 | 12,340 | $394,880.00 | 2,545 | $81,440.00 | 21,135 | $676,320.00 |
| 4 | 12" WATERMAIN - PVC PIPE | LF | $44.00 | 17,850 | $785,400.00 | 34,750 | $1,529,000.00 | 15,700 | $690,800.00 | 68,300 | $3,005,200.00 |
| 5 | 16" WATERMAIN - PVC PIPE | LF | $56.00 | 0 | $0.00 | 0 | $0.00 | 9,950 | $557,200.00 | 9,950 | $557,200.00 |
| 6 | 18" WATERMAIN - PVC PIPE | LF | $60.00 | 0 | $0.00 | 14,650 | $879,000.00 | 1,400 | $84,000.00 | 16,050 | $963,000.00 |
| 7 | 10" GATE VALVE AND BOX | EACH | $1,300.00 | 23 | $30,468.75 | 46 | $60,157.50 | 10 | $12,406.88 | 79 | $103,034.00 |
| 8 | 12" BUTTERFLY VALVE | EACH | $2,500.00 | 45 | $111,562.50 | 87 | $217,187.50 | 39 | $98,125.00 | 171 | $426,875.00 |
| 9 | 16" BUTTERFLY VALVE | EACH | $3,600.00 | 0 | $0.00 | 0 | $0.00 | 25 | $89,550.00 | 25 | $89,550.00 |
| 10 | 18" BUTTERFLY VALVE | EACH | $3,800.00 | 0 | $0.00 | 37 | $139,175.00 | 4 | $13,300.00 | 40 | $152,475.00 |
| 11 | WATER TOWER | MG | $2,000,000.00 | 0.5 | $1,000,000.00 | 0.75 | $1,500,000.00 | 0.5 | $1,000,000.00 | 2 | $3,500,000.00 |
| 12 | HYDRANT / BOX / VALVE | EACH | $6,000.00 | 60 | $361,500.00 | 154 | $926,100.00 | 70 | $422,925.00 | 285 | $1,710,525.00 |
| 13 | WELL AND RAW WATER LINES | EACH | $500,000.00 | 2 | $1,000,000.00 | 6 | $3,000,000.00 | 3 | $1,500,000.00 | 11 | $5,500,000.00 |
| 14 | JACKING | LF | $800.00 | 0 | $0.00 | 750 | $600,000.00 | 200 | $160,000.00 | 950 | $760,000.00 |
| | **Total Schedule "C"** | Estimated Construction Cost | | | **$8,770,400** | | **$18,075,840** | | **$9,246,410** | | **$36,092,639.00** |
| | | Rounded cost | | | $8,800,000 | | $18,100,000 | | $9,300,000 | | $36,100,000 |

| | | | | | |
|---|---|---|---|---|---|
| **Estimated Construction Costs** | Street & Storm Sewer | $3,150,000 | $5,100,000 | $3,100,000 | $11,350,000 |
| | Sanitary Sewer | $3,300,000 | $7,400,000 | $3,000,000 | $13,700,000 |
| | Water | $8,800,000 | $18,100,000 | $9,300,000 | $36,200,000 |
| | | $15,250,000 | $30,600,000 | $15,400,000 | $61,250,000 |
| | Contingency & Overhead 30% | $4,575,000 | $9,180,000 | $4,620,000 | $18,375,000 |
| | ROW ($40,000 per Acre) | $1,138,700 | $2,496,800 | $1,411,400 | $5,046,900 |
| | **Total Estimated Project Cost** | **$20,964,000** | **$42,277,000** | **$21,432,000** | **$84,673,000** |

# TABLE 2

# Sanitary Sewer and Water Supply Estimate
# City of East Bethel

**Schedule "A" - Street and Storm Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | SUBGRADE PREPARATION | LF | $25.00 | 12,400 | $310,000.00 | 22,770 | $569,250.00 | 13,800 | $345,000.00 | 48,970 | $1,224,250.00 |
| 2 | AGGREGATE BASE CLASS 5 | TON | $18.00 | 25,404 | $457,270.67 | 46,649 | $839,681.70 | 28,272 | $508,898.00 | 100,325 | $1,805,851.00 |
| 3 | WEARING COURSE MIXTURE (B) | TON | $65.00 | 4,631 | $301,006.17 | 8,504 | $552,734.72 | 5,154 | $334,990.74 | 18,288 | $1,188,732.00 |
| 4 | NON WEARING COURSE MIXTURE (B) | TON | $64.00 | 5,789 | $370,469.14 | 10,630 | $680,288.89 | 6,442 | $412,296.30 | 22,860 | $1,463,055.00 |
| 5 | CONCRETE CURB & GUTTER DESIGN B618 | LF | $12.00 | 24,800 | $297,600.00 | 45,540 | $546,480.00 | 27,600 | $331,200.00 | 97,940 | $1,175,280.00 |
| 6 | RESTORATION | ACRE | $4,000.00 | 134.3 | $537,190.08 | 71.5 | $285,977.96 | 37.7 | $150,927.46 | 244 | $974,096.00 |
| 7 | STORM SEWER | LF | $70.00 | 12,400 | $868,000.00 | 22,770 | $1,593,900.00 | 13,800 | $966,000.00 | 48,970 | $3,427,900.00 |
| | **Total Schedule "A"** | Estimated Construction Cost | | | **$3,141,540** | | **$5,068,320** | | **$3,049,320** | | **$11,259,164.00** |
| | | Rounded cost | | | $0 | | $0 | | $0 | | $0 |

**Schedule "B" - Sanitary Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | 8" PVC SEWER PIPE | LF | $60.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 2 | 10" PVC SEWER PIPE | LF | $65.00 | 4,000 | $260,000.00 | 330 | $21,450.00 | 2,750 | $178,750.00 | 7,080 | $460,200.00 |
| 3 | 12" PVC SEWER PIPE | LF | $70.00 | 8,400 | $588,000.00 | 4,820 | $337,400.00 | 4,500 | $315,000.00 | 17,720 | $1,240,400.00 |
| 4 | 15" PVC SEWER PIPE | LF | $75.00 | 0 | $0.00 | 1,450 | $108,750.00 | 1,450 | $108,750.00 | 2,900 | $217,500.00 |
| 5 | 21" PVC SEWER PIPE | LF | $115.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 6 | 24" PVC SEWER PIPE | LF | $120.00 | 0 | $0.00 | 0 | $0.00 | 2,900 | $348,000.00 | 2,900 | $348,000.00 |
| 7 | 27" PVC SEWER PIPE | LF | $122.00 | 0 | $0.00 | 8,250 | $1,006,500.00 | 0 | $0.00 | 8,250 | $1,006,500.00 |
| 8 | 30" PVC SEWER PIPE | LF | $135.00 | 0 | $0.00 | 6,740 | $909,900.00 | 0 | $0.00 | 6,740 | $909,900.00 |
| 9 | 36" PVC SEWER PIPE | LF | $145.00 | 0 | $0.00 | 5,600 | $812,000.00 | 3,770 | $546,650.00 | 9,370 | $1,358,650.00 |
| 10 | DEWATERING | LF | $50.00 | 12,400.00 | $620,000.00 | 27,190.00 | $1,359,500.00 | 15,370.00 | $768,500.00 | 54,960 | $2,748,000.00 |
| 11 | FORCEMAIN | LF | $90.00 | 14,200 | $1,278,000.00 | 6,400 | $576,000.00 | 0 | $0.00 | 20,600 | $1,854,000.00 |
| 12 | JACKING | LF | $800.00 | 250 | $200,000.00 | 750 | $600,000.00 | 460 | $368,000.00 | 1,460 | $1,168,000.00 |
| 13 | LIFT STATION | EACH | $500,000.00 | 0 | $0.00 | 2 | $1,000,000.00 | 0 | $0.00 | 2 | $1,000,000.00 |
| 14 | PRECAST MANHOLE | EACH | $8,000.00 | 35 | $283,428.57 | 78 | $621,485.71 | 44 | $351,314.29 | 157 | $1,256,229.00 |
| | **Total Schedule "B"** | Estimated Construction Cost | | | **$3,229,430** | | **$7,352,990** | | **$2,984,970** | | **$13,567,379.00** |
| | | Rounded cost | | | $3,300,000 | | $7,400,000 | | $3,000,000 | | $13,600,000 |

**Schedule "C" - Watermain**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | TREATMENT | GPM | $2,500.00 | 2,100 | $5,250,000.00 | 3,500 | $8,750,000.00 | 1,800 | $4,500,000.00 | 7,400 | $18,500,000.00 |
| 2 | 6" WATERMAIN - PVC PIPE | LF | $26.00 | 1,210 | $31,460.00 | 3,090 | $80,340.00 | 1,410 | $36,660.00 | 5,710 | $148,460.00 |
| 3 | 10" WATERMAIN - PVC PIPE | LF | $32.00 | 6,250 | $200,000.00 | 12,340 | $394,880.00 | 2,545 | $81,440.00 | 21,135 | $676,320.00 |
| 4 | 12" WATERMAIN - PVC PIPE | LF | $44.00 | 17,850 | $785,400.00 | 34,750 | $1,529,000.00 | 15,700 | $690,800.00 | 68,300 | $3,005,200.00 |
| 5 | 16" WATERMAIN - PVC PIPE | LF | $56.00 | 0 | $0.00 | 0 | $0.00 | 9,950 | $557,200.00 | 9,950 | $557,200.00 |
| 6 | 18" WATERMAIN - PVC PIPE | LF | $60.00 | 0 | $0.00 | 14,650 | $879,000.00 | 1,400 | $84,000.00 | 16,050 | $963,000.00 |
| 7 | 10" GATE VALVE AND BOX | EACH | $1,300.00 | 23 | $30,468.75 | 46 | $60,157.50 | 10 | $12,406.88 | 79 | $103,034.00 |
| 8 | 12" BUTTERFLY VALVE | EACH | $2,500.00 | 45 | $111,562.50 | 87 | $217,187.50 | 39 | $98,125.00 | 171 | $426,875.00 |
| 9 | 16" BUTTERFLY VALVE | EACH | $3,600.00 | 0 | $0.00 | 0 | $0.00 | 25 | $89,550.00 | 25 | $89,550.00 |
| 10 | 18" BUTTERFLY VALVE | EACH | $3,800.00 | 0 | $0.00 | 37 | $139,175.00 | 4 | $13,300.00 | 40 | $152,475.00 |
| 11 | WATER TOWER | MG | $2,000,000.00 | 0.5 | $1,000,000.00 | 0.75 | $1,500,000.00 | 0.5 | $1,000,000.00 | 2 | $3,500,000.00 |
| 12 | HYDRANT / BOX / VALVE | EACH | $6,000.00 | 60 | $361,500.00 | 154 | $926,100.00 | 70 | $422,925.00 | 285 | $1,710,525.00 |
| 13 | WELL AND RAW WATER LINES | EACH | $500,000.00 | 2 | $1,000,000.00 | 6 | $3,000,000.00 | 3 | $1,500,000.00 | 11 | $5,500,000.00 |
| 14 | JACKING | LF | $800.00 | 0 | $0.00 | 750 | $600,000.00 | 200 | $160,000.00 | 950 | $760,000.00 |
| | **Total Schedule "C"** | Estimated Construction Cost | | | **$8,770,400** | | **$18,075,840** | | **$9,246,410** | | **$36,092,639.00** |
| | | Rounded cost | | | $8,800,000 | | $18,100,000 | | $9,300,000 | | $36,100,000 |

| | | | | | |
|---|---|---|---|---|---|
| **Estimated Construction Costs** | Street & Storm Sewer | $0 | $0 | $0 | $0 |
| | Sanitary Sewer | $3,300,000 | $7,400,000 | $3,000,000 | $13,700,000 |
| | Water | $8,800,000 | $18,100,000 | $9,300,000 | $36,200,000 |
| | | $12,100,000 | $25,500,000 | $12,300,000 | $49,900,000 |
| | Contingency & Overhead 30% | $3,630,000 | $7,650,000 | $3,690,000 | $14,970,000 |
| | ROW ($40,000 per Acre) | $1,138,700 | $2,496,800 | $1,411,400 | $5,046,900 |
| | **Total Estimated Project Cost** | **$16,869,000** | **$35,647,000** | **$17,402,000** | **$69,918,000** |

# TABLE 3

# Sanitary Sewer and Water Supply Estimate
# City of East Bethel

**Schedule "A" - Street and Storm Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | SUBGRADE PREPARATION | LF | $25.00 | 12,400 | $310,000.00 | 22,770 | $569,250.00 | 13,800 | $345,000.00 | 48,970 | $1,224,250.00 |
| 2 | AGGREGATE BASE CLASS 5 | TON | $18.00 | 25,404 | $457,270.67 | 46,649 | $839,681.70 | 28,272 | $508,898.00 | 100,325 | $1,805,851.00 |
| 3 | WEARING COURSE MIXTURE (B) | TON | $65.00 | 4,631 | $301,006.17 | 8,504 | $552,734.72 | 5,154 | $334,990.74 | 18,288 | $1,188,732.00 |
| 4 | NON WEARING COURSE MIXTURE (B) | TON | $64.00 | 5,789 | $370,469.14 | 10,630 | $680,288.89 | 6,442 | $412,296.30 | 22,860 | $1,463,055.00 |
| 5 | CONCRETE CURB & GUTTER DESIGN B618 | LF | $12.00 | 24,800 | $297,600.00 | 45,540 | $546,480.00 | 27,600 | $331,200.00 | 97,940 | $1,175,280.00 |
| 6 | RESTORATION | ACRE | $4,000.00 | 134.3 | $537,190.08 | 71.5 | $285,977.96 | 37.7 | $150,927.46 | 244 | $974,096.00 |
| 7 | STORM SEWER | LF | $70.00 | 12,400 | $868,000.00 | 22,770 | $1,593,900.00 | 13,800 | $966,000.00 | 48,970 | $3,427,900.00 |
| | **Total Schedule "A"** | Estimated Construction Cost | | | **$3,141,540** | | **$5,068,320** | | **$3,049,320** | | **$11,259,164.00** |
| | | Rounded cost | | | $0 | | $0 | | $0 | | $0 |

**Schedule "B" - Sanitary Sewer**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | 8" PVC SEWER PIPE | LF | $60.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 2 | 10" PVC SEWER PIPE | LF | $65.00 | 4,000 | $260,000.00 | 330 | $21,450.00 | 2,750 | $178,750.00 | 7,080 | $460,200.00 |
| 3 | 12" PVC SEWER PIPE | LF | $70.00 | 8,400 | $588,000.00 | 4,820 | $337,400.00 | 4,500 | $315,000.00 | 17,720 | $1,240,400.00 |
| 4 | 15" PVC SEWER PIPE | LF | $75.00 | 0 | $0.00 | 1,450 | $108,750.00 | 1,450 | $108,750.00 | 2,900 | $217,500.00 |
| 5 | 21" PVC SEWER PIPE | LF | $115.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 | 0 | $0.00 |
| 6 | 24" PVC SEWER PIPE | LF | $120.00 | 0 | $0.00 | 0 | $0.00 | 2,900 | $348,000.00 | 2,900 | $348,000.00 |
| 7 | 27" PVC SEWER PIPE | LF | $122.00 | 0 | $0.00 | 8,250 | $1,006,500.00 | 0 | $0.00 | 8,250 | $1,006,500.00 |
| 8 | 30" PVC SEWER PIPE | LF | $135.00 | 0 | $0.00 | 6,740 | $909,900.00 | 0 | $0.00 | 6,740 | $909,900.00 |
| 9 | 36" PVC SEWER PIPE | LF | $145.00 | 0 | $0.00 | 5,600 | $812,000.00 | 3,770 | $546,650.00 | 9,370 | $1,358,650.00 |
| 10 | DEWATERING | LF | $50.00 | 12,400.00 | $620,000.00 | 27,190.00 | $1,359,500.00 | 15,370.00 | $768,500.00 | 54,960 | $2,748,000.00 |
| 11 | FORCEMAIN | LF | $90.00 | 14,200 | $1,278,000.00 | 6,400 | $576,000.00 | 0 | $0.00 | 20,600 | $1,854,000.00 |
| 12 | JACKING | LF | $800.00 | 250 | $200,000.00 | 750 | $600,000.00 | 460 | $368,000.00 | 1,460 | $1,168,000.00 |
| 13 | LIFT STATION | EACH | $500,000.00 | 0 | $0.00 | 2 | $1,000,000.00 | 0 | $0.00 | 2 | $1,000,000.00 |
| 14 | PRECAST MANHOLE | EACH | $8,000.00 | 35 | $283,428.57 | 78 | $621,485.71 | 44 | $351,314.29 | 157 | $1,256,229.00 |
| | **Total Schedule "B"** | Estimated Construction Cost | | | **$3,229,430** | | **$7,352,990** | | **$2,984,970** | | **$13,567,379.00** |
| | | Rounded cost | | | $3,300,000 | | $7,400,000 | | $3,000,000 | | $13,600,000 |

**Schedule "C" - Watermain**

| Item | Description | Unit | Unit Price | Growth Area A | | Growth Area B | | Growth Area C | | Total Estimated Quantity | Total Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | Estimated Quantity | Estimated Cost | | |
| 1 | TREATMENT | GPM | $0.00 | 2,100 | $0.00 | 3,500 | $0.00 | 1,800 | $0.00 | 7,400 | $0.00 |
| 2 | 6" WATERMAIN - PVC PIPE | LF | $26.00 | 1,210 | $31,460.00 | 3,090 | $80,340.00 | 1,410 | $36,660.00 | 5,710 | $148,460.00 |
| 3 | 10" WATERMAIN - PVC PIPE | LF | $32.00 | 6,250 | $200,000.00 | 12,340 | $394,880.00 | 2,545 | $81,440.00 | 21,135 | $676,320.00 |
| 4 | 12" WATERMAIN - PVC PIPE | LF | $44.00 | 17,850 | $785,400.00 | 34,750 | $1,529,000.00 | 15,700 | $690,800.00 | 68,300 | $3,005,200.00 |
| 5 | 16" WATERMAIN - PVC PIPE | LF | $56.00 | 0 | $0.00 | 0 | $0.00 | 9,950 | $557,200.00 | 9,950 | $557,200.00 |
| 6 | 18" WATERMAIN - PVC PIPE | LF | $60.00 | 0 | $0.00 | 14,650 | $879,000.00 | 1,400 | $84,000.00 | 16,050 | $963,000.00 |
| 7 | 10" GATE VALVE AND BOX | EACH | $1,300.00 | 23 | $30,468.75 | 46 | $60,157.50 | 10 | $12,406.88 | 79 | $103,034.00 |
| 8 | 12" BUTTERFLY VALVE | EACH | $2,500.00 | 45 | $111,562.50 | 87 | $217,187.50 | 39 | $98,125.00 | 171 | $426,875.00 |
| 9 | 16" BUTTERFLY VALVE | EACH | $3,600.00 | 0 | $0.00 | 0 | $0.00 | 25 | $89,550.00 | 25 | $89,550.00 |
| 10 | 18" BUTTERFLY VALVE | EACH | $3,800.00 | 0 | $0.00 | 37 | $139,175.00 | 4 | $13,300.00 | 40 | $152,475.00 |
| 11 | WATER TOWER | MG | $2,000,000.00 | 0.5 | $1,000,000.00 | 0.75 | $1,500,000.00 | 0.5 | $1,000,000.00 | 2 | $3,500,000.00 |
| 12 | HYDRANT / BOX / VALVE | EACH | $6,000.00 | 60 | $361,500.00 | 154 | $926,100.00 | 70 | $422,925.00 | 285 | $1,710,525.00 |
| 13 | WELL AND RAW WATER LINES | EACH | $500,000.00 | 2 | $1,000,000.00 | 6 | $3,000,000.00 | 3 | $1,500,000.00 | 11 | $5,500,000.00 |
| 14 | JACKING | LF | $800.00 | 0 | $0.00 | 750 | $600,000.00 | 200 | $160,000.00 | 950 | $760,000.00 |
| | **Total Schedule "C"** | Estimated Construction Cost | | | **$3,520,400** | | **$9,325,840** | | **$4,746,410** | | **$17,592,639.00** |
| | | Rounded cost | | | $3,600,000 | | $9,400,000 | | $4,800,000 | | $17,600,000 |

| | | | | | |
|---|---|---|---|---|---|
| **Estimated Construction Costs** | Street & Storm Sewer | $0 | $0 | $0 | $0 |
| | Sanitary Sewer | $3,300,000 | $7,400,000 | $3,000,000 | $13,700,000 |
| | Water | $3,600,000 | $9,400,000 | $4,800,000 | $17,800,000 |
| | | $6,900,000 | $16,800,000 | $7,800,000 | $31,500,000 |
| | Contingency & Overhead 30% | $2,070,000 | $5,040,000 | $2,340,000 | $9,450,000 |
| | ROW ($40,000 per Acre) | $1,138,700 | $2,496,800 | $1,411,400 | $5,046,900 |
| | **Total Estimated Project Cost** | **$10,109,000** | **$24,337,000** | **$11,552,000** | **$45,998,000** |

# ATTACHMENT 6

## Local Surface Water Management Plan

# Water Management Plan

July 2019

**Wetland Protection**

**Water Quality**

**Flood Control**

Hakanson Anderson

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**APPENDIX A**
WMO Joint Powers Agerements

# 1.0 Introduction and Executive Summary

## 1.1 Purpose of the Plan

The City of East Bethel is located in the north central portion of Anoka County. The City has an abundance of water resources which include numerous wetlands, several large lakes, and wooded areas, parks, and recreational lands. This plan provides the framework to be followed to preserve these resources as the city develops.

This plan was prepared to fulfill the legal requirements of the Metropolitan Surface Water Planning Rules (Chapter 8410). This plan also meets the current adopted policies and requirements of each of the Water Management Organizations within the city and other local, state, and federal agencies.

This plan was revised as part of the City's 2040 Comprehensive Plan Update.

## 1.2 General Approach to Planning

The general approach to water resource planning focuses on wetland protection, water quality, and flood control; each are described below.

### 1.2.1 Wetland Protection

Stormwater runoff carries soil particles, nutrients, and contaminants which can change the ecological balance of the receiving water body. Changes in the volume or rate of stormwater entering or discharging from the water body can also change the ecological balance. Change in the ecological balance of a wetland often results in changes in the water quality, changes in animal and fish habitat, replacement of native vegetation with invasive and tolerant plant species, and/or other impacts to the wetland's functions and values.

The State of Minnesota has published a guidance document which develops a methodology for determining the susceptibility of wetlands to degradation by stormwater input. This methodology relates wetland type to a level of susceptibility as shown in Table 3-2. Wetlands such as bogs and fens can be easily degraded by changes in the stormwater inflows and are designated as highly susceptible. On the other hand, floodplain forests can tolerate relatively significant changes in the chemical and physical characteristics of stormwater inflow without degradation and are therefore slightly susceptible. Commonly observed shallow marshes and wet meadows dominated by cattail and reed canary grass (respectively) have a moderate susceptibility to stormwater fluctuations.

Wetland management standards were developed to determine how and when stormwater should be routed through a wetland to minimize potential impacts. These standards, shown in Table 3-2, were largely based on the state guidance document. These standards determine tolerable hydrologic change in terms of bounce (difference

between the peak flood elevation and the wetland elevation), inundation period (time that flood waters temporarily stored in the wetland exceed the wetland elevation), and runout control (elevation of the outlet).

These standards provide guidance for the management of stormwater to minimize wetland impacts. It is assumed that wetland impacts will be minimized and existing wetland functions and values will be maintained if the proposed management system and criteria meet the management standards shown in Table 3-2.

### 1.2.2 Water Quality Protection

Within the eight main watersheds of the City of East Bethel, there are hundreds of water bodies ranging in size from lakes to small stormwater detention basins. Nonpoint pollution associated with stormwater runoff creates adverse impacts; the degree of impact depends on the water body's natural ability to remove, absorb, or process the pollutants through chemical, physical, or biological processes. Poor water quality usually indicates a situation where the resource receives more nutrients, or other pollutants, than can be processed naturally. Planning for water quality protection is necessary to preserve the beneficial uses of existing water bodies, as well as to evaluate wetland impacts as described above.

All water bodies will be classified into one of three groups. The classification groups are based on WMO's criteria and wetland vegetation susceptibility. Table 3-3 defines the water quality classification groups adopted by the city. Section 5 discusses how each group will be managed for water quality.

### 1.2.3 Flood Control

The flood and rate control portion of the planning consisted of estimating the 100-year flood elevation and discharge rate for each watershed. East Bethel has vast amounts of stormwater storage available in its wetlands and lakes. This storage was used in the development of the hydrologic model for the city. A summary of the watershed data is included in Section 11.

### 1.2.4 Stormwater Pollution Prevention Program

As required by the Clean Water Act, the City of East Bethel has prepared a Stormwater Pollution Prevention Program (SWPPP). The SWPPP is a requirement of the NPDES General Permit No. MNR040000, which authorizes Municipal Separate Storm Sewer System (MS4) operators to discharge stormwater. The goal of the Stormwater Pollution Prevention Program, when implemented, is to reduce the discharge of pollutants into receiving waters to the Maximum Extent Practicable (MEP).

There are six minimum control measures outlined below that are required to be included in the Stormwater Pollution Prevention Program under the requirements of the permit. Within each of the six minimum control measures, there are a number of Best Management Practices (BMP's) that are required for each minimum control measure

which are outlined in the City's SWPPP. The six minimum control measures are as follows:

1. Public Education and Outreach on Stormwater Impacts
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management in New Development and Redevelopment
6. Pollution Prevention/Good Housekeeping for Municipal Operations

## 1.3 Management Goals and Policies

As part of the planning process, goals and policies were developed for the management of resources within East Bethel. Goals propose the desired end; policies provide the means to achieve the goals. Goals are provided for wetland protection, water quality, water quantity, flood plain and shoreland management, recreation, open space and wildlife management, groundwater protection, erosion and sedimentation control, and drainageway maintenance. The goals and policies of this plan are presented in Section 4, and Section 5 – Implementation provides more specific details on how the goals and policies will be achieved.

## 1.4 Plan Organization

The Plan is organized as follows:

- **Section 2** presents **physical and general information** which relates to the city's resources.
- **Section 3** describes East Bethel's **surface water resources.** Section 3 presents the wetland, water quality, and water quantity management strategies.
- **Section 4** presents the **city's water resource goals and policies.**
- **Section 5** presents the **implementation strategies** to accomplish the goals and policies.
- **Sections 6 through 11** present **inventory data and management information** for each of the eight major watersheds within the city.
- **Section 12** outlines the procedures for **amending** this Plan.
- **Section 13** presents the required **submittals** for a development.
- **Section 14** presents a **description** of the **Hydrology Model** used for the plan.
- **Section 15** presents the **glossary of terms.**

# 2.0 Physical Environment Inventory

## 2.1 Climate

East Bethel and the Twin Cities area have a continental-type climate because of their proximity to the geographic center of the North American continent. The area has moderate amounts of precipitation, wide daily and seasonal temperature fluctuations, warm humid summers, and cold winters. Figure 2-1 summarizes the normal monthly temperatures and Figure 2-2 summarizes the normal monthly precipitation for the area.

The freeze-free period for the area is long enough that the stable crops of the area reach maturity without much danger from frost. The 50% probability of temperatures of 32º or lower can be expected later than May 12 and earlier than September 27.

Precipitation patterns are influenced by moisture from the Gulf of Mexico. Precipitation occurs as rain, freezing rain, hail, and snow. Tornadoes, severe thunderstorms, and hailstorms occur occasionally and are of short duration. Measurable precipitation of 0.01 inch occurs on about 110 days per year, 4 of which have 1 inch or more. Rainfall intensity of about 1 ½ inches an hour can be expected to recur once in 3 years. Annual normal precipitation is approximately 30 inches, of which approximately two-thirds occurs during the summer months of May through September.

The annual snowfall in East Bethel averages approximately 44 inches. Runoff from snowmelt can occur any time during the winter. The most severe snowmelt runoff conditions usually occur in March and early April, especially when rain falls on top of the snowpack.

The prevailing winds are northwesterly in the winter and spring, and shift to east and southeasterly in summer and fall. The average annual wind speed is close to 10 miles per hour.

## 2.2 Precipitation Measurement Station

The National Oceanic and Atmospheric Administration (NOAA) monitoring network has a long-term precipitation station near East Bethel. The station is in St. Francis, which is a northwestern neighbor of East Bethel. This station was selected to be used as a reference for any entity conducting future water quality or quantity studies in the city. The current thirty-year normal (1961-90) for annual precipitation at the St. Francis station is 29.84 inches.

## 2.3 Topography and Landforms

The topography in East Bethel was shaped by several ice advances into east-central Minnesota during the last (Wisconsin) glaciation, which occurred about 10,000 years

ago. In East Bethel, a large glacial outwash deposit, called the Anoka sandplain is the dominant geomorphic feature. It was formed largely by glacial drainage (melt-water) from the receding Grantsburg sublobe of the Des Moines glacier. The surface of the Anoka sandplain is flat to moderately undulating. Low regions of upland represent areas of till left from previous ice movements that were not buried by the outwash sand. Other features of positive relief are patches of sand dunes, formed by southwesterly winds after the sandplain was abandoned by the outwash streams. Landscape features of negative relief include numerous lakes and marshes which formed as ice blocks, originally buried by the outwash sand melted to create the depressions, which are now filled with water or organic soils. A topographic map can be seen in Figure 2-3.

## 2.4 Watersheds and Drainage Patterns

The City of East Bethel is within the jurisdiction of the Upper Rum River Watershed Management Organization (URRWMO) and the Sunrise River Watershed Management Organization (SRWMO). In general, water from the URRWMO drains to the Rum River, and water from the SRRWMO drains to the Sunrise River.

With the county ditch system in place, the drainage patterns for the City of East Bethel are fairly well defined. This plan divides the city into eight major watersheds; they include Fish Lake, Coopers Lake, Deer Lake, Sunrise River, Crooked Brook, Coon Lake, Rice Lake and Cedar Creek. These eight watersheds and the WMO boundaries are shown on Figure 2-4. Each of these eight major watersheds are further divided into subwatersheds. Each subwatershed is designated by a number that corresponds to the subwatershed and the outlet. Each subwatershed is discussed further in Sections 6 through 10.

The Fish Lake Watershed is located in northeastern East Bethel. It drains west to Cedar Creek and ultimately to the Rum River. Fish Lake is the only major water body located in this watershed.

The Coopers Lake Watershed is located in northwestern East Bethel. It drains south to Cedar Creek and ultimately to the Rum River. Coopers Lake and Minard Lake are the two major water bodies located in this watershed.

The Deer Lake Watershed is located in central East Bethel. It drains south to the Crooked Brook Watershed, eventually reaching Cedar Creek and ultimately joining the Rum River. Mud Lake, Deer Lake and Ned's Lake are the major water bodies in this watershed.

The Sunrise River Watershed is located in the northeast corner of East Bethel. It drains east to the Sunrise River. There are no major water bodies located in this watershed.

The Crooked Brook Watershed is located in the southwest corner of East Bethel. It drains northwest, through county ditches to Cedar Creek and ultimately to the Rum River. There are no major water bodies in this watershed.

The Coon Lake Watershed is located in the southeast corner of East Bethel. It drains southeast, through county ditches to Coon Lake and ultimately to the Sunrise River. Devil Lake, Anderson Lake, Goose Lake, and Coon Lake are the major water bodies located in this watershed.

The Rice Lake Watershed is located in east central East Bethel. It drains southeast, through county ditches, to Rice Lake and ultimately to the Sunrise River. The only major water body in this watershed is Rice Lake.

The Cedar Creek Watershed runs from the north central border to the west central border of East Bethel. This watershed contains Cedar Creek. Cedar Creek drains from Athens Township, north of East Bethel, through East Bethel, and eventually joins the Rum River in the City of Andover. Approximately 75% of the stormwater runoff in East Bethel eventually reaches Cedar Creek.

The Rum River joins the Mississippi River in the City of Anoka. The Sunrise River first drains to the St. Croix River, which then, eventually, joins the Mississippi River in eastern Minnesota.

## 2.5 MnDNR Protected Waters, Wetlands and Water Courses

The Minnesota Department of Natural Resources (MnDNR) has designated certain waters of the state as public waters (Minn. Rules 6115.1060). MnDNR "Protected Waters and Wetlands" maps show public waters within the city. A MnDNR permit is required for work within a designated public water. Protected waters and wetlands maps show public waters as one of the following:

- Protected waters
- Protected wetlands
- Protected watercourses

Figure 2.5 shows the protected waters, wetlands, and water courses located in the city. Protected waters are identified with a number and the letter "P". Protected wetlands are identified with a number and the letter "W". Protected wetlands include, and are limited to, types 3, 4, and 5 wetlands that have not been designated protected waters and are 2 ½ acres or more in size (10 acres in unincorporated area). Cedar Creek is the only protected watercourse in East Bethel. Figure 2-6 illustrates the typical wetland types found in East Bethel.

### 2.5.1 Protected Waters

There are 19 protected waters within the boundary of East Bethel. All of these basins are relatively shallow, ranging from partially-drained wetland areas to moderately shallow lakes (average depth less than 10 feet). The following provides a brief

description of East Bethel's major protected waters/lakes. Table 2-1 lists the protected waters within East Bethel.

**Table 2-1**
**East Bethel Public Waters**

| I.D. No. | Name | Twp./Range | Section(s) | Local Government Unit | Group [2] | Area (acres) | DNR Shoreland[1] Classification | OHW |
|---|---|---|---|---|---|---|---|---|
| 02-42P | Coon Lake | 32,33/22,23 | 1-3, 25-27; 35-36 | Ham Lake, Linwood, East Bethel | 1 | 1498 | GD | 904.75 |
| 02-43P | Rice Lake | 33/22,23 | 18,19,13,24 | Linwood, East Bethel | 3 | 262 | NE | |
| 02-55P | Lone Pine Lake | 33/23 | 2,3,10,11 | East Bethel | 1 | 209 | NE | |
| 02-56P | Booster Pond | 33/23 | 4 | East Bethel | 1 | 15 | NE | |
| 02-57P | Neds Lake | 33/23 | 8,9,16,17 | East Bethel | 1 | 551 | NE | |
| 02-58P | Devil Lake | 33/23 | 14,23 | East Bethel | 3 | 103 | NE | |
| 02-59P | Deer Lake | 33/23 | 15,16,21,22 | East Bethel | 1 | 376 | NE | |
| 02-60P | Mud Lake | 33/23 | 16 | East Bethel | 1 | 184 | NE | |
| 02-62P | Goose Lake | 33/23 | 23,26 | East Bethel | 3 | 257 | NE | |
| 02-63P | Anderson Lake | 33/23 | 24.25 | East Bethel | 3 | 84 | NE | |
| 02-65P | Fish Lake | 34/23 | 25,26,35,36 | East Bethel | 1 | 432 | NE | |
| 02-67P | Minard Lake | 34/23 | 29,30,31 | East Bethel | 1 | 124 | RD | 923.00 |
| 02-70P | Coopers Lake | 34/23 | 31,32 | East Bethel | 1 | 58 | NE | |
| 02-151P | unnamed lake | 34/23 | NE 26 | East Bethel | 1 | 35 | NOTSL | |
| 02-152P | Cedar Bog Lake | 34/23 | NW 27 | East Bethel | 1 | 3 | NOTSL | |
| 02-154P | unnamed lake | 34/23 | 27 | East Bethel | 1 | 3 | NOTSL | |
| 02-160P | unnamed lake | 34/23 | 35 | East Bethel | 1 | 5 | NOTSL | |
| 02-161P | unnamed lake | 34/23 | 35 | East Bethel | 1 | 23 | NOTSL | |
| 02-440P | unnamed lake | 33/23 | 4 | East Bethel | 1 | 2 | NOTSL | |

[1] NE = Natural Environment, RD = Recreational Development, GD = General Development, NOTSL = Not regulated by shoreland rules.
[2] See Section 3.2.

#### *2.5.1.1 Coon Lake (02-42P)*

Coon Lake is a 1,507-acre meandered basin located in the cities of East Bethel, Ham Lake and Columbus. It is the largest lake in Anoka County with an average depth of 10 feet and a maximum depth of 25 feet. Coon Lake has a fish population which consists of White Sucker, Carp, Black Bullhead, Brown Bullhead, Yellow Bullhead, Northern Pike, Yellow Perch, Largemouth Bass, Pumpkinseed Sunfish, Bluegill Sunfish, Hybrid Sunfish, White Crappie, Black Crappie and Golden Shiner. Existing water quality data for Coon Lake is shown on Table 2-2. Coon Lake is currently on the Minnesota Pollution Control Agencies 303(d) Impaired Waters list for mercury. This is further discussed in Section 3.4.2.2.

**Table 2-2**
**Existing Water Quality Data**
**Coon Lake**

| Parameter[1] | Unit | 1980 | 1984 | 1989 | 1994 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | | | | | | | | | | | | | | | 8.0 |
| Specific Conductivity | uS/cm | | | | | | | | | | | | | | 190 |
| Turbidity | FNRU | | | | | | | | | | | | | | 6 |
| Dissolved Oxygen | mg/l | | | | | | | | | | | | | | 8.5 |
| Temperature | ºC | | | | | | | | | | | | | | 23 |
| Salinity | % | | | | | | | | | | | | | | 0 |
| Chlorophylla-a | ppb | 28.3 | 16.2 | 13.1 | 15.7 | 14.5 | 14.4 | 9.4 | 14.6 | 17.6 | 14.8 | 16.6 | 4.6 | 6.2 | 17 |
| Total Phosphorus | ppb | 40 | 50 | 51 | 33 | 34 | 29.8 | 20.6 | 25.8 | 42.3 | 29.6 | 33.7 | 33.8 | 32 | 37 |
| Secchi | m | 1.2 | 1.5 | 1.8 | 1.9 | 1.4 | 1.8 | 2.3 | 2.0 | 1.8 | 1.9 | 1.8 | | | 1.8 |
| TSI | | 59 | 58 | 57 | 54 | 56 | 54 | 50 | 53 | 56 | 54 | 55 | | | |

[1] Results shown are average values. Detailed results can be obtained through the US EPA STORET data retrieval system.

#### *2.5.1.2 Rice Lake (02-43P)*

Rice Lake is a 633-acre meandered basin in the City of East Bethel and Linwood Township. The lake is affected by County Ditch No. 16, which inlets to the lake from the northwest. Rice Lake then outlets through a ditch/creek to Boot Lake.

#### *2.5.1.3 Devil Lake (02-58P)*

Devil Lake is a 69-acre meandered basin in East Bethel. The maximum depth of the lake is 4 feet. The lake is affected by County Ditch No. 56. The lake is now managed for waterfowl and furbearers.

#### *2.5.1.4 Deer Lake (02-59P)*

Deer Lake is a 376-acre meandered basin located in East Bethel. The lake has an average depth of 3 feet with a maximum of 9 feet. Some northern pike have been harvested over the years, but the lake contains mostly rough fish such as suckers and bullheads. The lake is managed by the Mn DNR as a waterfowl and furbearer habitat.

#### *2.5.1.5 Goose Lake (02-62P)*

Goose Lake is a 213-acre basin in East Bethel. The lake is affected by County Ditch No. 56 which runs through the lake and outlets to Coon Lake.

#### *2.5.1.6 Anderson Lake (02-63P)*

Anderson Lake is a 75-acre basin in East Bethel. The lake discharges to Coon Lake through a small unnamed ditch.

#### *2.5.1.7 Fish Lake (02-65P)*

Fish Lake is a 432-acre basin located within the Cedar Creek Natural History Area in East Bethel. The lake has an average depth of 3 feet with a maximum depth of 10 feet. Fish Lake was stocked with largemouth bass, crappie and northern pike between 1926 and 1942 and with northern pike in 1971. No further stocking has been undertaken. The lake experienced a winterkill in 1988 and 1989.

#### *2.5.1.8 Minard Lake (02-67P)*

Minard Lake is a 124-acre meandered basin in East Bethel. The lake has an average depth of 4 feet with a maximum depth of 7 feet. The lake is considered a marginal fish and game lake and is managed as a waterfowl and furbearer habitat by the Mn DNR. Two Secchi disc transparency measurements were made on the lake in 1990 at 2.5 feet and 1991 at 5.0 feet. No conclusions on problems or water quality can be made from this assessment.

#### *2.5.1.9 Coopers Lake (02-70P)*

Coopers Lake is a 58-acre basin in East Bethel. The lake was stocked with walleye and used for a rearing pond (fish stocking) by the Mn DNR from 1970 to 1983. As a rearing pond the lake failed to produce walleye fingerlings in 1983 and therefore no further similar efforts have been undertaken by the MnDNR.

Secchi disc transparency measurements were undertaken in 1975 and 1989 on Coopers Lake. Seventeen (17) observations in 1975 resulted in an average transparency of 6.5 feet as contrasted with two measurements of 2.0 feet in 1989. While the 1975 measurements would indicate that the lake is in a good to very good condition, the two 1989 measurements would reflect an extremely poor state. Further Secchi disc measurements would be necessary to define the water quality of Coopers Lake.

### 2.5.2 Protected Wetlands

In addition to the 19 protected waters, there are 39 other basins within the East Bethel area which have been inventoried by MnDNR. All of these basins are known as public waters wetlands (M.S., section 103G.005, subdivision 18) and therefore their beds along with the lakes are subject to regulatory authority of the Minnesota Department of Natural Resources (MnDNR).

Public waters wetlands mean all types 3, 4 and 5 wetlands, as defined in United States Fish and Wildlife Service Circular 39 (USDI, 1971), not included within the definition of public waters, that are ten or more acres in size in unincorporated areas, or 2-½ acres in incorporated areas. Table 2-2 lists the public waters wetlands subject to MnDNR jurisdiction.

## Table 2-3
## East Bethel Public Waters Wetlands

| I.D. No. | Name | Twp./Range | Section(s) | Local Government Unit | Group | Area (acres) | DNR Shoreland[1] Classification | OHW[2] |
|---|---|---|---|---|---|---|---|---|
| 02-61W | unnamed wetland | 33/23 | 17,18,19,2 | East Bethel | 1 | 39 | NOTSL | |
| 02-64W | unnamed wetland | 34/23 | 20,29 | East Bethel | 1 | 15 | NE | |
| 02-66W | unnamed wetland | 34/23 | 29 | East Bethel | 1 | 16 | NE | |
| 02-68W | unnamed wetland | 34/23 | 31 | East Bethel | 1 | 25 | NE | |
| 02-69W | unnamed wetland | 34/23 | 31,32 | East Bethel | 1 | 25 | NE | |
| 02-150W | unnamed wetland | 34/23 | 25 | East Bethel | 1 | 14 | NOTSL | |
| 02-153W | unnamed wetland | 34/23 | 29 | East Bethel | 1 | 11 | NOTSL | |
| 02-156W | unnamed wetland | 34/23 | 25,36 | East Bethel | 1 | 20 | NOTSL | |
| 02-157W | unnamed wetland | 34/23 | 36 | East Bethel | 1 | 9 | NOTSL | |
| 02-163W | unnamed wetland | 34/23 | 36 | East Bethel | 1 | 11 | NOTSL | |
| 02-166W | unnamed wetland | 33/23 | 3 | East Bethel | 1 | 4 | NOTSL | |
| 02-170W | unnamed wetland | 33/23 | 3 | East Bethel | 1 | 74 | NOTSL | |
| 02-171W | unnamed wetland | 33/23 | 5 | East Bethel | 1 | 5 | NOTSL | |
| 02-172W | unnamed wetland | 33/23 | 3 | East Bethel | 1 | 10 | NOTSL | |
| 02-175W | unnamed wetland | 34/24 | 30 | East Bethel | 1 | 7 | NOTSL | |
| 02-189W | unnamed wetland | 34/23 | 30 | East Bethel | 1 | 8 | NOTSL | |
| 02-190W | unnamed wetland | 34/23 | 30 | Bethel/ East Bethel | 1 | 74 | NOTSL | |
| 02-199W | unnamed wetland | 34/23 | 31 | East Bethel | 1 | 3 | NOTSL | |
| 02-280W | unnamed wetland | 34/23 | 36 | East Bethel | 1 | 3 | NOTSL | |
| 02-349W | unnamed wetland | 33/23 | 6,7 | East Bethel | 1 | 47 | NOTSL | |
| 02-350W | unnamed wetland | 33/23 | 7 | East Bethel | 1 | 6 | NOTSL | |
| 02-351W | unnamed wetland | 33/23 | 7 | East Bethel | 1 | 3 | NOTSL | |
| 02-366W | unnamed wetland | 33/23 | 19 | East Bethel | 1 | 10 | NOTSL | |
| 02-377W | unnamed wetland | 33/23 | NW 31 | East Bethel | 1 | 28 | NOTSL | |
| 02-379W | unnamed wetland | 33/23 | 31 | East Bethel | 1 | 11 | NOTSL | |
| 02-380W | unnamed | 33/23 | 31 | East Bethel | 1 | 3 | NOTSL | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | wetland | | | | | | | |
| 02-381W | unnamed wetland | 33/23 | 31 | East Bethel | 1 | 4 | NOTSL | |
| 02-393W | unnamed wetland | 32,33/23 | 6;31 | Oak Grove/ East Bethel | 1 | 47 | NOTSL | |
| 02-439W | unnamed wetland | 33/23 | 8 | East Bethel | 1 | 27 | NOTSL | |
| 02-442W | unnamed wetland | 33/23 | 3,10 | East Bethel | 1 | 11 | NOTSL | 915.29 |
| 02-452W | unnamed wetland | 33/23 | 10 | East Bethel | 1 | 8 | NOTSL | |
| 02-453W | unnamed wetland | 33/23 | NE 9 | East Bethel | 1 | 4 | NOTSL | |
| 02-455W | unnamed wetland | 33/23 | 9 | East Bethel | 1 | 21 | NOTSL | |
| 02-456W | unnamed wetland | 33/23 | 8,17 | East Bethel | 1 | 10 | NOTSL | |
| 02-457W | unnamed wetland | 33/23 | NW 16 | East Bethel | 1 | 5 | NOTSL | |
| 02-459W | unnamed wetland | 33/23 | 15 | East Bethel | 1 | 5 | NOTSL | |
| 02-472W | unnamed wetland | 32/23 | 4 | Ham Lake/ East Bethel | 1 | 12 | NOTSL | |
| 02-718W | unnamed wetland | 33/23 | 8 | East Bethel | 1 | 27 | NOTSL | |
| 02-719W | unnamed wetland | 33/23 | 10 | East Bethel | 1 | 4 | NOTSL | |

[1] NE = Natural Environment, NOTSL = Not regulated by shoreland rules.
[2] The Ordinary High Water (OHW) elevation is recorded from the 1929 datum unless otherwise noted.

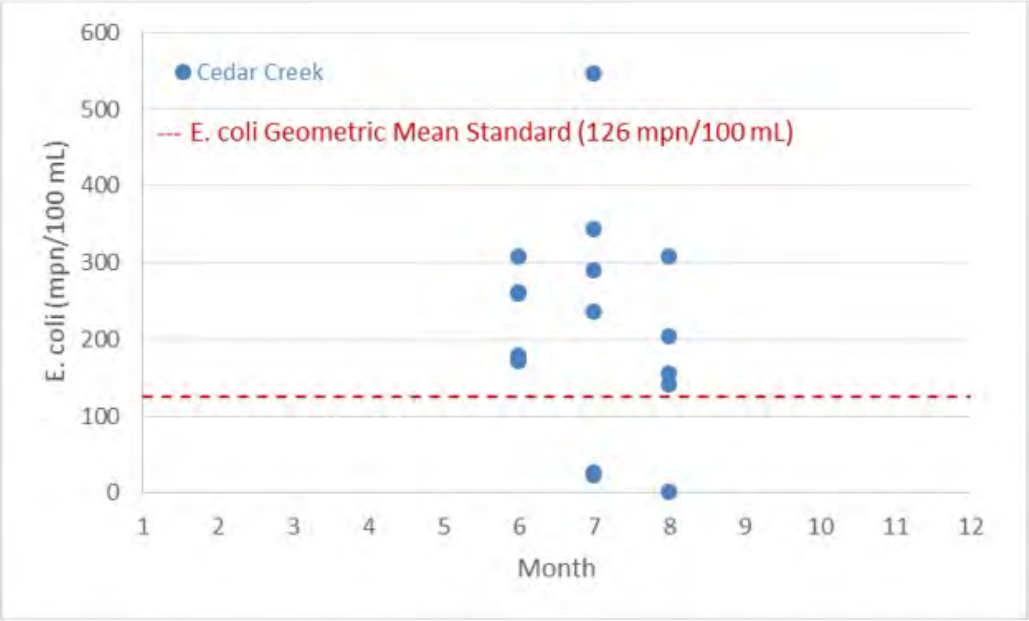
### 2.5.3 Watercourses

Public waters also includes all natural and altered watercourses with a total drainage area greater than two square miles. Cedar Creek is the only protected watercourse in East Bethel. The other watercourse of interest in East Bethel is Crooked Brook, which is further discussed below.

#### *2.5.3.1 Cedar Creek*

Cedar Creek is a large stream that originates in south-central Isanti County and flows south. The Cedar Creek drainage area is approximately 66.2 square miles. It is a silty bottom stream, and highly sinuous with many oxbows. In most areas it has a broad, flat floodplain. In north-central Anoka County is flows through some areas of high-quality natural communities including the Cedar Creek Natural History Area. Habitat surrounding the stream in other areas is of moderate to high quality. Cedar Creek is a tributary to the Rum River, and Crooked Brook (County Ditch 67) is an important tributary to Cedar Creek.

Cedar Creek is currently on the Minnesota Pollution Control Agency 303(d) Impaired Waters list for high *E. coli,* which is a naturally occurring bacteria that can be harmful to humans if ingested at high levels. The Minnesota water quality rules state, "*E.coli* bacteria shall not exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than 10% of all samples taken during any calendar month individually exceed 1,260 organisms per 100 mL. The standard applies only between April 1 and October 31." Cedar Creek was monitored by MPCA from 2006-2015; the water quality data is shown in Graph 1 below.




**Graph 1**. *E. coli* data by month from 2006-2015 from the Rum River TMDL report

Sources for high E. coli can include waste from livestock, wildlife, human, and pet sources. The City of East Bethel was given a wasteload load allocation based on the flow regime of Cedar Creek. High reductions in the very high flow zones typically indicates larger area-induced indirect pollutant sources, while high reduction in very low flow zones can be caused by direct pollutant loads in close proximity to the stream, such as livestock in a stream or failing septic systems. Cedar Creek needs reduction in very high, mid, and low flow zones. East Bethel's Wasteload allocation is in Table 2-4. This is further discussed in Section 3.4.2.3.

**Table 2-4**
**East Bethel Cedar Creek *E. coli* Wasteload Allocation**

| TMDL Component (billions of organisms/day) | Flow Zone | | | | |
|---|---|---|---|---|---|
| | **Very High** | **High** | **Mid** | **Low** | **Very Low** |
| East Bethel City MS4 | 108.39 | 56.62 | 35.14 | 24.65 | 13.06 |
| Subwatershed Reduction | 81% | 0% | 69% | 27% | NA |
| Overall Subwatershed Reduction Required | 58% | | | | |

### *2.5.3.2 Crooked Brook*

Crooked Brook, which is County Ditch 67, is a small ditch/stream that originates in southwest East Bethel and flows northwest where it joins Cedar Creek. It is perhaps the largest tributary to Cedar Creek. Crooked Brook is currently on the Minnesota Pollution Control Agency 303(d) Impaired Waters list for low dissolved oxygen. This is further discussed in Section 3.4.2.1.

The Anoka Conservation District monitored Crooked Brook between 1998 and 2006. The water quality data is shown in Table 2-5. Since then, a streambank restoration project took place along a residential property that borders Crooked Brook in East Bethel in 2010. The Petro Streambank Restoration project included removing invasive species, grading, stabilization via fabrics and biologs, and native species buffer planting. The project length was 170 feet and stabilized 2,550 square feet.

In more recent years, the 2016 Rum River Watershed Monitoring and Assessment Report reported Crooked Brook 2013 data supporting above threshold scores for fish and macroinvertebrates, which "…help[s] overcome the existing dissolved oxygen impairment from a previous assessment." The 2017 Rum River Watershed TMDL study mentioned Crooked Brook's DO impairment but did not address this issue. The report stated, "[it] will be addressed in subsequent watershed assessment and restoration

activities." The 2019 Upper Rum River Watershed Management Plan does not consider Crooked Brook a high priority, but the watershed encourages efforts to improve its water quality. Further investigation is still needed to determine the TMDL for dissolved oxygen.

**Table 2-5**
**Existing Water Quality Data**
**Crooked Brook**

| Parameter[1] | Unit | 1998 | 2001 | 2003 | 2006 |
|---|---|---|---|---|---|
| pH | | 7.6 | 7.4 | 7.5 | |
| Specific Conductivity | uS/cm | 384 | 383 | 425 | |
| Turbidity | FNRU | 15 | 5 | 4 | |
| Dissolved Oxygen Max. | mg/l | 8.0 | 9.6 | 11 | 5.2 |
| Dissolved Oxygen Min. | mg/l | 4.3 | 4 | 4.20 | 2.8 |
| Dissolved Oxygen Average | mg/l | 5.7 | 6.2 | 6.2 | 5.7 |
| Temperature | ºC | 22.6 | 19.3 | 14 | |
| Salinity | % | 0.01 | 0.01 | 0.01 | |
| Chloride | mg/l | 21 | 26 | 30 | |
| Total Phosphorus | ppb | 140 | 145 | 182 | |
| Total Suspended Solids | mg/l | 15 | 10 | 19 | |

[1] Results shown are average values unless otherwise noted. Detailed results can be obtained through the US EPA STORET data retrieval system.

### *2.5.3.3 St. Croix River*

The St. Croix River runs between the state of Minnesota and state of Wisconsin and has a watershed basin covering approximately 7,760 square miles. The City of East Bethel is spilt between two subwatersheds – the Upper Rum River and Sunrise. The Sunrise subwatershed is a part of the St. Croix River watershed. The 2012 Lake St. Croix Nutrient TMDL gave the state of Minnesota a categorical phosphorus WLA, which included the East Bethel MS4. The other MS4s include: MnDOT Metro District, Century College, Cottage Grove, Forest Lake, Grant, Hugo, Lake Elmo, Mahtomedi, Maplewood, North Branch, North St. Paul, Oakdale, Pine Springs, Ramsey County, Stillwater, Valley Branch WD, Washington County, West Lake Township, White Bear Lake, and Woodbury.

Since the 2012 TMDL report, four more MS4s were added: Bayport, Minnesota Correction Facility – Stillwater, Oak Park Heights, and Wyoming City. MCPA shifted 1,606 pounds per year of phosphorus from the TMDL load allocation to the waste load allocation due to the new areas. The WLA for the phosphorus for all of Minnesota's MS4s is 24.1 lbs/day.

## 2.6 Other Regulated Wetlands

In addition to the MnDNR waters discussed in Section 2.5, many additional wetlands within the city are included on the NWI maps but are not MnDNR water bodies. The following three characteristics make these water bodies exclusive from the MnDNR public waters and public waters wetlands.

- First, an individual basin may be dominated by wetland habitat (Types 1,2,6, and 7 [USDI, 1971] not statutorily covered by MnDNR and yet is immediately adjacent to an inventoried MnDNR basin or watercourse.
- Second, an individual isolated wetland basin may be smaller than the minimum MnDNR size (2 ½ or 10 acres) as discussed previously.
- Third, an individual isolated wetland basin may be dominated by habitat types (Types 1,2,6, and 7) not statutorily covered by MnDNR.

Excavation, filling, grading and/or development actions which may adversely affect these resources may be subject to federal permitting authority under Sections 404 and 401 of the Clean Water Act, (33 USC 125 et. seq.) and city approval under the 1991 Wetland Conservation Act, as amended.

## 2.7 County Ditches

A network of ditches was constructed in the late 1800s and early 1900s to drain surface waters from existing lakes and wetlands in northwest Anoka County in order to make additional lands available for agricultural use. In East Bethel, there were eight ditches constructed by Anoka County during the period of 1891 through 1922. This network of ditches drains most of the land in East Bethel. Minimal maintenance has been performed on the ditches since their construction, therefore the ditch system is in poor condition and operating below design capacity. The county ditch system is shown in Figure 2-3.

Land use within East Bethel has changed dramatically since the construction of the ditch system. Although much of the city has retained a rural character, significant urban cluster development has occurred. The ditch systems within residential areas no longer being used to beneficiate agricultural operations but have become a conveyance for urban stormwater runoff.

## 2.8 Groundwater Resource Data

The surficial outwash (Anoka Sand Plain) deposits located across East Bethel will yield small to large quantities of water. Where the aquifer has sufficient saturated thickness, a well may yield several hundred gallons of water per minute. The regional groundwater flow within the surficial aquifers and glacial drift is generally to the southeast, except near Cedar Creek where groundwater tends to flow toward the creek.

Groundwater is the primary drinking water source in the city. Groundwater is an important water resource and can be obtained from three aquifers within the city. The first groundwater resource is the shallow surficial drift aquifer, which is most susceptible to contamination. See Section 2.15 for further discussion on groundwater contamination. The next aquifer, which is hydraulically connected to the surficial aquifer, is the Franconia-Ironton-Galesville. The third available groundwater resource is the lower lying Mt. Simon-Hinckley aquifer.

The MnDNR has observation wells located throughout the state. The two wells located nearest to East Bethel are in Soderville and Bethel. Water levels have been measured approximately monthly in these wells since the early 1970's. These wells are completed at the water table in the fine sand deposits of the Anoka Sand Plain aquifer. This aquifer is quite uniform. Although these wells do not identify site-specific seasonal high-water levels, this data provides information from which we can generalize about the expected behavior of the water table in the city.

The highest water levels in the MnDNR wells are typically observed in April or May, and the lowest water levels typically occur in February. Water levels in the late summer and early fall are near the mid-point of the seasonal water level fluctuation. The groundwater elevation for these two wells are shown in figures 2-7 and 2-8.

## 2.9 Soils

The United States Department of Agriculture, Soil Conservation Service published the Soil Survey of Anoka County in 1977. The survey lists soils found in Anoka County along with their general characteristics and limitations on land use and development. The Soil Survey should be referenced for soils identifications and associated limitations on specific development sites. Figure 2-9 shows the soil associations occupying the City.

The City contains three soil associations. The Hubbard-Nymore Association is located in two areas on the northern limit of the city. This association is nearly level to slightly sloping and contains excessively drained soils that are sandy throughout. Hubbard soils are black and dark grayish brown at the surface and are underlain by dark brown and yellowish-brown coarse sand. Nymore soils are very dark gray and black to very dark grayish brown loamy sand underlain by dark brown loamy sand.

Soils of the Hubbard-Nymore Association are well-suited to urban uses and moderately well-suited to farming and recreation. Control of wind erosion and the water table in low-lying areas is often necessary.

The majority of the city is occupied by the Zimmerman-Isanti-Lino Association. This association ranges from excessively drained to very poorly drained, and is dominated by fine sands throughout. This association is a broad undulating sand plain left by outwash from receding glaciers. A high-water table is characteristic of the association. Zimmerman soils are excessively drained soils consisting of very dark gray and dark-

brown fine sand underlain by yellowish-brown and light yellowish-brown fine sand. The Isanti soils are very poorly drained black fine sandy loam underlain by gray and dark gray fine sand. Isanti soils occur in depressions and low-lying areas. Lino soils are somewhat poorly drained black, dark gray, or dark grayish-brown loamy fine sand underlain by mottled brown and light brownish-gray fine sand.

Much of this area is well-suited to urban development where the high-water table doesn't limit its use. The soils are moderately well-suited to farming and recreation. Primary management concerns include control of wind erosion and the water table in low-lying areas.

A small area of the Rifle-Isanti Association is located in the southeast corner of the city. This association is nearly level, very poorly drained soils formed in organic material and fine sand. Rifle soils occur in large bogs and are very poorly drained. They have a surface layer of very dark brown mucky peat. The next layer and the underlying material are dark yellowish-brown and very dark grayish-brown mucky peat.

Isanti soils occur as slight rises and narrow rims around island like features and are very poorly drained. They have a surface layer typically of black loamy fine sand or fine sandy loam. The subsoil is gray and dark-gray fine sand. The underlying material is light brownish-gray fine sand.

Most of this association is poorly suited to urban, farm, and recreational uses. A large part of this association is a game refuge. If drained, the organic soils are suited to specialty crops. The largest acreage is in cultured sod.

## 2.10 Native Vegetation

The City of East Bethel is in the northern deciduous forest region. The forest types were mainly northern hardwoods and oak. Within the oak forest were "oak openings" and scattered areas of pine. Grassland areas and scattered small wooded areas occurred on the Hubbard-Nymore association, especially on Hubbard soils. Small "oak openings," or savannas, were associated with Nymore soils and in some places with Sartell soils. Organic soil areas having poor drainage outlets were treeless. Other areas having better drainage were covered with stands of tamarack, white cedar, and black ash. Glacial till soils were covered with northern hardwood forest types, such as sugar maple, elm, basswood, red and white oak, ash, butternut, ironwood, and aspen.

The woodland that has not been cleared for crops is similar to what existed before settlement. It occurs as scattered small tracts and has been logged a number of times. Wooded areas are now very much in demand for home sites.

## 2.11 Land Use

Settlement of East Bethel began around 1850. The city is part of the Twin Cities Metropolitan area, and since 1950 has undergone rapid development. The population growth trend for East Bethel and the surrounding area is shown in the table below.

**Table 2-6**
**Population and Growth Trends for the Area**

| Local Government | 1970[a] | 1980[b] | 1990[b] | 2000[b] | 2010[c] | 2020[c] | 2030[c] | 2040[c] |
|---|---|---|---|---|---|---|---|---|
| City of East Bethel | 2,586 | 6,626 | 8,050 | 10,941 | 11,626 | 12,400 | 15,400 | 18,400 |
| City of Nowthen | 1,129[e] | 1,976[e] | 2429[e] | 3557[e] | 4,443 | 4,590 | 5,100 | 5,500 |
| City of Bethel | 311 | 272 | 394 | 443 | 466 | 480 | 520 | 550 |
| City of Ham Lake | 3,327[d] | 7,832 | 8,924 | 12,710 | 15,296 | 16,200 | 17,700 | 18,700 |
| City of St. Francis | 897 | 1,184 | 2,463 | 4,910 | 7,218 | 8,200 | 10,400 | 12,600 |
| City of Oak Grove | NA | NA | NA | 6903 | 8,031 | 8,600 | 9,500 | 10,400 |

a. U.S. Department of Commerce. Bureau of the Census. 1980 Census of the Population. Publication No. PC80-1-A25.
b. U.S. Census Bureau, 2000 Census of Population and Housing, *Population and Housing Unit Counts* PHC-3-25, Minnesota, Washington, DC, 2003.
c. Metropolitan Council. Thrive MSP 2040 – Forecasts as of January 1, 2019.
d. Ham Lake Township.
e. Burns Township.

### 2.11.1 Existing Land Use

The City of East Bethel has assembled a Comprehensive Plan to coordinate future development. Land use within the city is a mixture of suburban residential and commercial uses. There is a large area in the north-central part of the city, around Fish Lake, which is used for parks, public open space, and conservancy. Existing land use can be seen in the Comprehensive Plan.

### 2.11.2 Future Land Use

As shown in Table 2-6, the City of East Bethel is expected to have continued population growth through the year 2020. The city will experience increased residential development as people working in the Twin Cities' first and second tier suburbs continue to move outward from those urban areas. The City is in the process of completing a major Comprehensive Plan revision. In general, the proposed plan consists of providing municipal sewer and water services along Trunk Highway 65, County Road 22, and neighborhoods around the Coon Lake area. Figure 2-10 shows the proposed future land use.

## 2.12 Parks and Open Spaces

The most significant open space in East Bethel is the Cedar Creek Natural History Area. It consists of over 3,000 acres in northern East Bethel. This area is devoted to research and is under the control of the University of Minnesota. Although the Cedar Creek Natural History Area is not open for public use, it serves as a unique natural preserve in the City.

Anoka County Park near Ned's, Mud and Deer Lake is 172 acres, and provides activities such as nature hiking and bird and wildlife watching. The park will remain primarily undeveloped in order to preserve its natural amenities.

In addition to the County parkland above, approximately 435 total acres of land around Ned's, Mud and Deer Lakes is government owned. According the Minnesota County Biological Survey of the Department of Natural Resources, this area is one of few unique, undisturbed natural areas within the Twin Cities metropolitan area. It includes tamarack swamp, willow swamp, mixed hardwood swamp, wet meadows, and oak savanna. In addition, a wide variety of native plants and animals inhabit the area, including rare species such as Blandling's turtles, sandhill cranes, and lanceleaf violets.

Given the increasing pressure for residential development, including rural development in East Bethel, the County, the City and the MnDNR are in the process of developing a plan to combine their respective resources and land to establish the *Sand Hill Crane Natural Area.* The preliminary vision for this area is focused on low-impact recreation and public educational programs about this natural resource. Campfire Girls, a Girl Scout Camp, is also located on the eastern edge of the City surrounding 224$^{th}$ Avenue.

## 2.13 Fish and Wildlife Habitat

The water bodies and open spaces through the city provide habitat for fish and wildlife species including birds, mammals, and reptiles. Ducks and geese are present in large numbers at lakes, wetlands and open water areas. Vegetative cover in the undeveloped open areas support many mammalian species such as deer, raccoon, squirrels, chipmunks, and rabbits. The numerous wetlands in East Bethel provide habitat for a variety of aquatic species including snakes, turtles and frogs.

## 2.14 Unique Features and Scenic Areas

The MnDNR Natural Heritage Program and Nongame Wildlife Program maintains a database of rare plant or animal species and significant natural features. This data is listed in the WMO plans.

## 2.15 Pollutant Sources

The Minnesota Pollution Control Agency maintains up-to-date data on potential sources of groundwater contamination including: sanitary landfills, dumps, hazardous waste sites, registered underground and above ground storage tank sites, feedlots, abandoned wells, and permitted wastewater discharges. This information is available through the 14 databases maintained by the Minnesota Pollution Control Agency, Property Transfer, File Evaluation Service.

To address the susceptibility of the surficial aquifer to contamination, the Minnesota Department of Natural Resources, Division of Waters, contracted with the Minnesota Geological Survey to conduct an assessment study in 1991-92. The study, Regional Ground Water Assessment – Anoka Sand Plain, Anoka, Chisago, Isanti, and Sherburne

Counties, Minnesota, followed guidelines from the Department. A geologic sensitivity map was generated from the study and portrays an estimate of the time of vertical travel for water soluble, geologically inert materials released at the surface to reach the uppermost (surficial) aquifer.

The City of East Bethel has very high susceptibility to groundwater contamination. The "very high" designation indicates that the estimated travel time for water-borne surface contaminants to reach the uppermost aquifer is hours to months. However, this high sensitivity does not mean that groundwater has been degraded, or conversely, that it will be degraded. Rather, it indicates which areas are at greater risk of contamination as a result of high soil permeability and shallow groundwater levels.

## 2.16 Water Resources Related Agreements

The City of East Bethel has entered into two water resource related agreements which affect how the City manages its water resources. These agreements include:

- Amended Sunrise River Watershed Management Organization Joint Powers Agreement, in cooperation with the Cities of East Bethel, Ham Lake and Columbus and Linwood Township, August 2011.
- Amended Upper Rum River Watershed Management Organization Joint Powers Agreement, in cooperation with the Cities of East Bethel, Bethel, Ham Lake, Oak Grove, Saint Francis and Nowthen, January 2011.

Copies of the Joint Powers Agreements are included in Appendix A.

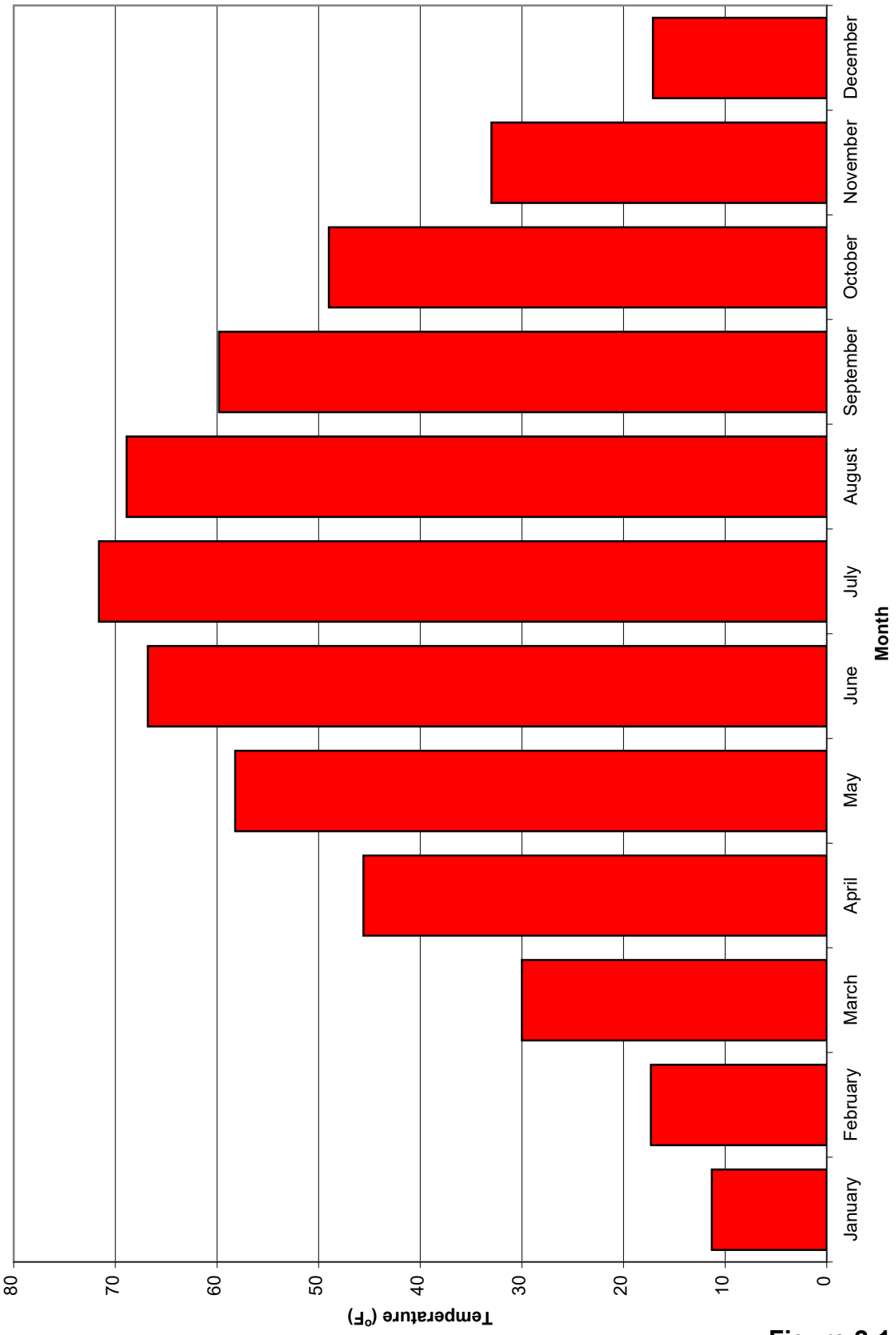



**Figure 2-1**
**Monthly Temperature Normals**
**City of East Bethel**

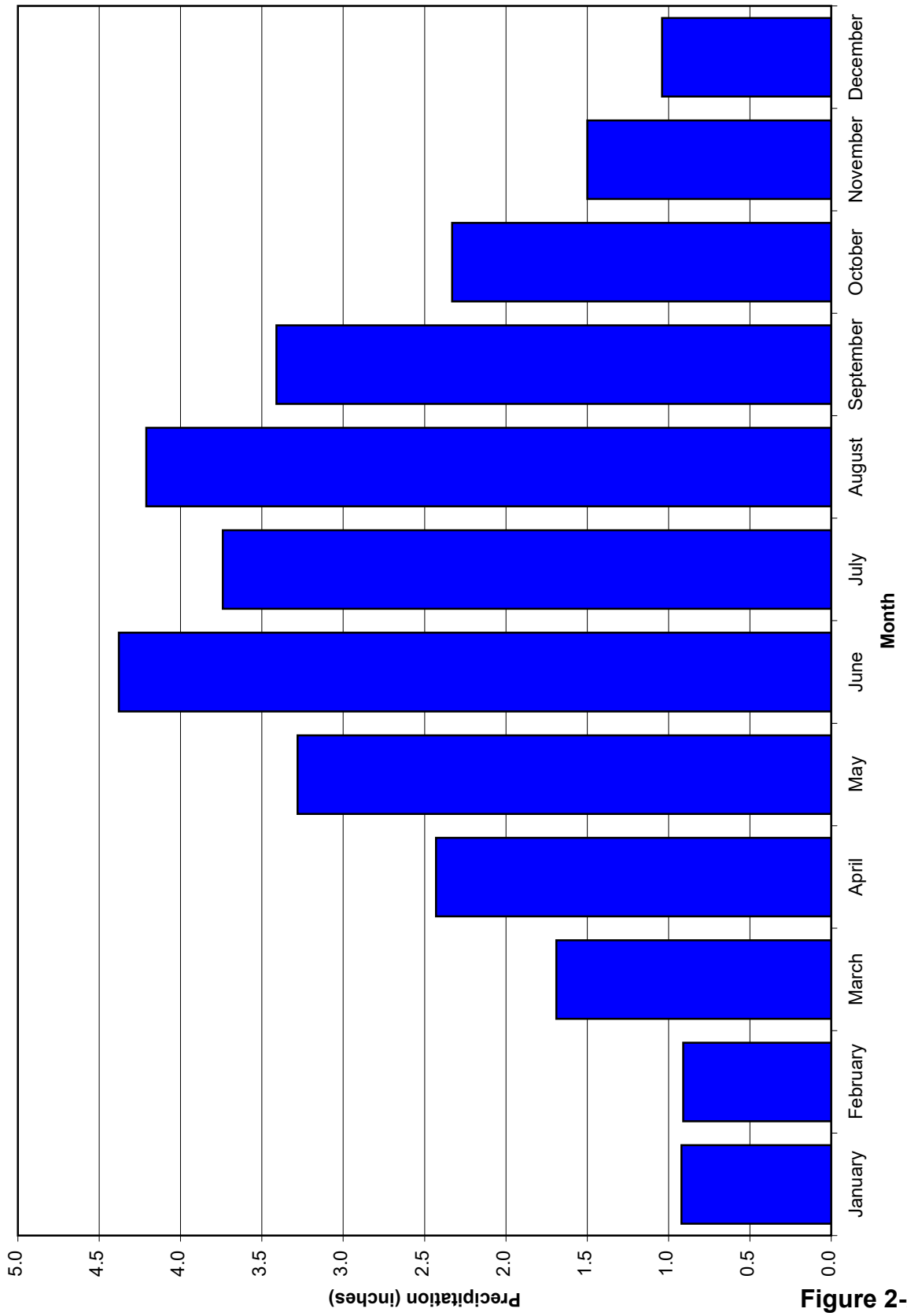
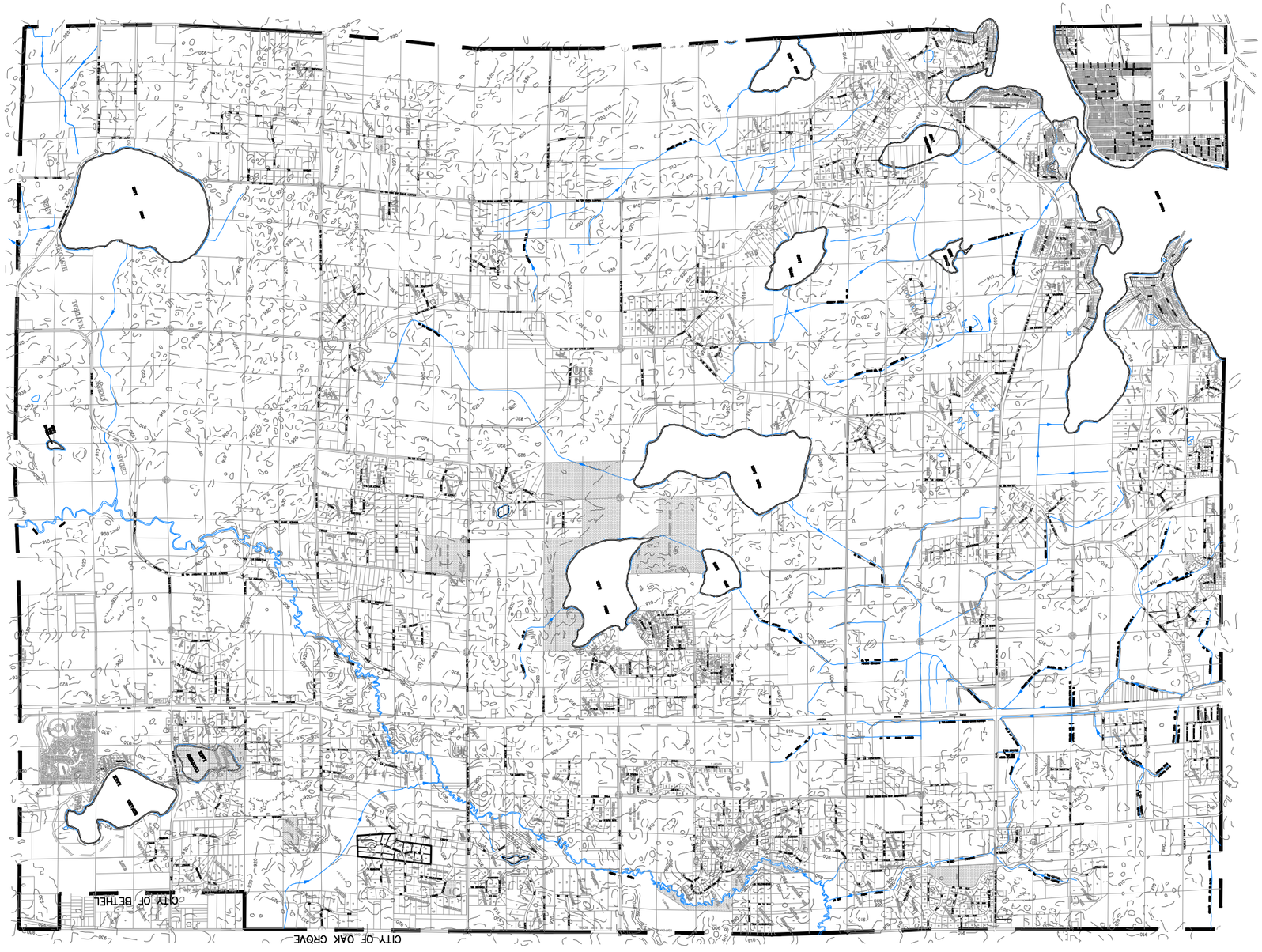



**Figure 2-2**
**Monthly Precipitation Normals**
**City of East Bethel**




4000 0 4000 8000
SCALE IN FEET

## LEGEND

DENOTES CORPORATE LIMITS

DENOTES TEN FOOT CONTOURS

SOURCE:

USGS MAPS

| | |
|---|---|
| CEDAR | 1993 |
| COON LAKE BEACH | 1993 |
| ISANTI | 1974 |
| ST. FRANCIS | 1974 |

Hakanson Anderson Assoc.,Inc.
Civil Engineers and Land Surveyors
3601 Thurston Ave., Anoka, Minnesota 55303
612-427-5860 FAX 612-427-0520

May 13, 2011 - 8:51am time
K:\cad_eng\CLIENT_FOLDERS\East Bethel\WATERSHED-EX-2006\2006\dwg\FIG-2-3.dwg

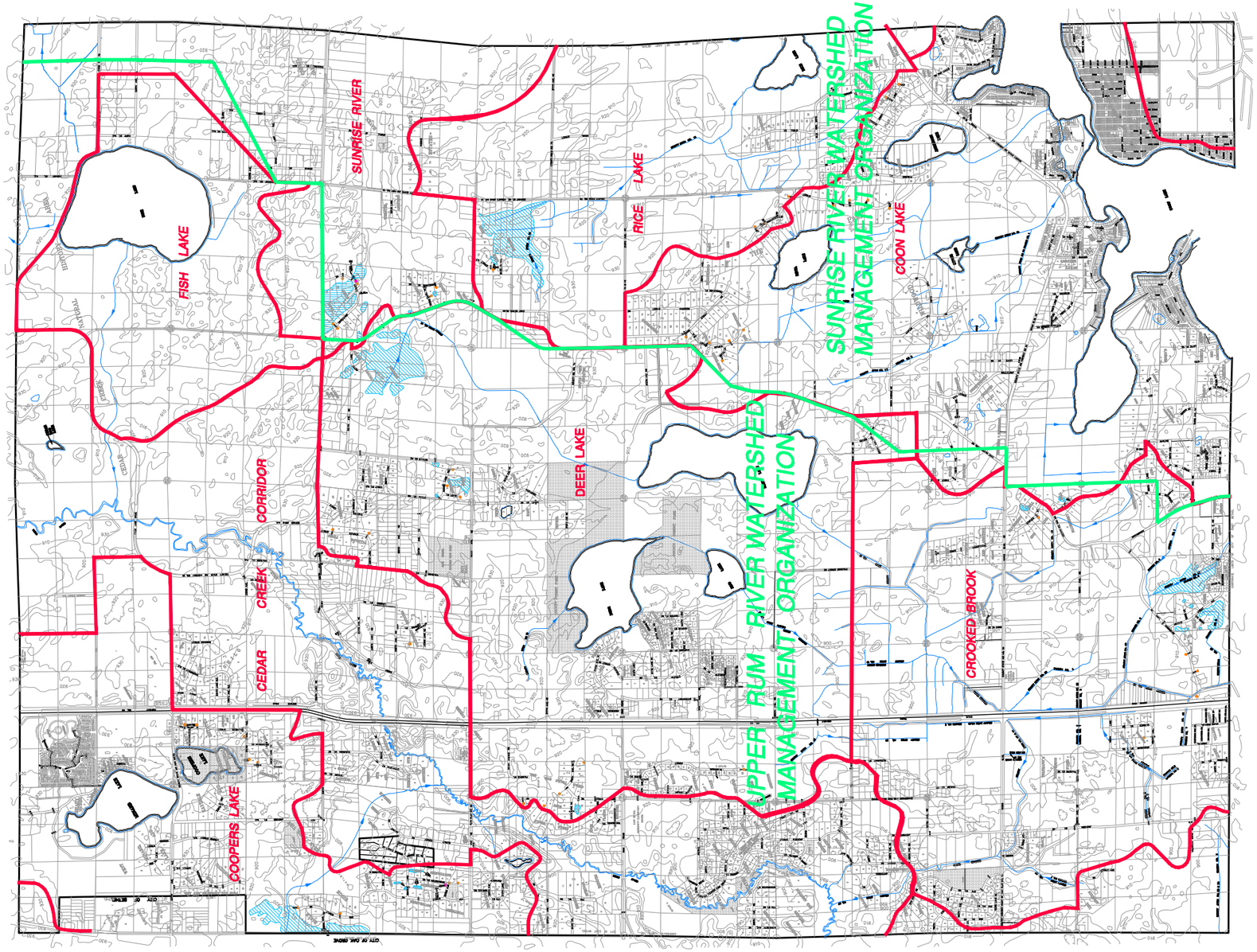
# FIGURE 2-3

## TOPOGRAPHIC MAP

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999 FILE: EB403

EB403\FIG-2-3.DWG




N

0 4000 8000

SCALE IN FEET

## LEGEND

DENOTES EAST BETHEL'S WATERSHED DIVIDES

DENOTES WATERSHED MANAGEMENT ORGANIZATION JURISDICTIONAL BOUNDARY

# FIGURE 2-4

## WMO JURISDICTIONAL BOUNDARIES

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999 FILE: EB403

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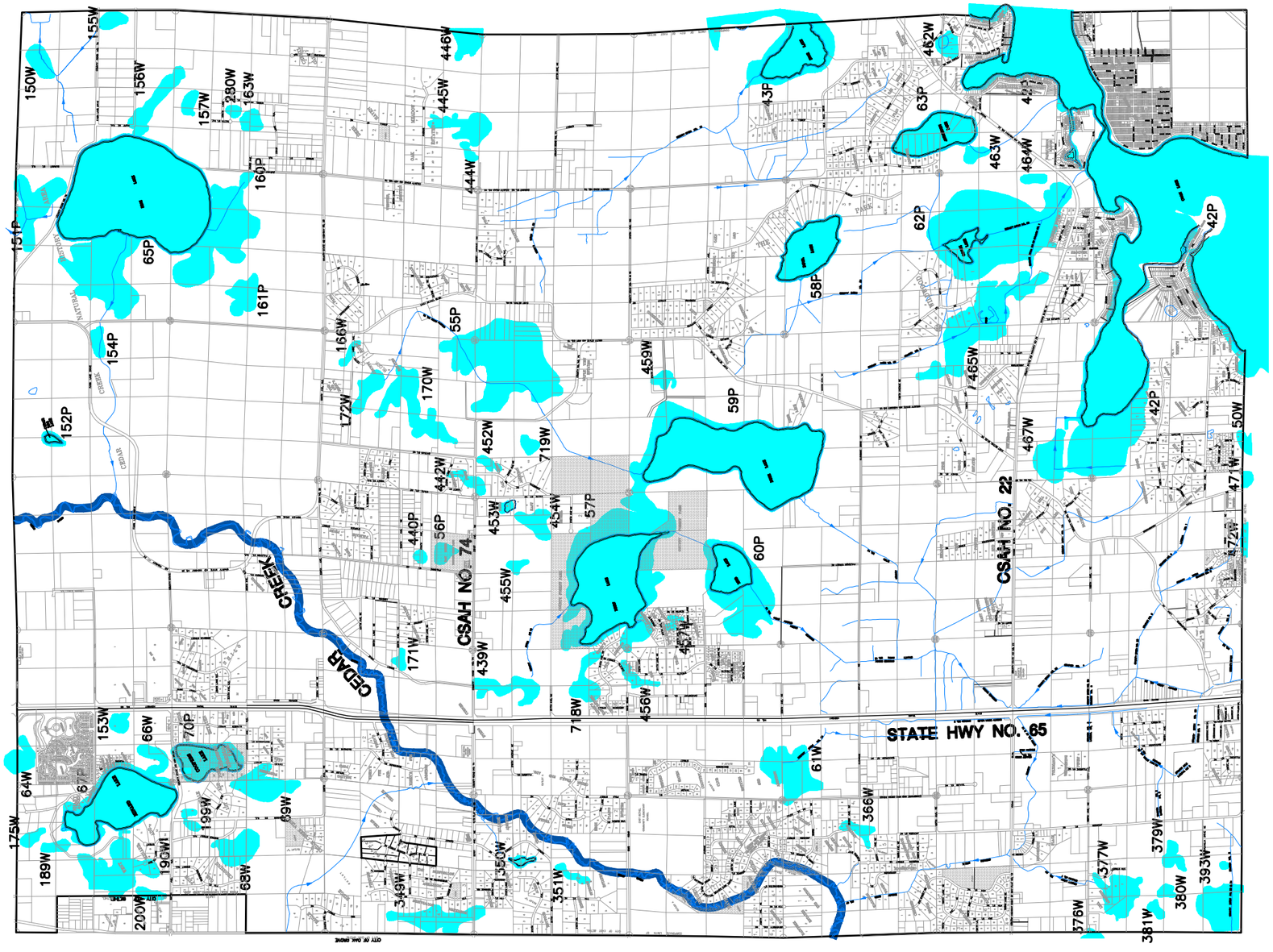
612-427-5860 FAX 612-427-0520



EB403\W-M-O.DWG

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SCALE IN FEET

## LEGEND

160P — DENOTES PROTECTED WATER

456W — DENOTES PROTECTED WETLAND

DENOTES PROTECTED WATER COURSE

Hakanson Anderson Assoc., Inc.
Civil Engineers and Land Surveyors
3601 Thurston Ave., Anoka, Minnesota 55303
612-427-5860 FAX 612-427-0520

May 13, 2011 - 8:30am tlee
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# FIGURE 2-5

## MnDNR PROTECTED WATERS

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999 FILE: EB403

EB403\DNR_WETLANDS.DWG

**TYPE 2 – Wet Meadow**

**TYPE 3 – Shallow-water Marsh**

**TYPE 4 – Deep-water Marsh**

*Photos from "Wetland Types and Definitions"*
*Minnesota Department of Natural Resources*

**TYPE 5 – Open Water**

**TYPE 6 – Shrub Swamp**

**TYPE 7 – Wooded Swamp**

**Figure 2-6**
**Typical Wetland Types**
**City of East Bethel**

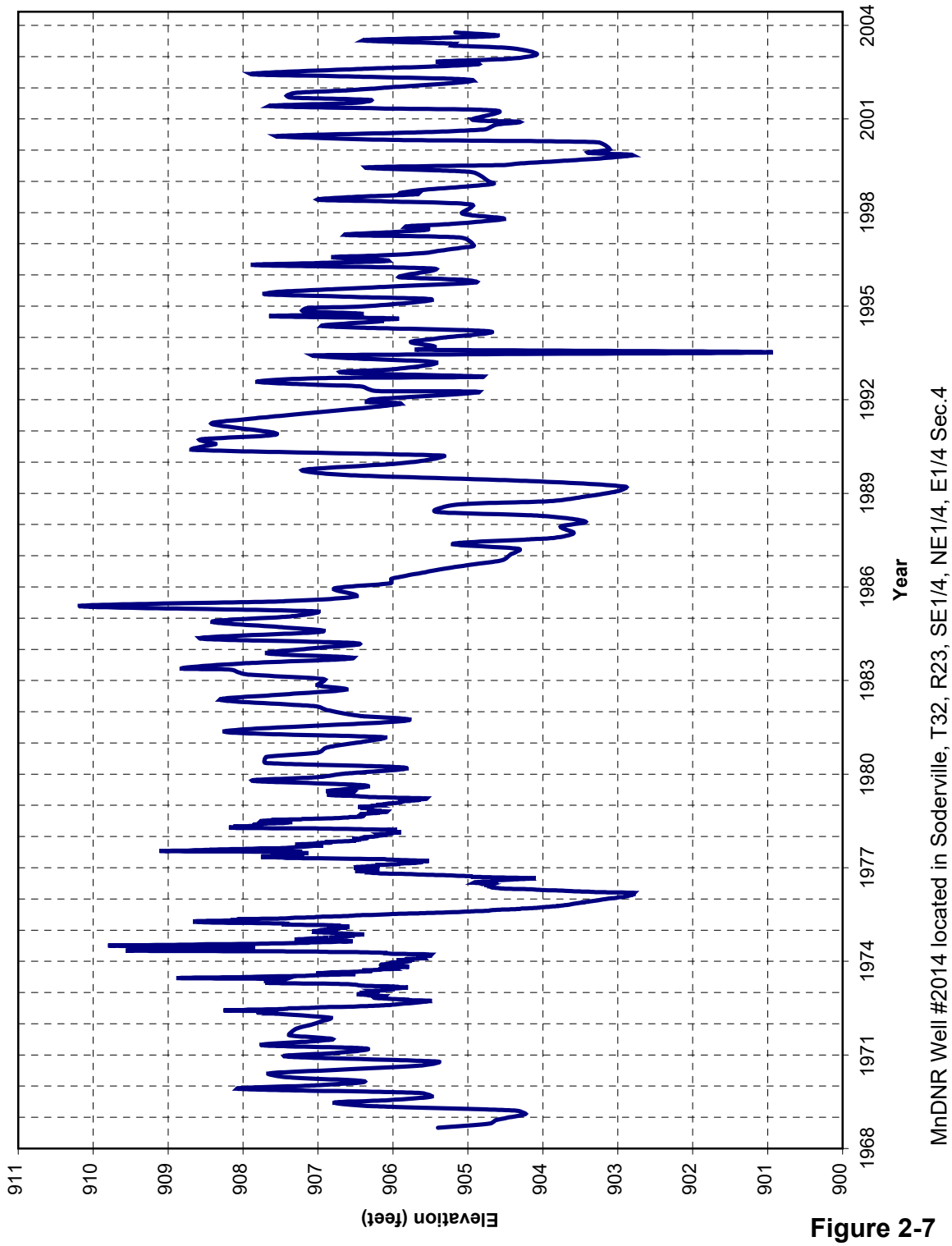



**Figure 2-7**
**Soderville Well**
**Groundwater Elevations**
**City of East Bethel**

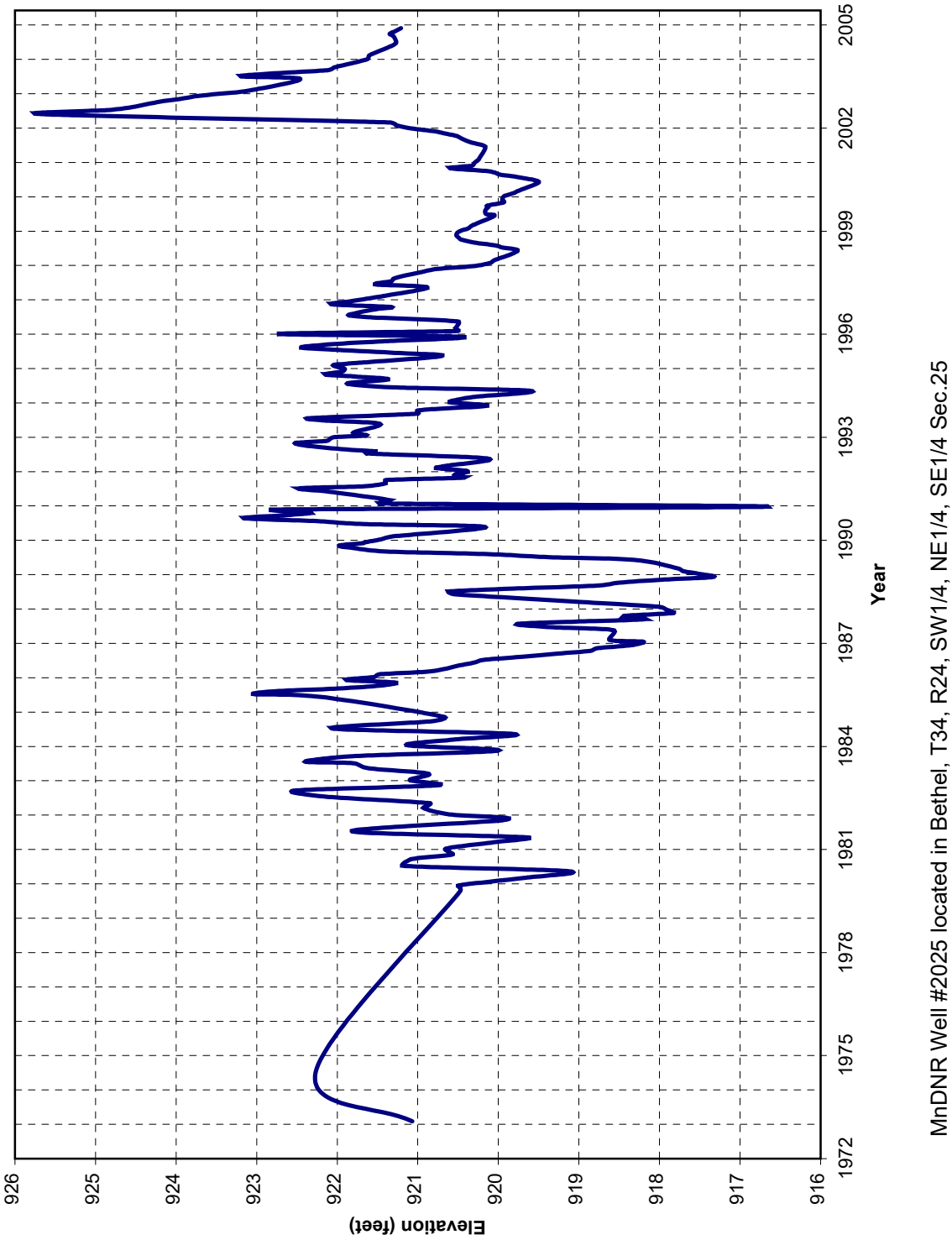
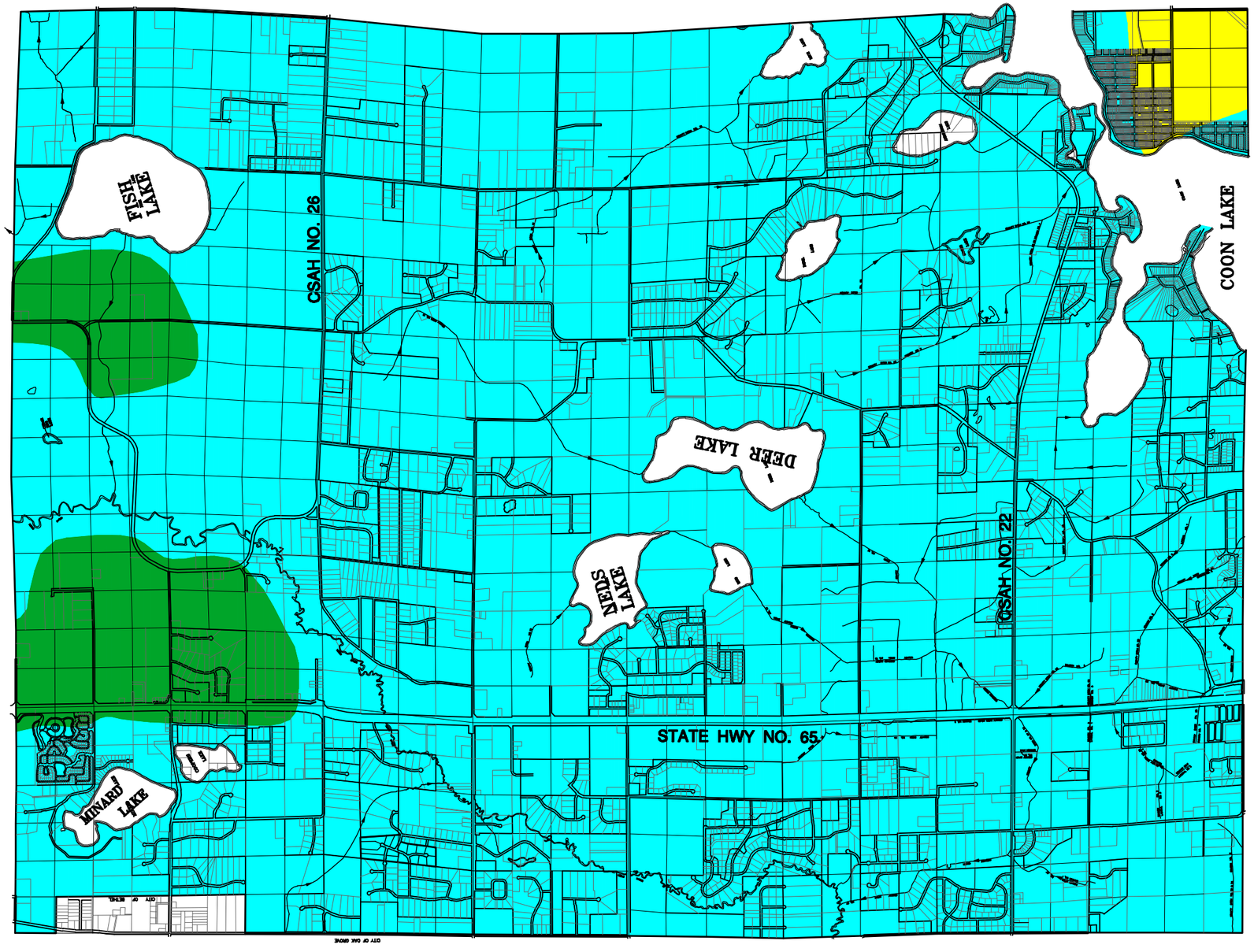



**Figure 2-8**
**Bethel Well**
**Groundwater Elevations**
**City of East Bethel**

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SCALE IN FEET

## LEGEND

ZIMMERMAN–ISANTI–LINO ASSOCIATION: NEARLY LEVEL TO UNDULATING, EXCESSIVELY DRAINED, SOMEWHAT POORLY DRAINED AND VERY POORLY DRAINED SOILS THAT ARE DOMINATED BY FINE SANDS THROUGHOUT

HUBBARD–NYMORE ASSOCIATION: NEARLY LEVEL TO GENTLY SLOPING, EXCESSIVELY DRAINED SOILS THAT ARE SANDY THROUGHOUT

RIFLE–ISANTI ASSOCIATION: NEARLY LEVEL, VERY POORLY DRAINED SOILS FORMED IN ORGANIC MATERIAL AND FINE SAND

# FIGURE 2-9

## SOILS MAP

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999 FILE: EB403

Hakanson Anderson Assoc.,Inc.
Civil Engineers and Land Surveyors
3601 Thurston Ave., Anoka, Minnesota 55303
612–427–5860 FAX 612–427–0520

May 13, 2011 - 8:38am time
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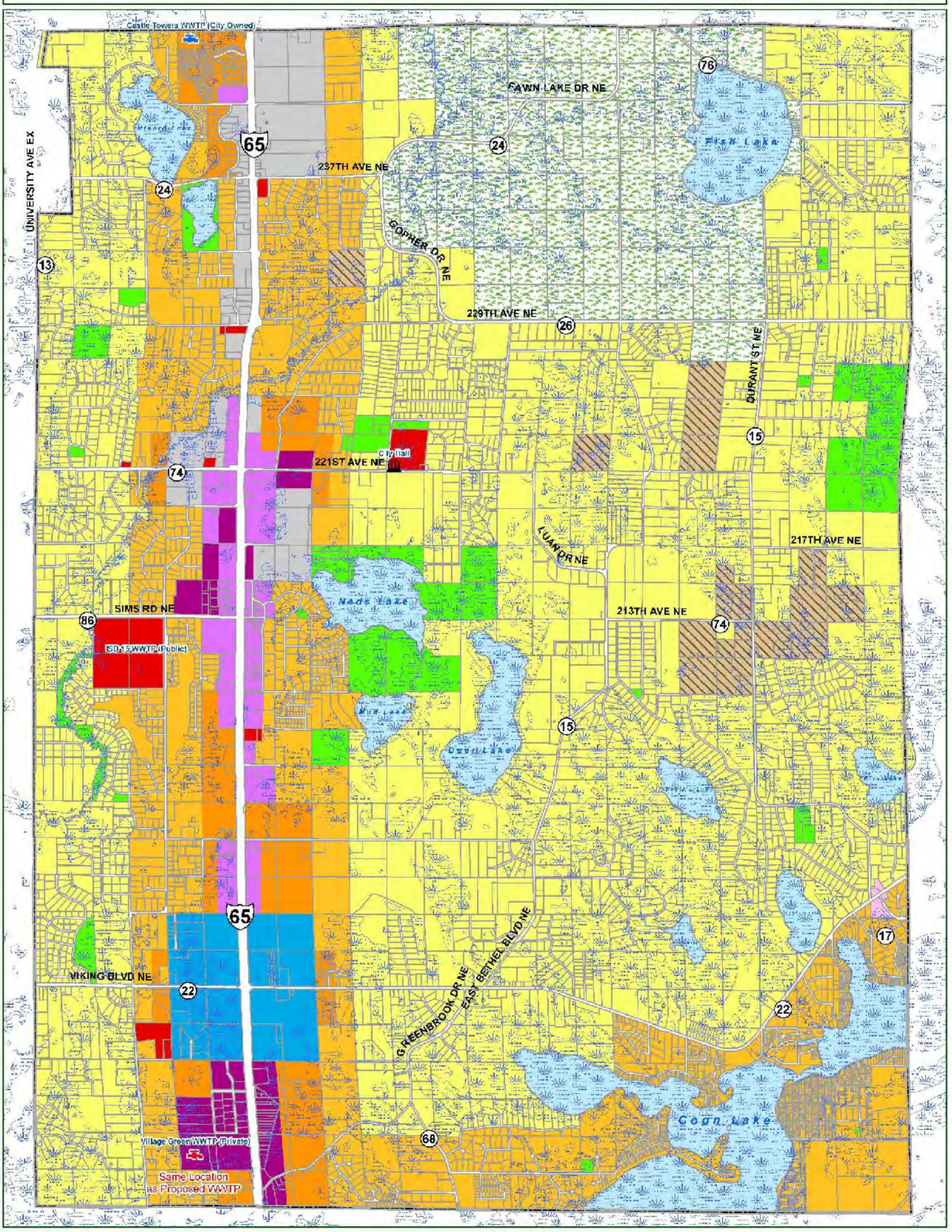
\EB403\SOILS_EXHIBIT.DWG

Hakanson Anderson Assoc., Inc.

# FUTURE LAND USE




**Landuse**
- Agriculture
- Limited Business
- Central Business
- Highway Business
- Light Industrial
- Low Density Residential (1 per 10 acres)
- Low / Medium Density Residential (3-4 per acre)
- Medium Density Residential (4-6 per acre)
- Mixed Use Development (4-6 per acre)
- Public / Institutional
- Natural Area
- Park/Open Space

**City Facilities**
- City Hall
- Castle Towers WWTP (City Owned)
- Village Green WWTP (Private)

- Parcel/Lot
- Wetlands
- Water
- City Limits

N

Map Date: May 2007

0 0.25 0.5 Miles

Sources: Anoka County, East Bethel Planning Commission, East Bethel GIS

East Bethel

Figure V - 2

**FIGURE 2-10**
**FUTURE LAND USE**
**CITY OF EAST BETHEL**

# 3.0 Management Strategies and Problem Areas

This section presents the process and information used to develop the management plan strategies for wetlands, water quality and flood control. Section 3.4 discusses the known problem areas within the city.

## 3.1 Wetland Protection

This section describes the process that was used to develop a wetland management strategy. The objective of this process is to provide no net loss of wetland functions and values. Impacts to wetlands include not only direct impacts such as filling and draining, but also indirect impacts from stormwater inputs. This process is based on the state guidance document "Stormwater and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Stormwater and Snowmelt Runoff on Wetlands" (State of Minnesota, Stormwater Advisory Group, June 1997), the Upper Rum River Watershed Management Organization (URRWMO) Comprehensive Watershed Management Plan and the Sunrise River Watershed Management Organization (SRWMO) Watershed Management Plan.

### 3.1.1 Wetland Classifications

Wetlands throughout the city serve a variety of beneficial functions including maintaining water quality, reducing flooding and erosion, providing groundwater recharge areas, providing food and habitat for wildlife and providing open space. Wetlands are important to the health, safety, economy, and general welfare of the city and regulating the wetlands and the land uses around them is therefore in the public interest.

The URRWMO and SRWMO provide wetland regulations for buffers, setbacks, sequencing, replacement and excavations and special protections for the wetland types that are most highly valued locally. The URRWMO and SRWMO seek to identify highly-valued wetlands and gives them greater protections, and allow more flexibility in and around lower-valued wetlands. The URRWMO and SRWMO have developed four wetland classes that are summarized, with the defining characteristics of each wetland class, in Table 3-1. As shown, the scores from five MnRAM categories are used to classify wetlands.

The state guidance document developed a methodology for determining the susceptibility of wetlands to degradation by stormwater input. This methodology relates wetland type to a level of susceptibility as shown in Table 3-3. Wetlands such as bogs and fens can be easily degraded by changes in the stormwater inflows and are designated as highly susceptible. On the other hand, floodplain forests can tolerate relatively significant changes in the chemical and physical characteristics of stormwater inflow without degradation and are therefore slightly susceptible. Figure 3-1, which was created by the Anoka Conservation District, is provided as a guide for a preliminary assessment. This figure has been generated without the benefit of field verifications.

### 3.1.2 Wetland Management Standards

#### *3.1.2.1 Wetland Standards based on Classification*

Wetland management standards were developed for each wetland classification. These standards, shown in Table 3-2, were based largely on the URRWMO Comprehensive Watershed Management Plan and the SRWMO Watershed Management Plan. The standards determine minimum buffer widths, structure setbacks, sequencing and avoidance requirements, wetland replacement ratios, and excavation areas.

These standards provide guidance for the management of stormwater to minimize wetland impacts. It is assumed that wetland impacts will be minimized and existing wetland functions and values will be maintained if the proposed management system and criteria meet the management standards shown in Table 3-2. Specific requirements designed to implement the city's wetland management strategies are outlined in Section 5.1

#### *3.1.2.2 Wetland Standards based on Relative Susceptibility*

Wetland management standards were developed to determine how and when stormwater should be routed through a wetland to minimize potential impacts. These standards, shown in Table 3-4, were largely based on the state guidance document. These standards determine tolerable hydrologic change in terms of bounce (difference between the peak flood elevation and the wetland elevation), inundation period (time that flood waters temporarily stored in the wetland exceed the wetland elevation), and runout control (elevation of the outlet).

These standards provide guidance for the management of stormwater to minimize wetland impacts. It is assumed that wetland impacts will be minimized and existing wetland functions and values will be maintained if the proposed management system and criteria meet the management standards shown in Table 3-4. Specific requirements designed to implement the city's wetland management strategies are outlined in Section 5.1.

### 3.1.3 Wetland Function and Value Assessment

A wetland function and value assessment for the five categories listed in Table 3-1 will be required where any of the following activities are proposed:

- Subdivision creating three or more lots and creating impervious surfaces or structures.
- Any projects with wetland impacts as defined by the WCA (Minnesota Rules 8420).
- Wetland excavation greater than 0.5 acres.

The latest version of the “Minnesota Routine Assessment Method for evaluating Wetland Functions” shall be used to access receiving waters. The assessment shall be completed by qualified wetland personnel who specialize in such work. Developers will be responsible for submitting the assessment for private projects. The assessments will be subjected to review and approval by the City.

***Table 3-1***
***Wetland Classifications for Wetland Buffers, Setbacks, Sequencing, Replacement and Excavation***

<table>
<tr><th colspan="2">Wetland Classification →</th><th>High Priority Wetlands</th><th>Moderate Priority Wetlands</th><th>Minor Priority Wetlands</th><th>Use Wetlands</th></tr>
<tr><td colspan="2">Description →</td><td>High quality natural basins that serve both target wetland functions of water quality treatment and wildlife habitat.</td><td>Wetlands that highly perform one of the two target wetland functions (water quality treatment or wildlife habitat).</td><td>Wetlands that do not highly perform either of the two target wetland functions (water quality treatment or wildlife habitat).</td><td>Wetlands created for stormwater management. These wetlands usually need periodic maintenance.</td></tr>
<tr><td>Targeted Wetland Functions</td><td>MnRAM Category</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Water Quality Treatment</td><td>Downstream water quality protection</td><td rowspan="2">MnRAM Score is “high” for at least one of these two MnRAM categories</td><td rowspan="2">MnRAM Score is “high” for at least one of these two MnRAM categories</td><td rowspan="5">Does not score “exceptional” or “high” for any of these MnRAM categories</td><td rowspan="5">Wetlands created for stormwater management. MnRAM scores are irrelevant.</td></tr>
<tr><td>Maintenance of wetland water quality</td></tr>
<tr><td colspan="2"></td><td>AND</td><td>OR</td></tr>
<tr><td rowspan="3">Wildlife Habitat</td><td>Vegetative diversity/integrity</td><td rowspan="3">MnRAM Score is “exceptional” or “high” for one or more of these three MnRAM categories</td><td rowspan="3">MnRAM Score is “exceptional” or “high” for one or more of these MnRAM categories</td></tr>
<tr><td>Maintenance of characteristic wildlife habitat structure</td></tr>
<tr><td>Maintenance of characteristic amphibian habitat</td></tr>
</table>

*Most wetlands serve a groundwater recharge function, so wetland standards were designed to be protective of this function in all wetlands.*

***Table 3-2***
***Wetland Buffer Width, Setback, Sequencing, Replacement and Excavation Requirements***

| Standard | Wetland Classification | | | |
|---|---|---|---|---|
| | **High Priority Wetlands [1]** | **Moderate Priority Wetlands** | **Minor Priority Wetlands** | **Use Wetlands [2]** |
| **Average Buffer Width [3]** | 25 ft | 15 ft | 15 ft | Top of Slope |
| **Structure Setbacks [3]** | 50 ft | 25 ft | 25 ft | 25 ft |
| **Sequencing and Avoidance** | No impacts allowed without demonstrating significant public benefit. | WCA sequencing applies. | WCA sequencing applies. | WCA sequencing applies. |
| **Wetland Replacement Ratios** | Minnesota Wetland Conservation Act (WCA) ratios apply | | | |
| **Excavation** | Excavations >0.5 acres must be denied for portions of wetlands that score high on the MnRAM vegetative diversity criteria | | All excavations >0.5 acres regulated per text | |

[1] Standards shall apply to wetlands adjacent to Significant Natural Environmental Areas (SNEA).
[2] Standards shall also apply to stormwater ponds.
[3] See the City Code for special setback requirements for the plats of Whispering Aspen and Viking Preserve, Significant Natural Environmental Areas (SNEA), Cedar Creek, and Lakes.

***Table 3-3***
***Wetland Classification by Sensitivity to Stormwater Inputs***

| Highly Susceptible Wetland Types:[1] | Moderately Susceptible Wetland Types:[2] | Slightly Susceptible Wetland Types:[3] | Least Susceptible Wetland Types:[4] |
|---|---|---|---|
| Sedge Meadows | Shrub-carrs [a] | Floodplain Forests [a] | Gravel Pits |
| Open Bogs | Alder Thickets [b] | Fresh (Wet) Meadows [b] | Cultivated Hydric Soils |
| Coniferous Bogs | Fresh (Wet) Meadows [c,e] | Shallow Marshes [c] | Dredged Material/Fill Material Disposal Sites |
| Calcarcous Fens | Shallow Marshes [d,e] | Deep Marshes [c] | |
| Coniferous Swamps | Deep Marshes [d,e] | | |
| Low Prairies | | | |
| Lowland Hardwood Swamps | | | |
| Seasonally Flooded Basins | | | |

1. Special consideration must be given to avoid altering these wetland types. Inundation must be avoided. Water chemistry changes due to alteration by stormwater impacts can also cause adverse impacts. Note: All scientific and natural areas and pristine wetlands should be considered in this category regardless of wetland type.
2. a., b., c. Can tolerate inundation from 6 inches to 12 inches for short periods of time. May be completely dry in drought or late summer conditions. d. Can tolerate +12 inches inundation, but adversely impacted by sediment and/or nutrient loading and prolonged high-water levels. c. Some exceptions.
3. a. Can tolerate annual inundation of 1 to 6 feet or more, possibly more than once/year. b. Fresh meadows which are dominated by reed canary grass. c. Shallow marshes dominated by reed canary grass, cattail, giant reed or purple loostrife.
4. These wetlands are usually so degraded that input of urban stormwater may not have adverse impacts.

Notes: There will always be exceptions of the general categories listed above. Use best professional judgement. Appendix A of the State Guidance document contains a more complete description of wetland characteristics under each category. Pristine wetlands are those that show little disturbance from human activity.

Source: "Stormwater and Wetlands: Planning and Evaluation Guideline for Addressing Potential Impacts of Urban Stormwater and Snowmelt Runoff on Wetlands" State of Minnesota, Stormwater Advisory Group, June 1997.

***Table 3-4***
***Stormwater Input Limitations***

| Standard | Wetland Susceptibility | | | | Comments |
|---|---|---|---|---|---|
| | **Highly Susceptible** | **Moderately Susceptible** | **Slightly Susceptible** | **Least Susceptible** | |
| Storm Bounce | Existing | Existing plus 0.5 feet | Existing plus 1.0 feet | No limit | Hydrologic analysis must be conducted on an annualized basis or a broad range of storm events from very small (1/4 inch) to large, i.e. 10- or 25-year storms |
| Discharge Rate | Existing | Existing | Existing or less | Existing or less | |
| Inundation Period (1- and 2-year event) | Existing | Existing plus 1 day | Existing plus 2 days | Existing plus 7 days | Inundation period is defined as the proposed peak storage divided by the average discharge (S/Q) |
| Inundation Period (100-year event and greater) | Existing | Existing plus 7 days | Existing plus 14 days | Existing plus 21 days | |
| Runout Control Elevation (Free Flowing) | No change | No change | 0 to 1.0 feet above existing runout | 0 to 4.0 feet above existing runout | |
| Runout Control Elevation (Landlocked) | Above delineated wetland | Above delineated wetland | Above delineated wetland | Above delineated wetland | |

## 3.2 Water Quality

Within the eight main watersheds of the City of East Bethel, there are hundreds of water bodies ranging in size from lakes to small stormwater detention basins. Nonpoint pollution associated with stormwater runoff creates adverse impacts; the degree of impact depends on the water body's natural ability to remove, absorb, or process the pollutants through chemical, physical, or biological processes. Poor water quality usually indicates a situation where the resource receives more nutrients, or other pollutants, than can be processed naturally. Planning for water quality protection is necessary to preserve the beneficial uses of existing water bodies, as well as to evaluate wetland impacts as described in Section 3.1.

### 3.2.1 Water Quality Management Groups

This section describes the water quality management process that was used to prioritize water bodies for water quality protection. All water bodies will be classified into one of three groups. The classification groups are based on WMO's criteria and wetland vegetation susceptibility. Table 3-5 defines the water quality classification groups adopted by the city.

**Table 3-5**
**Definition of Water Quality Classification Groups**

| | |
|---|---|
| ***Group 1*** | All waters (lakes and watercourses) and public waters wetlands which have been inventoried by the Minnesota Department of Natural Resources in accordance with Minnesota Statutes, section 103G.005, subdivision 15 and 18. This group shall also include all wetlands which are considered highly susceptible to stormwater. |
| ***Group 2*** | This group shall include all wetlands which are considered moderately susceptible to stormwater and do not meet any requirements of a Group 1 water. This group shall also include all wetlands immediately adjacent to Group 1 public waters and public waters wetlands with habitats dominated by Types 1,2,6, and 7 (Shaw, S.P. and C.G. Fredine, 1956). |
| ***Group 3*** | This group shall include all wetlands which are considered slightly or least susceptible to stormwater and do not meet any requirements of a Group 1 or Group 2 water. |

Water bodies will be managed to the most stringent water quality protection level shown in Table 3-5. For example, a sedge meadow may not be an inventoried wetland by the MnDNR, but may be considered "highly susceptible" which would make it a Group 1 waterbody.

The city intends to review plans for construction activities to ensure that water quality goals are met. Activities will be regulated according to the classification (Group 1, 2, or 3) of the

receiving water listed in Table 3-5. Specific requirements designed to implement the city's water quality management strategies are outlined in Section 5.2.

Water quality protection will also be achieved through implementation of the City's Stormwater Pollution Prevention Program (SWPPP) as discussed in Section 1.2.4.

## 3.3 Water Quantity

The flood and rate control portion of the planning consisted of estimating the 100-year flood elevation and discharge rate for each watershed. This section discusses the flood insurance study and the city's flood and rate control process.

### 3.3.1 Flood Insurance Study

A Flood Insurance Study (FIS) of the City of East Bethel was completed in May 1980 by the Federal Emergency Management Agency (FEMA). The FIS maps indicate the boundaries for 100-year levels. The study did not determine the actual flood elevations except for the profile along Cedar Creek. The 100-year flood elevations reported for Cedar Creek were used in the plan.

### 3.3.2 Flood Protection Level

Storm drainage systems are typically designed to pass a flood of a designated magnitude called the design flood. The design flood generally balances the cost of flood damages with the cost of the storm drainage system to achieve an overall minimum public cost. Watersheds in East Bethel are classified as requiring protection for either the 1 or 10 percent chance flood based on expected flood damages. Storm drainage systems that serve as the outlet for areas where flood damage is likely to occur must safely pass the critical-duration 1 percent chance flood. Storm drainage systems for areas where no significant flood damage or disruption of infrastructure is likely to occur must safely pass the critical-duration 10 percent chance flood.

### 3.3.3 Hydrologic Model

Simulating the stormwater system using a hydrologic model is important in determining the adequacy of the existing system and to provide guidance in designing systems to handle surface runoff for ultimate development conditions. A hydrologic model simulates the rainfall-runoff process so that runoff rates and volumes from design storms can be estimated for different stormwater configurations and land use conditions.

As rain falls on the watershed, several different processes move the water from the ground surface to one of three ultimate destinations. Initially water is stored in depressions and on the surface of the ground, and begins to infiltrate into the soil. As rainfall continues, the storage capacity of these depressions is exceeded and the excess water begins to runoff into gutters, swales, ditches and storm sewers. In East Bethel, these conveyance paths lead to county and public ditches, creeks or to one of the many lakes, ponds and wetlands in the city.

The amount of rain and the time over which the rain occurs influence the amount of runoff and the rate at which the runoff travels from the watershed. In addition to the rainfall conditions, the physical characteristics of the watershed also determine the volume of water that leaves the watershed as runoff, and the resulting flood levels in the ponds, wetlands and lakes in the watershed.

East Bethel's storm drainage system was analyzed for the 1 percent chance flood for existing and proposed (ultimate development) conditions. The 1 percent chance flood is used to design storm drainage systems that serve as the outlet for areas where significant flood damage is likely to occur.

A range of rainfall and runoff durations was analyzed to determine the critical event for each stormwater storage area and subwatershed. The storm or runoff duration that produces the greatest discharge (or detention storage volume, as appropriate) in each subwatershed is considered the critical duration for that subwatershed. The analysis used the 24-hour, and the 2- and 4-day duration rainfall events for non-landlocked areas. For landlocked areas runoff was analyzed for two back-to-back 1 percent chance rainstorms and the 10-day snowmelt. The critical 100-year runoff or precipitation event was used to determine the flood elevation of the stormwater storage areas, the amount of detention storage the areas should provide, and the outflow from the watershed.

To reflect proposed conditions, the hydrologic analyses assumed ultimate development consistent with the city's Comprehensive Plan. Full development land use generally has more impervious area (such as roads, driveways and roofs), which causes greater runoff volumes and rates than undeveloped areas.

The drainage divides were determined using:

- City of East Bethel storm sewer maps
- Various development plans
- Four USGS Maps: Cedar-1993, Coon Lake Beach – 1993, Isanti – 1974, St. Francis – 1974
- Field Surveyed pipes and water levels

For areas that are undeveloped or underdeveloped, the future watershed divides were assumed to follow the existing divides.

HydroCAD was used as the hydrologic model to simulate flow through the storm drainage systems in East Bethel. This computer model creates a hydrograph for each watershed. The model then routes these hydrographs through storage areas (such as wetlands, lakes, and detention ponds) and conveyance systems (storm sewers and ditches) and combines them with hydrographs from other subwatersheds. The hydrologic model estimates both the peak rate of runoff and the volume of runoff. The peak rate of runoff is the primary factor in determining storm sewer sizes. The volume of runoff is the primary factor in the design and

evaluation of stormwater storage areas and in the assessment of hydrologic impacts to wetlands. A more detailed discussion about the HydroCAD Model is given in Section 14.0.

### 3.3.4 Rate Control and Flood Storage

East Bethel has vast amounts of stormwater storage available in its wetlands and lakes. This storage was used in the development of the hydrologic model for the city. The storage areas were estimated from the USGS topographic maps and the elevations were based on field surveys of existing water levels and pipe inverts.

All projects that disturb one or more acres and certain projects in the shoreland zone, as discussed in Section 5.2.6 will be required to control the rate of discharge from each site. The proposed discharge rate shall not exceed the existing discharge rate for the 2-, 10-, and 100-year, 24-hour storm events. Section 5.2 discusses additional water quantity and quality requirements.

### 3.3.5 Flood Control

Flood control has been directed primarily at the management of flood levels which include the protection of structures and the safety of the residents of the city.

#### *3.3.5.1 Flood Protection Standards*

It is common practice in stormwater management to provide a safety factor against flooding. This factor of safety is typically represented as a vertical separation distance between the peak flood elevation and the flood damage elevation. This vertical separation is called the "freeboard." Section 5.2 presents the freeboard values that will be used for the city.

#### *3.3.5.2 Flood Control System*

The flood control system in East Bethel consists of the wetlands, ponds and lakes for storage of runoff, the roadways, storm sewers, ditches and streams for conveyance of water from the watershed, and the management of the water in the system. Normal levels, flood levels, flood storage, peak discharges and proposed storm sewer pipe sizes for each watershed are tabulated in the tables in Section 11.

The stormwater management plan provides guidance for construction and improvement of the drainage system required for ultimate development conditions within East Bethel. There is a certain amount of flexibility in the guidelines of the management plan. Although, any departure from the management plan must include compensating adjustments to maintain the continuity of the plan.

## 3.4 Problem Areas

An assessment of the known problem areas in the city was completed as part of this plan. The following paragraphs summarize the assessment.

### 3.4.1 Flooding Concerns Within the City

#### *3.4.1.1 Whispering Oaks*

In 1999, the city initiated a drainage study to address complaints from residents living in the Whispering Oaks development, which was constructed in 1995. Whispering Oaks consists of a single-family residential development with a 2.0 acre minimum lot size. Several residents complained about standing water in their front yards after heavy rainfalls.

The designed drainage system consists of a backyard infiltration pond on Lots 9 and 10 of Block 2, which was constructed approximately 3 feet deep. When the pond fills past the 3-foot depth, it overflows through a ditch which conveys water to the Rendova Street ditch and then eventually to the outlet pipe which crosses Rendova Street and drains east.

A field survey was conducted as part of the study. It was concluded that several driveway culverts which are within the Rendova Street ditch were installed 6 inches too high. Therefore, when the infiltration pond overflows, water ponds about 6 inches deep in front of the culverts on Lots 7 and 8 of Block 2.

**Corrective Action:**

This flooding does not threaten any structures and the ponded water eventually infiltrates into the ground. No further action will be taken by the city on this issue.

#### *3.4.1.2 Subwatersheds 300, 310 and 411*

Subwatersheds 300, 310 and 411 all have experienced raised water elevations due to beaver dam construction in the drainage ditches which serve as outlets for these watersheds. The beaver dam construction has caused flooding on Lots 1 and 2 of Block 4 in DeGardners 2nd Addition.

**Corrective Action:**

The city has in the past, and will continue to trap the beavers and remove the constructed dams as necessary.

#### *3.4.1.3 Fish Lake Outlet*

In the past, water levels experienced in Fish Lake have been high enough to jeopardize the integrity of County Road 76. Fish Lake is within Subwatershed 100. The outlet consists of a ditch which drains to the west to Outlet 100. Outlet 100 consists of two 18-inch CMP's. It is not known if the increased water levels are from an obstructed drainageway, or from area groundwater levels.

**Corrective Action:**

The City has cleaned the drainageway and culverts which has restored the outlet capacity of Fish Lake. No further action is anticipated.

#### *3.4.1.4 Street Flooding*

Segments of 183rd Avenue N.E. and Cedar Road in Subwatershed 709 have experienced short term flooding during periods of heavy rain.

**Corrective Action:**

The vertical alignment of these streets will be reviewed when upgrades are considered to 183rd Avenue and Cedar Road.

#### *3.4.1.5 Nordin Estates*

Nordin Estates, which is located in the southwest corner of Subwatershed 709, has experienced flooding of house basements in the past. The development is served by an outlet which crosses 181st Lane N.E. This pipe discharges to a private drainage ditch which conveys water to the south into Ham Lake. The flooding problem appears to be the private drainage ditch. The ditch is in poor condition and full of sediment and vegetation. The city has attempted to get permission to clean the private ditch, however, the owner will not cooperate with the city.

**Corrective Action:**

The flooding issue will be further reviewed when 181st Lane N.E. is upgraded.

This development has also experienced high ground water elevations in the past which have inundated the septic drainfields of the residents. The city initiated a study in 1997 to further investigate this issue. The area groundwater is directly influenced by the large waterbody of Coon Lake.

It was concluded from the study that lowering the area water table was not feasible. No further corrective actions are anticipated.

### 3.4.2 Lake and Stream Water Quality Problems

#### *3.4.2.1 Crooked Brook*

Crooked Brook from County Ditch 28 to Cedar Creek has been listed on the Minnesota Pollution Control Agency Impaired Waters list. Crooked Brook has been listed for low dissolved oxygen.

**Corrective Action:**

The 2017 Rum River Watershed TMDL report did not include Crooked Brook's impairment, but it may be incorporated in future findings. The URRWMO has included Crooked Brook in

their future monitoring plan. The City of East Bethel will set aside funds to review ways to meet the TMDL requirement, and the City revise its Water Management Plan as necessary to comply with future findings.

#### *3.4.2.2 Coon Lake*

Coon Lake has been listed on the Minnesota Pollution Control Agency's Impaired Waters list for mercury.

**Corrective Action:**

Impacts of mercury are mainly regional in nature. For this reason, it is anticipated that the TMDL Study for Coon Lake will be conducted by state and federal agencies. The City of East Bethel will revise its Water Management Plan as necessary to comply with future findings.

#### *3.4.2.3 Cedar Creek*

Cedar Creek has been listed on the MPCA's Impaired Waters list for *E. coli*. The City of East Bethel has an *E. coli* TMDL for the Cedar Creek watershed.

**Corrective Action**:

The City of East Bethel will set aside funds to review ways to meet the TMDL requirement, and the City revise its Water Management Plan as necessary to comply with future findings.

#### *3.4.2.4 St. Croix River*

The City of East Bethel has a phosphorus reduction TMDL for the Lake St. Croix watershed.

**Corrective Action**:

The City will be reducing its phosphorus load as this area develops. Additional funds will be set aside to review methods to further meet the TMDL requirement, and the City will revise its Water Management Plan as necessary to comply with future findings.

Hakanson Anderson Assoc., Inc.

**FIGURE 3-1**
**WETLAND SUSCEPTIBILITY TO DEGRADATION BY STORMWATER IMPACTS**

# 4.0 Goals and Policies

This section presents the goals and policies developed for the management of water resources within East Bethel. Goals are provided for wetland protection, water quality, water quantity, flood plain and shoreland management, recreation, open space and wildlife management, groundwater protection, erosion and sedimentation control, and drainageway maintenance. Goals propose the desired end; policies provide the means to achieve the goals. Section 5.0 provides more specific detail on how the goals and policies will be implemented.

## 4.1 Wetlands

**Goal: Maintain or enhance wetland functions and values.**

*Policy 1:*
Act as the Local Government Unit responsible for administration of the Wetland Conservation Act.

*Policy 2:*
Manage wetlands consistent with City ordinances and state and federal wetland regulations.

*Policy 3:*
Improve or enhance wetlands where economically feasible.

*Policy 4:*
Manage stormwater runoff to wetlands to avoid, minimize, and mitigate impacts to wetland functions and values consistent with this plan.

*Policy 5:*
Encourage establishment and maintenance of buffer areas around wetlands.

*Policy 6:*
Consider wetland biotic communities when evaluating water level fluctuation (bounce) in wetlands.

## 4.2 Water Quality

**Goal: Manage stormwater to protect designated water bodies as outlined in this plan.**

*Policy 1:*
Maintain and periodically update the water quality management classification of the city's water bodies.

*Policy 2:*
Manage stormwater consistent with the water quality standards outlined in this plan. In cases where a portion of the water body or its watershed is not entirely within East Bethel, stormwater will be managed to meet or exceed WMO standards.

*Policy 3:*
Cooperate with WMOs in water quality monitoring, modeling, and planning to protect priority resources. Cooperation could include: providing information on storm drainage features; topographic information, and inventory data; serving as a liaison between the WMO and city residents; implementing prescribed education programs and BMPs and financial support for WMO programs.

*Policy 4:*
Require development and redevelopment proposals to be consistent with the city's water quality management goals and water quality management standards including the implementation of NURP and infiltration standards for pretreatment of runoff and implementation of BMPs as prescribed in the plan. The city will review development proposals for consistency with this plan.

*Policy 5:*
Implement structural and non-structural stormwater BMPs on city projects and activities.

*Policy 6:*
Educate East Bethel residents about household BMPs to protect the city's water resources.

*Policy 7:*
Maintain, operate, and clean city owned structural BMPs such as sedimentation and detention structures as needed to preserve the initial intended performance.

*Policy 8:*
PUD's and conservation development designs are encouraged for parcels containing, or are adjacent to, waterbodies, high quality wetlands, and natural communities.

*Polity 9:*
Discharge of waters from dewatering projects should be through some form of treatment that removes solids and other pollutants, and in a manner that maximizes groundwater recharge without causing damage to public or private properties.

## 4.3 Water Quantity

**Goal: Minimize flooding potential while minimizing, to the greatest extent practical, the public capital expenditures necessary to control excessive volumes and rates of runoff.**

*Policy 1:*
The city will promote preservation of the retention capacities of the lakes, streams, wetlands and ditches of the present drainage system in order to control rates of runoff and potential flooding.

*Policy 2:*
The city will encourage the retention, on and in the soil, of the highest practical percentage of the annual precipitation in consideration of the overlying land use zoning.

*Policy 3:*
Detention facility design will include access for maintenance of the outlet structure and to the facility in general.

*Policy 4:*
Provide a positive overflow from all stormwater ponds and wetlands.

*Policy 5:*
Require low floors of new structures to be built to have 2 feet of freeboard protection for the critical duration 1 percent chance flood. Low floors of new structures adjacent to landlocked basins shall be elevated a minimum of 2 feet above the elevation of two consecutive 1 percent chance storms and low openings shall be 1 foot above the 10-day snowmelt as outlined in this plan.

*Policy 6:*
Review development and redevelopment proposals for consistency with this plan.

*Policy 7:*
Correct existing flooding problems within available funding constraints by upgrading the storm drainage system or implementing flood protection improvements.

*Policy 8:*
Trunk storm drainage systems that serve as the outlet for areas where flooding of structures or where significant flood damage is likely to occur will typically be designed to meet freeboard protection standards for the critical duration 1 percent chance flood. The design shall be based on a hydrograph method for appropriate rainfall and snowmelt events. The design shall be based on

proposed ultimate land use. The design shall consider potential flood, wetland, and water quality impacts to upstream and downstream areas.

*Policy 9:*
Trunk storm drainage systems for areas where no significant flood damage or disruption of infrastructure is to occur shall be designed to safely convey the critical duration 10 percent chance flood. The design shall be based on proposed ultimate land use. The design shall consider potential flood, wetland, and water quality impacts to upstream and downstream areas.

*Policy 10:*
Manage the rate and volume of runoff in general accordance with the stormwater management criteria presented in this plan.

*Policy 11:*
Provide emergency overflows for storm drainage systems where possible.

*Policy 12:*
Maintain, clean, and replace storm drainage systems as needed to preserve the initial design capacity.

*Policy 13:*
Where practical, stormwater conveyors shall not discharge directly into streams or lakes without at least primary sedimentation in natural or manmade basins.

*Policy 14:*
Require stormwater discharge volume control in new development and redevelopment to be protective against future flooding problems.

## 4.4 Floodplain Management

**Goal: Manage floodplain areas to minimize flooding and protect the functions of the floodplain.**

*Policy 1:*
Manage activities within the floodplain in accordance with the city's ordinance and state and federal regulations.

*Policy 2:*
The city shall prohibit encroachment into the floodway that will reduce storage capacity unless the storage volume is mitigated.

*Policy 3:*
The city shall manage the land use within the 100-year flood level as designated by this plan or the National Flood Insurance Program Flood Insurance Rate Maps (FIRM).

## 4.5 Shoreland Management

**Goal: Manage shoreland areas to protect the functions and values of shoreland regulated water bodies.**

*Policy 1:*
Manage activities within the shoreland districts in accordance with the city ordinance and state and federal regulations.

## 4.6 Recreation, Open Space and Wildlife Management

**Goal: To protect and enhance fish and wildlife habitat areas and water recreational facilities.**

*Policy 1:*
The city shall seek opportunities for integration of recreation open space and wildlife management facilities in conjunction with possible future water resource capital improvement projects.

*Policy 2:*
The city shall encourage protection and/or preservation of wetlands and uplands that provide habitat for game fish spawning and wildlife, especially in the residential development areas.

## 4.7 Groundwater

**Goal: Maintain and improve existing groundwater quality.**

*Policy 1:*
The evaluation and control of development in groundwater recharge areas shall be protected from potential sources of contamination in accordance with Minnesota Statutes section 103H.001 and the City Ordinances.

*Policy 2:*
The disposal of any solid or liquid wastes shall be controlled as necessary to ensure that the underground waters of the watershed are maintained within the range of natural background quality.

*Policy 3:*
Cooperate with Anoka County Health Department in ensuring that abandoned wells are properly sealed according to the Minnesota Department of Health Well Code.

## 4.8 Erosion and Sedimentation Control

**Goal: Prevent, to the extent possible, sediment from entering the city's surface water resources and to control the erosion from drainageways within the city.**

*Policy 1:*
Require development and redevelopment to implement construction site erosion and sediment control practices consistent with the city's Sediment and Erosion Control Ordinance, and the NPDES General Construction Permit and the "Minnesota Stormwater Manual", latest version.

*Policy 2:*
Inspect construction sites and provide enforcement for conformance to the site's approved erosion and sediment control plans.

*Policy 3:*
The City will encourage the preservation of natural vegetation.

## 4.9 Drainageway Maintenance

**Goal: Maintain drainageways to ensure design capacities are met.**

*Policy 1:*
The city shall maintain public water management structures between waters and wetlands, and regional detention basins.

*Policy 2:*
The responsibility for inspection, maintenance or repairs to the county ditch system shall remain with and be coordinated through Anoka County, Department of Highways.

## 4.10 Public Education Outreach and Participation

**Goal: Maintain or improve existing water quality through education, training and participation of East Bethel residents and employees.**

*Policy 1:*
Implement the public education and outreach strategies outlined in the City's SWPPP.

*Policy 2:*
Implement the public participation strategies outlined in the City's SWPPP.

*Policy 3:*
Provide training opportunities to City employees to prevent or reduce pollutant runoff from Municipal Operations.

## 4.11 Illicit Discharge Detection and Elimination

**Goal: Maintain or improve existing water quality through implementation and enforcement of an illicit discharge detection and elimination program.**

*Policy 1:*
Implement and enforce the illicit discharge detection and elimination strategies outlined in the City's SWPPP.

# 5.0 Plan Implementation

To uphold the goals and policies of this Plan, the City will review all proposed developments and improvements. Approvals for BMPs relating to water quality, wetland protection, and erosion and sediment control and rate control will be required for all developments and land disturbances including projects less than one acre that are part of a larger common plan of development or sale and applications that require permitting by City Ordinance.

The City has established the following regulatory control and criteria relating to its policies. These controls and criteria apply to the management of: wetlands, floodplains, shorelands, water quantity and quality, groundwater, soil erosion and sedimentation control and recreation, open space and wildlife and municipal operations. While these controls and criteria relate to one of the policy areas, it should be noted that they are interrelated and may serve multiple purposes.

The criteria, as a minimum, establish the degree of performance necessary to achieve improvements in water quantity and quality management. These criteria are not intended to dictate or preempt the design process, but rather provide a guide to proper development. Section 13 outlines the development submittals required for the city to complete the engineering review for proposed developments.

## 5.1 Wetlands

As discussed in Section 3.0, the city's strategy for managing wetlands will be guided by designating waters and wetlands in groups.

### 5.1.1 Wetland Alterations

Wetland alteration will continue to be permitted and enforced through City Ordinance and state and federal agencies. These regulatory programs are well established and agency personnel are trained to make qualitative judgments regarding wetland values. The City will continue to administer the Wetland Conservation Act.

### 5.1.2 Field Delineation

Any proposed development will require a field delineation by a qualified individual using accepted methodology. The functional values of identified wetlands must be assessed according to the latest version of MnRAM.

### 5.1.3 Wetland Excavation

Excavation may be allowed for wetland restoration, enhancement of wildlife habitat or for treatment of stormwater runoff, and then only when it will not have a substantial or adverse effect upon the ecological and hydrological characteristics of the wetland and

meets all City Ordinances, state and federal regulations, and the requirements of the Upper Rum River and Sunrise River Watershed Management Organizations.

### 5.1.4 Wetland Fill

Any filling shall not cause the total natural flood storage capacity of the wetland to fall below the projected volume that the wetland would hold following a 24-hour duration, 1 percent (100-year) frequency rainfall over the fully developed drainage area.

Fill material shall not be placed below the Ordinary High Water (OHW) level of state public waters and public waters wetlands without obtaining appropriate permits from the Army Corps of Engineers, Minnesota Department of Natural Resources, and the City as required. Fill material may only be placed within the wetland limit if there are not conflicts with floodplain management policies and, if federal, state and local permits as may be required are obtained.

### 5.1.5 Stormwater Runoff

Stormwater runoff into wetlands shall conform to the requirements listed in Table 3-2.

### 5.1.6 Sequencing Procedures

When a proposed wetland alteration(s) involves excavation, filling, or stormwater runoff, the City will determine the applicability of the 1991 Minnesota Wetland Conservation Act, as amended. Project proposers must follow City Ordinances and the sequencing procedures described in Minnesota Rules, Chapter 8420 – Wetland Conservation. Sequencing will be restricted in “Highly Susceptible” wetlands. No impacts (as defined by the WCA) are allowed in “Highly Susceptible” wetlands unless significant public benefit can be demonstrated.

### 5.1.7 Wetland Buffers

Wetland buffers are unmowed areas adjacent to wetlands that contain non-invasive vegetation, preferably dense native vegetation. Buffers filter pollutants before they can enter the wetland, reduce erosion, protect vegetation diversity and wildlife habitat, and minimize human impacts to the wetlands. Wetland buffers shall be established around all wetlands when any of the following activities are proposed:

- Subdivision creating three or more lots and creating impervious surfaces or structures.
- Any projects with wetland impacts as defined by the WCA (Minnesota Rules 8420).
- Wetland excavation greater than 0.5 acres.

Buffer widths are shown in Table 3-2.

#### *5.1.7.1 Buffer Averaging*

Buffers are encouraged to have a meandering shape for a more natural appearance and in order to make reasonable accommodations for nearby features of the development or landscape. The buffer width may vary around the wetland such that:

1. It may be 10 feet less than the minimum allowable (see Table 3-2), but not less than 5 feet.

2. The total acreage of the buffer cannot be reduced.

3. In areas of concentrated inflow to the wetland, the buffer cannot be less than the minimum allowable buffer width in Table 3-2.

#### *5.1.7.2 Buffer Variances*

Variances of buffer width may, at the City's discretion, be granted for the following reasons:

1. Part of the required buffer is outside of the wetland's watershed. Due to topography near the wetland, runoff flows away from and never enters the wetland through surface flows. Variances should only be for that portion of the buffer that would be outside of the wetland's watershed.

2. If drainage is redirected to an area where a buffer is feasible.

3. If the site is not generating stormwater or is using stormwater minimizing techniques such as rain gardens, rain barrels, vegetated swales, and other BMP's to replace the functions of the buffers.

4. If the applicant is protecting additional upland, beyond that required by other ordinances or control measures, to connect existing wildlife habitat.

5. Roads and other linear projects, except those created as part of new residential or commercial developments.

6. No buffers are required for small wetlands where the entire wetland area is less than or equal to the area of wetland impact allowed without replacement as *de minimis* under the WCA.

#### *5.1.7.3 Activities Prohibited within Buffers*

Activities that disturb the roots or influence the growth of vegetation are prohibited, including:

1. Mowing (except as part of City-approved wetland buffer management or for pedestrian trails).

2. Structures.

3. Paving (except as allowed in Section 5.1.7.4).

4. Retaining walls.

5. Clearing and removal of vegetation (except selective clearing and pruning of individual trees and shrubs, which are dead, diseased, hazards, or removal of noxious or invasive weeds).

6. Introduction of non-native vegetation.

7. Filling, dumping, or yard waste disposal.

8. Fertilization.

9. Removal of buffer monuments.

10. Septic systems.

### *5.1.7.4 Activities Allowed within Buffers*

1. Management needed to establish the buffer, such as mowing or burning.

2. Activities consistent with municipal park management plans.

3. Plantings that enhance the natural vegetation.

4. Selective clearing and pruning of individual trees and shrubs, which are dead, diseased, or hazards.

5. Noxious or invasive vegetation removal.

6. Use and maintenance of an unimproved access strip not more than 10 feet wide for recreational access and the exercise of riparian rights.

7. Pedestrian trails, provided that at least 10 feet of buffer remains between the trail and wetland.

8. Placement, maintenance, or repair of utility and drainage systems that exist on creation of the buffer strip or are required by the City, as long as any adverse impacts have been avoided or minimized.

9. Construction, maintenance, repair, or reconstruction of existing and future public roads as long as any adverse impacts have been avoided or minimized.

10. Others as approved by the City.

#### *5.1.7.5 Buffer Easements*

A conservation easement (preferred), or functional equivalent such as a drainage and utility easement or outlot, is required on the wetland and buffer.

## 5.2 Water Quantity and Quality Management

The water quantity and quality management strategy are guided by requiring all developments to adhere to this Plan's policies and criteria for the control of surface runoff. The following prescribe the design criteria for water quality and quantity assessment.

### 5.2.1 General Hydrology

Hydrologic analysis of stormwater runoff for the planning and design of flows in storm sewers, ditches, streams and channels to lakes, detention basins, and wetlands shall be made using generally accepted hydrograph methods.

Determination of total runoff volume should follow the USDA-SCS curve number method which incorporates land use and hydrologic soil groups. Specific step-by-step process can be found in the Soil Conservation Service (SCS) publication National Engineering Handbook: Chapter 4, SCS Hydrology (1972), and Hydrology Guide for Minnesota (1992). Peak runoff rates should be determined through the use of the SCS method incorporating "time of concentration" for both pre and post development conditions.

The developed runoff hydrograph should then be routed through the drainage area, that is, mathematically the peaks and volumes are followed as they move in a wave progressively downstream.

"Design Storms" or storm volumes for hydrologic analyses shall be based upon Hershfield, D.M., 1961, Rainfall Frequency Atlas of the United States for Durations of 30 minutes to 24 hours and Return Periods from 1 to 100 years, Technical Publication Number 40 (TP-40) along with the supplementary documents entitled: Vinha, K., J. A. Sventek and G.L. Oberts, 1995: Precipitation Frequency Analysis for the Twin Cities Metropolitan Area, Metropolitan Council, Publication Number 32-95-009 and Fredrick, R.H., 1977, Five-to-Six-Minute Precipitation Frequency for the Eastern United States, NOAA Technical Memorandum NWS HYDRO-35, Office of Hydrology, Silver Spring, Maryland.

The rational method may be used to determine peak runoff rates for primary systems. Construction of a hydrograph should be undertaken which characterizes the movement of surface water as a function of time and precipitation.

### 5.2.2 Rainfall

Usually the standard 24-hour SCS rainfall distribution will be used to calculate the peak discharge rates and levels from developments. The following minimum rainfall and snowmelt values shall be used in calculations for the City of East Bethel:

| Event | Rainfall (inches) |
|---|---|
| 1 year, 24 hour | 2.44 |
| 2 year, 24 hour | 2.82 |
| 10 year, 24 hour | 4.18 |
| 25 year, 24 hour | 5.17 |
| 50 year, 24 hour | 6.02 |
| 100 year, 24 hour | 6.93 |
| 100 year, 2 day | 7.32 |
| 100 year, 4 day | 7.98 |
| 100 year, 10 day snowmelt | 7.2 inches of runoff |

### 5.2.3 Curve Numbers

Table 13-1 in Section 13 lists the allowable Curve Numbers (CN) which shall be used for design. Hydrologic soil groups shall be determined based upon the Soil Survey for Anoka County, Minnesota as published by the United States Department of Agriculture Soil Conservation Service in Cooperation with Minnesota Agricultural Experiment Station. Curve numbers used to model post-construction conditions in soil types B, C and D shall be shifted down one Hydrologic Soil Group Classification to account for grading impacts to soil structure, unless soil is amended or deep ripped.

The curve numbers presented for predevelopment are considered maximum values while curve numbers for post development are considered minimum values. The designer shall use their engineering judgment to select the appropriate curve numbers.

### 5.2.4 Flood Protection

Consistent with state and federal regulations, East Bethel requires that the level of flood protection along all ditches, detention basins, lakes, streams and wetlands be established based upon the 1 percent (100-year frequency) flood. Land use within floodplains shall be regulated in accordance with city ordinance and state floodplain zoning regulations.
The following freeboard values are required for the City of East Bethel:

- Landlocked Basins (no outlet) — 2.0 feet — (Established high water, see 5.2.6.8.)
- Non-Landlocked Basins — 2.0 feet — (100-year frequency)

### 5.2.5 Waterbody Classification

The first step involved in implementing the water quality goals is to classify the receiving water body as discussed in Section 3.2. Table 5-1 then outlines the requirements for each classification group.

**Table 5-1**
**General Requirements for Water Management**
**According to Water Quality Management Classification**

| Management Classification | Best Management Practices | Runoff Treatment | | | |
|---|---|---|---|---|---|
| | | Infiltration Basins | Skimming | Sediment Removal | Nutrient Removal |
| Group 1 and Group 2 | Required | May be required, see 5.2.6.1.1 | Required | Required | Required |
| Group 3 | Required | May be required see 5.2.6.1.1 | Required | Required | Not Required |

For watersheds that require nutrient and sediment removal, the permanent pool shall be designed per Section 5.2.6.1. For watersheds that require only sediment removal, the permanent pool shall be designed per section 5.2.6.2.

### 5.2.6 Stormwater Basin Design

It is the policy of the City of East Bethel to require the following types of projects to control urban stormwater quantity and quality through a management approach of better site design, infiltration, and detention.

- Development and redevelopment projects disturbing one or more acres.
- Projects in the shoreland zone that meet the following conditions (except that peak flow rate control requirements are not applicable for shoreland zone projects):
    - Projects requiring a building permit and a variance from the maximum impervious surface percentage.
    - Any project requiring a building permit that increases or replaces impervious surface by 1,000 square feet or more.

The following order preference for stormwater management techniques shall be followed:

- First – Better site design (as defined in the Minnesota Stormwater Manual Chapter 4)
- Second – Infiltration
- Third – Extended detention basins or NURP ponds

Detention and infiltration techniques, whether on-site or regional in nature, shall be designed to incorporate all requirements of the National Pollution Discharge Elimination

System Application for General Stormwater Permits for Construction Activity (MN R100001) and the following:

### *5.2.6.1 Infiltration Basins*

All new development and redevelopment projects disturbing one or more acres will be required to infiltrate within 48 hours the first 1.1 inches of runoff from the impervious areas created by new project where there are A and B soils. Infiltration techniques will not be allowed in stormwater hotspots. Potential stormwater hotspots are defined as a land use or activity that produces higher concentrations of trace metals, hydrocarbons, or pollutants not normally found in stormwater. Examples include fueling stations, vehicle service or washing areas, vehicle fleet storage areas and facilities that generate or store hazardous materials. Infiltration basins shall be designed, constructed and maintained in accordance with "Stormwater infiltration Best Management Practices" of the Minnesota Stormwater Manual, Latest Version with the following additional requirements:

1. Construction of an approved pre-treatment system shall be required prior to discharging to the infiltration basin.

2. Exit velocities from the pre-treatment system shall be less than 3 feet per second for the 100-year storm event and flows shall be evenly distributed across the width of the outlet.

3. During the planning and design phase of a project, infiltration rates shall be determined using soil borings. A minimum of three soil borings or pits shall be submitted with the design to verify soil types and infiltration capacity characteristics and to determine the depth to restrictive soil layers and groundwater. The depth of the soil borings or pits shall be a minimum of ten feet below the bottom elevation of the proposed infiltration practice. Soil boring reports shall be conducted by a qualified geotechnical professional.
   If infiltration rates are not measured directly with an infiltrometer, the maximum soil infiltration rates used for design purposes shall be those found in Table 5-2 below.

The MIDS calculator or similar program shall be used to determine the effectiveness of the infiltration practice.

**Table 5-2**
**Infiltration Rates for Hydrologic Soil Groups**

| Hydrologic Soil Group | Soil Textures | Corresponding Unified Soil Classification | Infiltration Rate (in/hr) |
|---|---|---|---|
| A | Gravel, sand, sandy gavel, silty gavel, loamy sand, sandy loam | **GW** – Well-graded gravel or well-graded gravel with sand<br>**GP** – Poorly graded gravel or poorly graded gravel with sand | 1.6 |
| | | **GM** – Silty gravel or silty gravel with sand<br>**SW** – Well-graded sand or well-graded sand with gravel<br>**SP** – Poorly graded sand or poorly graded sand with gravel | 0.8 |
| B | Loam, silt loam | **SM** – Silty sand or silty sand with gravel | 0.6 |
| | | **ML** – Silt<br>**OL** – Organic silt or organic silt with sand or gravel or gravelly organic silt | 0.3 |
| C | Sandy clay loam | **GC** – Clayey gravel or clayey gravel with sand<br>**SC** - Clayey sand or clayey sand with gravel | 0.2 |
| D | Clay, clay loam, silty clay loam, sandy clay, silty clay | CL- Lean clay or lean clay with sand or gravel or gravelly lean clay<br>CH – Fat clay or fat clay with sand or gravel or gravelly fat clay<br>OH – Organic clay or organic clay with sand or gravel or gravelly organic clay<br>MH – Elastic silt or elastic silt with sand or gravel | <0.2 |

Source: Minnesota Stormwater Manual

4. The bottom of the infiltration practice must be at least three feet from the seasonal high ground water table, bedrock, or other impeding layer.

5. Infiltration practices must not have standing water longer than 48 hours following each storm event.

#### 5.2.6.1.1 Maintenance Guidelines

The following guidelines will help ensure that the infiltration basin can be maintained effectively after construction:

1. Adequate access must be provided for all infiltration practices for inspection, maintenance and landscaping upkeep, including appropriate equipment and vehicles.

2. A legally binding and enforceable maintenance plan clarifying responsible parties is required for all infiltration practices.

3. A way to visually inspect infiltration practice performance, such as a perforated PVC observation well.

4. An easement and/or outlot is required over the area inundated by the 100-year storm event and adequate to provide maintenance access.

5.

5.2.6.1.2 Infiltration in Drinking Water Supply Management Areas (DWSMA)

Some areas may not be suitable for infiltration due to elevated risk of groundwater contamination. DWSMA boundaries are available from public water suppliers or the Minnesota Department of Health (MDH, http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm).

Projects within a DWSMA should refer to MDH guidance entitled "Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas" (http://www.health.state.mn.us/divs/eh/water/factsheet/index.html) to determine if infiltration techniques are appropriate. This guidance relies on the answers to the following questions:

1. Is the wellhead protection area or DWSMA considered vulnerable?

2. Does the aquifer receiving the water from the infiltration basin exhibit fracture or solution-enhanced groundwater flow conditions (secondary porosity features)?

3. Is the proposed infiltration site within the 1-year time-of-travel (emergency response zone) as designated by MDH?

4. What current or proposed land uses drain to the infiltration site? If the land use is commercial, industrial, municipal, or transportation corridors, are emergency procedures for containment of spills established and acceptable?

5. Are site planning, BMPs, pre-treatment, or secondary containment measures, or natural attenuation characteristics in the vadose zone acceptable to meet federal drinking water standards?

5.2.6.1.3 Nutrient Removal

When infiltration is not feasible or allowed, a permanent pool ("dead storage") volume, shall be provided, below the normal elevation which shall be greater than or equal to the runoff from a 2.5-inch rainstorm over the entire contributing drainage area assuming full development. This modified NURP criteria includes a 25 percent increase in basin storage to permit routine sediment accumulation over a 20-year design period,

assuming the drainage area is protected with proper erosion and sedimentation control practices. The permanent pool average depth (basin volume/basin area) shall be greater than 4 feet with a maximum depth of 10 feet.

The runoff volume shall consider the entire area contributing to the pond; however, the minimum permanent pool volume must be greater than or equal to the volume produced from 0.5 inches of runoff from all impervious areas in the contributing watershed.

#### *5.2.6.2 Sediment Removal*

When only sediment removal is required, a permanent pool ("dead storage") volume shall be provided below the normal elevation which shall be greater than or equal to 250 cubic feet per acre of impervious area. Design the outlet to remove all suspended solids greater than forty microns (fine sand). The basin shall be designed such that the minimum area is equal to or greater than 450 square feet per cubic feet of outflow for the 2 year storm event.

In areas where infiltration basins, per Section 5.2.6.1.1 are required, no additional sediment removal will be required.

#### *5.2.6.3 Emergency Spillway*

An emergency spillway (emergency outlet) adequate to control the critical one percent frequency/duration rainfall event (usually 100-year, 24-hour).

#### *5.2.6.4 Basin Side Slopes*

Basin side slopes above the normal water level should be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of 10 feet and a slope of 10:1 starting at the normal water level shall be provided.

#### *5.2.6.5 Length to Width Ratio*

To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized. The ratio of maximum length to maximum width of the permanent pool should be at least 3:1.

#### *5.2.6.6 Flood Storage*

To protect downstream channels and structures the following flood control criteria are required for basin design:

1. A flood pool ("live storage") volume above the normal elevation shall be adequate so that the peak discharge rates from the 2-year, 10-year, and 100-year frequency, critical duration storms (usually the 24-hour) are no greater than predevelopment basin watershed conditions.

2. Dead storage volume may not be utilized as live storage.

### *5.2.6.7 Skimming Structures*

Skimming structures shall be utilized for each basin. The skimming structure shall be in accordance with the City Standard Plates. Skimming structures shall be shown on the plans.

### *5.2.6.8 For Areas without Formal Outlets (i.e. Landlocked Areas)*

Wherever practical, the construction of a positive outlet is required. Where the construction of a positive outlet is not practical, the following shall apply:
The minimum building elevation (low floor) shall be set two (2) feet above the level resulting from two concurrent 100-year rainfall events. The starting elevation of the pond/waterbody prior to the runoff event shall be established by one of the following:

1. Existing Ordinary High Water level established by the Minnesota Department of Natural Resources;
2. Local observation well records, as approved by the City; or
3. Mottled soil.

All areas below the established high water level shall be contained within a drainage and utility easement.

Landlocked areas shall also be analyzed for the 100 year 10 day snowmelt event. The analysis shall consider a minimum of 7.2 inches of runoff. The minimum building opening shall be set a minimum of 1 foot above the 100 year 10 day snowmelt elevation.

### *5.2.6.9 Stormwater Discharge*

Discharge must be made to a receiving stream, ditch, or another pond or an approved discharge route as shown in the Water Management Plan.

### *5.2.6.10 Storm Sewer*

A. Storm sewer sizing shall be based upon the 10 year storm event. Inlet capacities and roadway spread at each inlet shall be determined. The maximum allowable roadway spread at any inlet shall be on-half of the traveled lane.

   Storm sewer inlets shall be spaced to ensure that not more than ½ of the traveled lane is inundated during the 10 year storm event. Manning's equation shall be utilized to determine the flow in the street at each catchbasin for verification of actual spread. A manning's n of 0.016 shall be utilized for asphalt pavement. Additionally, grate inlet capacities shall be verified at the maximum allowable depth of flow to verify that the proposed grates will pass the 10 year flows. When appropriate, by-pass flows shall be considered in calculations.

B. Storm sewer systems shall also meet the following requirements:

1. Maintain a minimum velocity of 3 fps for 10-year storm event.

2. Maintain a minimum cover of 2 feet from top of pipe to top of casting or flow line elevation.

3. Maintain a minimum of 3 feet of final cover over corrugated high density polyethylene (HDPE) pipe. See the Engineering Manual to determine when HDPE is allowed.

4. Maintain a minimum of 1.5 feet of final cover over RCP in areas not used for vehicle traffic.
5. Storm sewers inverts, which outlet to detention basins, shall be placed at the normal level of the basin. Storm sewers may be submerged a maximum of ½ the pipe diameter below the basin normal level if approved by the City Engineer.

### 5.2.7 Rate Control Requirements

Post development peak flow rates shall not exceed existing rates, in aggregate, within the project boundary for the 2-, 10-, and 100-year, 24-hour storm events. For areas that discharge to "special waters" as defined in the NPDES General Stormwater Permit for Construction Activities, the permanent stormwater management system must be designed such that the pre and post project runoff rates and volumes from the 1- and 2-year, 24-hour storm events remain the same.

### 5.2.8 Exemptions

The following activities are exempt:

1. Road reconstruction projects that do not add more than 1 acre of new impervious surface.
2. Road mill and overlay.
3. Maintenance and paving of existing gravel roads.
4. Agricultural crop production activities not creating additional impervious surfaces.
5. Emergency activities necessary for protection of life, property, or natural resources.

## 5.3 Water Quality Monitoring Program

The City will continue to cooperate with the WMOs with water quality monitoring, modeling, and planning to protect priority resources. The WMOs in cooperation with the Anoka Conservation District will continue to monitor water quality in Cedar Creek, Crooked Brook, and Coon Lake. The existing water quality data is presented in Section 2 of this plan. The City of East Bethel promotes Coppers Lake as a swimmable water

body. This lake has park facilities and a swimming beach on the south end. The City, in cooperation with the Anoka Conservation District, will add Coopers Lake to the monitoring program.

The City will use Table 5-3 as a guide to evaluate the quality of its Lakes.

**Table 5-3**
**Water Quality Standards**

| Parameter | Unit | Standard |
|---|---|---|
| pH | | 6.5 to 9.0 |
| Turbidity | FNRU | 25 |
| Dissolve Oxygen | Mg/l | >5 |
| Chlorophylla-a | ppb | <15 |
| Total Phosphorus | ppb | <40 |
| Secchi | meters | > 1.2 |
| TSI | | <57 |

## 5.4 Flood Plains and Shoreland Management

Various levels of government are involved in regulation of surface water, wetlands and floodplain. As previously discussed, the MnDNR has inventoried and classified water bodies and wetlands in the State of Minnesota. The "protected waters and wetlands" program identifies water bodies and wetlands that require DNR permits for activities like draining, filling, dredging, and diverting of water. The MnDNR *Shoreland Management Program* has also established a classification system for lakes greater than 10 acres in size and rivers with a drainage area two square miles or greater. These classifications establish minimum development standards for protection by local units of government and are related to their use. The standards apply to those areas within 300 feet of a classified river and 1000 feet from a classified lake.

The City of East Bethel enforces the standards described above, which are generally consistent with existing zoning, and outlined in Table 5-4. Actual regulations may be stricter. "Impact Zone" refers to areas immediately adjacent to lakes, rivers, and bluffs that are necessary to preserve in order to maintain good water and visual qualities of these resources. Floodplain and shoreland areas are governed by the City's Shoreland and Floodplain Ordinances, which regulate activities adjacent to water bodies classified by the Minnesota DNR.

**Table 5-4**
**MnDNR Shoreland Management Program Minimum Regulations**

| | *Lakeshore Lots* | | | | | *Non-Lakeshore Lots* | |
|---|---|---|---|---|---|---|---|
| **Classification** | **Min. Lot Width** | **Min. Lot Area** | **Min. Structure Setback (from water)** | **Min. ISTS Setback (from water)** | **Impact Zone** | **Min. Lot Width** | **Min. Lot Area** |
| ***Natural Environment*** ***lakes not listed below*** | **200** | **80,000** | **150** | **150** | **75** | **200** | **80,000** |
| **Recreational Development** ***Minard Lake*** | **150** | **40,000** | **100** | **75** | **50** | **150** | **40,000** |
| **General Development** ***Coon Lake*** | **100** | **20,000** | **75** | **50** | **37.5** | **150** | **40,000** |
| **Tributary River** ***Cedar Creek*** | **100** | **N/A** | **100** | **75** | **50** | **N/A** | **N/A** |

## 5.5 Recreation, Open Space and Wildlife Management

Through development review the city shall encourage protection and/or preservation of wetlands and uplands that provide habitat for fish and wildlife.

## 5.6 Groundwater Management

The City of East Bethel contains natural characteristics which result in high to very high sensitivity for groundwater contamination. The Plan contains policies and criteria which will guide land use development to protect existing groundwater quality.

### 5.6.1 Groundwater Protection Ordinance

The City will adopt a Groundwater Protection Ordinance which acts as a guideline for best management practices and land use controls to protect groundwater recharge areas.

### 5.6.2 Well Abandonment

The City will develop, in cooperation with the Anoka Conservation District and Anoka County Extension, an education program relating to land use control practices and proper well abandonment procedures in accordance with Minnesota Rules, Section 4725.2700.

### 5.6.3 Individual Sewage Treatment Systems

A principal risk of direct contamination of groundwater comes from sewage from individual sewage treatment systems. East Bethel will ensure protection of local

groundwater through implementation of its ordinances regarding private on-site sewer systems. Wetlands, floodplain and shoreland areas also serve as important areas of groundwater recharge. Strategies to protect these areas were described in the previous sections.

## 5.7 Soil Erosion and Sediment Control

Although development is moderate within the City of East Bethel, significant increases are anticipated. The control of erosion and sedimentation remains important to maintaining water quality in the area. Of paramount importance to the maintenance of water quality in the City is the proper enforcement of erosion and sediment controls. Enforcement will involve indirect and direct approaches.

### 5.7.1 Indirect Approach

The indirect approach includes incentives within the ordinance such as the requirement for a performance bond equal to the work to be performed and civil penalties of up to $700 per day for each violation.

### 5.7.2 Direct Approach

The direct approach involves the inspection and enforcement of the sediment control elements in the Plan to ensure compliance with the principles and standards. The inspection and enforcement will be undertaken by the City or its representative.

The following soil loss limits and conservation principles will be guided by the following criteria (Soil Loss Limits and Conservation Principles) for applicable land disturbance activities. Conservation practices installed as source or structural control measures shall be based upon site conditions and the application of the Universal Soil Loss Equation (USLE). The USLE is applied to a given site in order to determine the need for structural or source control measures for the Worst Case Soil Loss Condition. When the Post-disturbance Condition is determined, the USLE is again applied to evaluate whether permanent source or structural control measures will achieve the applicable soil loss limits.

### 5.7.3 Soil Loss Limits

#### *5.7.3.1 Urban Land Use*

The average annual soil loss rate on any post construction grade shall not exceed 2 tons per acre per year as calculated by the use of the Universal Soil Loss Equation (USLE). At the discretion of the erosion and sediment control plan approving authority, a developer may be required to document performance.

#### *5.7.3.2 Agricultural Land Use*

The average annual soil loss rate shall not exceed 5 tons per acre per year as calculated by the use of the Universal Soil Loss Equation (USLE). At the discretion of URRWMO or a local government unit, an agricultural land user may be required to document conformance.

### 5.7.4 Conservation Principles

For applicable urban land disturbance activities, the developer shall prepare and implement an erosion and sediment control plan. The Plan shall include the necessary erosion and sediment control practices, implementation schedule and other necessary items to conform to the General Stormwater Permit for Construction Activity (MN R100001) and City ordinance.

The erosion and sediment control practices selected for the plan shall be designed, applied, installed and maintained within the prescribed practice standards and specifications to ensure effective reduction of soil losses within the tolerable limits previously identified. It shall be the developer's option to select a specific practice or combination of practices that will provide effective control of erosion within the limits of generally accepted soil and water conservation practices and in concert with the particular development stage. The "Erosion Control Handbook II" prepared by the Minnesota Department of Transportation, dated 2006 shall be used as a guide.

### 5.7.5 Stormwater System Maintenance Plan

The Stormwater System Maintenance Plan has been developed to assure that the system of stormwater retention/treatment basins and stormwater conveyance systems are adequately inspected and maintained to assure that they meet their design functions. Outlined below are the inspection and maintenance activities the City intends to implement:

1. At a minimum, 20 percent of all City stormwater retention, infiltration, and treatment basins and outlets will be inspected each year on a rotating basis to determine if the basin's retention and treatment characteristics are adequate.

2. On a two-year cycle, portions of the City's storm sewer system will be inspected on a rotating basis. During these inspections, debris present at trash grates and catch basins grates will be removed so as to provide reasonable assurance that the system will operate in an unobstructed manner during rainfall events.

3. City streets will be swept once annually in all areas and twice annually in priority areas. Priority areas are those that drain directly to water bodies and/or natural wetlands without pretreatment of stormwater runoff.

4. All public sump catchbasins, sump manholes, skimmer structures and other settling or filter devices will be cleaned and inspected every year.

The City is currently evaluating and will further refine the maintenance plan in accordance with the SWPPP. This item is specifically outlined in the BMP No. 6b-3.

## 5.8 Stormwater Pollution Prevention Program

In addition to design guidelines and strategies previously presented the City will implement its SWPPP. Implementation of the SWPPP will assist in maintaining or improving existing water quality through implementation of public and employee education and participation programs, illicit discharge and detection programs and improved municipal operations.

## 5.9 Capital Improvements Plan

Table 11-5 provides an estimate of expenses and funding sources to implement the strategies outlined in this plan.

# 6.0 Fish Lake and Sunrise River

## 6.1 Fish Lake Watershed Summary

This section presents the management plan for the Fish Lake Watershed located in northeastern East Bethel. This watershed is divided into two subwatersheds. The Fish Lake Watershed contains subwatersheds 100 and 101, which flow west into Cedar Creek.

Sections 6.1.1 and 6.1.2 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, and existing ditches are shown on Figure 6-1, located at the end of this section. Information tables are provided in Section 11.0. Proposed land use for this watershed is shown on Figure 2-10.

### 6.1.1 Subwatershed 100

***Location***
Subwatershed 100 is located in northeastern portion of East Bethel. It contains Fish Lake and the areas south, west, and east of Fish Lake.

***Drainage Area***
1359 acres.

***Wetlands***
This subwatershed contains approximately 670 acres of wetlands, most of which is protected by the Minnesota DNR. Protected Wetlands 156W and 157W, and protected waters 65P, 160P, and 161P are all within this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. All stormwater in this subwatershed drains to Subwatershed 101 through two existing 18-inch pipes.

The existing overflow elevation is 919.4, which results in a flood elevation and discharge of 920.0 and 58 cfs, respectively. It is proposed that the two 18-inch CMPs be replaced by one 24-inch RCP, with a 12-inch diameter orifice to control flow and the overflow be built to 920.5. This will result in a flood elevation of 920.1, and less discharge, 5.4 cfs.

### 6.1.2 Subwatershed 101

***Location***
Subwatershed 101 is located in northern East Bethel, just west of East Bethel Blvd.

***Drainage Area***
464 acres.

***Wetlands***
This subwatershed contains approximately 140 acres of wetlands. There is one DNR protected water, 154P.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains from south to north in this subwatershed. Stormwater from this subwatershed drains to Cedar Creek through an existing 36-inch pipe.

## 6.2 Sunrise River Watershed Summary

This section presents the management plan for the Sunrise River Watershed located in northeast East Bethel. This watershed is divided into thirteen subwatersheds. The Sunrise River Watershed contains subwatersheds 500 through 512.

Sections 6.2.1 through 6.2.13 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches and stormwater storage areas are shown on Figure 6-1, located at the end of this section. Information tables are provided in section 11.0.

### 6.2.1 Subwatershed 500

***Location***
This subwatershed is located on the northern border of East Bethel, west of Durant St. N.E. and north of County Rd. 76.

***Drainage Area***
355 acres.

***Wetlands***
This subwatershed contains approximately 50 acres of wetlands. Basin 151P is protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater generally drains south to north in this subwatershed. Stormwater drains to Athens Township through private ditches.

### 6.2.2 Subwatershed 501

***Location***
This subwatershed is located in the northeast corner of East Bethel, north of County Rd. 76 and east of Durant St. N.E.

***Drainage Area***
453 acres.

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands. The DNR protects watershed 150W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this subwatershed. Stormwater drains to Linwood Township through private ditches.

### 6.2.3 Subwatershed 502

***Location***
Subwatershed 502 is located on the eastern border of East Bethel, between 239th Ave. N.E. and County Rd. 76.

***Drainage Area***
54 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands. Protected Wetland 155W is within this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows south to north in this subwatershed. Stormwater drains to Subwatershed 501 through an existing 48-inch pipe.

### 6.2.4 Subwatershed 503

***Location***
This subwatershed is located on the eastern border of East Bethel, just south of 239th Ave. N.E.

***Drainage Area***
77 acres

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. The stormwater runoff generally drains to the existing wetlands.

### 6.2.5 Subwatershed 504

***Location***
This subwatershed is located on the eastern border of East Bethel, just north of County Rd. 26.

***Drainage Area***
308 acres.

***Wetlands***
This subwatershed contains approximately 30 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally flows into the existing wetlands.

### 6.2.6 Subwatershed 505

***Location***
This subwatershed is located in northeastern East Bethel, north of County Rd. 26 and east of Durant St. N.E.

***Drainage Area***
108 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains into the existing wetlands.

### 6.2.7 Subwatershed 506

***Location***
This subwatershed is located on the eastern border of East Bethel, south of County Rd. 26 and east of Durant St. N.E.

***Drainage Area***
634 acres.

***Wetlands***
This subwatershed contains approximately 210 acres of wetlands. The DNR protects wetland 446W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this watershed. Stormwater drains to Linwood Township through open channels.

### 6.2.8 Subwatershed 507

***Location***
This subwatershed is located in northeastern East Bethel, west of County Rd. 15 between County Rd. 26 and 221st Ave. N.E.

***Drainage Area***
374 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains to the wetlands existing in the subwatershed.

### 6.2.9 Subwatershed 508

***Location***
This subwatershed is located in northeastern East Bethel, south of County Rd. 26 and east of E. Bethel Blvd.

***Drainage Area***
124 acres.

***Wetlands***
This subwatershed contains approximately 30 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater generally drains to the water quality/rate control ponds, then to the natural ponding areas in the subwatershed.

### 6.2.10 Subwatershed 509

***Location***
This subwatershed is located in northeastern East Bethel, just north of County Rd. 26 between East Bethel Blvd. and County Rd. 15.

***Drainage Area***
223 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains to the existing wetlands in the subwatershed.

### 6.2.11 Subwatershed 510

***Location***
This subwatershed is located in northeastern East Bethel, just north of 231st Lane N.E.

***Drainage Area***
73 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands, most of which are protected by the DNR. Wetlands 280W and 163W are both protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally flows into the wetlands in the subwatershed.

### 6.2.12 Subwatershed 511

***Location***
This subwatershed is located in northeastern East Bethel, just east of East Bethel Blvd.

***Drainage Area***
11 acres

***Wetlands***
This subwatershed contains no wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater generally drains to the natural ponding area in the subwatershed.

### 6.2.13 Subwatershed 512

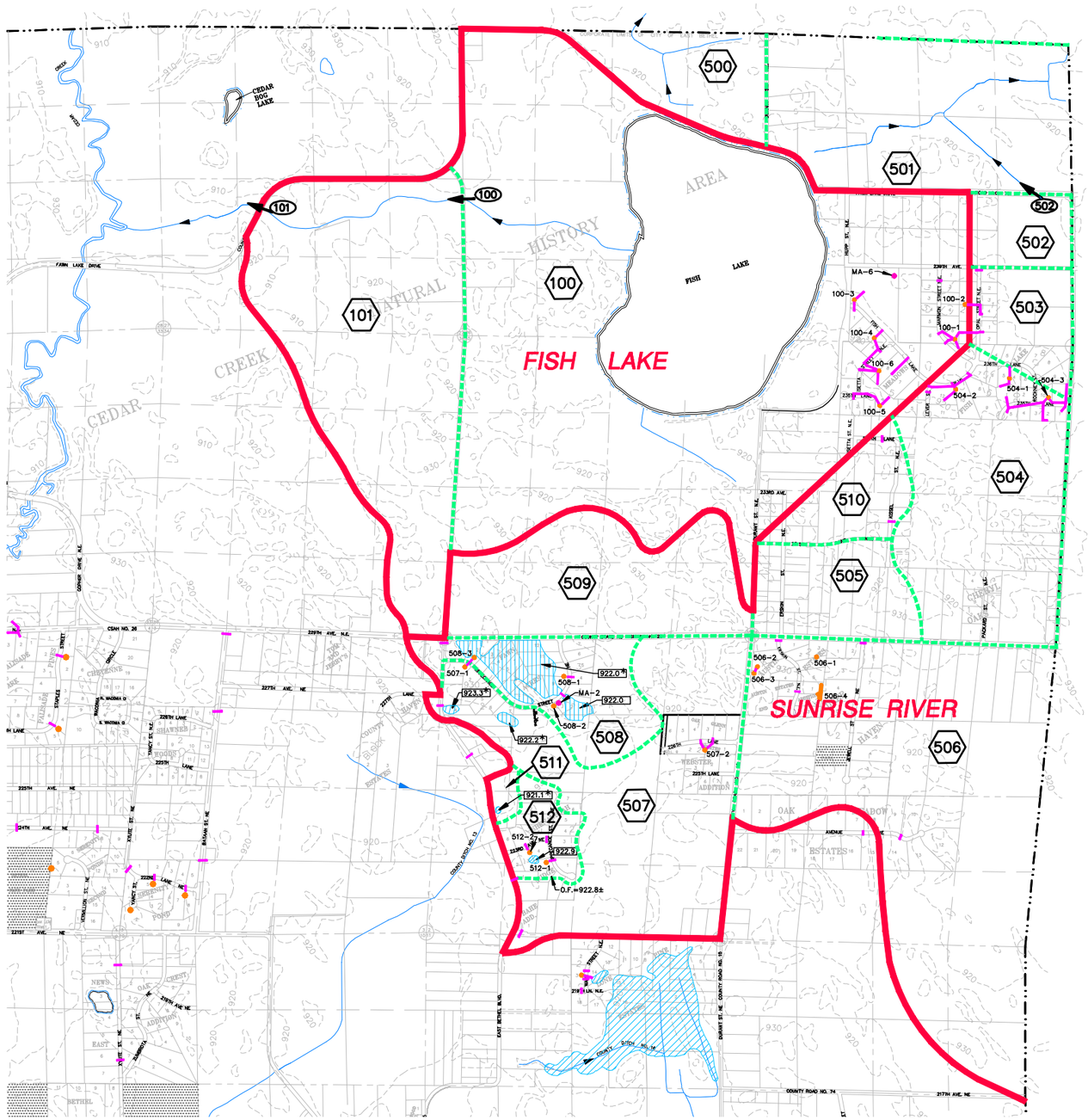
***Location***
This subwatershed is located in northeastern East Bethel, just east of East Bethel Blvd.

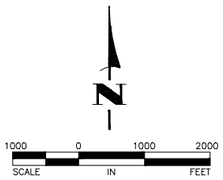
***Drainage Area***
44 acres.

***Wetlands***
This subwatershed contains approximately 3 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains to the water quality/rate control ponds, then to the natural ponding area in the subwatershed.




LEGEND

- DENOTES EXISTING DITCH
- DENOTES EXISTING CONTOUR (10 FOOT INTERVAL)
- 400 — DENOTES MAJOR STORMWATER COLLECTION PIPE
- DENOTES MINOR STORMWATER COLLECTION PIPE
- 400-1 — DENOTES EXISTING WATER QUALITY/RATE CONTROL POND
- 905.2 — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR FLOOD ELEVATION
- DENOTES SUBWATERSHED DIVIDE
- DENOTES WATERSHED DIVIDE
- DENOTES DRAINAGE FLOW
- MA-2 — DENOTES MITIGATION AREA
- 905.2* — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR, BACK-TO-BACK, FLOOD ELEVATION

# FIGURE 6-1

## FISH LAKE AND SUNRISE RIVER WATERSHEDS

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999
REVISED: DECEMBER, 2009

FILE: EB403

Hakanson Anderson Assoc., Inc.
Civil Engineers and Land Surveyors
3601 Thurston Ave., Anoka, Minnesota 55303
612-427-5860 FAX 612-427-0520

May 13, 2011 - 8:48am time
K:\Cad_Eng\CLIENT_FOLDERS\East Bethel\WATERSHED-EX-2006\2006\dwg\DRAINAGE-AREAS.dwg

# 7.0 Coopers Lake and Cedar Creek

## 7.1 Coopers Lake Watershed Summary

This section presents the management plan for the Coopers Lake Watershed located in the northwest corner of East Bethel. This watershed is divided into eight subwatersheds. The Coopers Lake Watershed contains subwatersheds 200 through 207. This entire watershed flows into Cedar Creek.

Sections 7.1.1 through 7.1.8 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 7-1. Information tables are provided in Section 11.0. Proposed land use for this watershed is shown on Figure 2-10.

### 7.1.1 Subwatershed 200

***Location***
Subwatershed 200 is located in the northwest corner of East Bethel, north of County Rd. 24 and west of State Trunk Highway #65.

***Drainage Area***
1256 total acres. 457 acres from Athens Township.

***Wetlands***
This subwatershed contains approximately 306 acres of wetlands, most of which are protected by the DNR. Protected Wetlands 200W, 190W, 189W, 175W, 66W, 153W, and 64W and Protected Water Basin 67P are all within the subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater in this subwatershed drains first to Minard Lake, then to Subwatershed 202 through an existing 48-inch pipe.

### 7.1.2 Subwatershed 201

***Location***
Subwatershed 201 is located along the northern boundary of East Bethel, just east of State Trunk Highway #65.

***Drainage Area***
486 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands. The DNR does not protect any wetlands in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. All the stormwater in this subwatershed drains to Cedar Creek through an existing 18-inch pipe.

With new development expected in this subwatershed, a better outlet is advised. For the proposed conditions, an 18-inch RCP was used. The RCP resulted in a lower flood elevation and the discharge was reduced approximately 25%.

### 7.1.3 Subwatershed 202

***Location***
This subwatershed is located south of County Rd. 24 between Jackson St. and State Trunk Highway #65 in northwestern East Bethel.

***Drainage Area***
418 acres.

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands, most of which are protected by the DNR. 69W and 70P are the protected wetland and water, respectively.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. All the stormwater in this subwatershed drains to Subwatershed 206 through an existing 24-inch pipe.

To reduce the discharge from this subwatershed, a smaller outlet is proposed. For the proposed conditions, the 24-inch CMP was replaced by a 21-inch RCP. This results in a lower flood elevation and a reduced discharge, from 23 cfs to 21 cfs. With the smaller RCP, the storage volume is also reduced.

### 7.1.4 Subwatershed 203

***Location***
This subwatershed is located in northwestern East Bethel. It is north of and includes the Pineview Addition.

***Drainage Area***
200 acres.

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands. The DNR does not protect any of the wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this subwatershed. All stormwater in this subwatershed drains to Cedar Creek through an open channel.

To control the discharge, a 21-inch RCP is proposed to replace the open channel. With the pipe, the discharge is reduced from 34 cfs to 20 cfs, but the peak storage increases. The large wetland in this subwatershed will handle the increased storage.

### 7.1.5 Subwatershed 204

***Location***
This subwatershed is located on the western boundary of East Bethel just south of County Rd. 74.

***Drainage Area***
151 acres

***Wetlands***
This subwatershed contains approximately 30 acres of wetlands. The DNR protects one wetland, 350W, in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this subwatershed. All stormwater in this subwatershed drains to Cedar Creek through an existing 15-inch pipe.

### 7.1.6 Subwatershed 205

***Location***
This subwatershed is located on the western border of East Bethel just north of County Rd. 74.

***Drainage Area***
160 acres.

***Wetlands***
This subwatershed contains approximately 40 acres of wetlands. The DNR protects one wetland, 349W, in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater generally flows from the natural ponding areas in the north to the two water quality/rate control ponds in the south.

### 7.1.7 Subwatershed 206

***Location***
This subwatershed is located in northwestern East Bethel. It is south of County Rd. 24 between the Bethel/East Bethel city line and Jackson St.

***Drainage Area***
204 acres.

***Wetlands***
This watershed contains approximately 60 acres of wetlands, most of which the DNR protects. 68W and 99W are the two protected DNR wetlands in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater generally drains from north to south in this subwatershed. All stormwater in this subwatershed drains to Subwatershed 203 through an open channel.

### 7.1.8 Subwatershed 207

***Location***
This subwatershed is located on the western border of East Bethel, just south of Bethel.

***Drainage Area***
216 total acres. 117 acres from Bethel.

***Wetlands***
This watershed contains approximately 40 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed receives stormwater from Oak Grove through an existing 48-inch pipe under University Ave. The stormwater runoff generally drains from west to east in this subwatershed. The stormwater drains to Subwatershed 203 through an open channel.

## 7.2 Cedar Creek Watershed Summary

This section presents the management plan for the Cedar Creek Watershed. This watershed runs from the north central border to the west central border of East Bethel. This watershed is divided into six subwatersheds. The Cedar Creek Watershed contains subwatersheds 800 through 805. The subwatersheds collect most of the runoff from East Bethel and the water flows southwest out of the city.

Sections 7.2.1 through 7.2.6 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 7-1, located at the end of this Section. Information tables are provided in Section 11.

### 7.2.1 Subwatershed 800

***Location***
Subwatershed 800 is located on the north central border of East Bethel.

***Drainage Area***
10300 total acres. 9520 acres from Athens Township.

***Wetlands***
This watershed contains approximately 390 acres of wetlands. Only a small Protected Water, 152P, and Cedar Creek are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater generally drains north to south in this subwatershed. All stormwater in this subwatershed drains to Subwatershed 801 through an existing 20' x 7.6' box culvert.

### 7.2.2 Subwatershed 801

***Location***
Subwatershed 801 is located in north central East Bethel, between County Roads 24 and 26.

***Drainage Area***
810 acres.

***Wetlands***
This subwatershed contains approximately 320 acres of wetlands. The DNR only protects Cedar Creek in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. The stormwater drains to Subwatershed 802 through an opening under a bridge on County Rd. 26.

### 7.2.3 Subwatershed 802

***Location***
This subwatershed is located in north central East Bethel, east of State Trunk Highway #65 between County Roads 74 and 24.

***Drainage Area***
1953 acres.

***Wetlands***
This subwatershed contains approximately 290 acres of wetlands. Along with Cedar Creek, the DNR also protects Wetland 171W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. The stormwater drains to Subwatershed 803 through an existing 20' x 10' box culvert under State Trunk Highway #65.

### 7.2.4 Subwatershed 803

***Location***
This subwatershed is located in northwestern East Bethel, north of County Rd. 74 and west of State Trunk Highway #65.

***Drainage Area***
653 acres.

***Wetlands***
This subwatershed contains approximately 260 acres of wetlands. The DNR only protects Cedar Creek.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains to Subwatershed 804 through two existing 72-inch pipes.

### 7.2.5 Subwatershed 804

***Location***
This subwatershed is located on the west central border of East Bethel, between Sims Road and County Rd. 74.

***Drainage Area***
421 acres.

***Wetlands***
This subwatershed contains approximately 80 acres of wetlands, some of which is protected by the DNR. Wetland 351W and Cedar Creek are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows from north to south in this subwatershed. The stormwater drains to Subwatershed 805 through two existing 108-inch (equivalent size) arch pipes.

### 7.2.6 Subwatershed 805

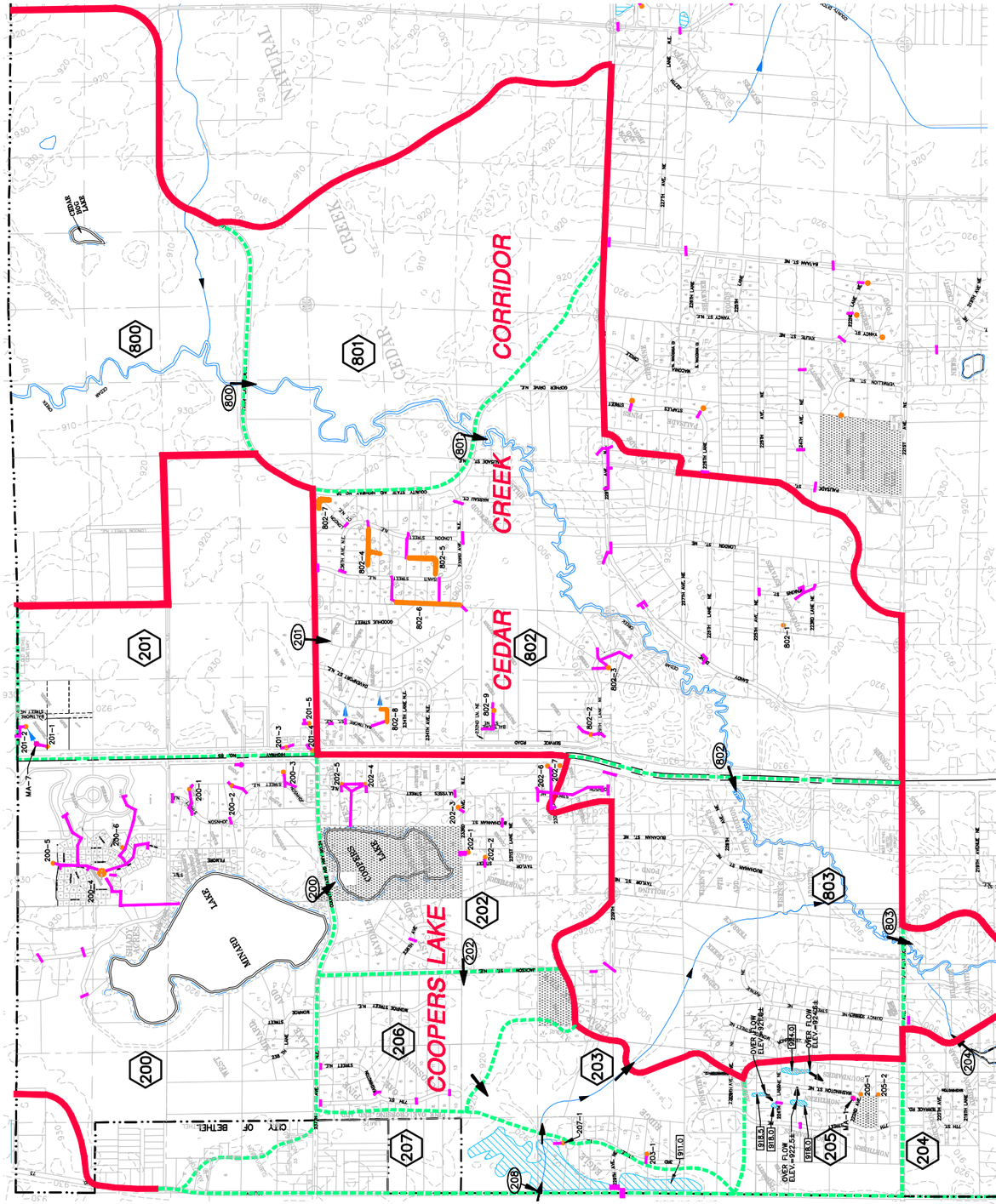
***Location***
This subwatershed is located on the east central border of East Bethel, south of Sims Road.

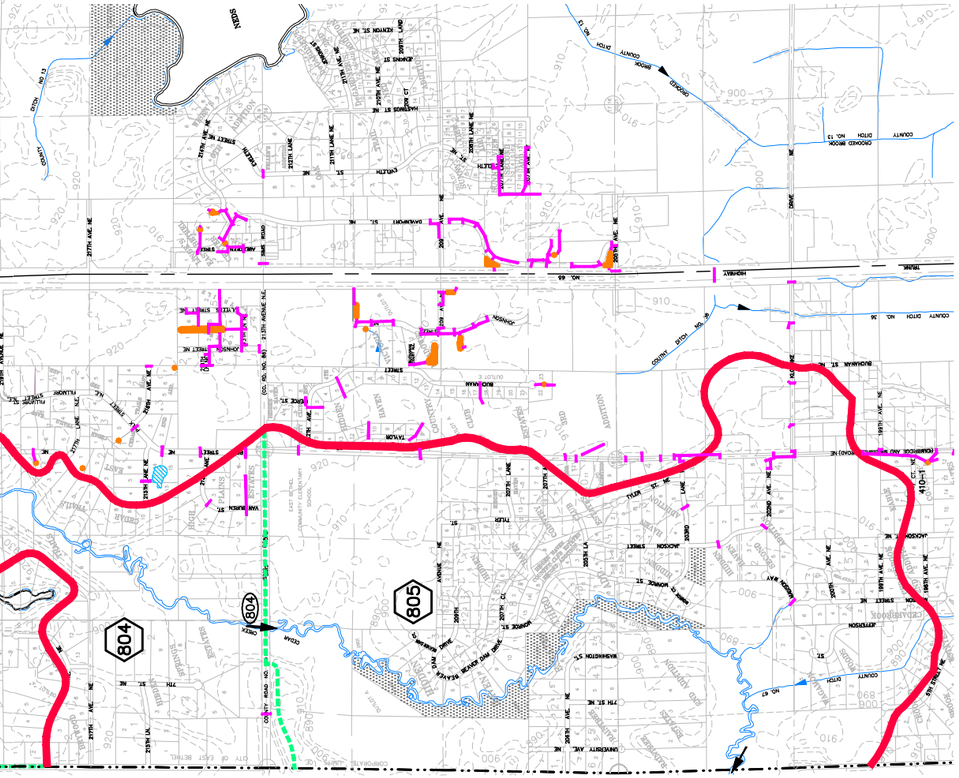
***Drainage Area***
1119 acres.

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands, some of which is protected by the DNR. Cedar Creek and Wetland 366W are the areas protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south in this subwatershed. Most of the stormwater from East Bethel leaves the city through Subwatershed 805. The peak discharge for this outlet is 595 cfs for the existing conditions, compared to 596 cfs for the proposed conditions. Only a 0.2% increase in discharge from existing to proposed conditions.




## LEGEND

- DENOTES EXISTING DITCH
- DENOTES EXISTING CONTOUR (10 FOOT INTERVAL)
- 400 — DENOTES MAJOR STORMWATER COLLECTION PIPE
- DENOTES MINOR STORMWATER COLLECTION PIPE
- 400-1 — DENOTES EXISTING WATER QUALITY/RATE CONTROL POND
- 905.2 — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR FLOOD ELEVATION
- DENOTES SUBWATERSHED DIVIDE
- DENOTES WATERSHED DIVIDE
- DENOTES DRAINAGE FLOW
- MA-2 — DENOTES MITIGATION AREA
- 905.2* — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR, BACK-TO-BACK, FLOOD ELEVATION

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# FIGURE 7-1

## COOPERS LAKE AND CEDAR CREEK WATERSHEDS

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999
REVISED: DECEMBER, 2009

FILE: EB403

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# 8.0 Deer Lake

## 8.1 Watershed Summary

This section presents the management plan for the Deer Lake Watershed located in the center of East Bethel. This watershed is divided into twenty-one subwatersheds. The Deer Lake Watershed contains subwatersheds 300 through 320, which flow south to the Crooked Brook Watershed.

Sections 8.1.1 through 8.1.21 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 8-1, located at the end of this Section. Information tables are provided in Section 11.0. Proposed land use for this watershed is shown on Figure 2-10.

### 8.1.1 Subwatershed 300

***Location***
Subwatershed 300 is located in north central East Bethel, between E. Bethel Blvd. and Bataan St. N.E.

***Drainage Area***
840 acres.

***Wetlands***
This subwatershed contains approximately 380 acres of wetlands, most of which are protected by the DNR. Water 55P and watersheds 170W, 172W, and 166W are all protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south through County Ditch No. 13. The stormwater drains to Subwatershed 301 through an existing 36-inch pipe.

### 8.1.2 Subwatershed 301

***Location***
This subwatershed is located in central East Bethel, north of Klondike Dr. N.E. and west of East Bethel Blvd.

***Drainage Area***
1287 acres.

***Wetlands***
This subwatershed contains approximately 480 acres of wetlands, some of which are protected by the DNR. Water 59P and wetlands 452W, 459W, and 719W are all protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south through County Ditch No. 13. The stormwater drains to Subwatershed 404 through an existing 36-inch pipe.

To reduce discharge, a 21-inch RCP is proposed to replace the existing 36-inch CMP. Under the proposed conditions, the discharge is greatly reduced, while the storage has increased. This subwatershed contains Deer Lake, so the storage should not be a problem.

### 8.1.3 Subwatershed 302

***Location***
This subwatershed is located in central East Bethel, just south of County Rd. 74.

***Drainage Area***
238 acres.

***Wetlands***
The subwatershed contains approximately 30 acres of wetlands, most of which are protected by the DNR. The DNR protects watersheds 453W, 454W, and 455W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains from north to south in this subwatershed. The stormwater drains to Subwatershed 309 through an open channel.

### 8.1.4 Subwatershed 303

***Location***
This subwatershed is located in north central East Bethel, east of Palisade St. N.E. and south of County Rd. 26.

***Drainage Area***
60 acres.

***Wetlands***
This subwatershed doesn't contain any wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally flows into two existing water quality/rate control ponds in the subwatershed.

### 8.1.5 Subwatershed 304

***Location***
This subwatershed is located in north central East Bethel, south of County Rd. 26 and west of Bataan St. N.E.

***Drainage Area***
170 acres.

***Wetlands***
This subwatershed contains approximately 5 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally flows into the wetlands in the subwatershed.

### 8.1.6 Subwatershed 305

***Location***
This subwatershed is located in north central East Bethel, north of County Road 74.

***Drainage Area***
219 acres

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, most of which is protected by the DNR. Waters 56P and 440P are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. The stormwater generally flows into the wetlands in the subwatershed.

### 8.1.7 Subwatershed 306

***Location***
This subwatershed is located in north central East Bethel, north of County Rd. 74 and west of Bataan St. N.E.

***Drainage Area***
63 acres.

***Wetlands***
This subwatershed contains approximately 5 acres of wetlands, all of which are protected by the DNR. The protected DNR wetland is 442W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south in this subwatershed. Stormwater flows into one of three existing water quality/rate control ponds before discharging into the wetland. From the wetland, the water flows to Subwatershed 308 through an existing 12-inch pipe.

To reduce the flood elevation and storage, a 15-inch RCP is proposed to replace the existing 12-inch CMP. Under the proposed conditions, the flood elevation is reduced 0.8’ and the storage is reduced 4 ac-ft.

### 8.1.8 Subwatershed 307

***Location***
This subwatershed is located in north central East Bethel, just west of Bataan St. N.E.

***Drainage Area***
18 acres.

***Wetlands***
This subwatershed contains approximately 1 acre of wetlands, which are not protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater generally flows into the existing ponding area in the subwatershed.

### 8.1.9 Subwatershed 308

***Location***
This subwatershed is located in north central East Bethel, east of Xylite St. N.E. and south of County Rd. 74.

***Drainage Area***
33 acres.

***Wetlands***
This subwatershed contains approximately 5 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains from north to south in this subwatershed. Stormwater drains to Subwatershed 302 through an existing 15-inch pipe.

To accommodate future development, a 15-inch RCP is proposed to replace the existing 15-inch CMP. The proposed conditions produce a higher flood elevation and discharge. The increase is not significant enough to warrant any changes.

### 8.1.10 Subwatershed 309

***Location***
This subwatershed is located near the center of East Bethel, south of County Rd. 74 and east of State Trunk Highway #65.

***Drainage Area***
1107 acres.

***Wetlands***
This subwatershed contains approximately 550 acres of wetlands, most of which are protected by the DNR. The DNR protected wetlands are 439W, 456W, and 718W. The DNR Protected Water is 57P.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south, through County Ditch No. 13 in this subwatershed. The stormwater drains to Subwatershed 310 through an open channel.

### 8.1.11 Subwatershed 310

***Location***
This subwatershed is located near the center of East Bethel. It is generally located around Mud Lake.

***Drainage Area***
363 acres.

***Wetlands***
This subwatershed contains approximately 130 acres of wetlands, most of which is protected by the DNR. Water 60P and Wetland 457W are both protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains from north to south in this subwatershed. The stormwater drains to Subwatershed 313 through an open channel.

### 8.1.12 Subwatershed 311

***Location***
This subwatershed is located near the center of East Bethel, just north of Klondike Dr. N.E.

***Drainage Area***
51 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south through a private ditch. The stormwater drains to Subwatershed 404 through an existing 24-inch pipe.

### 8.1.13 Subwatershed 312

***Location***
This subwatershed is located near the center of East Bethel, just north of Klondike Dr. N.E.

***Drainage Area***
32 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south through a private ditch. The stormwater drains to Subwatershed 404 through an existing 24-inch pipe.

### 8.1.14 Subwatershed 313

***Location***
This subwatershed is located near the center of East Bethel, east of State Trunk Highway #65 and north of Klondike Dr. N.E.

***Drainage Area***
448 acres.

***Wetlands***
This subwatershed contains approximately 130 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south through County Ditch No. 13. The stormwater drains to Subwatershed 404 through an existing 36-inch pipe.

To reduce the discharge, a smaller pipe is proposed. Under proposed conditions, a 30-inch RCP replaces the existing 36-inch CMP. This change reduces the discharge approximately 24% from 34 cfs to 26 cfs.

### 8.1.15 Subwatershed 314

***Location***
This subwatershed is located in west central East Bethel, west of State Trunk Highway #65 between 219th Ave. N.E. and County Rd. 74.

***Drainage Area***
77 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north in this subwatershed. The stormwater drains to Cedar Creek through an existing 24-inch pipe.

### 8.1.16 Subwatershed 315

***Location***
This subwatershed is located in west central East Bethel, west of State Trunk Highway #65 between Sims Road and 219th Ave. N.E.

***Drainage Area***
224 acres

***Wetlands***
This subwatershed contains approximately 6 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. The stormwater runoff generally drains to water quality/rate control ponds or to the existing wetland in this subwatershed.

### 8.1.17 Subwatershed 316

***Location***
This subwatershed is located in west central East Bethel, west of State Trunk Highway #65 between Sims Road and Klondike Dr. N.E.

***Drainage Area***
450 acres.

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands, most of which are protected by the DNR. The DNR protects watershed 61W.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains to Subwatershed 407 through an existing 18-inch pipe.

### 8.1.18 Subwatershed 317

***Location***
This subwatershed is located near the center of East Bethel, south of Klondike Dr. N.E. and west of E. Bethel Blvd.

***Drainage Area***
83 acres

***Wetlands***
This subwatershed contains approximately 4 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north in this subwatershed. All stormwater in this subwatershed drains to Subwatershed 301 through an existing 12-inch pipe. It is proposed to replace the existing 12-inch outlet with an 18-inch RCP to accommodate future development runoff.

### 8.1.19 Subwatershed 318

***Location***
This subwatershed is in west central East Bethel, just west of Fillmore St. N.E.

***Drainage Area***
10 acres.

***Wetlands***
There are no wetlands in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. The stormwater drains to the existing water quality/rate control pond, then discharges to Cedar Creek through an existing 12-inch pipe.

### 8.1.20 Subwatershed 319

***Location***
This subwatershed is located in west central East Bethel, just east of Tyler St. N.E.

***Drainage Area***
19 acres.

***Wetlands***
This subwatershed contains no wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. The stormwater drains to the existing water quality/rate control pond, then discharges to Cedar Creek through an existing 12-inch pipe.

### 8.1.21 Subwatershed 320

***Location***
This subwatershed is located in west central East Bethel, near Polk St. N.E.

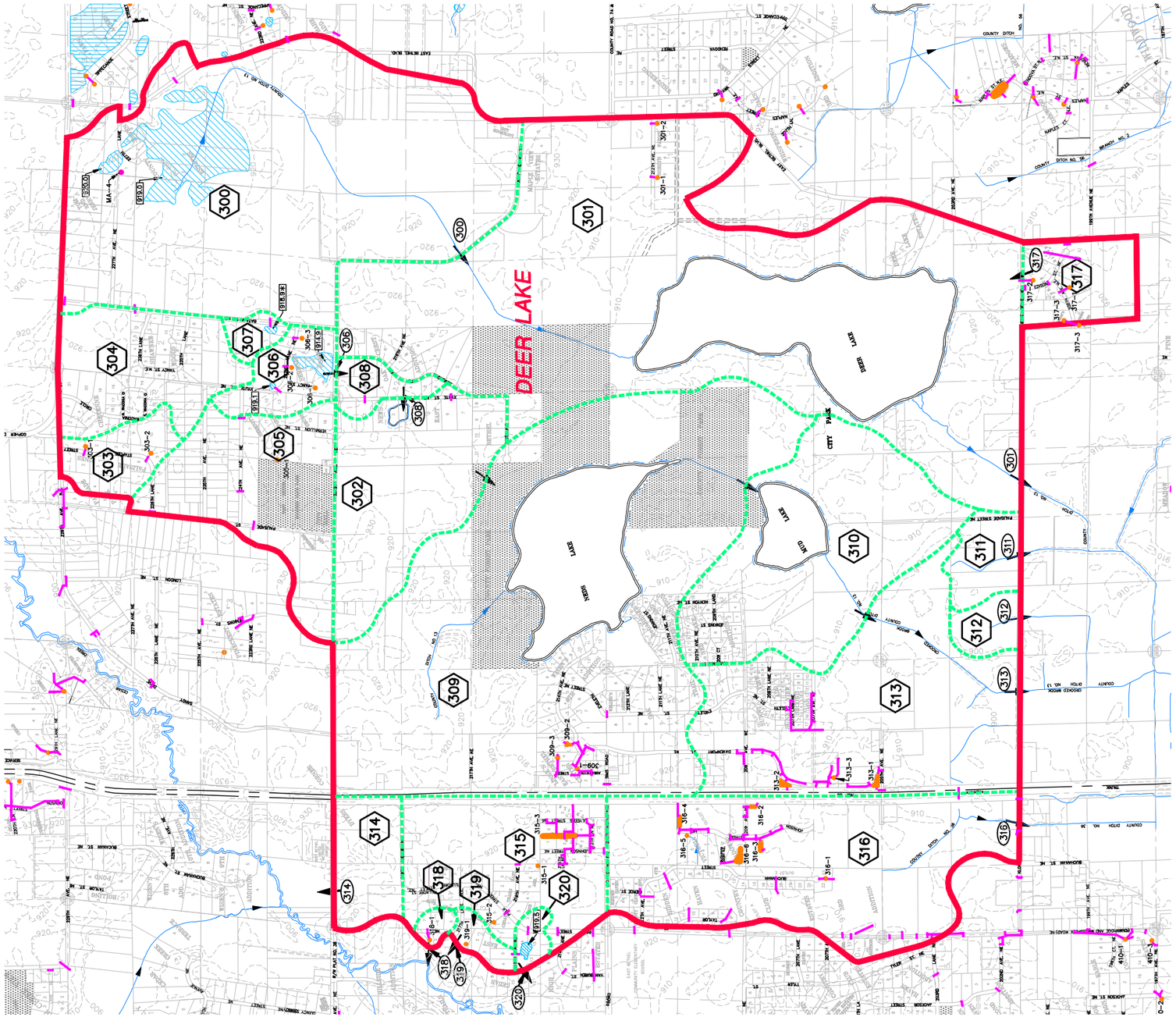
***Drainage Area***
116 acres.

***Wetlands***
There are no wetlands in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***

Stormwater runoff generally drains east to west in this subwatershed. The stormwater drains to the natural ponding area, then discharges to Cedar Creek through an existing 12-inch pipe.

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## LEGEND

- DENOTES EXISTING DITCH
- DENOTES EXISTING CONTOUR (10 FOOT INTERVAL)
- 400 — DENOTES MAJOR STORMWATER COLLECTION PIPE
- DENOTES MINOR STORMWATER COLLECTION PIPE
- 400-1 — DENOTES EXISTING WATER QUALITY/RATE CONTROL POND
- 905.2 — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR FLOOD ELEVATION
- DENOTES SUBWATERSHED DIVIDE
- DENOTES WATERSHED DIVIDE
- DENOTES DRAINAGE FLOW
- MA-2 — DENOTES MITIGATION AREA
- 905.2* — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR, BACK-TO-BACK, FLOOD ELEVATION

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# FIGURE 8-1

## DEER LAKE WATERSHED

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999
REVISED: DECEMBER, 2009

FILE: EB403

# 9.0 Crooked Brook

## 9.1 Watershed Summary

This section presents the management plan for the Crooked Brook Watershed located in the southwest corner of East Bethel. This watershed is divided into eighteen subwatersheds. The Crooked Brook Watershed contains subwatersheds 400 through 416 and 421. The subwatersheds flow to Cedar Creek.

Sections 9.1.1 through 9.1.18 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 9-1, located at the end of this section. Information tables are provided in Section 11. Proposed land use for this watershed is shown on Figure 2-10.

### 9.1.1 Subwatershed 400

***Location***
This subwatershed is located on the southern border of East Bethel, just east of State Trunk Highway #65.

***Drainage Area***
96 total acres. 34 acres from Ham Lake.

***Wetlands***
This subwatershed contains approximately 6 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west, through Branch 8 of County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 425 through an existing 72-inch pipe.

### 9.1.2 Subwatershed 401

***Location***
This subwatershed is located on the southern border of East Bethel, south of Briarwood Lane N.E. and west of County Rd. 68.

***Drainage Area***
283 total acres. 49 acres from Ham Lake.

***Wetlands***
This subwatershed contains approximately 80 acres of wetlands. There is a DNR protected wetland, 472W, on the southern border of the city.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through Branch 6 of County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 424 through an existing 18-inch pipe.

### 9.1.3 Subwatershed 402

***Location***
This subwatershed is located in south central East Bethel, just east of County Rd. 68.

***Drainage Area***
191 acres.

***Wetlands***
This subwatershed contains approximately 100 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 38, in this subwatershed. Stormwater drains to Subwatershed 403 through an existing 36-inch pipe.

### 9.1.4 Subwatershed 403

***Location***
This subwatershed is located in south central East Bethel, east of County Rd. 68 and south of County Rd. 22.

***Drainage Area***
264 acres.

***Wetlands***
This subwatershed contains approximately 70 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 38, in this subwatershed. Stormwater drains to Subwatershed 404 through an existing 48-inch pipe.

### 9.1.5 Subwatershed 404

***Location***
This subwatershed is located in south central East Bethel, east of State Trunk Highway #65 between County Rd. 22 and Klondike Drive N.E.

***Drainage Area***
1048 acres.

***Wetlands***
This subwatershed contains approximately 190 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through County Ditch No. 13, in this subwatershed. Stormwater drains to Subwatershed 406 through an existing 72-inch pipe.

### 9.1.6 Subwatershed 405

***Location***
This subwatershed is located in southwestern East Bethel, just west of State Trunk Highway #65.

***Drainage Area***
71 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east, through Branch 7 of County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 425 through an existing 30-inch pipe.

### 9.1.7 Subwatershed 406

***Location***
This subwatershed is located in south central East Bethel, east of State Trunk Highway #65 and south of County Road 22.

***Drainage Area***
382 acres.

***Wetlands***
This subwatershed contains approximately 50 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 409 through an existing 90-inch pipe.

### 9.1.8 Subwatershed 407

***Location***
This subwatershed is located in southwestern East Bethel, west of State Trunk Highway #65 between Klondike Dr. N.E. and County Rd. 22.

***Drainage Area***
203 acres.

***Wetlands***
This subwatershed contains approximately 50 acres of wetlands, none of which is protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through County Ditches 36 and 28, in this subwatershed. Stormwater drains to Subwatershed 409 through an existing 48-inch pipe.

### 9.1.9 Subwatershed 408

***Location***
This subwatershed is located in southwestern East Bethel, just north of County Rd. 22.

***Drainage Area***
91 acres.

***Wetlands***
This subwatershed contains approximately 60 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater drains to Subwatershed 409 through an existing 30-inch pipe.

### 9.1.10 Subwatershed 409

***Location***
This subwatershed is located in southwestern East Bethel, west of State Trunk Highway #65 and south of County Rd. 22.

***Drainage Area***
302 acres.

***Wetlands***
This subwatershed contains approximately 6 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows from south to north through County Ditches 67, 13 and 28 in this subwatershed. Stormwater drains to Subwatershed 413 through an existing 90-inch pipe.

### 9.1.11 Subwatershed 410

***Location***
This subwatershed is located in southwestern East Bethel, east of Jackson St. N.E. and north of County Rd. 22.

***Drainage Area***
128 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west in this subwatershed. Stormwater drains to Subwatershed 412 through an existing 15-inch pipe.

With increased development, the flood elevation will overtop the road, unless the existing culvert is replaced. An 18-inch RCP, placed one foot below the existing invert, and a control structure, placed at the existing invert, are proposed to replace the existing 15-inch CMP. This would result in a lower flood elevation, 900.0 to 899.4, and a lower discharge, 23 cfs to 14 cfs.

### 9.1.12 Subwatershed 411

***Location***
This subwatershed is located in southwestern East Bethel, just south of County Rd. 22.

***Drainage Area***
258 acres.

***Wetlands***
This subwatershed contains approximately 100 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 67, in this subwatershed. Stormwater drains to Subwatershed 412 through an existing 42-inch pipe.

### 9.1.13 Subwatershed 412

***Location***
This subwatershed is located in southwestern East Bethel, north of County Rd. 22 and west of Jackson St. N.E.

***Drainage Area***
220 acres.

***Wetlands***
This subwatershed contains approximately 80 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 67, in this subwatershed. Stormwater drains to Cedar Creek through an open channel.

### 9.1.14 Subwatershed 413

***Location***
This subwatershed is located in southwestern East Bethel, west of Jackson St. N.E. and south of County Rd. 22.

***Drainage Area***
25 acres.

***Wetlands***
There are no wetlands in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west, through County Ditch No. 67, in this subwatershed. Stormwater drains to Subwatershed 412 through 66 and 54-inch existing pipes.

### 9.1.15 Subwatershed 414

***Location***
This subwatershed is located on the southern border of East Bethel, near Fillmore St. N.E.

***Drainage Area***
13 acres

***Wetlands***
This subwatershed contains approximately 3 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this subwatershed. Stormwater drains to the City of Ham Lake through an existing 18-inch pipe.

### 9.1.16 Subwatershed 415

***Location***
This subwatershed is located on the southern border of East Bethel, south of Briarwood Lane N.E.

***Drainage Area***
88 total acres. 9 acres from Ham Lake.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west, through Branch 8 of County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 400 through an open channel.

### 9.1.17 Subwatershed 416

***Location***
This subwatershed is located on the southern border of East Bethel, just west of State Trunk Highway #65.

***Drainage Area***
24 acres.

***Wetlands***
This subwatershed contains approximately 3 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater drains to Ham Lake through an existing 30-inch pipe.

### 9.1.18 Subwatershed 421

***Location***
This subwatershed is located on the southern border of East Bethel, just east of Jackson St. N.E.

***Drainage Area***
9 acres.

***Wetlands***
This subwatershed contains approximately 2 acres of wetlands, which are not protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater drains to Ham Lake through an existing 15-inch pipe.

### 9.1.19 Subwatershed 422

***Location***
This subwatershed is located in Southwestern East Bethel, just south of 187$^{th}$ Lane N.E.

***Drainage Area***
45 acres.

***Wetlands***
This subwatershed contains approximately 2 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 409 through an existing 36-inch pipe. The existing pipe will be replaced when 187th Lane is reconstructed.

### 9.1.20 Subwatershed 423

***Location***
This subwatershed is located in southwestern East Bethel, just west of Buchanan St. N.E.

***Drainage Area***
266 acres

***Wetlands***
This subwatershed contains approximately 90 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east in this subwatershed. Stormwater drains to Subwatershed 422 through an existing 54-inch pipe.

### 9.1.21 Subwatershed 424

***Location***
This subwatershed is located in southwestern East Bethel, just north of Briarwood Lane N.E.

***Drainage Area***
153 acres.

***Wetlands***
This subwatershed contains approximately 30 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains east to west, through Branch 6 of County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 425 through an open channel.

### 9.1.22 Subwatershed 425

***Location***
This subwatershed is located in southwestern East Bethel, just east of State Trunk Highway #65.

***Drainage Area***
56 acres.

***Wetlands***
This subwatershed contains approximately 20 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 28, in this subwatershed. Stormwater drains to Subwatershed 426 through an existing open channel. A 72-inch RC culvert will replace the open channel when the Trunk Highway 65 service road is realigned.

### 9.1.23 Subwatershed 426

***Location***
This subwatershed is located in southwestern East Bethel, east of State Trunk Highway #65 and south of 187$^{th}$ Lane N.E.

***Drainage Area***
8 acres

***Wetlands***
This subwatershed contains approximately 1 unprotected acre of wetland.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through County Ditch No. 28 in this subwatershed. Stormwater drains to subwatershed 406 through an existing open

channel. A 72-inch RC culvert will replace the open channel when 187th Lane is constructed.

### 9.1.24 Subwatershed 427

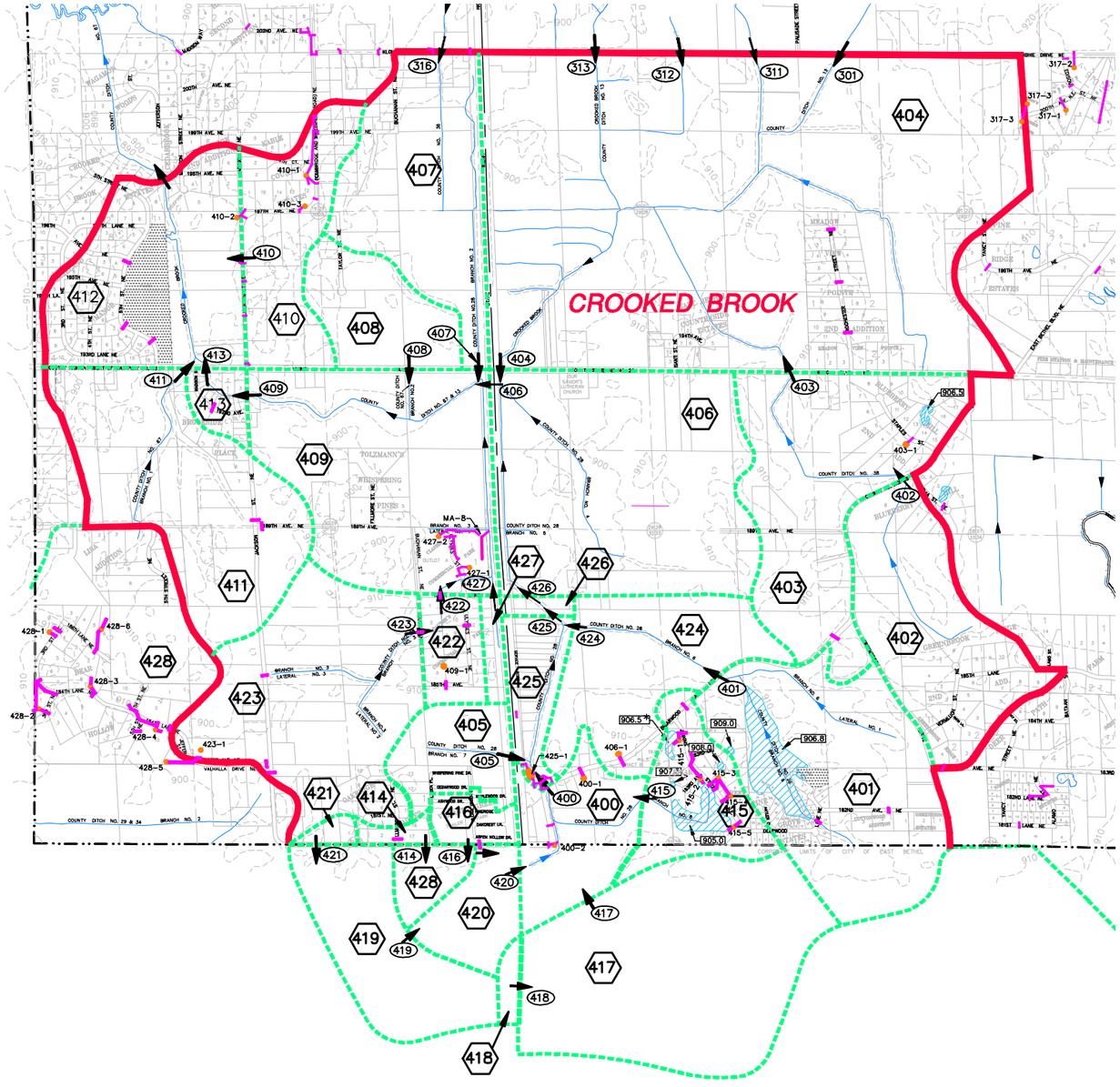
***Location***
This subwatershed is located in southwestern East Bethel, west of Trunk Highway #65 and south of 187th Lane.

***Drainage Area***
15 acres.

***Wetlands***
This subwatershed does not contain any wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north in this subwatershed. Stormwater drains to subwatershed 409 through an existing 18-inch pipe. The pipe will be lengthened when 187th Lane is reconstructed.




N

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## LEGEND

- DENOTES EXISTING DITCH
- DENOTES EXISTING CONTOUR (10 FOOT INTERVAL)
- 400 — DENOTES MAJOR STORMWATER COLLECTION PIPE
- DENOTES MINOR STORMWATER COLLECTION PIPE
- 400-1 — DENOTES EXISTING WATER QUALITY/RATE CONTROL POND
- 905.2 — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR FLOOD ELEVATION
- DENOTES SUBWATERSHED DIVIDE
- DENOTES WATERSHED DIVIDE
- DENOTES DRAINAGE FLOW
- MA-2 — DENOTES MITIGATION AREA
- 905.2* — DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR, BACK-TO-BACK, FLOOD ELEVATION

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# FIGURE 9-1

## CROOKED BROOK WATERSHED

### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999
REVISED: DECEMBER, 2009

FILE: EB403

# 10.0 Rice Lake and Coon Lake

## 10.1 Rice Lake Watershed Summary

This section presents the management plan for the Rice Lake Watershed located in east central East Bethel. This watershed is divided into seven subwatersheds. The Rice Lake Watershed contains subwatersheds 600 through 606.

Sections 10.1.1 through 10.1.7 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 10-1, located at the end of this section. Information tables are provided in section 11.0. Proposed land use for this watershed is shown on Figure 2-10.

### 10.1.1 Subwatershed 600

***Location***
This subwatershed is located in east central East Bethel, just west of East Bethel Blvd.

***Drainage Area***
23 acres

***Wetlands***
This subwatershed contains approximately 2 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south in this subwatershed. Stormwater drains to Subwatershed 601 through an existing 15-inch pipe.

To reduce the storage and the flood elevation, a 15-inch RCP is proposed to replace the existing 15-inch CMP. Under these conditions, the flood is reduced 0.6’ and the storage decreases 1 ac-ft. The discharge increases, but only slightly.

### 10.1.2 Subwatershed 601

***Location***
This subwatershed is located in east central East Bethel, north of County Rd. 74, between County Rd. 15 and East Bethel Blvd.

***Drainage Area***
548 acres.

***Wetlands***
This subwatershed contains approximately 160 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains west to east, through County Ditch No. 16, in this subwatershed. Stormwater drains to Subwatershed 606 through an existing 48-inch pipe.

### 10.1.3 Subwatershed 602

***Location***
This subwatershed is located in east central East Bethel, north of County Rd. 74 and east of County Rd. 15.

***Drainage Area***
353 acres

***Wetlands***
This subwatershed contains approximately 50 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater drains to Subwatershed 606 through an existing 24-inch pipe.

### 10.1.4 Subwatershed 603

***Location***
This subwatershed is located in east central East Bethel, south of Wild Rice Dr. and north of 200$^{th}$ Lane N.E.

***Drainage Area***
135 acres.

***Wetlands***
This subwatershed contains approximately 40 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains south to north, through a private ditch, in this subwatershed. Stormwater drains to Subwatershed 606 through an existing 18-inch pipe.

### 10.1.5 Subwatershed 604

***Location***
This subwatershed is located in east central East Bethel, west of County Rd. 74 and south of County Rd. 15.

***Drainage Area***
285 acres.

***Wetlands***
This subwatershed contains approximately 100 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally flows north to south in this subwatershed. Stormwater drains to Subwatershed 606 through an existing 27-inch pipe.

### 10.1.6 Subwatershed 605

***Location***
This subwatershed is located in east central East Bethel, just east of County Rd. 74.

***Drainage Area***
40 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. Stormwater drains to Subwatershed 604 through an existing 18-inch pipe.

### 10.1.7 Subwatershed 606

***Location***
This subwatershed is located on the eastern border of East Bethel, south of County Rd. 74 and north of Wild Rice Dr.

***Drainage Area***
1925 total acres. 689 acres from Linwood Township.

***Wetlands***
This subwatershed contains approximately 680 acres of wetlands in East Bethel, some of which are protected by the DNR. Water 43P is protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through County Ditch No. 16, in this subwatershed. Stormwater drains to Rice Lake and then to Linwood Township.

## 10.2 Coon Lake Watershed Summary

This section presents the management plan for the Coon Lake Watershed located in southeast East Bethel. This watershed is divided into ten subwatersheds. The Coon Lake Watershed contains subwatersheds 700 through 709.

Sections 10.2.1 through 10.2.10 discuss the water resources within the subwatersheds. Watershed divides, storm sewer pipes, existing ditches, and stormwater storage areas are shown on Figure 10-1, located at the end of this section. Information tables are provided in Section 11.0.

### 10.2.1 Subwatershed 700

***Location***
This subwatershed is located near the center of East Bethel, west of East Bethel Blvd. near Deer Lake.

***Drainage Area***
68 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains to Subwatershed 702 through an existing 27-inch pipe.

### 10.2.2 Subwatershed 701

***Location***
This subwatershed is located in east central East Bethel, near Devil Lake.

***Drainage Area***
455 acres.

***Wetlands***
This subwatershed contains approximately 190 acres of wetlands, some of which are protected by the DNR. 58P is a DNR protected water in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains to Subwatershed 702 through an open channel.

### 10.2.3 Subwatershed 702

***Location***
This subwatershed is located in southeastern East Bethel, north of County Rd. 22 and southeast of East Bethel Blvd.

***Drainage Area***
993 acres

***Wetlands***
This subwatershed contains approximately 660 acres of wetlands, some of which are protected by the DNR. Wetland 464W and Water 62P are protected by the MnDNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through County Ditch No. 56, in this subwatershed. The stormwater drains to Coon Lake through an existing 60-inch pipe.

### 10.2.4 Subwatershed 703

***Location***
Subwatershed 703 is located in southeastern East Bethel, just east of East Bethel Blvd.

***Drainage Area***
121 acres

***Wetlands***
This subwatershed contains approximately 50 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through Branch 2 of County Ditch No. 56, in this subwatershed. The stormwater drains to Subwatershed 706 through an existing 12-inch pipe.

A 15-inch RCP is proposed to replace the damaged 12-inch CMP existing now. Under the proposed conditions, with more development, the storage and discharge remain almost the same as they were in the existing conditions.

### 10.2.5 Subwatershed 704

***Location***
This subwatershed is located in south central East Bethel, west of East Bethel Blvd. and north of County Rd. 22.

***Drainage Area***
115 acres.

***Wetlands***
This subwatershed contains approximately 10 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains to the wetlands in this subwatershed.

### 10.2.6 Subwatershed 705

***Location***
This subwatershed is located in south central East Bethel, north of County Rd. 22 and east of East Bethel Blvd.

***Drainage Area***
127 acres.

***Wetlands***
This subwatershed contains approximately 30 acres of wetlands, none of which are protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
This subwatershed is landlocked. Stormwater runoff generally drains to the existing wetlands in the subwatershed.

### 10.2.7 Subwatershed 706

***Location***
This subwatershed is located in southeastern East Bethel, just north of County Rd. 22.

***Drainage Area***
465 acres.

***Wetlands***
This subwatershed contains approximately 200 acres of wetlands. 465W is a DNR protected wetland in this subwatershed.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south, through Branch 1 of County Ditch No. 56, in this subwatershed. The stormwater drains to Subwatershed 702 through an existing open channel.

### 10.2.8 Subwatershed 707

***Location***
This subwatershed is located in southeastern East Bethel, northwest of County Rd. 22.

***Drainage Area***
354 acres.

***Wetlands***
This subwatershed contains approximately 140 acres of wetlands, most of which are protected by the DNR. Water 63P and Wetland 463W are both protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains from Anderson Lake to Coon Lake through an existing 24-inch pipe.

### 10.2.9 Subwatershed 708

***Location***
This subwatershed is located in southeastern East Bethel, northwest of County Rd. 22.

***Drainage Area***
16 acres.

***Wetlands***
This subwatershed does not contain any wetlands.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains north to south in this subwatershed. The stormwater drains to Coon Lake through an existing 24-inch pipe.

### 10.2.10 Subwatershed 709

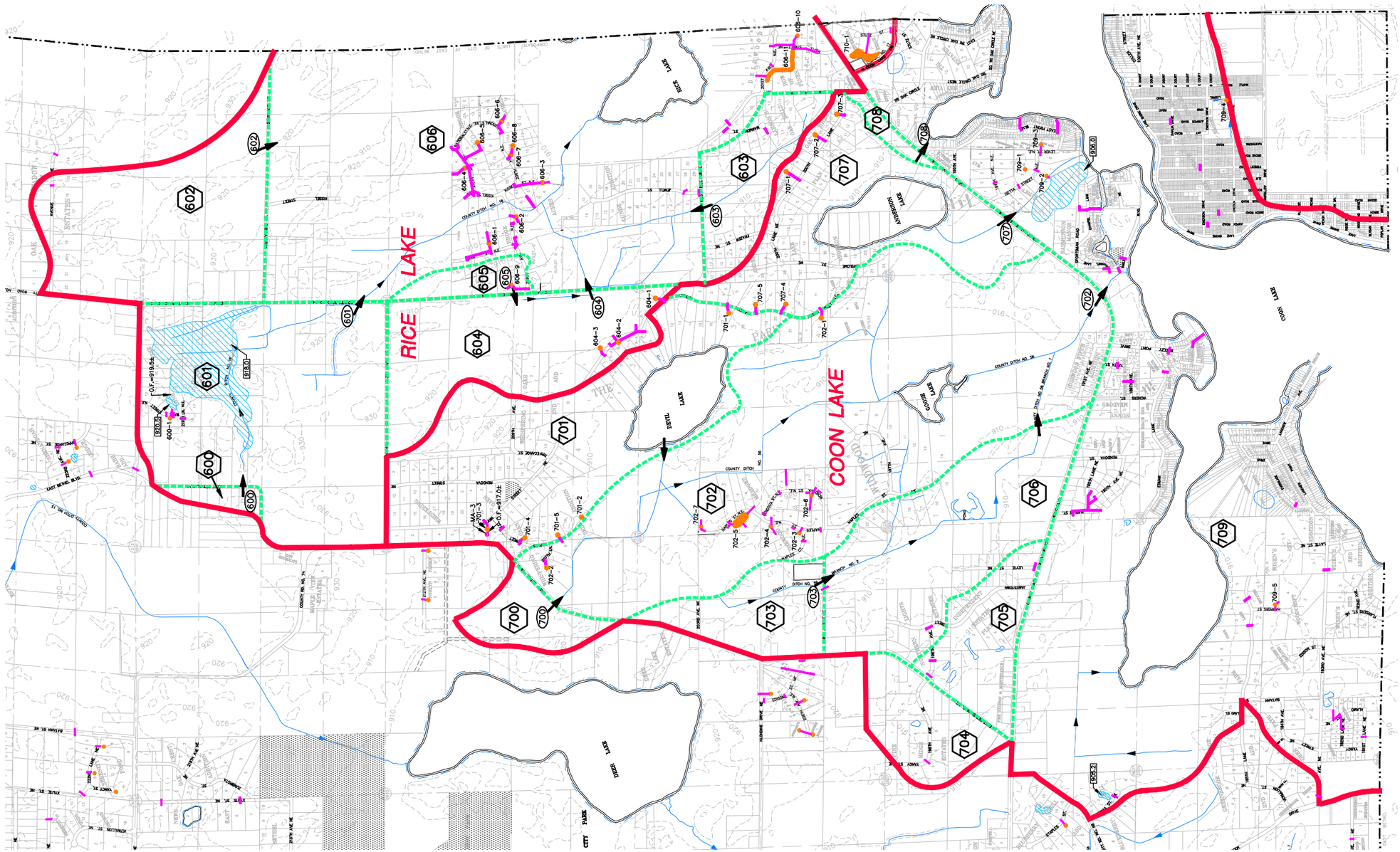
***Location***
This subwatershed is located in southeastern East Bethel, around Coon Lake.

***Drainage Area***
3881 total acres. 1269 acres from Ham Lake and Columbus Township.

***Wetlands***
This subwatershed contains approximately 1690 acres of wetlands, most of which are protected by the DNR. Water 42P and Wetlands 467W, 50W and 471W are all protected by the DNR.

***Water Quality***
Water quality management strategies shall be implemented throughout this watershed as discussed in Section 5.0.

***Flood Control***
Stormwater runoff generally drains to Coon Lake. Stormwater outlets Coon Lake in Columbus Township through two existing 30-inch pipes.




## LEGEND

- DENOTES EXISTING DITCH
- DENOTES EXISTING CONTOUR (10 FOOT INTERVAL)
- DENOTES MAJOR STORMWATER COLLECTION PIPE
- DENOTES MINOR STORMWATER COLLECTION PIPE
- DENOTES EXISTING WATER QUALITY/RATE CONTROL POND
- DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR FLOOD ELEVATION
- DENOTES SUBWATERSHED DIVIDE
- DENOTES WATERSHED DIVIDE
- DENOTES DRAINAGE FLOW
- DENOTES MITIGATION AREA
- DENOTES NATURAL PONDING AREA WITH DETERMINED 100 YEAR, BACK-TO-BACK, FLOOD ELEVATION

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# FIGURE 10-1
## RICE LAKE AND COON LAKE WATERSHEDS
### CITY OF EAST BETHEL

DATE: NOVEMBER, 1999
REVISED: DECEMBER, 2009

FILE: EB403

May 13, 2011 - 8:51am time
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# 11.0 Watershed Data Tables

This section contains data tables which present pertinent information to the watersheds discussed in Sections 6-10. Also attached is the Capital Improvements Program. The tables are as follows:

Table 11-1: Tabulates Existing Conditions Watershed Data
Table 11-2: Tabulates Proposed Conditions Watershed Data
Table 11-3: Tabulates Existing Water Quality/Rate Control Pond Information
Table 11-4: Tabulates Existing Wetland Mitigation Area Information
Table 11-5: Capital Improvement Program

The legend that pertains to the tables is as follows:

**Footnotes**

[1]When an "NA" is listed for the proposed conditions outlet size and type; the outlet should be replaced with an RCP which has an equivalent capacity as the existing conditions pipe.

[2]The reported flood elevation is based on Flood Insurance Study.

[3]The reported bounce is the depth at which the water will rise at the outlet during the 100-year storm event. This bounce was reported when actual field elevations were not available.

**Abbreviations**

OC = Open Channel
CMP = Corrugated Metal Pipe
RCP = Reinforced Concrete Pipe
HDPE = High Density Polyethylene Pipe
INA = Information Not Available
NA = Not Applicable
CCP = Corrugated Polyethylene Pipe

**Table 11-1**
**EXISTING CONDITIONS WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | EXISTING OUTLET | | | | WATER ELEV. (feet) | OVERFLOW ELEV. (feet) | MnDNR NUMBER | OHWL (feet) | 100-yr STORM EVENT - EXISTING CONDITIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ELEV. (feet) | SIZE (inches) | TYPE | LENGTH (feet) | | | | | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) |
| **Fish Lake Watershed** | | | | | | | | | | | | | | |
| 100 | 1359 | 917.6 | 18 | CMP | 28 | NONE | 919.4 | 161P, 160P, 65P, 157W, 156W | INA | 917.5 | 920.0 | NA | 521 | 58 |
| | | 917.5 | 18 | CMP | 28 | | | | | | | | | |
| 101 | 464 | 907.6 | 36 | CMP | 60 | 911.3 | 914.4 | 154P | INA | 907.6 | 913.0 | NA | 282 | 50 |
| **Coopers Lake Watershed** | | | | | | | | | | | | | | |
| 200 | 1256 | 919.8 | 48 | CMP | 58 | 919.9 | 926.6 | 200W, 190W, 189W, 175W, 66W, 153W, 64W, 67P | 67P = 923.0 | 919.8 | 923.4 | NA | 382 | 50 |
| 201 | 486 | 911.8 | 18 | CMP | 60 | NONE | 918.4 | NA | NA | 911.8 | 918.5 | NA | 106 | 45 |
| 202 | 418 | 918.4 | 24 | CMP | 60 | NONE | 922.8 | 69W, 70P | INA | 918.4 | 922.7 | NA | 270 | 23 |
| 203 | 200 | 898.0 | NA | OC | NA | INA | NA | NA | NA | 898.0 | 900.7 | NA | 207 | 34 |
| 204 | 151 | 897.7 | 15 | CMP | 66 | NONE | 903.9 | 350W | INA | 897.7 | 900.7 | NA | 41 | 5 |
| 205 | 160 | NA | NA | NA | NA | INA | NA | 349W | INA | NA | NA | NA | NA | NA |
| 206 | 204 | NA | NA | OC | NA | INA | NA | 68W, 99W | INA | NA | NA | 2.1 | 86 | 20 |
| 207 | 216 | NA | NA | OC | NA | INA | NA | NA | NA | NA | 911.8 | NA | 62 | 47 |
| 208 | 400 | 906.5 | 48 | CMP | 69 | 907.8 | 911.2 | NA | NA | 906.5 | 909.0 | NA | 123 | 29 |
| **Deer Lake Watershed** | | | | | | | | | | | | | | |
| 300 | 840 | 912.8 | 36 | CMP | 70 | 914.3 | 921.6 | 166W, 170W, 172W, 55P | INA | 912.8 | 915.4 | NA | 525 | 21 |
| 301 | 1287 | 899.4 | 36 | CMP | 67 | 899.7 | 904.9 | 452W, 719W, 459W, 59P | INA | 899.4 | 902.4 | NA | 539 | 42 |
| 302 | 238 | NA | NA | OC | NA | INA | NA | 453W, 454W, 455W | INA | NA | NA | 2.5 | 48 | 30 |
| 303 | 60 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 304 | 170 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 305 | 219 | NA | NA | NA | NA | INA | NA | 440P, 56P | INA | NA | NA | NA | NA | NA |
| 306 | 63 | 914.3 | 12 | CMP | 60 | NONE | 919.1 | 442W | 915.3 | 914.3 | 917.5 | NA | 11 | 4 |
| 307 | 18 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 308 | 33 | 913.5 | 15 | CMP | 60 | NONE | 916.4 | NA | NA | 913.5 | 915.9 | NA | 8 | 5 |
| 309 | 1107 | NA | NA | OC | NA | INA | NA | 439W, 718W, 456W, 57P | INA | NA | NA | 3.3 | 448 | 51 |
| 310 | 363 | NA | NA | OC | NA | INA | NA | 60P, 457W | INA | NA | NA | 2.5 | 258 | 29 |
| 311 | 51 | 896.7 | 24 | CMP | 44 | 897 | 902.3 | NA | NA | 896.7 | 898.3 | NA | 10 | 6 |
| 312 | 32 | 897.1 | 24 | CMP | 52 | 897.2 | 902.6 | NA | NA | 897.1 | 898.1 | NA | 6 | 5 |
| 313 | 448 | 895.5 | 36 | CMP | 46 | 896.8 | 901.4 | NA | NA | 895.5 | 898.0 | NA | 169 | 34 |
| 314 | 77 | 895.7 | 24 | CMP | 75 | NONE | 903.8 | NA | NA | 895.7 | 897.6 | NA | 10 | 12 |

**Table 11-1**
**EXISTING CONDITIONS WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | EXISTING OUTLET | | | | WATER ELEV. (feet) | OVERFLOW ELEV. (feet) | MnDNR NUMBER | OHWL (feet) | 100-yr STORM EVENT - EXISTING CONDITIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ELEV. (feet) | SIZE (inches) | TYPE | LENGTH (feet) | | | | | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) |
| **Deer Lake Watershed (cont.)** | | | | | | | | | | | | | | |
| 315 | 224 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 316 | 450 | 901.1 | 18 | CMP | 64 | NONE | 904.8 | 61W | INA | 901.1 | 903.7 | NA | 146 | 7 |
| 317 | 83 | 907.5 | 12 | CMP | 38 | NONE | 909.5 | NA | NA | 907.5 | 909.6 | NA | 10 | 18 |
| 318 | 10 | 896.5 | 12 | HDPE | 20 | INA | 899.5 | NA | NA | 896.5 | 898.5 | NA | 0 | 5 |
| 319 | 19 | NA | 12 | RCP | 96 | INA | NA | NA | NA | 918.9 | 922.1 | NA | 1 | 6 |
| 320 | 116 | NA | 12 | RCP | 96 | INA | NA | NA | NA | NA | 919.3 | NA | 2 | 3 |
| **Crooked Brook Watershed** | | | | | | | | | | | | | | |
| 400 | 96 | 893.5 | 72 | RCP | 152 | 898.5 | 905.8 | NA | NA | 893.5 | 902.2 | NA | 32 | 290 |
| 401 | 283 | 900.2 | 18 | RCP | 64 | INA | 909.2 | 472W | INA | 900.2 | 904.6 | NA | 32 | 42 |
| 402 | 191 | 899.9 | 36 | RCP | 64 | 902.7 | 909.1 | NA | NA | 899.9 | 903.3 | NA | 129 | 35 |
| 403 | 264 | 898.1 | 48 | RCP | 80 | 901.6 | 908.6 | NA | NA | 898.1 | 902.6 | NA | 102 | 82 |
| 404 | 1048 | 887.6 | 72 | CMP | 69 | 890.4 | 896.1 | NA | NA | 887.6 | 893.7 | NA | 655 | 161 |
| 405 | 71 | 897.2 | 30 | RCP | 195 | 897.5 | NA | NA | NA | 897.2 | 898.5 | NA | 14 | 8 |
| 406 | 382 | 886.5 | 90 | CMP | 195 | 890.1 | 897.8 | NA | NA | 886.5 | 894.1 | NA | 366 | 256 |
| 407 | 203 | 887.1 | 48 | RCP | 96 | 890.1 | 896.2 | NA | NA | 887.1 | 891.0 | NA | 80 | 42 |
| 408 | 91 | 888.3 | 30 | CMP | 116 | 889.8 | 894.4 | NA | NA | 888.3 | 890.3 | NA | 49 | 14 |
| 409 | 302 | 885.7 | 90 | CMP | 107 | 888.7 | 895.7 | NA | NA | 885.7 | 892.0 | NA | 799 | 200 |
| 410 | 128 | 897.1 | 15 | CMP | 56 | NONE | 900.0 | NA | NA | 897.1 | 900.0 | NA | 22 | 23 |
| 411 | 258 | 891.9 | 42 | CMP | 84 | 892.0 | 895.4 | NA | NA | 891.9 | 893.6 | NA | 81 | 20 |
| 412 | 220 | NA | NA | OC | NA | INA | NA | NA | NA | NA | NA | 7.1 | 468 | 188 |
| 413 | 25 | 885.5 | 66 | CMP | 88 | 887.8 | 895.0 | NA | NA | 885.5 | 890.8 | NA | 2 | 200 |
| | | 885.4 | 54 | CMP | 91 | | | | | | | | | |
| 414 | 13 | 901.0 | 18 | RCP | 55 | NONE | NA | NA | NA | 901.0 | 902.2 | NA | 1 | 4 |
| 415 | 88 | NA | NA | OC | NA | INA | NA | NA | NA | NA | 904.1 | NA | 7 | 20 |
| 416 | 24 | 899.8 | 15 | RCP | 89 | INA | 903.2 | NA | NA | 899.8 | 905.0 | NA | 3 | 12 |
| 417 | 388 | 899.8 | 24 | CMP | 62 | INA | 904.8 | NA | NA | 899.8 | NA | NA | NA | NA |
| 418 | 12 | 900.7 | 24 | RCP | 230 | INA | NA | NA | NA | 900.7 | 902.2 | NA | 1 | 6 |
| 419 | 127 | NA | 24 | RCP | 50 | INA | NA | NA | NA | NA | NA | 2.7 | 17 | 19 |
| 420 | 70 | 895.7 | 72 | RCP | 270 | INA | NA | NA | NA | 895.7 | 901.4 | NA | 19 | 53 |
| 421 | 9 | 902.9 | 15 | RCP | 55 | NONE | NA | NA | NA | 902.9 | 903.9 | NA | 1 | 3 |
| 422 | 45 | 889.2 | 36 | RCP | 80 | 892.0 | 898.0 | NA | NA | 889.2 | 893.5 | NA | 14 | 51 |
| 423 | 266 | 892.0 | 54 | RCP | 64 | 894.3 | 899.0 | NA | NA | 892.0 | 894.9 | NA | 127 | 47 |
| 424 | 153 | NA | NA | OC | NA | INA | NA | NA | NA | NA | NA | 2.4 | 77 | 50 |
| 425 | 56 | 894.2 | NA | OC | NA | INA | NA | NA | NA | 894.2 | 898.8 | NA | 107 | 214 |
| 426 | 8 | 894.0 | NA | OC | NA | INA | NA | NA | NA | 894.0 | 898.6 | NA | 5 | 214 |
| 427 | 15 | 898.4 | 18 | CMP | 90 | NONE | 903.0 | NA | NA | 898.4 | 901.5 | NA | 1 | 8 |

**Table 11-1**
**EXISTING CONDITIONS WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | EXISTING OUTLET | | | | WATER ELEV. (feet) | OVERFLOW ELEV. (feet) | MnDNR NUMBER | OHWL (feet) | 100-yr STORM EVENT - EXISTING CONDITIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ELEV. (feet) | SIZE (inches) | TYPE | LENGTH (feet) | | | | | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) |
| **Fish Lake Watershed** | | | | | | | | | | | | | | |
| 100 | 1359 | 917.6 | 18 | CMP | 28 | NONE | 919.4 | 161P, 160P, 65P, 157W, 156W | INA | 917.5 | 920.0 | NA | 521 | 58 |
| | | 917.5 | 18 | CMP | 28 | | | | | | | | | |
| 101 | 464 | 907.6 | 36 | CMP | 60 | 911.3 | 914.4 | 154P | INA | 907.6 | 913.0 | NA | 282 | 50 |
| **Coopers Lake Watershed** | | | | | | | | | | | | | | |
| 200 | 1256 | 919.8 | 48 | CMP | 58 | 919.9 | 926.6 | 200W, 190W, 189W, 175W, 66W, 153W, 64W, 67P | 67P = 923.0 | 919.8 | 923.4 | NA | 382 | 50 |
| 201 | 486 | 911.8 | 18 | CMP | 60 | NONE | 918.4 | NA | NA | 911.8 | 918.5 | NA | 106 | 45 |
| 202 | 418 | 918.4 | 24 | CMP | 60 | NONE | 922.8 | 69W, 70P | INA | 918.4 | 922.7 | NA | 270 | 23 |
| 203 | 200 | 898.0 | NA | OC | NA | INA | NA | NA | NA | 898.0 | 900.7 | NA | 207 | 34 |
| 204 | 151 | 897.7 | 15 | CMP | 66 | NONE | 903.9 | 350W | INA | 897.7 | 900.7 | NA | 41 | 5 |
| 205 | 160 | NA | NA | NA | NA | INA | NA | 349W | INA | NA | NA | NA | NA | NA |
| 206 | 204 | NA | NA | OC | NA | INA | NA | 68W, 99W | INA | NA | NA | 2.1 | 86 | 20 |
| 207 | 216 | NA | NA | OC | NA | INA | NA | NA | NA | NA | 911.8 | NA | 62 | 47 |
| 208 | 400 | 906.5 | 48 | CMP | 69 | 907.8 | 911.2 | NA | NA | 906.5 | 909.0 | NA | 123 | 29 |
| **Deer Lake Watershed** | | | | | | | | | | | | | | |
| 300 | 840 | 912.8 | 36 | CMP | 70 | 914.3 | 921.6 | 166W, 170W, 172W, 55P | INA | 912.8 | 915.4 | NA | 525 | 21 |
| 301 | 1287 | 899.4 | 36 | CMP | 67 | 899.7 | 904.9 | 452W, 719W, 459W, 59P | INA | 899.4 | 902.4 | NA | 539 | 42 |
| 302 | 238 | NA | NA | OC | NA | INA | NA | 453W, 454W, 455W | INA | NA | NA | 2.5 | 48 | 30 |
| 303 | 60 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 304 | 170 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 305 | 219 | NA | NA | NA | NA | INA | NA | 440P, 56P | INA | NA | NA | NA | NA | NA |
| 306 | 63 | 914.3 | 12 | CMP | 60 | NONE | 919.1 | 442W | 915.3 | 914.3 | 917.5 | NA | 11 | 4 |
| 307 | 18 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 308 | 33 | 913.5 | 15 | CMP | 60 | NONE | 916.4 | NA | NA | 913.5 | 915.9 | NA | 8 | 5 |
| 309 | 1107 | NA | NA | OC | NA | INA | NA | 439W, 718W, 456W, 57P | INA | NA | NA | 3.3 | 448 | 51 |
| 310 | 363 | NA | NA | OC | NA | INA | NA | 60P, 457W | INA | NA | NA | 2.5 | 258 | 29 |
| 311 | 51 | 896.7 | 24 | CMP | 44 | 897 | 902.3 | NA | NA | 896.7 | 898.3 | NA | 10 | 6 |
| 312 | 32 | 897.1 | 24 | CMP | 52 | 897.2 | 902.6 | NA | NA | 897.1 | 898.1 | NA | 6 | 5 |
| 313 | 448 | 895.5 | 36 | CMP | 46 | 896.8 | 901.4 | NA | NA | 895.5 | 898.0 | NA | 169 | 34 |
| 314 | 77 | 895.7 | 24 | CMP | 75 | NONE | 903.8 | NA | NA | 895.7 | 897.6 | NA | 10 | 12 |

**Table 11-1**
**EXISTING CONDITIONS WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | EXISTING OUTLET | | | | WATER ELEV. (feet) | OVERFLOW ELEV. (feet) | MnDNR NUMBER | OHWL (feet) | 100-yr STORM EVENT - EXISTING CONDITIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ELEV. (feet) | SIZE (inches) | TYPE | LENGTH (feet) | | | | | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) |
| **Deer Lake Watershed (cont.)** | | | | | | | | | | | | | | |
| 315 | 224 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 316 | 450 | 901.1 | 18 | CMP | 64 | NONE | 904.8 | 61W | INA | 901.1 | 903.7 | NA | 146 | 7 |
| 317 | 83 | 907.5 | 12 | CMP | 38 | NONE | 909.5 | NA | NA | 907.5 | 909.6 | NA | 10 | 18 |
| 318 | 10 | 896.5 | 12 | HDPE | 20 | INA | 899.5 | NA | NA | 896.5 | 898.5 | NA | 0 | 5 |
| 319 | 19 | NA | 12 | RCP | 96 | INA | NA | NA | NA | 918.9 | 922.1 | NA | 1 | 6 |
| 320 | 116 | NA | 12 | RCP | 96 | INA | NA | NA | NA | NA | 919.3 | NA | 2 | 3 |
| **Crooked Brook Watershed** | | | | | | | | | | | | | | |
| 400 | 96 | 893.5 | 72 | RCP | 152 | 898.5 | 905.8 | NA | NA | 893.5 | 902.2 | NA | 32 | 290 |
| 401 | 283 | 900.2 | 18 | RCP | 64 | INA | 909.2 | 472W | INA | 900.2 | 904.6 | NA | 32 | 42 |
| 402 | 191 | 899.9 | 36 | RCP | 64 | 902.7 | 909.1 | NA | NA | 899.9 | 903.3 | NA | 129 | 35 |
| 403 | 264 | 898.1 | 48 | RCP | 80 | 901.6 | 908.6 | NA | NA | 898.1 | 902.6 | NA | 102 | 82 |
| 404 | 1048 | 887.6 | 72 | CMP | 69 | 890.4 | 896.1 | NA | NA | 887.6 | 893.7 | NA | 655 | 161 |
| 405 | 71 | 897.2 | 30 | RCP | 195 | 897.5 | NA | NA | NA | 897.2 | 898.5 | NA | 14 | 8 |
| 406 | 382 | 886.5 | 90 | CMP | 195 | 890.1 | 897.8 | NA | NA | 886.5 | 894.1 | NA | 366 | 256 |
| 407 | 203 | 887.1 | 48 | RCP | 96 | 890.1 | 896.2 | NA | NA | 887.1 | 891.0 | NA | 80 | 42 |
| 408 | 91 | 888.3 | 30 | CMP | 116 | 889.8 | 894.4 | NA | NA | 888.3 | 890.3 | NA | 49 | 14 |
| 409 | 302 | 885.7 | 90 | CMP | 107 | 888.7 | 895.7 | NA | NA | 885.7 | 892.0 | NA | 799 | 200 |
| 410 | 128 | 897.1 | 15 | CMP | 56 | NONE | 900.0 | NA | NA | 897.1 | 900.0 | NA | 22 | 23 |
| 411 | 258 | 891.9 | 42 | CMP | 84 | 892.0 | 895.4 | NA | NA | 891.9 | 893.6 | NA | 81 | 20 |
| 412 | 220 | NA | NA | OC | NA | INA | NA | NA | NA | NA | NA | 7.1 | 468 | 188 |
| 413 | 25 | 885.5 | 66 | CMP | 88 | 887.8 | 895.0 | NA | NA | 885.5 | 890.8 | NA | 2 | 200 |
| | | 885.4 | 54 | CMP | 91 | | | | | | | | | |
| 414 | 13 | 901.0 | 18 | RCP | 55 | NONE | NA | NA | NA | 901.0 | 902.2 | NA | 1 | 4 |
| 415 | 88 | NA | NA | OC | NA | INA | NA | NA | NA | NA | 904.1 | NA | 7 | 20 |
| 416 | 24 | 899.8 | 15 | RCP | 89 | INA | 903.2 | NA | NA | 899.8 | 905.0 | NA | 3 | 12 |
| 417 | 388 | 899.8 | 24 | CMP | 62 | INA | 904.8 | NA | NA | 899.8 | NA | NA | NA | NA |
| 418 | 12 | 900.7 | 24 | RCP | 230 | INA | NA | NA | NA | 900.7 | 902.2 | NA | 1 | 6 |
| 419 | 127 | NA | 24 | RCP | 50 | INA | NA | NA | NA | NA | NA | 2.7 | 17 | 19 |
| 420 | 70 | 895.7 | 72 | RCP | 270 | INA | NA | NA | NA | 895.7 | 901.4 | NA | 19 | 53 |
| 421 | 9 | 902.9 | 15 | RCP | 55 | NONE | NA | NA | NA | 902.9 | 903.9 | NA | 1 | 3 |
| 422 | 45 | 889.2 | 36 | RCP | 80 | 892.0 | 898.0 | NA | NA | 889.2 | 893.5 | NA | 14 | 51 |
| 423 | 266 | 892.0 | 54 | RCP | 64 | 894.3 | 899.0 | NA | NA | 892.0 | 894.9 | NA | 127 | 47 |
| 424 | 153 | NA | NA | OC | NA | INA | NA | NA | NA | NA | NA | 2.4 | 77 | 50 |
| 425 | 56 | 894.2 | NA | OC | NA | INA | NA | NA | NA | 894.2 | 898.8 | NA | 107 | 214 |
| 426 | 8 | 894.0 | NA | OC | NA | INA | NA | NA | NA | 894.0 | 898.6 | NA | 5 | 214 |
| 427 | 15 | 898.4 | 18 | CMP | 90 | NONE | 903.0 | NA | NA | 898.4 | 901.5 | NA | 1 | 8 |

**Table 11-1**
**EXISTING CONDITIONS WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | EXISTING OUTLET | | | | WATER ELEV. (feet) | OVERFLOW ELEV. (feet) | MnDNR NUMBER | OHWL (feet) | 100-yr STORM EVENT - EXISTING CONDITIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ELEV. (feet) | SIZE (inches) | TYPE | LENGTH (feet) | | | | | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) |
| **Sunrise River Watershed** | | | | | | | | | | | | | | |
| 500 | 355 | NA | NA | OC | NA | INA | NA | 151P | NA | NA | NA | NA | NA | NA |
| 501 | 453 | NA | NA | OC | NA | INA | NA | 150W | NA | NA | NA | NA | NA | NA |
| 502 | 54 | 912.8 | 48 | CMP | 58 | 915.8 | 919.3 | 155W | NA | 912.8 | 916.1 | NA | 27 | 17 |
| 503 | 77 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 504 | 308 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 505 | 108 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 506 | 634 | NA | NA | OC | NA | INA | NA | 446W | NA | NA | NA | NA | NA | NA |
| 507 | 374 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 508 | 124 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 509 | 223 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 510 | 73 | NA | NA | NA | NA | INA | NA | 280W, 163W | NA | NA | NA | NA | NA | NA |
| 511 | 11 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 512 | 44 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Rice Lake Watershed** | | | | | | | | | | | | | | |
| 600 | 23 | 916.1 | 15 | CMP | 52 | NONE | 918.7 | NA | NA | 916.1 | 918.0 | NA | 3 | 3 |
| 601 | 548 | 904.7 | 48 | CMP | 61 | 907.1 | 912.6 | NA | NA | 904.7 | 908.0 | NA | 262 | 47 |
| 602 | 353 | 910.8 | 24 | CMP | 61 | NONE | 918.7 | NA | NA | 910.8 | 913.8 | NA | 99 | 12 |
| 603 | 135 | 906.2 | 18 | CMP | 55 | 906.3 | 909.2 | NA | NA | 906.2 | 907.9 | NA | 47 | 5 |
| 604 | 285 | 904.7 | 27 | CMP | 50 | 905.3 | 909.7 | NA | NA | 904.7 | 906.7 | NA | 120 | 12 |
| 605 | 40 | 906.8 | 18 | CMP | 50 | 907.6 | 912.3 | NA | NA | 906.8 | 908.4 | NA | 13 | 4 |
| 606 | 1925 | 901.5 | 48 | RCP | 80 | 902.1 | NA | 43P | INA | 901.5 | 904.0 | NA | 1163 | 43 |
| **Coon Lake Watershed** | | | | | | | | | | | | | | |
| 700 | 68 | 908.3 | 27 | CMP | 69 | 909.6 | 914.2 | NA | NA | 908.3 | 910.4 | NA | 6 | 13 |
| 701 | 455 | NA | NA | OC | NA | INA | NA | 58P | INA | NA | NA | 1.9 | 164 | 16 |
| 702 | 993 | 902.0 | 60 | RCP | 72 | 904 | 913.1 | 62P, 464W | INA | 902.0 | 905.6 | NA | 598 | 62 |
| 703 | 121 | 908.8 | 12 | CMP | 31 | NONE | 910.7 | NA | NA | 908.8 | 910.1 | NA | 50 | 3 |
| 704 | 115 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 705 | 127 | NA | NA | NA | NA | INA | NA | NA | NA | NA | NA | NA | NA | NA |
| 706 | 465 | NA | NA | OC | NA | INA | NA | 465W | NA | NA | NA | 1.3 | 201 | 8 |
| 707 | 354 | 904.3 | 24 | RCP | 64 | 905.5 | 909.5 | 63P, 463W | INA | 904.3 | 907.3 | NA | 126 | 18 |
| 708 | 16 | 906.1 | 24 | RCP | 80 | NONE | 914.1 | NA | NA | 906.1 | 907.5 | NA | 0 | 10 |
| 709 | 3881 | 900.9 | 2 - 30 | RCP | 20 | 904 | 905.5 | 42P, 467W, 50W, 471W | 42P = 904.8 | 904.0 | 905.3 | NA | 5578 | 84 |
| **Cedar Creek Watershed** | | | | | | | | | | | | | | |
| 800 | 10300 | 897.3 | 20' x 7.6' | Wood Box | 66 | INA | 907.8 | 152P | INA | 897.3 | NA | NA | NA | NA |
| 801 | 810 | 898.1 | 30.5' x 5.4' | Concrete Bridge | 42 | 900.3 | 906.6 | NA | NA | 898.1 | 905.1 | NA | 1555 | 1205 |
| 802 | 1953 | 892.2 | 20' x 10' | Concrete Box | 150 | 895.2 | 906.1 | 171W | INA | 892.2 | 899.0 [2] | NA | 1068 | 746 |
| 803 | 653 | 889.2 | 72 | RCP | 88 | 892.8 | 900.9 | NA | NA | 889.2 | 896.0 [2] | NA | 1078 | 482 |
| | | 889.3 | 72 | RCP | 88 | | | | | | | | | |
| 804 | 421 | 883.1 | 84 x 138 | Concrete Arch | 64 | 887.8 | 894.7 | 351W | INA | 883.1 | 891.0 [2] | NA | 38 | 485 |
| | | 883.2 | 84 x 138 | Concrete Arch | 64 | | | | | | | | | |
| 805 | 1119 | NA | NA | OC | NA | INA | NA | 366W | INA | NA | 883.0 [2] | NA | 68 | 589 |

**Table 11-2**
**PROPOSED CONDITIONS - WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | PROPOSED OUTLET | | 100-yr STORM EVENT - PROPOSED CONDITIONS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| | | SIZE (inches) | TYPE [1] | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) | |
| Fish Lake Watershed | | | | | | | | | |
| 100 | 1359 | 24 | RCP | 917.5 | 920.1 | NA | 577 | 5.4 | Proposed: Construct road to 920.5. Culvert invert @ 916.5. Control structure outlet @ 917.5. |
| 101 | 464 | NA | NA | 907.6 | 912.4 | NA | 225 | 43 | |
| Coopers Lake Watershed | | | | | | | | | |
| 200 | 1256 | NA | NA | 919.8 | 923.4 | NA | 382 | 50 | 457 acres from Athens Township. |
| 201 | 486 | 18 | RCP | 911.8 | 918.4 | NA | 105 | 33 | |
| 202 | 418 | 21 | RCP | 918.4 | 922.6 | NA | 258 | 21 | |
| 203 | 200 | 21 | RCP | 898.0 | 901.8 | NA | 305 | 20 | |
| 204 | 151 | NA | NA | 897.7 | 900.7 | NA | 41 | 5 | |
| 205 | 160 | NA | NA | NA | NA | NA | NA | NA | |
| 206 | 204 | NA | NA | NA | NA | 2.1 | 86 | 20 | |
| 207 | 216 | NA | NA | NA | 911.8 | NA | 63 | 48 | 117 acres from Bethel. |
| 208 | 400 | NA | NA | 906.5 | 909 | NA | 123 | 29 | Entire watershed is in Oak Grove. |
| Deer Lake Watershed | | | | | | | | | |
| 300 | 840 | NA | NA | 912.8 | 915.5 | NA | 532 | 22 | |
| 301 | 1287 | 21 | RCP | 899.4 | 902.7 | NA | 605 | 18 | |
| 302 | 238 | NA | NA | NA | NA | 2.7 | 51 | 33 | |
| 303 | 60 | NA | NA | NA | NA | NA | NA | NA | |
| 304 | 170 | NA | NA | NA | NA | NA | NA | NA | |
| 305 | 219 | NA | NA | NA | NA | NA | NA | NA | |
| 306 | 63 | 15 | RCP | 914.3 | 916.7 | NA | 7 | 8 | |
| 307 | 18 | NA | NA | NA | NA | NA | NA | NA | |
| 308 | 33 | 15 | RCP | 913.5 | 916.1 | NA | 8 | 8 | |
| 309 | 1107 | NA | NA | NA | NA | 3.3 | 454 | 53 | |
| 310 | 363 | NA | NA | NA | NA | 2.5 | 263 | 30 | |
| 311 | 51 | NA | NA | 896.7 | 898.4 | NA | 11 | 7 | |
| 312 | 32 | NA | NA | 897.1 | 898.1 | NA | 7 | 5 | |
| 313 | 448 | 30 | RCP | 895.5 | 898.4 | NA | 201 | 26 | |
| 314 | 77 | NA | NA | 895.7 | 897.7 | NA | 10 | 12 | |

**Table 11-2**
**PROPOSED CONDITIONS - WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | PROPOSED OUTLET | | 100-yr STORM EVENT - PROPOSED CONDITIONS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| | | SIZE (inches) | TYPE [1] | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) | |
| Fish Lake Watershed | | | | | | | | | |
| 100 | 1359 | 24 | RCP | 917.5 | 920.1 | NA | 577 | 5.4 | Proposed: Construct road to 920.5. Culvert invert @ 916.5. Control structure outlet @ 917.5. |
| 101 | 464 | NA | NA | 907.6 | 912.4 | NA | 225 | 43 | |
| Coopers Lake Watershed | | | | | | | | | |
| 200 | 1256 | NA | NA | 919.8 | 923.4 | NA | 382 | 50 | 457 acres from Athens Township. |
| 201 | 486 | 18 | RCP | 911.8 | 918.4 | NA | 105 | 33 | |
| 202 | 418 | 21 | RCP | 918.4 | 922.6 | NA | 258 | 21 | |
| 203 | 200 | 21 | RCP | 898.0 | 901.8 | NA | 305 | 20 | |
| 204 | 151 | NA | NA | 897.7 | 900.7 | NA | 41 | 5 | |
| 205 | 160 | NA | NA | NA | NA | NA | NA | NA | |
| 206 | 204 | NA | NA | NA | NA | 2.1 | 86 | 20 | |
| 207 | 216 | NA | NA | NA | 911.8 | NA | 63 | 48 | 117 acres from Bethel. |
| 208 | 400 | NA | NA | 906.5 | 909 | NA | 123 | 29 | Entire watershed is in Oak Grove. |
| Deer Lake Watershed | | | | | | | | | |
| 300 | 840 | NA | NA | 912.8 | 915.5 | NA | 532 | 22 | |
| 301 | 1287 | 21 | RCP | 899.4 | 902.7 | NA | 605 | 18 | |
| 302 | 238 | NA | NA | NA | NA | 2.7 | 51 | 33 | |
| 303 | 60 | NA | NA | NA | NA | NA | NA | NA | |
| 304 | 170 | NA | NA | NA | NA | NA | NA | NA | |
| 305 | 219 | NA | NA | NA | NA | NA | NA | NA | |
| 306 | 63 | 15 | RCP | 914.3 | 916.7 | NA | 7 | 8 | |
| 307 | 18 | NA | NA | NA | NA | NA | NA | NA | |
| 308 | 33 | 15 | RCP | 913.5 | 916.1 | NA | 8 | 8 | |
| 309 | 1107 | NA | NA | NA | NA | 3.3 | 454 | 53 | |
| 310 | 363 | NA | NA | NA | NA | 2.5 | 263 | 30 | |
| 311 | 51 | NA | NA | 896.7 | 898.4 | NA | 11 | 7 | |
| 312 | 32 | NA | NA | 897.1 | 898.1 | NA | 7 | 5 | |
| 313 | 448 | 30 | RCP | 895.5 | 898.4 | NA | 201 | 26 | |
| 314 | 77 | NA | NA | 895.7 | 897.7 | NA | 10 | 12 | |

**Table 11-2**
**PROPOSED CONDITIONS - WATERSHED DATA**

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | PROPOSED OUTLET | | 100-yr STORM EVENT - PROPOSED CONDITIONS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| | | SIZE (inches) | TYPE [1] | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) | |
| Deer Lake Watershed (cont.) | | | | | | | | | |
| 315 | 224 | NA | NA | NA | NA | NA | NA | NA | |
| 316 | 450 | NA | NA | 901.1 | 903.7 | NA | 146 | 7 | |
| 317 | 83 | 18 | RCP | 907.5 | 909.2 | NA | 9 | 12 | Existing culvert is plugged<br>Proposed:<br>Culvert invert @ 906.5. Control structure outlet @ 907.5. |
| 318 | 10 | NA | NA | 896.5 | 898.6 | NA | 0 | 5 | |
| 319 | 19 | NA | NA | 918.9 | 922.1 | NA | 1 | 6 | |
| 320 | 116 | NA | NA | NA | 919.3 | NA | 2 | 3 | |
| Crooked Brook Watershed | | | | | | | | | |
| 400 | 96 | NA | NA | 893.5 | 902.3 | NA | 32 | 291 | 34 acres from Ham Lake. |
| 401 | 283 | NA | NA | 900.2 | 904.6 | NA | 34 | 42 | 49 acres from Ham Lake. |
| 402 | 191 | NA | NA | 899.9 | 903.3 | NA | 129 | 35 | |
| 403 | 264 | NA | NA | 898.1 | 902.6 | NA | 102 | 83 | |
| 404 | 1048 | NA | NA | 887.6 | 893.6 | NA | 631 | 149 | |
| 405 | 71 | NA | NA | 897.2 | 898.5 | NA | 14 | 8 | |
| 406 | 382 | NA | NA | 886.5 | 894.1 | NA | 361 | 253 | |
| 407 | 203 | NA | NA | 887.1 | 891.0 | NA | 81 | 43 | |
| 408 | 91 | NA | NA | 888.3 | 890.3 | NA | 49 | 14 | |
| 409 | 302 | NA | NA | 885.7 | 892.1 | NA | 821 | 206 | |
| 410 | 128 | 18 | RCP | 897.1 | 899.4 | NA | 15 | 14 | Proposed:<br>Culvert invert @ 896.1. Control structure outlet @ 897.1. |
| 411 | 258 | NA | NA | 891.9 | 893.6 | NA | 82 | 20 | |
| 412 | 220 | NA | NA | NA | NA | 7.3 | 480 | 194 | |
| 413 | 25 | NA | NA | 885.5 | 890.9 | NA | 2 | 206 | |
| 414 | 13 | NA | NA | 901 | 902.2 | NA | 1 | 4 | |
| 415 | 88 | NA | NA | NA | 904.2 | NA | 7 | 21 | 9 acres from Ham Lake. |
| 416 | 24 | 30 | RCP | 899.8 | 902.3 | NA | 1 | 39 | Proposed: Culvert @ 898.1. |
| 417 | 388 | NA | NA | 899.8 | NA | NA | NA | NA | Entire watershed is in Ham Lake. |
| 418 | 12 | NA | NA | 900.7 | 902.2 | NA | 1 | 6 | Entire watershed is in Ham Lake. |
| 419 | 127 | NA | NA | NA | NA | 2.7 | 17 | 19 | Entire watershed is in Ham Lake. |
| 420 | 70 | NA | NA | 895.7 | 901.4 | NA | 19 | 53 | Entire watershed is in Ham Lake. |
| 421 | 9 | NA | NA | 902.9 | 904 | NA | 1 | 3 | |
| 422 | 45 | 36 | RCP | 889.2 | 893.8 | NA | 15 | 53 | |
| 423 | 266 | NA | NA | 892.0 | 895.0 | NA | 129 | 49 | |
| 424 | 153 | NA | NA | NA | NA | 2.4 | 77 | 50 | |
| 425 | 56 | 72 | RCP | 891.5 | 898.1 | NA | 113 | 197 | Proposed: Culvert @ 891.5. |
| 426 | 8 | 72 | RCP | 891.3 | 898 | NA | 7 | 196 | Proposed: Culvert @ 891.3. |
| 427 | 15 | 18 | CMP | 898.4 | 902.2 | NA | 1 | 9 | Existing culvert is being extended. |

## Table 11-2
## PROPOSED CONDITIONS - WATERSHED DATA

| WATERSHED NUMBER | TOTAL WATERSHED AREA (acres) | PROPOSED OUTLET | | 100-yr STORM EVENT - PROPOSED CONDITIONS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| | | SIZE (inches) | TYPE [1] | NORMAL ELEV. (feet) | FLOOD ELEV. (feet) | BOUNCE[3] (feet) | STORAGE (ac-ft) | PEAK DISCHARGE (cfs) | |
| Sunrise River Watershed | | | | | | | | | |
| 500 | 355 | NA | NA | NA | NA | NA | NA | NA | |
| 501 | 453 | NA | NA | NA | NA | NA | NA | NA | |
| 502 | 54 | NA | NA | 912.8 | 916.1 | NA | 27 | 18 | |
| 503 | 77 | NA | NA | NA | NA | NA | NA | NA | |
| 504 | 308 | NA | NA | NA | NA | NA | NA | NA | |
| 505 | 108 | NA | NA | NA | NA | NA | NA | NA | |
| 506 | 634 | NA | NA | NA | NA | NA | NA | NA | |
| 507 | 374 | NA | NA | NA | NA | NA | NA | NA | |
| 508 | 124 | NA | NA | NA | NA | NA | NA | NA | |
| 509 | 223 | NA | NA | NA | NA | NA | NA | NA | |
| 510 | 73 | NA | NA | NA | NA | NA | NA | NA | |
| 511 | 11 | NA | NA | NA | NA | NA | NA | NA | |
| 512 | 44 | NA | NA | NA | NA | NA | NA | NA | |
| Rice Lake Watershed | | | | | | | | | |
| 600 | 23 | 15 | RCP | 916.1 | 917.4 | NA | 2 | 4 | |
| 601 | 548 | NA | NA | 904.7 | 908.1 | NA | 266 | 48 | |
| 602 | 353 | NA | NA | 910.8 | 913.9 | NA | 102 | 13 | |
| 603 | 135 | NA | NA | 906.2 | 907.9 | NA | 47 | 5 | |
| 604 | 285 | NA | NA | 904.7 | 906.7 | NA | 122 | 12 | |
| 605 | 40 | NA | NA | 906.8 | 908.4 | NA | 13 | 4 | |
| 606 | 1925 | NA | NA | 901.5 | 904.0 | NA | 1169 | 44 | 689 acres from Linwood Township. |
| Coon Lake Watershed | | | | | | | | | |
| 700 | 68 | NA | NA | 908.3 | 910.5 | NA | 7 | 13 | Southeast end of culvert is damaged. |
| 701 | 455 | NA | NA | NA | NA | 1.9 | 164 | 16 | |
| 702 | 993 | NA | NA | 902 | 905.6 | NA | 600 | 62 | |
| 703 | 121 | 15 | RCP | 908.8 | 910.1 | NA | 49 | 4 | North end of cuvert is damaged. |
| 704 | 115 | NA | NA | NA | NA | NA | NA | NA | |
| 705 | 127 | NA | NA | NA | NA | NA | NA | NA | |
| 706 | 465 | NA | NA | NA | NA | 1.3 | 205 | 8 | |
| 707 | 354 | NA | NA | 904.3 | 907.3 | NA | 126 | 18 | |
| 708 | 16 | NA | NA | 906.1 | 907.7 | NA | 0 | 11 | |
| 709 | 3881 | NA | NA | 904.0 | 905.3 | NA | 5579 | 84 | 1269 acres from Ham Lake & Columbus Township<br>Proposed: Control structure outlet @ 903.3. |
| Cedar Creek Watershed | | | | | | | | | |
| 800 | 10300 | NA | NA | 897.3 | NA | NA | NA | NA | 9520 acres from Athens Township. |
| 801 | 810 | NA | NA | 898.1 | 905.1 | NA | 1555 | 1205 | Elevation is to the creek bed. |
| 802 | 1953 | NA | NA | 892.2 | 899.0 [2] | NA | 1070 | 748 | |
| 803 | 653 | NA | NA | 889.2 | 896.0 [2] | NA | 1076 | 481 | |
| 804 | 421 | NA | NA | 883.1 | 891.0 [2] | NA | 38 | 484 | |
| 805 | 1119 | NA | NA | NA | 883.0 [2] | NA | 68 | 591 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| Fish Lake Watershed | | | | | | | | | | | |
| 100-1 | Meadows of Fish Lake | 2004 | 917.5 | 920.0 | 914.0 | Y | Reverse Grade Pipe | 15" | RCP | 85 | |
| 100-2 | Meadows of Fish Lake | 2004 | 918.0 | 920.0 | 914.0 | NA | NA | NA | NA | NA | Land locked, EOF @ 918.0 |
| 100-3 | Meadows of Fish Lake | 2004 | 917.5 | 920.0 | 914.0 | Y | Reverse Grade Pipe | 15" | RCP | 20 | |
| 100-4 | Meadows of Fish Lake | 2004 | 917.5 | 918.3 | 914.0 | NA | NA | 15" | RCP | NA | Outlet FES @ 917.6 |
| 100-5 | Meadows of Fish Lake | 2004 | 917.5 | 918.5 | 914.0 | Y | Reverse Grade Pipe | 15" | RCP | 70 | |
| 100-6 | Meadows of Fish Lake | 2004 | 917.5 | 918.2 | 914.0 | Y | Reverse Grade Pipe | 15" | RCP | 34 | |
| Coopers Lake Watershed | | | | | | | | | | | |
| 200-1 | Wargo Ponds | | 920.0 | 924.2 | 917.0 | Y | Reverse Grade Pipe | 18" | RCP | 20 | FES outle |
| 200-2 | Wargo Ponds | | 920.8 | 924.2 | 919.0 | Y | Reverse Grade Pipe | 15" | RCP | 12 | |
| 200-3 | Wargo Ponds | | 910.0 | 924.2 | 915.0 | Y | Reverse Grade Pipe | 18" | RCP | 16 | Skimmer Structure at end on swale north of pond |
| 200-4 | Whispering Aspen | | 921.0 | 925.3 | 918.0 | NA | NA | NA | NA | NA | FES outle |
| 200-5 | Whispering Aspen | | 922.3 | 925.3 | 918.0 | NA | NA | NA | NA | NA | |
| 200-6 | Whispering Aspen | | 921.0 | 925.5 | 918.0 | NA | NA | NA | NA | NA | FES outlet to Pond 200-15, EOF @ 926.0 |
| 201-1 | Cemstone Redimix Plant | 2004 | 922.0 | 923.8 | 917.0 | Y | Reverse Grade Pipe | 18" | RCP | 60 | |
| 201-2 | Cemstone Redimix Plant | 2004 | 922.0 | 923.8 | 917.0 | Y | Reverse Grade Pipe | 18" | RCP | 60 | |
| 201-3 | NA | | 925.0 | 927.3 | 925.0 | NA | NA | NA | NA | NA | Overflow @ 927.9 |
| 201-4 | NA | | 925.0 | 927.9 | 925.0 | NA | NA | NA | NA | NA | Overflow @ 927.9 |
| 201-5 | NA | | 925.0 | 927.9 | 925.0 | NA | NA | NA | NA | NA | Overflow @ 927.3 |
| 202-1 | Northern Oaks | | 921.8 | 923.5 | 917.8 | Y | Baffled Weir | 15" | HDPE | 80 | |
| 202-2 | Northern Oaks | | 921.5 | 922.5 | 918.5 | Y | Baffled Weir | 15" | HDPE | 20 | |
| 202-3 | West Side Estates | 1998 | 925.0 | 925.5 | 922.0 | Y | Baffled Weir | 15" | HDPE | 20 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 202-4 | West Side Estates | 1998 | 924.0 | 925.5 | 918.0 | Y | Baffled Weir | 15" | RCP | NA | Equalizer culvert between 202-4 & 202-5 |
| 202-5 | West Side Estates | 1998 | 924.0 | 925.5 | 920.0 | Y | Baffled Weir | 15" | RCP | NA | Equalizer culvert between 202-5 & 202-4 |
| 202-6 | Shade Tree Commerical Park | | NA | 925.0 | 913.0 | NA | NA | NA | NA | NA | 2 yr = 917.1 |
| 202-7 | Shade Tree Commerical Park | | NA | 925.0 | 914.0 | NA | NA | NA | NA | NA | 2 yr = 915.2 |
| 203-1 | Eagle Ridge | 1999 | 911.5 | 912.5 | 906.0 | Y | Skimmer Manhole | 6" | PVC | 38 | |
| 205-1 | Northern Boundaries 2nd | | NA | 913.5 | 909.0 | N | NA | NA | OC | NA | |
| 205-2 | Northern Boundaries 2nd | | NA | 912.5 | 909.0 | N | NA | NA | OC | NA | |
| 207-1 | Eagle Ridge | 1999 | 910.0 | 911.1 | 906.0 | Y | Skimmer Manhole | 6" | PVC | 66 | |
| Deer Lake Watershed | | | | | | | | | | | |
| 301-1 | Norlyn Farms | 2005 | NA | NA | 920.0 | N | NA | NA | OC | NA | Riprap overflow @ 921.7 |
| 301-2 | Norlyn Farms | 2005 | NA | NA | 923.0 | N | NA | NA | OC | NA | Riprap overflow @ 925.5 |
| 303-1 | Palisade Pines | 1997 | 918.0 | 919.4 | NA | N | NA | 12" | CMP | 30 | |
| 303-2 | Palisade Pines | 1997 | NA | 920.5 | 914.0 | N | NA | 11' wide | OC | NA | |
| 305-1 | Serenity Ponds 2nd Addition | | NA | 919.6 | 915.0 | NA | NA | NA | NA | NA | Riprap overflow @ 920.0 |
| 306-1 | Serenity Pond | 1999 | 915.0 | 916.4 | 908.0 | Y | Baffled Weir | 15" | CPP | 35 | |
| 306-2 | Serenity Pond | 1999 | 918.7 | 919.9 | 914.0 | Y | Baffled Weir | 15" | CPP | 55 | |
| 306-3 | Serenity Pond | 1999 | 924.0 | 924.9 | 920.0 | Y | Baffled Weir | 15" | CPP | 35 | |
| 309-1 | NA | | NA | NA | 909.0 | NA | NA | 15" | RCP | NA | FES outlet @ 911.0 |
| 309-2 | NA | | 908.1 | NA | 903.0 | Y | Reverse Grade Pipe | 24" | RCP | 27 | |
| 309-3 | NA | | NA | NA | 906.0 | NA | NA | 15" | RCP | NA | FES outlet @ 907.3 |
| 313-1 | NA | | 905.5 | 908.0 | 896.0 | Y | Reverse Grade Pipe | 15" | RCP | 26 | |
| 313-2 | NA | 2008 | 908.2 | 911.2 | 904.0 | Y | Reverse Grade Pipe | 15" | RCP | 26 | |
| 313-3 | NA | 2007 | 909.7 | 911.4 | 908.0 | Y | Reverse Grade Pipe | 18" | CPP | 290 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 315-1 | Cedar Trails 2nd Addition | 1997 | NA | 917.7 | 912.0 | N | NA | NA | OC | NA | |
| 315-2 | Cedar Trails 2nd Addition | 1997 | NA | 917.4 | 910.0 | N | NA | NA | OC | NA | |
| 315-3 | Oakwood Trails | | 912.6 | 916.2 | 910.0 | Y | Reverse Grade Pipe | 24" | CPP | 557 | |
| 316-1 | Hidden Haven Country Club Estates 3rd Addition | | 907.0 | 910.0 | 903.0 | Y | Reverse Grade Pipe | 8" | PVC | 40 | |
| 316-2 | NA | | 911.0 | 912.7 | 907.0 | Y | Reverse Grade Pipe | 15" | RCP | 27 | |
| 316-3 | NA | | 903.1 | 909.3 | 900.0 | Y | Reverse Grade Pipe | 18" | RCP | 287 | |
| 316-4 | NA | | 913.0 | 915.8 | 909.0 | Y | Reverse Grade Pipe | 18" | RCP | 241 | |
| 316-5 | Victory Meadows | NA | 914.3 | 910.0 | NA | NA | NA | NA | NA | NA | |
| 316-6 | Victory Meadows | NA | 916.3 | 912.0 | NA | NA | NA | NA | NA | NA | |
| 317-1 | Klondike Ridge | 2000 | 909.0 | 909.5 | 906.0 | Y | Baffled Weir | NA | OC | NA | |
| 317-2 | Klondike Ridge | 2000 | 910.5 | 911.0 | 904.0 | Y | Baffled Weir | NA | OC | NA | Emergency overflow @ 911.0 |
| 317-3 | Swensons Klodike Estates | | 916.0 | 920.4 | 916.0 | NA | NA | NA | NA | NA | EOF @ 920.9 |
| 318-1 | Cedar Trails East | | 896.5 | NA | 892.5 | N | NA | 12" | HDPE | 20 | Overflow @ 899.5 |
| 319-1 | Cedar Trails East | | 918.9 | 921.9 | 913.9 | N | NA | 12" | RCP | 96 | |
| Crooked Brook Watershed | | | | | | | | | | | |
| 400-1 | NA | 1999 | NA | 905.5 | 902.2 | N | NA | 9' wide | Riprap Overflow | 13 | |
| 400-2 | NA | 1999 | 898.5 | 902.6 | 897.0 | Y | Reverse Grade Pipe | 18" | RCP | 16 | |
| 403-1 | Blueberry Hill 2nd Addition | | 904.5 | 906.5 | 901.0 | N | NA | 15" | CMP | 24 | |
| 406-1 | NA | 1999 | NA | 905.5 | 902.2 | N | NA | 9' wide | Riprap Overflow | 13 | |
| 409-1 | Sauter's Commercial Park | | 896.0 | 897.1 | 892.0 | Y | Baffled Weir | 12" | CMP | 12 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 410-1 | NA | | 899.0 | 902.3 | 895.0 | NA | NA | NA | NA | NA | Outlet FES @ 903.8 |
| 410-2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | Pond information unavaible |
| 410-3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | Pond information unavaible |
| 415-1 | Briar Creek | 2000 | 904.2 | 906.5 | 898.0 | Y | Baffled Weir | 12" | CPP | 14 | |
| 415-2 | Briar Creek | 2000 | 904.4 | 907.1 | 898.0 | Y | Baffled Weir | 12" | CPP | 33 | |
| 415-3 | Briar Creek | 2000 | 903.7 | 904.6 | 895.0 | Y | Baffled Weir | 12" | RCP | 157 | |
| 415-4 | Briar Creek | 2000 | 904.0 | 904.7 | 895.0 | N | NA | 12" | CPP | 135 | |
| 415-5 | Briar Creek | 2000 | 903.5 | 904..6 | 899.5 | Y | Baffled Weir | 12" | CPP | 43 | |
| 423-1 | Bear Hollows | | 900.8 | 901.7 | NA | NA | NA | NA | NA | NA | Land locked |
| 425-1 | NA | 1999 | 895.7 | NA | 892.4 | Y | Reverse Grade Pipe | 24" | RCP | 32 | |
| 427-1 | Classic Commerical Park | | 891.2 | 895.5 | 888.0 | Y | Reverse Grade Pipe | 36" | RCP | 55 | |
| 427-2 | Classic Commerical Park | | 892.0 | 896.9 | 882.0 | Y | Reverse Grade Pipe | 33" | RCP | 254 | |
| 428-1 | Bear Hollow | | 901.8 | 904.0 | 897.8 | Y | Reverse Grade Pipe | 12" | RCP | 35 | |
| 428-2 | Bear Hollow | | 902.5 | 903.4 | 898.5 | Y | Reverse Grade Pipe | 12" | RCP | 33 | |
| 428-3 | Bear Hollow | | 901.6 | 904.0 | 897.6 | Y | Reverse Grade Pipe | 12" | RCP | 50 | |
| 428-4 | Bear Hollow | | 902.0 | 903.5 | 898.0 | Y | Reverse Grade Pipe | 12" | RCP | 35 | |
| 428-5 | Bear Hollow | | 901.5 | 901.9 | 899.5 | NA | NA | NA | NA | NA | Riprap overflow @ 901.5 |
| 428-6 | Bear Hollow | | 901.8 | 903.0 | 897.8 | Y | Reverse Grade Pipe | 12" | RCP | 37 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| Sunrise River Watershed | | | | | | | | | | | |
| 504-1 | Meadows of Fish Lake | | 916.7 | 917.4 | 914.0 | Y | Reverse Grade Pipe | 15" | RCP | 90 | |
| 504-2 | Meadows of Fish Lake | | 917.0 | 918.5 | 912.0 | Y | Reverse Grade Pipe | 15" | RCP | 34 | |
| 504-3 | Meadows of Fish Lake | | 916.7 | 917.5 | 914.0 | NA | NA | NA | NA | NA | Outlet @ 916.7 |
| 506-1 | Austin Estates | | 920.4 | NA | 918.0 | NA | NA | NA | NA | NA | 2yr = 923.6 |
| 506-2 | Austin Estates | | 920.0 | 923.8 | 918.0 | NA | NA | NA | NA | NA | Riprap weir @ 923.8 to Pond 506-3 |
| 506-3 | Austin Estates | | 920.0 | NA | 920.0 | NA | NA | NA | NA | NA | 2 yr = 924.1 |
| 506-4 | Austin Estates 2nd Addition | | 920.0 | 922.9 | 916.0 | NA | NA | NA | NA | NA | Land locked, 100yr B/B @ 924.9 |
| 507-1 | Fawn Acres | 1999 | 921.5 | 924.2 | 917.5 | N | NA | 15" | CMP | 111 | Equalizer culvert betweem 507-1 & 508-3 |
| 507-2 | Oak Glen Estates | 2008 | 924.0 | 925.6 | 918.0 | Y | Reverse Grade Pipe | 15" | RCP | 129 | |
| 508-1 | Fawn Acres | 1999 | 922.0 | 920.9 | 918.0 | Y | Baffled Weir | 12" | CMP | 26 | |
| 508-2 | Fawn Acres | 1999 | 922.0 | 923.4 | 918.0 | Y | Baffled Weir | 15" | CMP | 32 | |
| 508-3 | Fawn Acres | 1999 | 921.5 | 924.2 | 918.5 | Y | Baffled Weir | 12" | CMP | 36 | Equalizer culvert betweem 508-3 & 507-1 |
| 512-1 | Shenandoah Ridge | 1998 | NA | 920.5 | 918.0 | N | NA | 10' wide | Grouted Riprap Overflow | 15 | |
| 512-2 | Shenandoah Ridge | 1998 | NA | 920.5 | 918.0 | N | NA | 10' wide | Grouted Riprap Overflow | 15 | |
| Rice Lake Watershed | | | | | | | | | | | |
| 600-1 | Lone Pine Estates | 1999 | 919.0 | 921.2 | 914.0 | Y | Baffled Weir | 18" | RCP | 120 | |
| 604-1 | The Park | | 908.5 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 910.5 |
| 604-2 | The Park | | 908.7 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 909.7 |
| 604-3 | The Park | | 908.4 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 909.8 |
| 606-1 | Oak Brook Acres | | 906.0 | 907.1 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 52.0 | |
| 606-2 | Oak Brook Acres | | 906.0 | 907.6 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 12.0 | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 606-3 | Oak Brook Acres | | 906.0 | 907.4 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 13.0 | |
| 606-4 | Oak Brook Acres | | 908.2 | 911.0 | 904.0 | Y | Reverse Grade Pipe | 15" | RCP | 38.0 | |
| 606-5 | Oak Brook Acres | | 912.5 | 913.4 | 912.0 | NA | NA | NA | NA | NA | Land locked |
| 606-6 | Oak Brook Acres | | 906.5 | 908.5 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 81.0 | |
| 606-7 | Oak Brook Acres | | 906.8 | 908.6 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 20 | |
| 606-8 | Oak Brook Acres | | 906.0 | 907.7 | 905.0 | NA | NA | 15" | RCP | 130 | FES |
| 606-9 | Oak Brook Acres | | 907.8 | 909.2 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 16 | |
| 606-10 | Dellwood Acres | | 909.3 | 910.4 | 900.0 | NA | NA | NA | NA | NA | EOF @ 913.8 |
| 606-11 | Dellwood Acres | | 908.5 | 910.4 | 907.0 | Y | Reverse Grade Pipe | 15" | HDPE | 143 | |
| Coon Lake Watershed | | | | | | | | | | | |
| 701-1 | The Park | | 908.8 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 910.8 |
| 701-2 | Whispering Oaks 3rd Addition | 1998 | 912.0 | 912.7 | 910.0 | Y | Baffled Weir | NA | Grouted Riprap Overflow | NA | |
| 701-3 | Whispering Oaks | | NA | NA | 913.0 | N | NA | NA | OC | NA | Overflows to a Wetland Mitigation Area |
| 701-4 | Whispering Oaks 3rd Addition | 1998 | 913.0 | 914.4 | 911.0 | Y | Baffled Weir | NA | Grouted Riprap Overflow | NA | |
| 701-5 | Whispering Oaks 3rd Addition | 1998 | 912.0 | 913.0 | 910.0 | Y | Baffled Weir | NA | Grouted Riprap Overflow | NA | |
| 702-1 | The Park | | 908.2 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 909.8 |
| 702-2 | Whispering Oaks 3rd Addition | 1998 | 910.0 | 910.9 | 906.0 | Y | Baffled Weir | NA | Grouted Riprap Overflow | NA | |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 702-3 | Oakwood Meadows | | 910.8 | 911.7 | 910.0 | Y | Weir Overflow | 12" | PVC | 35.0 | |
| 702-4 | Oakwood Meadows | | 910.8 | 911.8 | 910.0 | Y | Weir Overflow | 12" | PVC | 77.0 | |
| 702-5 | Oakwood Meadows | | 910.8 | 911.7 | 910.0 | Y | Weir Overflow | 12" | PVC | 25.0 | |
| 702-6 | Oakwood Meadows | | 912.5 | 912.5 | 911.0 | Y | Weir Overflow | 12" | PVC | 175.0 | |
| 702-7 | Oakwood Meadows | | 910.8 | 911.5 | 910.0 | Y | Weir Overflow | 12" | PVC | 20.0 | |
| 707-1 | Larson's Oak Hills Plan 2 | | NA | NA | 906.0 | NA | NA | NA | OC | NA | |
| 707-2 | Larson's Oak Hills Plan 2 | | NA | NA | 906.0 | NA | NA | NA | OC | NA | |
| 707-3 | Larson's Oak Hills Plan 2 | | NA | NA | 908.0 | NA | NA | NA | OC | NA | |
| 707-4 | The Park | | 909.5 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 911.5 |
| 707-5 | The Park | | 909.5 | NA | NA | NA | NA | NA | OC | NA | Top of berm @ 911.0 |
| 709-1 | Kaite's Way | | 908.0 | 909.7 | 907.0 | NA | NA | NA | NA | NA | Outlet FES @ 908.0 |
| 709-2 | Kaite's Way | | 907.0 | 908.3 | 903.0 | NA | NA | NA | NA | NA | Outlet FES w/weir @ 907.0 |
| 709-3 | Kaite's Way | | NA | 905.7 | 903.5 | NA | NA | NA | NA | NA | |
| 709-4 | Rhoden Addition | | 904.0 | 908.3 | 902.0 | NA | NA | NA | NA | NA | EOF @ 908.6 |
| 709-5 | Woodcroft | 2007 | 906.6 | 908.3 | 902.0 | Y | Reverse Grade Pipe | 15" | RCP | 16 | |
| 710-1 | Peterson Ridge | | 904.0 | 906.4 | 903.0 | NA | NA | NA | NA | NA | 100 yr B/B = 911.4 |
| Cedar Creek Watershed | | | | | | | | | | | |
| 802-1 | Pinecrest Estates | | NA | 913.0 | 908.0 | N | NA | NA | OC | NA | |
| 802-2 | Cedar Creek Meadows | | 907.0 | 907.3 | 904.0 | Y | Weir Wall | 8" | PVC | 15 | Top of weir wall @ 907.0 |
| 802-3 | Cedar Creek Meadows | | 912.4 | 914.3 | 910.0 | Y | Reverse Grade Pipe | 12" | RCP | 125 | |
| 802-4 | Shade Tree Crossing | | 910.0 | 914.2 | 910.0 | NA | NA | NA | NA | NA | Land locked, 100yr B/B @ 916.6 |
| 802-5 | Shade Tree Crossing | | 908.0 | 915.3 | 908.0 | NA | NA | NA | NA | NA | Land locked, 100yr B/B @ 917.6 |
| 802-6 | Shade Tree Crossing | | 914.0 | 915.6 | 910.0 | Y | Reverse Grade Pipe | 15" | HDPE | 20 | Weir overflow @ 915.6 |
| 802-7 | Shade Tree Crossing | | 918.0 | 920.8 | 918.0 | NA | NA | NA | Weir Overflow | NA | 100yr B/B @ 921.8, Weir overflow @ 921.9 |

**Table 11-3**
**Inventory of Existing Water Quality/Rate Control Ponds**

| POND INFORMATION | | | | | | | | OUTLET INFORMATION | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | DEVELOPMENT | YEAR BUILT | NORMAL ELEV. | FLOOD ELEV. | BOTTOM ELEV. | SKIMMER Y or N | SKIMMER TYPE | SIZE (inches) | TYPE | LENGTH (feet) | |
| 802-8 | Birch Meadows 2nd Addition | | NA | 925.5 | 920.0 | NA | NA | NA | NA | NA | Riprap overflow @ 925.5 |
| 802-9 | Baltimore Cedar Creek | | 908.0 | 909.5 | 902.0 | Y | Reverse Grade Pipe | 15" | HDPE | 28 | |

**Table 11-4**
**Inventory of Existing Wetland Mitigation Areas**

| Wetland Mitigation Number | Mitigation Area (s.f.) | Year Built | Development | Location | |
|---|---|---|---|---|---|
| | | | | Block Number | Lot Number |
| MA - 1 | 1,200 | | Northern Boundaries 2nd | 2 | 4 |
| MA - 2 | 14,400 | 1999 | Fawn Acres | 3 | 1 & 2 |
| MA - 3 | 17,000 | 1995 | Whispering Oaks | 3 | 7 & 8 |
| MA - 4 | 13,100 | 1998 | Country Haven Estates | 1 | 1 |
| MA - 5 | 7,000 | 1999 | Eagle Ridge | 2 | 1 |
| MA - 6 | NA | 2004 | Meadows of Fish Lake | NA | NA |
| MA - 7 | 14,930 | 2004 | Cemstone Redimix Plant | 1 | 1 |
| MA - 8 | 3.35 Acres | 2005 | Classic Commercial Park | 1 | 1 |

# TABLE 11-5
# CAPITAL IMPROVEMENT PROGRAM

| Project Description | | Year | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **A. SWPPP TASKS** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 1 | Distribute Educational Materials | $440 | $440 | $440 | $440 | $440 | | SWUF |
| 2 | Coordination of Education Program | $500 | $500 | $500 | $500 | $500 | | SWUF |
| 3 | Annual Public Meeting | $580 | $340 | $340 | $340 | $340 | | SWUF |
| 4 | Solicit Public Input and opinion on the Adequacy of the SWPPP | $170 | $170 | $170 | $170 | $170 | | SWUF |
| 5 | Consider Public Input | $290 | $290 | $290 | $290 | $290 | | SWUF |
| 6 | Storm Sewer System Map | $1,500 | $1,500 | $500 | $500 | $500 | | SWUF |
| 7 | Regulatory Control Program | $680 | $680 | $680 | $680 | $680 | | SWUF |
| 8 | Illicit Discharge Detection | $680 | $680 | $680 | $680 | $680 | | SWUF |
| 9 | Identification of Non Stormwater Discharges and Flows | $680 | $680 | $680 | $680 | $680 | | SWUF |
| 10 | Ordinance or other Regulatory Mechanism | $170 | $170 | $170 | $170 | $170 | | SWUF |
| 11 | Construction Site Implementation of Erosion and Sediment Control BMPs | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 12 | Waste Controls for Construction Site Operators | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 13 | Site Plan Review | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 14 | Reports of Stormwater Noncompliance | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 15 | Site Inspections and Enforcement | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 16 | Implementation of Structural and/or Non-structural BMPs | $340 | $340 | $340 | $340 | $340 | | SWUF |
| 17 | Long-term Operation and Maintenance of BMPs | $2,120 | $2,120 | $2,120 | $2,120 | $2,120 | | SWUF |
| 18 | Municipal Operations and Maintenance Program | $1,260 | $1,260 | $1,260 | $1,260 | $1,260 | | SWUF |
| 19 | Street Sweeping | $14,760 | $15,060 | $15,750 | $16,450 | $17,150 | | SWUF |
| 20 | Annual Inspection of All Structural Pollution Control Devices | $3,900 | $3,900 | $3,900 | $3,900 | $3,900 | | SWUF |
| 21 | Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis | $3,900 | $3,900 | $3,900 | $3,900 | $3,900 | | SWUF |
| 22 | Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas | $1,060 | $1,060 | $1,060 | $1,060 | $1,060 | | SWUF |
| 23 | Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures | $4,420 | $4,420 | $4,420 | $4,420 | $4,420 | | SWUF |
| 24 | Record Reporting and Retention of all Inspections and Responses to the Inspections | $1,060 | $1,060 | $1,060 | $1,060 | $1,060 | | SWUF |
| 25 | TMDL Implementation Review | $1,500 | $1,500 | $1,500 | $10,000 | $10,000 | | SWUF |
| 26 | TMDL Implementation | $0 | $0 | $0 | $10,000 | $10,000 | $30,000 | SWUF |
| | **Subtotal** | $41,710 | $41,770 | $41,460 | $60,660 | $61,360 | $30,000 | |

# TABLE 11-5
# CAPITAL IMPROVEMENT PROGRAM

| Project Description | | Year | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **B. Annual WMO Expense** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 25 | | $23,672 | $24,145 | $24,628 | $25,121 | $25,623 | | SWUF |
| | **Subtotal** | $23,672 | $24,145 | $24,628 | $25,121 | $25,623 | $0 | |
| **C. Improvements For Future Municipal Services** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 26 | Future Improvements | | | $300,000 | $300,000 | $300,000 | | All Funds |
| | **Subtotal** | $0 | $0 | $300,000 | $300,000 | $300,000 | $0 | |
| **D. Scheduled City Improvement Projects** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 27 | 189th Avenue | $50,000 | | | | | | MSACF |
| 28 | East Service Road | | $300,000 | | | | | SCF |
| | **Subtotal** | $50,000 | $300,000 | $0 | $0 | $0 | $0 | |
| **E. Storm Sewer Improvements[2]** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 29 | Subwatershed 100 | | | | | | $10,790 | Dev |
| 30 | Subwatershed 201 | | | | | | $10,270 | Dev |
| 31 | Subwatershed 202 | | | | | | $10,530 | Dev |
| 32 | Subwatershed 203 | | | | | | $10,530 | Dev |
| 33 | Subwatershed 301 | | | | | | $10,530 | Dev |
| 34 | Subwatershed 306 | | | | | | $8,450 | Dev |
| 35 | Subwatershed 308 | | | | | | $8,450 | Dev |
| 36 | Subwatershed 313 | | | | | | $11,310 | Dev |
| 37 | Subwatershed 317 | | | | | | $10,270 | Dev |
| 38 | Subwatershed 410 | | | | | | $10,270 | Dev |
| 39 | Subwatershed 422 | | | | | | $11,700 | MSCAF |
| 40 | Subwatershed 425 | | | | | | $19,500 | MSCAF |
| 41 | Subwatershed 426 | | | | | | $19,500 | MSCAF |
| 42 | Subwatershed 427 | | | | | | $1,950 | Dev |
| 43 | Subwatershed 600 | | | | | | $8,450 | Dev |
| 44 | Subwatershed 703 | | | | | | $8,450 | Dev |
| | **Subtotal** | $0 | $0 | $0 | $0 | $0 | $170,950 | |

# TABLE 11-5
# CAPITAL IMPROVEMENT PROGRAM

| Project Description | | Year | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **F. Proposed Developments** | | **2019** | **2020** | **2021** | **2022** | **2023** | **Beyond 2023** | **Funding Source[1]** |
| 45 | Viking Preserve | $200,000 | | | | | | Dev |
| 46 | Future | | $150,000 | $150,000 | $150,000 | $150,000 | | Dev |
| | **Subtotal** | $200,000 | $150,000 | $150,000 | $150,000 | $150,000 | $0 | |
| | **TOTALS** | $315,382 | $515,915 | $516,088 | $535,781 | $536,983 | $200,950 | |

[1] SWUF = Stormwater Utility Fund
SCF = Street Capital Fund
MSACF = Municipal State Aid Construction Fund
Dev = Developer Funds

[2] Project timing will be based on development. Some projects may be constructed sooner than shown in the CIP.

# 12.0 Plan Amendments

This plan will be reviewed at five to ten-year intervals to determine whether updates are required to meet changing legal or physical conditions. Amendments may be either minor or major.

Minor amendments are amendments that do not change the goals, policies, management strategies, and management processes. Minor amendments include, but are not limited to the following:

- Updates to the storm drainage system based on construction or to correct errors or omissions.
- Changes to watershed divides provided they do not affect major watershed divides.
- Minor amendments as defined by Minn. Rules 8410.0020, Subp. 10 which reads as follows:
  ". . . items such as recodification of the plan, revision of a procedure meant to streamline administration of the plan, clarification of the intent of a policy, the inclusion of additional data not requiring interpretation, or any other action that will not adversely affect a local unit of government or diminish a water management organizations' ability to achieve the plan's goals or implementation program."

Minor amendments will be submitted to the affected WMO as required by respective WMO policy.

Major amendments will include:

- Modifications to the watershed divides or storm drainage system that change the projected rates and volume of flow.
- Modifications to the goals and policies.
- Major amendments, when required, will involve the same steps as approval of the original document.

# 13.0 Development Submittal Requirements

## 13.1 Purpose and Intent

This section of the plan is intended to provide Developer's Engineers with a standardized format for submittal of drainage plans and calculations and wetland delineation and mitigation reports to the City for review. A standardized format will provide the following:

- Reduce preparation time for submittals by providing direct guidelines for Developer's Engineers to follow.
- Reduce review time required by the City's Engineer by ensuring that a complete and comprehensive drainage plan and calculations are submitted.
- Ensure that the City will receive the best possible protection of its resources, which could be adversely affected by inadequate stormwater management planning.

## 13.2 General Requirements – Grading, Drainage, and Erosion Control Plan

Grading, Drainage, and Erosion Control Plans shall be provided by the Developer in accordance with the City Code. Several items critical to the review of the drainage system must be adequately depicted on the plan by the Developer's Engineer. The following key elements must be depicted on the plan:

### 13.2.1 Topography

Existing and proposed contours at a minimum of 2-foot intervals. A 1-foot contour interval or proposed spot elevations shall be used where conditions dictate. The determination of contour interval shall be made based upon clarity and readability of the plans.

### 13.2.2 Stormwater Basins

Infiltration and wet basin locations as depicted by the proposed contours. Normal level and 2-year, 10 year and 100 year flood water levels shall be depicted on the plan for each basin. Basins are required at each outfall point from the proposed plat. Perimeter berm elevation and width shall be clearly labeled on plan sheets.

Permanent wet detention basins, when used, may be utilized as construction detention basins, provided they are cleaned after permanent erosion control measures are established. Design features of the infiltration and wet detention basins shall be as described in this Plan.

### 13.2.3 Erosion Control Features

Locations of silt fence, bale checks, wood fiber blanket, rock construction entrances, storm drain inlet protection, outlet projection, rip rap, temporary seeding, permanent

seeding, sod, mulch, or other erosion control features proposed to be implemented for the project.

### 13.2.4 Wetland Delineation

Show the field delineated boundaries of all public waters and wetlands.

### 13.2.5 Storm Sewer Facilities

Storm sewer facilities, when utilized, shall be adequately depicted on the drawings. As a minimum, the following must be shown on the plan:

Storm sewer pipe length, grade, type of material, and size between each catch basin and manhole.

Catchbasin and manhole structural data including size or diameter, depth, and material of construction. A typical section depicting each different type of catchbasin or manhole used shall be shown on the drawing. Type of casting utilized shall be referenced for each catchbasin or manhole. Elevations for the top of inlet and each invert shall be referenced on the drawing.

A typical curb section for urban design streets shall be shown on the drawing.

If ditch sections are used, a typical section shall be shown on the drawing depicting bottom width and side slopes of the ditch.

Details of skimming structures utilized.

## 13.3 Storm Drainage System Submittal Requirements

The stormwater drainage report shall be comprised of the following sections to provide the City Engineer with adequate base information for which to review the report. The following data must be included in the report:

**Title Page.** The title page shall list the project name, project location, date prepared, and preparer's name, title, and company.

**Table of Contents.** The table of contents must provide a description of the major categories of the report and also list each hydrograph and reservoir report presented in the report.

**Summary.** The summary must provide descriptions of items critical to the review of the entire report. Assumptions and results of the calculations shall be included in the summary:

A. Pre-Development Site Conditions (Existing)
   1. Total site area
   2. Delineation of sub-drainage areas, as appropriate.
   3. For each drainage area, or sub-drainage area, provide the following information:
      a. Area in acres.

b. Curve number (with justification)
c. Time of Concentration (with justification)
d. Runoff rate and runoff volume

B. Post-Development Site Conditions (Proposed)
1. Total site area
2. Delineation of sub-drainage areas, as appropriate.
3. For each drainage area, or sub-drainage area, provide the following information:
a. Area in acres
b. Curve number (with justification)
c. Time of Concentration (with justification)
d. Runoff rate and runoff volume

C. Comparison of pre-development to post-development runoff rates and volumes when rate control is required.

D. Discussion of temporary and permanent erosion control measures utilized.

E. A discussion of the storm sewer system, if applicable, to include a summary of flows to each catchbasin and the depth of water over each catchbasin during the ten year event.

**Drainage maps:** Drainage maps depicting pre-development and post-development conditions. The maps may be 22”x34” plans, but shall also be provided on 11”x17” reductions. The plans shall delineate drainage area and sub-drainage area boundaries. All areas shall be labeled and referenced to those presented in the report.

**Computer Printouts:** Drainage maps of all hydrograph and reservoir files shall be included at the back of the report for reference.

## 13.4 Wetland Delineation and Replacement

### 13.4.1 Wetland Delineation

When a regulated use or activity is proposed on a property which is within a wetland or wetland buffer area, a wetland delineation and report is required. The applicant shall provide a wetland report prepared by a qualified Wetland Specialist. The wetland report shall include the following:

1. Vicinity map;
2. A copy of a National Wetland Inventory Map identifying the wetlands on or adjacent to the site;
3. A site map setting forth all of the following:
a. Surveyed wetland boundaries based upon delineation;
b. Site boundary property lines and roads;
c. Internal property lines, rights-of-way, easements, etc.;

d. Existing physical features of the site including buildings, fences, and other structures, roads, parking lots, utilities, water bodies, etc.;
e. Contours at the smallest readily available intervals, preferably at 2-foot intervals;
f. Hydrologic mapping showing patterns of surface water movement and know subsurface water movement into, through, and out of the site area.
g. Location of all test holes and vegetation sample sites, numbered to correspond with flagging in the field and field data sheets.

4. A report which discusses the following:
   a. Location information (legal description, parcel number and address);
   b. Delineation. The wetland boundaries on the site established by the delineation shall be staked and flagged in the field. If the wetland extends outside the site, the delineation report shall discuss all wetland areas within 150 feet of the site, but need only delineate those wetland boundaries within the site;
   c. General site conditions including topography, acreage, and surface areas of all wetlands identified;
   d. Hydrological analysis, including topography, of existing surface and known significant sub-surface flows into and out of the subject wetland(s);
   e. Analysis of functional values of existing wetlands, including vegetative, faunal, and hydrologic conditions;
5. A summary of proposed activity and potential impacts to the wetland(s);
6. Recommended wetland group, including rationale for the recommendation;
7. Site plan of proposed activity, including location of all parcels, tracts, easement, roads, structures, and other modifications to the existing site. The location of all wetlands and buffers shall be identified on the site plan.

### 13.4.2 Wetland Replacement

When wetland impacts cannot be avoided, the applicant shall prepare a Wetland Replacement Plan. The Wetland Replacement Plan components shall conform to the requirements of Minnesota Rules 8420.0530.

# Table 13-1
# City of East Bethel Runoff Curve Numbers

| Cover Description | Curve numbers for hydrologic soil group | | | |
|---|---|---|---|---|
| **Cover type and hydrologic condition** | **A** | **B** | **C** | **D** |
| ***Fully developed urban areas (vegetation established)*** | | | | |
| Open space (lawns, parks, golf courses, cemeteries, etc. | | | | |
| Grass Cover > 75% | 39 | 61 | 74 | 80 |
| Grass Cover < 75% | 49 | 65 | 77 | 82 |
| Impervious areas: | | | | |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | 98 | 98 | 98 | 98 |
| Streets and roads: | | | | |
| Paved; curbs and storm sewers (excluding right-of-way) | 98 | 98 | 98 | 98 |
| Paved; open ditches (including right-of-way) | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | 72 | 82 | 87 | 89 |
| Water Surface: | 100 | 100 | 100 | 100 |
| Urban Districts: | | | | |
| Commercial and business | NA[1] | 92 | 94 | 95 |
| Industrial | NA[1] | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | |
| 1/8 acre of less (town houses) | NA[1] | 85 | 90 | 92 |
| 1/4 acre | NA[1] | 75 | 83 | 87 |
| 1/3 acre | NA[1] | 72 | 81 | 86 |
| 1/2 acre | NA[1] | 70 | 80 | 85 |
| 1 acre | 59 | 68 | 79 | 84 |
| 2 acres and greater | 55 | 65 | 77 | 82 |
| **Developing Urban Areas** | | | | |
| Newly graded areas (pervious areas only, no vegetation) | 77 | 86 | 91 | 94 |
| ***Undeveloped areas*** | | | | |
| Agricultural land (all current uses) | 55 | 67 | 77 | 82 |
| Pasture, grassland, or range – continuous forage for grazing | 49 | 65 | 77 | 82 |
| Meadow – continuous grass, protected from grazing and generally mowed for hay | 30 | 58 | 71 | 78 |
| Brush – brush-weed-grass mixture with brush the major element | 35 | 56 | 70 | 77 |
| Woods – grass combination (orchard or tree farm) | 43 | 65 | 76 | 82 |
| Woods | 36 | 60 | 73 | 79 |

[1]Use of Type A soil is not allowed for this hydrologic condition.

# 14.0 Hydrologic/Hydraulic Models

## 14.1 General Overview

The need for stormwater modeling has increased as new construction changes the usage of the surrounding land. For example, replacing a stand of trees with a parking lot has a dramatic effect on runoff, greatly increasing its total volume and the rate of runoff. The potential for erosion and flooding is increased in areas downstream of construction. To prevent such damage, the runoff must be predicted before construction so that suitable steps can be taken to handle the runoff in a safe and effective manner.

HydroCAD, a hydrologic computer modeling program, was used for this management plan. Hydraulic evaluations of pipes, ditches, and other structures were performed using standard engineering procedures and are not discussed. The Flood Insurance Study for Cedar Creek was adopted by this plan and was not restudied.

To determine the critical flood levels for each subwatershed, runoff volumes from pervious and impervious areas were determined for storms with durations varying between one and four days and a snowmelt runoff event with a duration of ten days.

## 14.2 Hydrologic Model (HydroCAD)

Stormwater modeling and drainage design techniques can be divided into two basic groups:

1) Steady-state (constant flow) methods, such as the Rational Method as applied to storm sewer pipe networks.
2) Hydrograph generation and routing procedures designed to simulate the time varying nature of actual runoff.

Although HydroCAD can be used for steady-state designs, it is designed primarily as a hydrograph generation and routing program. It is based primarily on hydrology techniques developed by the Soil Conservation Service (SCS) combined with standard hydraulics calculations. For any given storm these techniques are used to generate hydrographs throughout a watershed.

### 14.2.1 Runoff Volumes

The volume and rate of runoff from a subwatershed are affected by the runoff curve number (CN). The soil group classification and antecedent soil moisture condition have an effect on the CN.

The soil group classification used for this study is Group B. Soil Group B contains shallow, sandy loams. The antecedent soil moisture condition (AMC) is a measure of how much rain falls five days before a 24-hour storm. For this study, AMC II was used. The total 5 day antecedent rainfall, for AMC II, is 0.5-1.1” during the dormant season

and 1.4 – 2.1" during the growing season. From this information a CN, which indicates the percentage of runoff from a subwatershed, can be determined. For this study, the CN's range from 50-100. With the CN and the rainfall distribution and duration information, the runoff from each subwatershed can be determined using the SCS TR-20 method.

### 14.2.2 Rainfall Distribution and Duration

Design storm characteristics must be determined for the model. This requires determining both the amount of precipitation and the intensity distribution of the precipitation. Technical Paper Numbers 40 and 49, and Hydro-35 published by the National Weather Service was used to determine the amount of precipitation.

Two separate rainfall intensity distributions were used for this study. The 1-day duration uses a SCS Type II distribution, which is used for the continental U.S. east of the Sierra Nevada and Cascade Mountains in California, Oregon, and Washington. The Type II distribution is based on the generalized rainfall depth-duration frequency relationships shown in technical publications of the Weather Bureau. The rainfall intensity distribution for the 2-day and 4-day storm durations was developed from F.A. Huff's fourth quartile, 50 percent probability hyetograph. This hyetograph is discussed in Huff's paper, "Time Distribution of Rainfall in Heavy Storms", published in Water Resources Research, Fourth Quarter, 1967.

### 14.2.3 Flood Elevations

After the hydrographs are created for each subwatershed, they are routed through storage areas (wetlands, lakes, detention ponds, etc.) and conveyance systems (storm sewers and ditches) and combined with other hydrographs at junctions with other subwatersheds. Specific characteristics of the water body and its outlet are input into the elevation-flood storage-discharge relationship used in the routing through each water body.

The storm duration that is critical for a watershed is dependent on the watershed size and slope, the volume of storage available in the system, and the outlet capacity. The critical duration is determined by routing several different duration storms of a given frequency and determining which duration produces the greatest peak discharge or flood elevation. A small watershed with little available storage will have a critical storm of shorter duration than a large watershed with abundant storage.

The elevations reported in this plan have been derived using limited topographic information and shall not be used for the purpose of establishing flood protection standards of new or existing structures. As development/building applications are submitted, the applicants will be required to further investigate the drainage patterns in accordance with Section 13.0 to more accurately determine flood elevations.

# 15.0 Glossary

**1 Percent Chance Flood:** The flood event that has an annual probability of being equaled or exceeded in any given year of 1 percent. This flood is the result of the critical duration 1 percent chance storm falling on the watershed. This is also commonly called the “100-year” flood.

**10 Percent Chance Flood:** The flood event that has an annual probability of being equaled or exceeded in any given year of 10 percent. This flood is the result of the critical duration 10 percent chance storm falling on the watershed. This is also commonly called the “10-year” flood.

**100-Year Storms:** Rainstorms of varying duration (e.g. 2-, 6-, 24-hour) and intensities (inches per hour) expected to recur on the average of once every one hundred years (1% frequency probability).

**Acre-Foot:** A measurement of water volume that is equal to 1 foot of water covering an area of 1 acre.

**Algae:** Simple rootless plants that grow in bodies of water in relative proportion to the amount of nutrients available. Algal blooms, or sudden growth spurts, can affect water quality adversely.

**Aquifer:** Saturated permeable geologic unit(s) that can transmit significant quantities of water under ordinary hydraulic gradients.

**Bedrock Aquifer:** One or more saturated geologic units composed of sedimentary, metamorphic, or origineous rock, that can transmit significant quantities of water under ordinary hydraulic gradients.

**Best Management Practices (BMPs):** Practices that can be used to control urban nonpoint source pollution.

**BMP Fingerprinting:** A series of techniques used to manage stormwater to minimize impacts to wetlands, forest, and sensitive stream reaches. Techniques include bypassing flow around a wetland and discharge of stormwater to a pretreatment pond around or adjacent to the wetland.

**Bounce:** The vertical elevation difference between the peak flood elevation and the wetland elevation.

**County Ditch:** An open channel to conduct the flow of water. (Minnesota Statutes, section 103E.005, Subd. 8). County ditch includes only those ditches which are part of the public drainage system as identified in the Anoka County Public Ditch Inventory dated January 1992.

**Design Storm:** A rainfall event of specific return frequency and duration (e.g., a storm with a 2-year frequency of occurrence and 24-hour duration) that is used to calculate the runoff volume and peak discharge rate.

**Detention:** The temporary storage of storm runoff used to control the peak discharge rates, and which provides gravity settling of pollutants.

**Detention Pond:** An impoundment that is normally dry but is used to store water runoff until it is released from the structure. Used to reduce the peak discharge from stormwater runoff.

**Detention Time:** The amount of time a parcel of water actually is present. Theoretical detention time for a runoff event is the average time parcels of water reside in the basin over the period of release.

**Ditch Repair:** To restore all or part of a drainage system, as nearly as practicable, to the same condition as when originally constructed and subsequently improved.

- Resloping of ditches, leveling and reseeding of waste banks, if necessary, to prevent further deterioration;
- Realignment of original construction, if necessary, and to restore the effectiveness of the system or prevent the drainage of a wetland;
- Routine operations that may be required to remove obstructions and maintain the efficiency of the drainage system;
- Restoration or enhancement of wetlands; and
- Wetland replacement under Minnesota Statutes, section 103G.222.

**Erosion:** Wearing away of the lands or structures by running water, glaciers, winds, and waves.

**Eutrophication:** The natural or artificial process of nutrient enrichment whereby a water body becomes filled with aquatic plants and low in oxygen content.

**Evapotranspiration:** Water evaporated and transpired from soil and plant surfaces.

**Flood Fringe:** The portion of the floodplain outside of the floodway.

**Flood Profile:** A graph of a longitudinal plot of water surface elevations of a flood event along a reach of a stream or river.

**Floodplain:** Lowland area adjoining water bodies which are susceptible to inundation of water during a flood.

**Floodway:** The channel of a watercourse and those portions of the adjoining floodplain which are reasonably required to carry and discharge the 100-year flood.

**Freeboard:** A factor of safety above a certain flood level. This typically is defined as the vertical separation (feet) between the design flood level (e.g., 1 percent chance flood elevation) and the lowest floor of a structure or the top of an embankment. Freeboard compensates for the many unknown factors (e.g., waves, ice, debris, etc.) that may increase flood levels beyond the calculated level.

**Geology:** The science which treats the origin, history, and structure of the earth, as recorded in the rocks; together with the forces and processes now operating to modify rocks.

**Glacial Drift:** Material which was deposited by glaciers.

**Groundwater:** Water underneath the ground surface that is under positive pressure.

**Hydric Soils:** Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

**Hydrograph:** A graph showing variation in the water depth or discharge in a stream or channel, over time, at a specified point of interest.

**Hydrology:** The applied science concerned with the waters of the earth in all its states – their occurrences, distribution, and circulation through the unending hydrologic cycle of: precipitation; consequent runoff, stream flow, infiltration, and storage; eventual evaporation; and reprecipitation.

**Impervious Area:** Impermeable surfaces, such as pavement or rooftops, which prevent the infiltration of water into the soil.

**Infiltration:** The entrance of water into the soil or other porous material through the interstices or pores of a soil or other porous medium.

**Inundation Period:** Time that flood waters temporarily stored in the wetland exceed the wetland elevation. Difference between the peak flood elevation and the wetland elevation.

**Invert Elevation:** The vertical elevation of a pipe or orifice in a pond which defines the water level.

**Judicial Ditch:** A public drainage system established under Chapter 106 of the Minnesota Statutes and under the jurisdiction of the district court or a watershed management organization.

**Landlocked Lake or Basin:** Area which has an outlet that is significantly higher than the normal water level of the lake, pond, or wetland.

**Lateral Ditch:** Any open channel or storm sewer drainage construction by branch or extension, or a system of branches and extensions, or a drain that connects or provides an outlet to property with an established drainage system (Minnesota Statutes, section 103E.005, subdivision 15). Lateral includes only those facilities which are connected to the Anoka County Ditch system as identified in the Anoka County Public Ditch Inventory dated January 1992.

**Level of Protection:** The amount of secondary stormwater runoff capacity required to avoid flood damage and provide for public safety.

**Level of Service:** The amount of primary stormwater runoff capacity required to avoid unusual hardship or significant interference with normal public activities (transportation, sanitary, or utilities).

**Management Strategy:** The specific physical, legal or administrative actions recommended or implemented based upon the established criteria and will achieve the policies and goals.

**Nationwide Urban Runoff Program (NURP):** A study initiated by the EPA in 1978 to develop a consistent database and set of recommendations to be used to make planning decisions about nonpoint pollution issues. This study included 28 projects across the United States that were completed independently under the direction of the EPA. This study has been used extensively in both the characterization of stormwater quality, and as a guide to implementation of management alternatives for stormwater treatment. The most often cited management option derived from this study is a detention basin referred to as a NURP pond. The NURP study provided recommendations for the size and shape of detention ponds to provide pollutant removal efficiency.

**No Net Loss:** No reduction in the area and value of a wetland from existing conditions.

**Nonpoint Source Pollution:** Pollution from any source other than any discernible, confined and discrete conveyances, including but not limited to surface runoff from agricultural, silvicultural, mining, construction, subsurface disposal and urban activities.

**Normal Level:** For basins, that water elevation maintained by a natural or man-made outlet.

**Nutrients:** Fertilizer, particularly phosphorous and nitrogen (the two most common components that run off in sediment).

**On-Site Detention:** A method of temporarily storing stormwater runoff at a development site in the form of wet or dry basins. While the primary objective is water quality control, significant reduction in outflow conveyor overloading is accomplished for high intensity, short duration storm events. This method is employed on developments when the regional detention basin approach is not available, usually due to site location of either facility.

**Ordinary High Water (OHW) Level:** The boundary of public waters and wetlands, and shall be an elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For watercourses, the ordinary high-water level is the elevation of the top of the bank of the channel. For reservoirs and flowages, the ordinary high-water level is the operating elevation of the normal summer pool.

**Peak Discharge:** The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

**Percolation:** Movement of water through soil layers of material.

**Policies:** The plans or course of action to be followed in achieving the goals.

**Post-Disturbance Condition:** The state of a site following crop or development establishment in which source and/or structural control measures have been implemented resulting in erosion and sedimentation control achieving soil loss limits.

**Precipitation:** The total measurable supply of water of all forms of falling moisture, including dew, rain, mist, snow, hail, and sleet; usually expressed as depth of liquid water on a horizontal surface in a day, month, or year, and designated as daily, monthly, or annual precipitation.

**Primary Capacity:** The volume and/or rate of stormwater runoff defined as that level of service provided by the primary system.

**Primary System:** The primary system conveys runoff from the more frequent events such as the 2 to 10-year events. In general, the system is composed of swales, ditches, gutters, and storm sewers.

**Public Waters:** Any waters as defined in Minnesota Statutes, section 105.37, subdivisions 14 and 15.

**Reach:** Longitudinal segments of a stream defined by natural or manmade restrictions. In an urban area the segments of the stream between two consecutive road crossings could typically constitute a reach.

**Recharge:** Replenishment of the groundwater system by natural or artificial means.

**Recurrence Interval:** The average interval of time, based on a statistical analysis of actual or representative stream flow records, which can be expected to elapse between floods equal to or greater than a specified stage or discharge. The recurrence interval is generally expressed in years.

**Regional Detention Basin:** A natural pond or wetland area, often modified by man, in which a minimum and permanent water level is maintained. During periods of stormwater runoff of various durations, the basin receives additional water, stores it temporarily, and releases it at a controlled rate(s). In addition to runoff flow equalization in reducing existing flooding problems, the basin serves pollutants from existing as well as planned development.

**Retention:** The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

**Retention Facility:** A permanent natural or manmade structure that provides for the storage of stormwater runoff by means of a permanent pool of water.

**Riparian:** A relatively narrow strip of land that borders a stream or river, often coincides with the maximum water surface elevation of the 100-year storm.

**Runoff:** That portion of the precipitation which is not absorbed by the deep strata but finds its way into the surface water system after meeting the demands of evapotranspiration.

**Secchi Disc:** A circular plate, used to measure the transparency or clarity of water by noting the greatest depth at which it can be visually detected. Its primary use is in the study of lakes.

**Secondary Capacity:** The volume and/or rate of stormwater runoff in excess of the primary capacity and defined as that level of protection provided by the secondary system.

**Secondary System:** The system is composed of all the pathways that runoff takes when the capacity of the primary system is exceeded and in general is composed of streets, swales, ditches, storm sewers, detention basins, creeks, streams and rivers.

**Sediment:** Solid matter carried by water, sewage, or other liquids.

**Shoreland:** Land located within the following distances from public water: 1,000 feet from the ordinary high-water level of a lake, pond, or flowage; and 300 feet from a rive or stream, or the landward extent of a floodplain designated by ordinances on a river or stream, whichever is greater.

**Source Control:** The application of erosion techniques including but not limited to: mulching, seeding, sodding, and greenbelts.

**Stormwater Runoff:** The flow on the surface of the ground, resulting from precipitation in the form of rainfall or snowmelt.

**Structural Control:** The application of construction erosion techniques including but not limited to: sediment basins, silt fences, debris dams, dikes, terracing, riprap and diversions.

**Swale:** A natural depression or wide shallow ditch used to temporarily store, route, or filter runoff.

**Time of Concentration:** The time required for surface runoff from the most remote part of a drainage basin to reach the basin outlet.

**Transpiration:** The process by which plants dissipate water into the atmosphere from leaves and other surfaces.

**Universal Soil Loss Equation:** A method developed by the Agricultural Research Service, USDA, and used by Soil and Water Conservation Districts to estimate the average annual soil erosion based on rainfall, soil erodibility, slope of the land, length of slope, vegetative cover, and erosion control practices.

**Water Bodies:** Natural and man-made depressions and stormwater conveyance and storage facilities including wetlands, lakes, ponds, streams and rivers.

**Watershed:** A geographical area which collects precipitation and provides runoff to a particular collector such as a stream, lake, or marsh.

**Worst-case Soil Loss Condition:** The state of a site which is denuded and rough grade contours could create the greatest potential soil loss (e.g., a site in which all of the vegetative cover is removed, the existing or interim grades are unstabilized and could result in significant soil loss).

# APPENDIX A

## WMO Joint Powers Agreements

- Sunrise River
- Upper Rum River

AMENDED

# SUNRISE RIVER WATERSHED MANAGEMENT ORGANIZATION

# JOINT POWERS AGREEMENT

THIS AMENDED JOINT POWERS AGREEMENT made and entered into as of the date of execution by and between the Local Government Units of the City of Columbus, City of East Bethel, City of Ham Lake and Linwood Township. The purpose of this Joint Powers Agreement is to establish a Water Management Organization to assist the member local units of government with surface water, ground water, water quality and water usage issues.

WHEREAS, the parties to this Agreement have authority pursuant to Minnesota Statutes, Chapter 471.59, to jointly or cooperatively, by agreement, exercise any power common to the contracting parties. Pursuant to Minnesota Statutes, Chapters 103B.201 to 103B.255, these local units of government have authority to jointly or cooperatively manage or plan for the management of surface water within a defined watershed; and

WHEREAS the parties to this Agreement desire to prepare a surface water management plan for the purpose of management and implementation of the programs identified by Minnesota Statutes, Chapters 103B.201 through 103B.255.

NOW, THEREFORE, the parties to this Agreement do mutually agree as follows:

## SECTION I

General Purpose

1.1 It is the general purpose of the parties to this Agreement to establish a Water Management Organization to jointly and cooperatively develop a Watershed Management Plan for the purposes of (a) protecting, preserving, and using natural surface and groundwater storage and retention systems in the Sunrise River Watershed; (b) minimizing public capital expenditures needed to correct flooding and water quality problems; (c) identifying and planning for means to effectively protect and improve surface and groundwater quality; (d) assist with establishing more uniform local policies and official controls for surface and ground water management; (e) preventing erosion of soil into surface water systems; (f) promoting groundwater recharge; (g) protecting and enhancing fish and wildlife habitat and water recreational facilities; and (h) securing other benefits associated with the proper management of surface and groundwater. The plan and programs shall operate within the boundaries of the Sunrise River Watershed as set forth in Appendix 1 and 2, attached hereto (hereinafter "Area").

## SECTION II

Sunrise River Watershed Management Organization

2.1 Establishment: There is hereby established the "Sunrise River Watershed Management Organization" whose membership shall be appointed in accordance with the provisions of this section and whose duties shall be to carry out the purposes contained herein. The Sunrise River Watershed Management Organization (hereinafter "Organization") shall be constituted as described in Section 2.2.

2.2 Membership Appointment: Each party to this Agreement shall appoint two (2) representatives to serve as members of the Organization board. Each representative of a party to this agreement who is current in the payment of operating costs shall have one (1) vote. Representatives appointed to the Organization board shall be evidenced by a resolution or certified copy of official meeting minutes of the governing body of each party and filed with the Organization.

2.3 Alternate Members: One alternate member of the Organization board may be appointed by appropriate resolution or certified copy of official meeting minutes of the governing body of each party to this Agreement filed with the Organization. The alternate member may attend any meeting of the Organization board when a regular member representing that party is absent and vote on behalf of the party the member represents. If an Organization board member is also an officer of the Organization, the alternate member shall not be entitled to serve as such officer.

2.4 Term: The members of the Organization board shall be filled by the governing body of the party whose membership position on the board is vacant. Removal of a board member or alternate board member shall be at the sole discretion of the appointing authority. The term of appointment is at the sole discretion of the appointing authority.

2.5 Vacancies: The Organization shall notify the Board of Water and Soil Resources of member appointments and vacancies in member positions within 30 days. A vacancy on the Organization board shall be filled by 90 days after the vacancy occurs by the governing body of the party whose membership position on the board is vacant.

Vacancies resulting from expiration of members' terms or other reasons shall be filled only after published notice of the vacancy once a week for two (2) successive weeks in a newspaper of general circulation in the watershed management organization area. The notices must state that the party is considering applications for appointment of a member to the Organization board and that persons interested in being appointed to serve on the board may submit their names to the appointing authority for consideration. A vacancy shall not be filled until at least 15 days have elapsed after the last published notice.

2.6 Compensation and Expenses: The Organization members shall not be entitled to compensation or reimbursement for expenses incurred in attending meetings, except to the extent that the governing body of a party may determine to compensate or reimburse the

expenses of the member(s) it appoints, in which case the obligation to make such payments shall be that of the party and not that of the Organization.

2.7 Officers: The Organization board shall elect from its membership a chair, a vice-chair, a secretary, and a treasurer. All such officers shall hold office for a term of one (1) year and until their successors have been qualified and duly elected by the board. An officer may serve only while a member of the Organization. A vacancy in an office shall be filled from the membership of the board by election for the remainder of the unexpired term of such office.

2.8 Duties of Officers: The duties of the officers of the Organization shall be as outlined in Parts 40 and 41, Article VII, Robert's Rules of Order, as the board deems necessary.

2.9 Quorum: Voting members of the Organization board representing a majority of the parties to this Agreement shall constitute a quorum. Less than a quorum may adjourn a scheduled meeting.

2.10 Meetings:

A. Meetings of the Organization board will be scheduled as needed, with the annual meeting held in February at the East Bethel City Hall, 2241 221st Avenue NE, East Bethel, MN 55011. Notice of all regular meetings shall be provided with a minimum of thirty (30) days advance notice of the meeting by the secretary of the Board to all parties to this Agreement. Such meeting notice shall be posted on the official notification board for each party to this agreement.

At the annual meeting the board, at a minimum, shall:

1. Elect officers for the next fiscal year;
2. Establish the annual budget and work plan;
3. Hear recommendations on amendments to this agreement and the watershed management plan;
4. Biennially renew or decide on contracts for professional, legal, and administrative services; and
5. Decide on meeting dates.

B. Special meetings may be held at the call of the chair or by any three (3) members of the board giving not less than 72 hours written notice of the time, place, and purpose of such meeting delivered by mailed or email to the residence of each Organization member and delivered to the City or Town Hall of each party to this Agreement.

C. All meetings of the board are subject to Minnesota Statutes, Section 13D and the notice provisions contained therein. Posted notice, when required, shall be given separately to each party to this Agreement.

2.11 Conduct of Meetings: The Organization board shall adopt rules of order and procedure for the conduct of its meetings; the board may adopt any such rules as a

majority of all voting members shall agree. Decisions by the board may not require more than a majority vote, except a decision on a capital improvement project may require a unanimous vote by all parties.

2.12 Organization Office: The office of the Organization shall be the East Bethel City Hall, 2241 221st Avenue NE, East Bethel, MN 55011. All notices to the Organization shall be delivered or served at said office.

## SECTION III

Organization Powers and Duties

3.1 Authority: Upon execution of the Agreement by all parties, the Organization shall have authority provided for in Minnesota Statutes, Chapter 103B.211 through 103B.255, unless otherwise limited by this Agreement that provides for, in part:

A. The authority to prepare, adopt and implement a plan for the Sunrise River Watershed meeting the requirements of Minnesota Statutes, Chapter 103B.231.

B. The authority to review and approve local water management plans as provided in Minnesota Statutes, Chapter 103B.235, Subd. 3, Review.

C. Other powers necessary to exercise the authority under clauses A and B, including the power to enter into contracts for the performance of functions with governmental units or persons.

3.2 Watershed Management Plan: The Organization shall prepare a Watershed Management Plan for the Sunrise River Watershed. The plan shall be in compliance with Minnesota Statutes, chapter 103B.231, Subd. 4 as from time to time amended. This Chapter describes plan contents to include but not limited to the following:

A. Description of the existing physical environment, land use and development in the Sunrise River Watershed. It shall further describe the environment, land use and development proposed in existing local and metropolitan comprehensive plans; and

B. Present information on the hydrologic system in the Sunrise River Watershed and its components, including any drainage systems previously constructed under Minnesota Statutes, Chapter I03E, and existing and potential problems relating thereof; and

C. State objectives and policies, including management principles, alternatives and modifications, water quality, and protection of natural characteristics; and

D. Set forth a management plan, including the hydrologic and water quality conditions that will be sought and significant opportunities for improvement; and

E. Describe the effect of the Watershed Management Plan on existing drainage systems; and

F. Describe conflicts between the Watershed Management Plan and existing plans of local government units; and

G. Set forth an Implementation Program consistent with the Watershed Management Plan, which may include a Capital Improvement Program; and

H. Set out a procedure for amending the Watershed Management Plan. The plan shall be amended as required from time to time.

3.3 Employment: The Organization may contract for services, may contract services from parties to this Agreement, or may employ such other persons as it deems necessary. Where staff services of a party are contracted, such services shall not reduce the financial commitment of such party to the operating fund of the Organization unless the Organization so authorizes.

3.4 Committees: The Organization may appoint such committees and subcommittees as it deems necessary. The Organization shall establish a citizen advisory committee and technical advisory committee and promote other means of public participation.

Citizen and/or technical advisory committees will be formed from time-to-time as deemed appropriate by the Organization board and shall be issue-specific. Committees may be formed that include both citizens and technical experts. Committees shall operate by seeking consensus, while noting any dissenting opinions. Committee findings shall be reduced to writing and submitted to the Organization board. In all cases, committees shall be advisory in nature and their findings shall be referred to the Organization board. Issues that may warrant formation of advisory committees include but are not limited to amendments or updates to the Organization's Watershed Management Plan; lake level or water quality issues; a total maximum daily load (TMDL) impaired waters study or implementation of the study; capital improvement projects; major hydrological changes in the watershed and others as deemed appropriate by the Organization board.

Technical advisory committees shall include technical experts in areas relating to land use, natural resources, pollution control, and soil and water resources.

Citizen advisory committees shall include residents and elected officials from the affected area including but not limited to homeowners; business owners; lake association or lake improvement district representatives; and, others, as deemed appropriate by the Organization Board.

All advisory committees shall include at least one Organization board member.

3.5 Rules and Regulations: The Organization may prescribe and promulgate such rules and regulations as it deems necessary or expedient to carry out its powers and duties and the purpose of the Agreement.

3.6 Review and Recommendations: Where the Organization is authorized or requested to review and make recommendations on any matter relating to the Watershed Management Plan, the Organization shall act on such matter within 60 days of receipt of the matter referred. Failure of the Organization to act within 60 days shall constitute approval of the matter referred, unless the Organization requests and receives from the referring unit of government an extension of time to act on the matter referred. Such extension shall be in writing and acknowledged by both parties.

The Board shall adopt an appeal procedure for any party aggrieved by a decision of the Board or an alleged failure to implement the Plan pursuant to Minnesota Statutes, Chapter 103B.231, Subd. 13.

3.7 Ratification: The Organization may, and where required by this Agreement shall, refer matters to the governing bodies of the parties for review, comment or action

3.8 Financial Matters:

A. Method of Operation: The Organization may collect and receive money and contract for services subject to the provision of the Agreement from the parties and from any other sources approved by the Organization. The organization may incur expenses and make disbursements necessary and incidental to the effectuation of the purposes of this Agreement. Funds may be expended by the Organization in accordance with procedures established herein. Checks shall be signed by the chair or treasurer. Other legal instruments shall be executed on behalf of the Organization by the chair or vice-chair and an appointed Board member.

B. Operating Funds. On or before June 1st of each year, the Organization shall prepare a work plan and operating budget for the following year. The annual budget shall provide details to support the proposed revenues and expenditures for the Organization. This detail shall be sufficient to meet standard budget and/or accounting principles generally recognized for governmental organizations. Expenditures may include administrative expenses, plan development costs, review expenses, capital improvement costs authorized in Section 3.12, and insurance costs as authorized in Section 3.14. Upon the approval of a majority of the partners of this agreement, the budget shall be recommended to the parties for ratification along with a statement showing each party's proposed share of the budget. The budget shall be implemented only after ratification by all parties to this Agreement. Failure to ratify or pay its share of the budget by any party to this Agreement shall be subject to the procedures in Section 3.6. Each party's share of the operating cost is based on 50% of their portion of the watershed's Total Market Value (TMV) and 50% of their portion of the Total Taxable Watershed Acreage (TWA).

Work Plan - ((PA / WA) + (PV / WV)) / 2 = the party's percentage share of the organization's operating budget.

PA = Party's area within the watershed organization area

WA = watershed organization area

PV = party's market valuation within the watershed organization area

WV = market valuation of the watershed organization area

Operating Costs - Total amount to be divided equally between members of the Joint Powers Agreement. Operating costs per the operating budget are defined as copies, postage, recording secretary fees, insurance, and administrative fee charged to each member community.

After ratification by the organization, the Organization Secretary shall certify the recommended budget to each party on or before June 1 of each year together with a statement showing the budgeted amounts applicable to each party. Each party shall pay over to the Organization the amount owing based on invoices presented for services rendered. Amounts due and owing shall be paid by parties to this Agreement within 30 days of the invoice.

C. Review Services: When the Organization is authorized or requested to undertake a review and submit recommendations to a party as provided in this Agreement, the Organization shall conduct such review, without charge, except as provided below. Where the project size and complexity of review are deemed by the Organization to be extraordinary and substantial, the Organization may charge a fee for such review services, the amount to be based upon direct and indirect costs attributable to that portion of review services determined by the Organization to be extraordinary and substantial. Where the Organization determines that a fee will be charged for extraordinary and substantial review services, or where the flowage enters the Sunrise River, but the party is not a member of the Sunrise River Watershed Management Organization, the party to be charged shall receive written notice from the Organization of the services to be performed and the fee therefore, prior to undertaking such review services. Unless the party to be charged objects within fifteen (15) days of receipt of such written notice to the amount of the fee to be charged, such review services shall be performed and the party shall be responsible for the cost thereof. If the party to be charged objects to the proposed fee for such services with fifteen (15) days and the party and the Organization are unable to agree on a reasonable alternative amount for review services, such extraordinary and substantial review services shall not be undertaken by the Organization. Payment for such services shall be in advance of any work performed.

3.9 Annual Audit. The Organization shall annually prepare a comprehensive financial report on operations and activities. An annual audit, by an independent accounting firm or the State Auditor, shall be provided for that includes a full and complete audit of all books and accounts the Organization is charged with maintaining. Such audit shall be conducted in accordance with generally accepted auditing principles and guidelines. A copy of the annual financial report and auditor's statement shall be provided to all parties to this agreement and to the Board of Water and Soil Resources no later than June 30$^{th}$ of each year. The report to the Board of Water and Soil Resources shall include an annual

activity report. All of its books, reports and records shall be available for and open to examination by any party at all reasonable times.

3.10 Gifts, Grants, Loans. The Organization may, within the scope of this Agreement, accept gifts, may apply for and use grants of money or other property from the United States, the State of Minnesota, a local government unit or other governmental unit or organization or any person or entity for the purpose described herein. The Organization may enter into any reasonable agreement required in connection therewith. The Organization shall comply with any laws or regulations applicable to grants, donations and agreements. The Organization may hold, use, and dispose of such money or property in accordance with the terms of the gift, grant, or agreement relating thereto.

3.11 Contracts. The Organization may make such contracts and enter into any such agreements as it deems necessary to make effective any power granted to it by this Agreement. Every contract for the purchase or sale of merchandise, materials, or equipment by the Organization shall be let in accordance with the Uniform Municipal Contracting Law, Minnesota Statutes, Section 471.345 and the Joint Exercise of Powers Statute, Minnesota Statues, Section 471.59. No member or employee of the Organization or officer or employee of any of the parties shall be directly or indirectly have an interest in any contract made by the Organization.

3.12 Works of Improvement: Works of improvement for protection and management of the natural resources of the Area, including, but not limited to, improvements to property, land acquisition, easements, or right-of-way, may be initiated by:

A. Recommendation of the Organization to a party or parties; or

B. Petition to the Organization by the governing body of a party or parties.

Where works of improvement are recommended by the Organization, the Organization shall first determine whether such improvement will result in a local or regional benefit to the area. Where the Organization determines that the benefits from the improvement will be local or not realized beyond the boundaries of the party in which the improvement is to be established, the Organization may recommend such improvement to the governing body of the unit of government which the Organization determines will be benefited. The recommendation shall include the total estimated cost of the improvement and a detailed description of the benefits to be realized.

Where the Organization determines that the benefits from the improvement will be beyond the local unit or beyond the boundaries of the party in which the improvement is to be established, the Organization may recommend such improvement to each party to this Agreement which the Organization determines will be benefited thereby. The recommendation of the Organization shall include the total estimated cost of the improvement, a description of the extent of the benefits to be realized by each party to this Agreement and the portion of the cost to be borne by each party benefited in accordance with the benefit of party to this Agreement.

Each party to whom the Organization submits such recommendation shall respond within 60 days from receipt of such recommendation. Where the Organization determines that the benefits of such improvement will be local, the unit of government to whom such recommendation is made may decline to ratify and undertake said improvement. Where the Organization determines that the benefits of such improvement will be regional, all Parties to this Agreement must ratify the project proposal before any project is moved forward by the Organization. Should the project not be ratified by all Parties to this Agreement, the Organization shall continue to review and recommend alternative methods of cooperation and implementation among those parties ratifying the recommendation of the Organization, unless and until the Organization determines that said improvement is no longer feasible.

When works of improvement are initiated by a Party to this Agreement, a copy of the proposed project shall be submitted to the Organization for review and comment. The Organization shall review and make recommendations on the proposed improvement and its compliance with the Organization's management plan in accordance with the provisions of Section 3.5 of this Agreement.

When a proposed improvement may be eligible for federal or state funds as a cost-share project, the Organization shall receive the approval of all Parties to this Agreement prior to submission of any grant request. No member Party shall unreasonably withhold approval for a grant application. All improvements that are considered for state or federal grant funding that have a local or member share (matching funds) must be submitted for approval in advance of the proposed grant award. All improvements that are considered for state or federal grant funding shall be presented to each Party to the Agreement for review, comment and approval and shall provide details to include projects scope, estimated cost, estimated matching share, benefits to be derived and project timing.

3.13 Claims. The Organization or its agents may enter upon lands within or without the Sunrise River Watershed to make surveys and investigations to accomplish the purpose of the Organization. The Organization shall be liable for actual damages resulting there from. But every person who claims damages shall serve the Chairperson or Secretary of the Organization with a notice of claim as required by Minnesota Statutes, Section 466.05. The Organization shall obtain court orders authorizing and directing such entries when necessary due to refusals of landowners to allow the same.

3.14 Indemnification and Insurance. Any and all claims that arise or may arise against the Organization, its agents or employees as a consequence of any act or omission on the part of the Organization or its agents or employees while engaged in the performance of this Agreement shall in no way be the obligation or responsibility of the parties. The Organization shall indemnify, hold harmless and defend the parties, their officers and employees against any and all liability, loss, costs, damages, expenses, claims, or actions, including attorney's fees which the parties, their officers, or employees may hereafter sustain, incur, or be required to pay, arising out of or by reason of any act or omission of the Organization, its agents or employees in the execution, performance, or failure to

adequately perform the Organization's obligations and understandings pursuant to the Agreement.

The Organization agrees that in order to protect itself as well as the parties under the indemnity provision set forth above, it will at all times during the term of this Agreement keep in force the following insurance policies in the limits specified.

A. Commercial General Liability/Professional Liability: $1,250,000 per incident and shall include the following endorsements:

B. Automobile Coverage ($0)

C. Worker's Compensation Coverage (statutory minimum)

The minimum liability limits shall be increased to the statutory limits provided for member local units of government in Minnesota Statutes.

Any policy obtained and maintained under this clause shall provide that it shall not be cancelled, materially changed or not renewed without a minimum of thirty (30) days prior notice thereof to each of the parties.

Prior to the effective date of this Agreement, and as a condition precedent to this Agreement, the Organization will furnish the parties with certificates of insurance listing each party to the Agreement as an additional insured.

3.15 General: The Organization may take all such other actions as are reasonably necessary and convenient to carry out the purpose of this Agreement.

## SECTION IV

Mediation

4.1 The parties agree that any controversy that cannot be resolved between parties shall be submitted to for mediation. Mediation shall be conducted by a mutually agreeable process by all parties.

## SECTION V

Termination of Agreement

5.1 This Agreement may be terminated by approval of two-thirds vote of the governing bodies of each party hereto, provided that all such approvals occur within a ninety (90) day period. Withdrawal of any party may be accomplished by filing written notice with the Organization and the other parties sixty (60) days prior to the effective date of termination. No party may withdraw from this Agreement until the withdrawing party has met its full financial obligations through the effective date of such withdrawal.

## SECTION VI

Dissolution of Organization

6.1 The Organization shall be dissolved under any of the following conditions:

A. Upon termination of this Agreement;

B. Upon unanimous agreement of all parties; or

C. Upon the membership of the Organization being reduced to fewer than three (3) parties.

D. Process. At least 90 days notice of the intent to dissolve shall be given to affected counties and the Board of Water and Soil Resources. Upon dissolution, all personal property of the Organization shall be sold, and the proceeds thereof, together with monies on hand after payment of all obligations, shall be distributed to the parties. Such distribution of Organization assets shall be made in proportion to the total contributions to the Organization for such costs made by each party. All payments due and owing for operating costs under Section 3.8, B, or other unfilled financial obligations, shall continue to be the lawful obligation of the parties.

## SECTION VII

Amendment

7.1 The Organization may recommend changes and amendments to this Agreement to the governing bodies of the parties. Amendments shall be adopted by all governing bodies of the parties. Adopted amendments shall be evidenced by appropriate resolutions or certified copies of meeting minutes of the governing bodies of each party filed with the Organization and shall, if no effective date is contained in the amendment, become effective as of the date all such filings have been completed.

## SECTION VIII

Counterparts

8.1 This Agreement shall be executed in several counterparts and all so executed shall constitute one Agreement, binding on all of the parties hereto. Each party to the agreement shall receive a fully executed copy of the entire document following adoption by all parties.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the 2nd day of March, 2010.

CITY OF COLUMBUS

By: Mel - Mylitta
Mayor

Dated: 3/02/2010

By: Elaine Kinsolo
City Clerk

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the 17th day of March, 2010.

CITY OF EAST BETHEL

By: _____
Mayor

Dated: March 17, 2010

By: _____
City Administrator

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the 10 day of February, 2010.

CITY OF HAM LAKE

By: _____
Mayor

Dated: 2/10/10

By: _____
City Clerk

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the 4 day of April, 2010.

LINWOOD TOWNSHIP

By: _____
Board Chair

Dated: 4-13-2010

By: _____
Township Clerk

SRWMO JPA Appendix 1

SUNRISE RIVER WATERSHED MANAGEMENT ORGANIZATION
LEGAL DESCRIPTION OF SUBJECT PROPERTY

All of Linwood Township, Anoka County.

That part of East Bethel Township, Anoka County lying Easterly of the following described line:

Beginning on the Anoka and Isanti County Line at the Northwest corner of East Half of East Half of Section 25, Township 34 North, Range 23 West, Anoka County, Minnesota; thence South along the West line of East Half of East Half of Section 25 and East Half of East Half of Section 36 to the Southeast corner of Northwest Quarter of Northeast Quarter of Section 36; thence Southwesterly in a straight line to the intersection of Durant Street and 231st Lane NE on the East line of Section 35, Township 34 North, Range 23 West, thence South along Durant Street to 229th Avenue at the Northeast corner of Section 2, Township 33 North, Range 23 West; thence West along 229th Avenue and North line of Section 2 to East Bethel Boulevard at the Northwest corner of Section 2; thence Southerly along East Bethel Boulevard to 221st Avenue and the North line of Section 11, Township 33 North Range 23 West; thence in a straight line to East Bethel Boulevard at the Northwest corner of the Southwest Quarter of Section 11; thence Southerly along East Bethel Boulevard to the center of Section 22, Township 33 North Range 23 West; thence in a straight line to the Northwest corner of the Southeast quarter of the Southwest Quarter of Section 22. Thence South along the West line of East Half of Southwest Quarter of Section 22 and the East Half of Northwest Quarter of Section 27 to the Southwest corner of East Half of Northwest Quarter Section 27;

Thence West along the North line of Southwest Quarter Section 27 to the West line of Section 27; thence South along the West line of Sections 27 and 34 to the Northeast corner of the Southeast Quarter of Section 33, Township 33 North, Range 23 West:

Thence West along the North line of the Southeast Quarter of Section 33 to the centerline of County Road No. 68 (Greenbrook Drive); thence Southerly along the centerline of County Road No. 68 to the South line of Section 33, which is also the South line of East Bethel, and the North line of Ham Lake; and there terminating.

That part of Columbus Township, Anoka County lying Northerly of the following described line:

Beginning at the West line of Section 6, Township 32 North, Range 22 West, at the Northwest corner of the South Half of Section 6, which is the Northerly line of Coon Creek Watershed District; thence Easterly along the Northerly line of the South Half of Section 6 to the Southwest corner of East Half of Northeast Quarter of Section 6; thence North along the West line of East Half of Northeast Quarter to the Northwest

corner of the East Half of Northeast Quarter; thence East along the North line of Section 6 to the Southwest corner of Section 32, Township 33 North, Range 22 West;

Thence North along the West line of Section 32 to the Northwest corner of the South Half of the South Half of Section 32, thence Easterly along the North line of South Half of South Half to the East line of Section 32; thence Southerly along the Easterly line of Section 32 and Section 5, Township 32 North, Range 22 West, to the Southwest corner of Northwest Quarter of Section 4: thence Easterly along the South line of the Northwest Quarter to Northwest corner of East Half of Southwest Quarter; thence Southerly along the West line of East Half of Southwest Quarter to South line of Section 4; thence Easterly along the South line of Section 4 to the Northeast corner of Northwest Quarter of Section 9;

Thence Southerly along the East line of Northwest Quarter to Northeast corner of Southwest Quarter, of Section 9; thence, departing from the boundary of Coon Creek Watershed District to follow the Northerly line of Rice Creek Watershed District, Southerly on the East line of the Southwest Quarter to the Southeast corner of the Northeast Quarter of the Southwest Quarter; thence Easterly on the North line of the South Half of the Southeast Quarter to the Northeast corner of the South Half of the Southeast Quarter of Section 9; thence Northerly on the West line of Section 10 to the Northwest corner of the South Half of the Northwest Quarter of Section 10;

Thence Easterly on the North line of the South Half of the North Half of Section 10 and South Half of the Northwest Quarter of Section 11 to the Northeast corner of the South Half of the Northwest Quarter of Section 11; thence Northerly on the West line of the East Halves of Sections 11 and 2 to the Northwest corner of South Half of Southeast Quarter of Section 2; thence Easterly on the South line of North half of Southeast Quarter of Section 2 to a point of intersection with the Southerly extension of the East line of Lot 1, Block 2, (Hansen Farms); thence North on said line to the Northeast corner of Lot 1, Block 2, (Hansen Farms); thence Northeasterly to the Southeast corner of Lot 8, Block 1, (Hansen Fan's); thence North along the East line of Lot 8, Block 1, (Hansen Farms) to the Northeast corner of Lot 8, Block 1, (Hansen Farms) at the North line of South Half of Section 2; thence Easterly on the North line of the South Halves of Section 2 and 1 to the Northeast corner of the Southwest Quarter of Section 1; thence Southerly on the East line of the Southwest Quarter to the Southeast corner of the Southwest Quarter; thence Easterly on the North line of Section 12 to the Northeast corner of the West Half of the Northeast Quarter of Section 12;

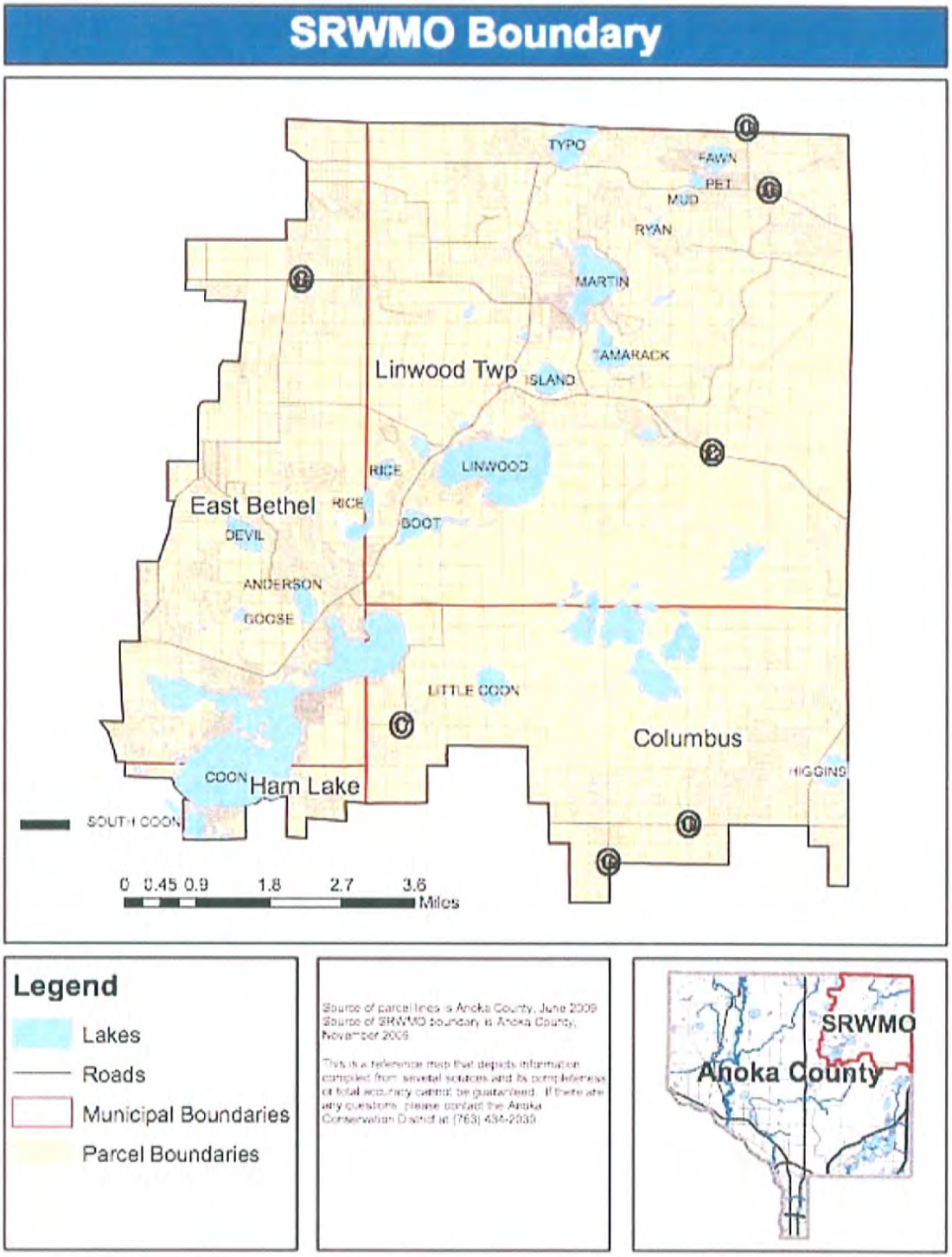
Thence Southerly on the East line of the West Half of the Northeast Quarter to the Southeast corner of the West Half of the Northeast Quarter; thence Easterly on the North line of the Southeast Quarter to the Northeast corner of the Southeast Quarter; this point being on the East boundary of Columbus Township, and the East boundary of Anoka County; and there terminating.

That part of Ham Lake, Anoka County described as follows:

Government Lot 1 and Government Lot 2 Section 1, the Northeast Quarter of Section 1, the Northwest Quarter of the Southeast Quarter of Section 1, the Southeast Quarter of the Northwest Quarter of Section 1, the North Half of the Southwest Quarter of Section 1, the Southwest Quarter of the Southwest Quarter of Section 1 and that part of Government Lot 1 of Section 2 lying North of the Southeast Quarter, Government Lot 3 and Government Lot 4, Section 2 and Government Lot one and Government Lot 3 in Section 3, the Southeast Quarter of the Southeast Quarter of Section 3, that part of Government Lot 2 in Section 3 lying East of the West Half of the Northeast Quarter, all in Township 32 North, Range 23 West.

That part of Forest Lake Township, Washington County lying Westerly of the following described line:

The center line of Elmcrest Ave N within the Northeast Quarter of Section 6, Township 32 North, Range 21 West.


SRWMO Boundary
TYPO
FAWN
PET
MUD
RYAN
MARTIN
TAMARACK
ISLAND
Linwood Twp
LINWOOD
RICE
East Bethel
RICE
BOOT
DEVIL
ANDERSON
GOOSE
LITTLE COON
Columbus
HIGGINS
COON
Ham Lake
SOUTH COON
0 0.45 0.9 1.8 2.7 3.6
Miles
Legend
Lakes
Roads
Municipal Boundaries
Parcel Boundaries
Source of parcel lines is Anoka County, June 2009
Source of SRWMO boundary is Anoka County, November 2009
This is a reference map that depicts information compiled from several sources and its completeness or total accuracy cannot be guaranteed. If there are any questions, please contact the Anoka Conservation District at (763) 434-2030
SRWMO
Anoka County

AMENDED
UPPER RUM RIVER WATERSHED MANAGEMENT ORGANIZATION
JOINT POWERS AGREEMENT

THIS AGREEMENT, made and entered into as of the date of execution by and between the Local Government Units of:

Town of Burns, City of Bethel, City of East Bethel, City of Ham Lake, City of Oak Grove and City of St. Francis for the establishment of a watershed management organization.

WITNESSETH:

WHEREAS, the parties to this Agreement have authority pursuant to Minnesota Statutes, Section 471.59 to jointly or cooperatively by agreement exercise any power common to the contracting parties and pursuant to Minnesota Statutes, Sections 103B.201 to 103B.255 have authority to jointly or cooperatively manage or plan for the management of surface water; and

WHEREAS, the parties to this Agreement desire to prepare a surface water management plan for the purpose of management and implementation of the programs required by Minnesota Statutes, Sections 103B.201 to 103B.255.

NOW, THEREFORE, the parties to this Agreement do mutually agree as follows:

SECTION I

General Purpose

1.1 It is the general purpose of the parties to this Agreement to establish an organization to jointly and cooperatively develop a Watershed Management Plan and an Implementation Program and a Capital Improvement Program for the purposes of (a)

protecting, preserving and using natural surface and groundwater storage and retention systems in the Upper Rum River Watershed; (b) minimizing public capital expenditures needed to correct flooding and water quality problems; (c) identifying and planning for means to effectively protect and improve surface and groundwater quality; (d) establishing more uniform local policies and official controls for surface and groundwater management; (e) preventing erosion of soil into surface water systems; (f) promoting groundwater recharge; (g) protecting and enhancing fish and wildlife habitat and water recreational facilities; and (h) securing the other benefits associated with the proper management of surface and groundwater. The plan and programs shall operate within the boundaries of the Upper Rum River Watershed as set forth in Exhibit 1, attached hereto (hereinafter "Area").

## SECTION II

## Upper Rum River Watershed Management Organization

2.1 Establishment: There is hereby established the "Upper Rum River Watershed Management Organization" whose membership shall be appointed in accordance with the provisions of this section and whose duties shall be to carry out the purposes contained herein.

The Upper Rum River Watershed Management Organization (hereinafter "Organization") shall be constituted as described in Section 2.2

2.2 Membership Appointment: Each party to this Agreement shall appoint two (2) representatives to serve as members of the Organization board. Each representative of a dues-paying party

shall have one (1) vote. Representatives to the Organization board shall be evidenced by a resolution of the governing body of each party, filed with the Organization.

2.3 Alternate Members: One alternate member of the Organization board may be appointed by appropriate resolution of the governing body of each party to this Agreement, filed with the Organization. The alternate member may attend any meeting of the Organization board when a regular member representing that party is absent and vote on behalf of the party the member represents. If an Organization board member is also an officer of the Organization, the alternate member shall not be entitled to serve as such officer.

2.4 Term: The members of the Organization board shall be filled by the governing body of the party whose membership position on the board is vacant; a member may be removed by the governing body by whom appointed for just cause.

2.5 Vacancies: The Organization shall notify the Board of Water and Soil Resources of member appointments and vacancies in member positions within 30 days. A vacancy on the Organization board shall be filled by 90 days after the vacancy occurs by the governing body of the party whose membership position on the board is vacant. Vacancies resulting from expiration of members' terms and other reasons shall be filled only after published notice of the vacancy once a week for two (2) successive weeks in a newspaper of general circulation in the watershed management organization area; the notices must state that the party is considering

applications for appointment of a member to the Organization board and that persons interested in being appointed to serve on the board may submit their names to the party for consideration. A vacancy shall not be filled until at least 15 days have elapsed after the last published notice.

2.6 Additional Parties-Membership: The Organization, with the ratification of the governing bodies of all voting members of the Organization, may invite other local government units within the Upper Rum River Watershed to also become parties to this Agreement. The governing body of any such additional party shall appoint a member to the Organization who shall have voting rights in accordance with the provisions of Section 2.2 and in all respects thenceforth enjoy the full rights, duties and obligations of this Agreement.

2.7 Compensation and Expenses: The Organization members shall not be entitled to compensation or reimbursement for expenses incurred in attending meetings, except to the extent that the governing body of a party may determine to compensate or reimburse the expenses of the member(s) it appoints, in which case the obligation to make such payments shall be that of the party and not that of the Organization.

2.8 Officers: The Organization board shall elect from its membership a chair, a vice-chair, a secretary and a treasurer and such other officers as it deems necessary to reasonably carry out the purpose of this Agreement. All such officers shall hold office for a term of one (1) year and until their successors have been

elected by the board. An officer may serve only while a member of the Organization and may be re-elected to an office. A vacancy in an office shall be filled from the membership of the board by election for the remainder of the unexpired term of such office.

2.10 Duties of Officers: The duties of the officers of the Organization shall be as outlined in Parts 40 and 41, Article VII, Robert's Rules of Order.

2.11 Quorum: Voting members of the Organization board representing a majority of the parties to this Agreement shall constitute a quorum, but less than a quorum may adjourn a scheduled meeting. For the purpose of this Section 2.10, only one voting representative of a party need be present to establish the presence of that party for the purpose of constituting a quorum.

2.12 Meetings:

A. Meetings of the Organization board will be scheduled on the third Tuesday of the month as needed but at least annually, on a day selected by the board. The annual meeting shall normally be held on the third Tuesday of July at 7:00 p.m. at Oak Grove City Hall. At the annual meeting the board, at a minimum, shall:

1. Elect officers for the next fiscal year;
2. Establish the annual budget and work plan;
3. Hear recommendations on amendments to this agreement and the watershed management plan;
4. Biennially renew or decide on contracts for professional, legal and administrative services;
5. Decide on any monthly meetings that should be cancelled; and
6. Conduct such other business as necessary.

B. Special meetings may be held at the call of the chair or by any three (3) members of the board giving not less than 72 hours written notice of the time, place and purpose of such meeting delivered or mailed to the residence of each Organization member.

C. All meetings of the board are subject to Minnesota

Statutes, Section 471.705 and the notice provisions contained therein. Posted notice, when required, shall be given separately by each party to this Agreement.

2.13 Conduct of Meetings: The Organization board shall adopt rules of order and procedure for the conduct of its meetings; the board may adopt any such rules as a majority of all voting members shall agree. Decisions by the board may not require more than a majority vote, except a decision on a capital improvement project may require no more than a two-thirds vote.

2.14 Organization Office: The office of the Organization shall be the Oak Grove City Hall, 19900 Nightingale Street NW, Cedar, Minnesota 55011. All notices to the Organization shall be delivered or served at said office.

## SECTION III

## Organization Powers and Duties

3.1 Authority: Upon execution of this Agreement by the parties, the Organization shall have authority as follows:

D. The authority to prepare, adopt and implement a plan for the Upper Rum River Watershed meeting the requirements of Minnesota Statutes, Section 103B.231.

E. The authority to review and approve local water management plans as provided in Minnesota Statutes, Section 103B.235.

F. The authority of a Watershed District under Minnesota Statutes, Chapter 103D, to regulate the use and development of land in the Upper Rum River Watershed when one or more of the following conditions exists:

(1) The local government unit exercising planning and zoning authority over the land under Minnesota Statutes, Section 366.10 to 366.19, 394.21 to 394.37 or 462.351 to 462.364, does not have a local water management plan approved and adopted in accordance with the requirements of Minnesota Statutes, Section 103B.235 or has not adopted the

implementation program described in the plan;

(2) An application to the local government unit for a permit for the use and development of land requires an amendment to or variance from the adopted local water management plan or implementation program of the local unit; or

(3) The local government unit has authorized the Organization to require permits for the use and development of land.

G. The authority of a Watershed District under Minnesota Statutes, Section 103D.625, to accept the transfer of drainage systems in the Upper Rum River Watershed, to repair, improve and maintain the transferred drainage systems and to construct all new drainage systems and improvements of existing drainage systems in the watershed, provided that projects may be carried out under the powers granted in Minnesota Statutes, Sections 103B.205 to 103B.255 or Chapter 103D or 103E and that proceedings of the board with respect to the systems must be in conformance with the watershed plan adopted under Minnesota Statutes, Section 103B.231.

H. The authority of a Watershed District under Minnesota Statutes, Section 103D.911 to adopt a budget and decide on the total amount necessary to be raised from ad valorem tax levies to meet the budget.

I. The authority of a Watershed District under Minnesota Statutes, Section 103D.915 to certify its budget with the auditor of each county having territory within the joint powers watershed management organization.

J. The authority of a Watershed District under Minnesota Statutes, Section 103D.901 to file approved assessment statements with each affected county.

K. Other powers necessary to exercise the authority under clauses A through C, including the power to enter into contracts for the performance of functions with governmental units or persons.

L. The authority to levy a tax as provided in Minnesota Statutes, Section 103B.241.

M. The authority to establish a watershed management tax district as provided in Minnesota Statutes, Section 103B.245.

N. The authority to certify for payment all or any part of

the cost of a capital improvement as provided in Minnesota Statutes, Section 103B.251.

3.2 Watershed Management Plan: The Organization shall prepare a Watershed Management Plan for the Upper Rum River Watershed. The plan shall:

A. Describe the existing physical environment, land use and development in the Upper Rum River Watershed, and shall further describe the environment, land use and development proposed in existing local and metropolitan comprehensive plans;

B. Present information on the hydrologic system in the Upper Rum River Watershed and its components, including any drainage systems previously constructed under Minnesota Statutes, Chapter 103E, and existing and potential problems relating thereof;

C. State objectives and policies, including management principles, alternatives and modifications, water quality and protection of natural characteristics;

D. Set forth a management plan, including the hydrologic and water quality conditions that will be sought and significant opportunities for improvement;

E. Describe the effect of the Watershed Management Plan on existing drainage systems;

F. Describe conflicts between the Watershed Management Plan and existing plans of local government units;

G. Set forth an Implementation Program consistent with the Watershed Management Plan, which includes a Capital Improvement Program and standards and schedules for amending the comprehensive plans and official controls of local government units in the watershed to bring about conformance with the Watershed Management Plan; and

H. Set out a procedure for amending the Watershed Management Plan.

The plan shall be amended as required from time to time.

3.3 Employment: The Organization may contract for services, may utilize existing staff of the parties and may employ such other persons as it deems necessary. Where staff services of a party are

utilized, such services shall not reduce the financial commitment of such party to the operating fund of the Organization unless the Organization so authorizes, where the utilization of staff services is substantial.

3.4 Committees: The Organization may appoint such committees and sub-committees as it deems necessary. The Organization shall establish citizen and technical advisory committees unless other means of public participation are established.

3.5 Rules and Regulations: The Organization may prescribe and promulgate such rules and regulations as it deems necessary or expedient to carry out its powers and duties and the purpose of this Agreement.

3.6 Review and Recommendations: Where the Organization is authorized or requested to review and make recommendations on any matter, the Organization shall act on such matter within 60 days of receipt of the matter referred. Failure of the Organization to act within 60 days shall constitute approval of the matter referred, unless the Organization requests and receives from the referring unit of government an extension of time to act on the matter referred. Where the Organization makes recommendations on any matter to a party, the governing body of a party not acting in accordance with any such recommendation shall submit a written statement of its reasons for doing otherwise to the Organization within ten days of its decision to act contrary to the Organization's recommendation. The Organization shall review the written statement and if determined insufficient by the Organ-

ization, request written clarification within an additional ten days.

3.7. Ratification: The Organization may, and where required by this Agreement shall, refer matters to the governing bodies of the parties for ratification. Within 60 days the governing bodies of the parties shall take action upon any matter referred for ratification.

3.8 Financial Matters:

Subdivision 1 - Method of Operation: The Organization may collect and receive money and services subject to the provisions of this Agreement from the parties and from any other sources approved by the Organization, and it may incur expenses and make expenditures and disbursements necessary and incidental to the effectuation of the purposes of this Agreement. Funds may be expended by the Organization in accordance with procedures established herein. Orders, checks and drafts shall be signed by the chair or vice-chair and the treasurer. Other legal instruments shall be executed on behalf of the Organization by the chair and secretary.

Subdivision 2 - Operating Funds (Dues): On or before August 1st of each year, the Organization shall prepare a work plan and an operating budget for the following year for the purpose of providing funds to operate the Organization's business. Organization expenditures may include administrative expenses, plan development, review expenses, capital improvement costs as authorized in Section 3.12 and insurance costs as authorized in

Section 3.14. Upon the approval of all voting members of the Organization, the budget shall be recommended to the parties for ratification along with a statement showing each party's proposed share of the budget. The budget shall be implemented only after ratification by each party to this Agreement. Failure to ratify or pay its share of the budget by any party to this Agreement shall be subject to the procedures in Section 3.6. Each party shall contribute funds toward the budget according to the following formula:

(PA ÷ WA) + (PV ÷ WV) ÷ 2 = the party's percentage share of the Organization's operating budget.

PA = party's area within the watershed organization area.
WA = watershed organization area.
PV = party's market valuation within the watershed organization area.
WV = market valuation of the watershed organization area.

After ratification the Secretary shall certify the recommended budget to each party on or before September 1 of each year together with a statement showing the amounts due form each party. Each party shall pay over to the Organization the amount owing in two equal installments, the first on or before January 1st and the second on or before July 1st in accordance with the tax year for which the amount due is being paid.

Subdivision 3 - Review Services: When the Organization is authorized or requested to undertake a review and submit recommendations to a party as provided in this Agreement, the Organization shall conduct such review, without charge, except as

provided below. Where the project size and complexity of review are deemed by the Organization to be extraordinary and substantial, the Organization may charge a fee for such review services, the amount to be based upon direct and indirect costs attributable to that portion of review services determined by the Organization to be extraordinary and substantial. Where the Organization determines that a fee will be charged for extraordinary and substantial review services, or where the flowage enters the Upper Rum River, but the party is not a member of the Upper Rum River Watershed Management Organization, the party to be charged shall receive written notice from the Organization of the services to be performed and the fee therefor, prior to undertaking such review services. Unless the party to be charged objects within 15 days of receipt of such written notice to the amount of the fee to be charged, such review services shall be performed and the party shall be responsible for the cost thereof. If the party to be charged objects to the proposed fee for such services within 15 days and the party and the Organization are unable to agree on a reasonable alternative amount for review services, such extraordinary and substantial review services shall not be undertaken by the Organization.

3.9 Annual Accounts: The Organization shall annually make a full and complete financial accounting and report to each party and to the Board of Water and Soil Resources. The report to the Board of Water and Soil Resources shall include an annual activity report. All of its books, reports and records shall be available

for and open to examination by any party at all reasonable times. Any member may request that the Organization conduct and provide to its members financial statements audited by an independent certified public accountant.

3.10 Gifts, Grants, Loans: The Organization may, within the scope of this Agreement, accept gifts; may apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a local government unit or other governmental unit or organization or any person or entity for the purpose described herein; may enter into any reasonable agreement required in connection therewith; may comply with any laws or regulations applicable thereto; and may hold, use and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement relating thereto.

3.11 Contracts: The Organization may make such contracts and enter into any such agreements as it deems necessary to make effective any power granted to it by this Agreement. Every contract for the purchase or sale of merchandise, materials or equipment by the Organization shall be let in accordance with the Uniform Municipal Contracting Law, Minnesota Statutes, Section 471.345 and the Joint Exercise of Powers Statute, Minnesota Statutes, Section 471.59. No member or employee of the Organization or officer or employee of any of the parties shall be directly or indirectly interested in any contract made by the Organization.

3.12 Works of Improvement: Works of improvement for

protection and management of the natural resources of the Area, including, but not limited to, improvements to property, land acquisition, easements or rights-of-way, may be initiated by:

A. Recommendation of the Organization to a party or parties; or

B. Petition to the Organization by the governing body of a party or parties.

Where works of improvement are recommended by the Organization, the Organization shall first determine whether such improvement will result in a local or regional benefit to the Area. Where the Organization determines that the benefits from the improvement will be local or not realized beyond the boundaries of the party in which the improvement is to be established, the Organization shall recommend such improvement to the governing body of the unit of government which the Organization determines will be benefited thereby, with the total estimated cost of the improvement and a description of the benefits to be realized beyond the boundaries of the party in which the improvement is to be established, the Organization shall recommend such improvement to each governing body of the units of government which the Organization determines will be benefited thereby. The recommendation of the Organization shall include the total estimated cost of the improvement, a description of the extent of the benefits to be realized by each unit of government and the portion of the cost to be borne by each party benefited in accordance with the extent of the benefit of each unit of government as described by the Organization.

Each party to whom the Organization submits such recommendation shall respond within 60 days from receipt of such recommendation. Where the Organization determines that the benefits of such improvement will be local, the unit of government to whom such recommendation is made may decline to ratify and undertake said improvement. Where the Organization determines that the benefits of such improvement will be regional, unless all parties to whom such recommendation is directed decline to ratify and undertake said improvement, the Organization shall continue to review and recommend alternative methods of cooperation and implementation among those parties ratifying the recommendation of the Organization, unless and until the Organization determines that said improvement is no longer feasible.

When works of improvement are initiated by the governing body of a party or parties to this Agreement, said governing body or bodies shall submit a petition to the Organization setting forth a description of the proposed work of improvement, the benefits to be realized by said improvement, its total estimated cost and a proposed cooperative method for implementation of the improvement, if applicable. The Organization shall review and make recommendations on the proposed improvement and its compliance with the Organization's management plan in accordance with the provisions of Section 3.5 of this Agreement.

When a proposed improvement may be eligible for federal or state funds as a cost-share project, the Organization may undertake a proposed work of improvement for the area, subject to

Organization recommendation to and ratification by the parties to this Agreement, as required for an improvement of regional benefit.

The Organization is further authorized to undertake experimental improvement projects within the Area to serve as a basis for evaluation of other improvements by the parties. When the Organization determines to undertake an experimental improvement project, the costs of such project shall be the obligation of the Organization and not of the parties to this Agreement.

3.13 Claims: The Organization or its agents may enter upon lands within or without the Upper Rum River Watershed to make surveys and investigations to accomplish the purpose of the Organization. The Organization shall be liable for actual damages resulting therefrom, but every person who claims damages shall serve the Chairperson or Secretary of the Organization with a notice of claim as required by Minnesota Statutes, Section 466.05. The Organization shall obtain court orders authorizing and directing such entries when necessary due to refusals of landowners to allow the same.

3.14 Indemnification and Insurance: Any and all claims that arise or may arise against the Organization, its agents or employees as a consequence of any act or omission on the part of the Organization or its agents or employees while engaged in the performance of this Agreement shall in no way be the obligation or responsibility of the parties. The Organization shall indemnify, hold harmless and defend the parties, their officers and employees

against any and all liability, loss, costs, damages, expenses, claims or actions, including attorney's fees which the parties, their officers or employees may hereafter sustain, incur or be required to pay, arising out of or by reason of any act or omission of the Organization, its agents or employees in the execution, performance or failure to adequately perform the Organization's obligations and understandings pursuant to the Agreement.

The Organization agrees that in order to protect itself as well as the parties under the indemnity provision set forth above, it will at all times during the term of this Agreement keep in force the following protection in the limits specified:

A. Commercial General Liability/Professional Liability ($200,000 per individual; $600,000 per incident) including the following endorsements:

B. Automobile Coverage ($ 0 )

C. Worker's Compensation Coverage (statutory minimum)

Any policy obtained and maintained under this clause shall provide that it shall not be cancelled, materially changed or not renewed without thirty days prior notice thereof to each of the parties.

Prior to the effective date of this Agreement, and as a condition precedent to this Agreement, the Organization will furnish the parties with certificates of insurance listing the Organization as a certificate holder.

3.15 General: The Organization may take all such other

actions as are reasonably necessary and convenient to carry out the purpose of this Agreement.

## SECTION IV

## Arbitration

4.1 The parties agree that any controversy that cannot be resolved between a party and the Organization through the review and recommendations procedures outlined herein shall be submitted to binding Arbitration. The Uniform Arbitration Act (Minnesota Statutes, Sections 572.08 - 572.30) is adopted by the Organization as the authority to be followed in submitting all controversies to Arbitration. The result of the Arbitration shall be binding on the party and the Organization. Arbitration shall be by a panel of three arbitrators. The party and the Organization each shall select one arbitrator to represent its position in the controversy. The two arbitrators then shall select a third arbitrator, and in the event they are unable to agree on a third arbitrator, either side may petition the District Court to appoint a third arbitrator. Thereafter, arbitration shall proceed as outlined in the Uniform Arbitration Act.

## SECTION V

## Termination of Agreement

5.1 This Agreement may be terminated by approval of two-thirds vote of the governing bodies of each party hereto, provided that all such approvals occur within a 90 day period. Withdrawal of any party may be accomplished by filing written notice with the organization and the other parties 60 days prior to the effective

date of the termination. No party may withdraw from this Agreement until the withdrawing party has met its full financial obligations through the effective date of such withdrawal.

## SECTION VI

### Dissolution of Organization

6.1 The Organization shall be dissolved under any of the following conditions:

A. Upon termination of this Agreement;

B. Upon unanimous agreement of all parties; or

C. Upon the membership of the Organization being reduced to less than three (3) parties.

At least 90 days notice of the intent to dissolve shall be given to affected counties and the Board of Water and Soil Resources. Upon dissolution, all personal property of the Organization shall be sold, and the proceeds thereof, together with monies on hand after payment of all obligations, shall be distributed to the parties. Such distribution of Organization assets shall be made in proportion to the total contributions to the Organization for such costs made by each party. All payments due and owing for operating costs under Section 3.7, Subd. 2, or other unfilled financial obligations, shall continue to be the lawful obligation of the parties.

## SECTION VII

### Amendment

7.1 The Organization may recommend changes in and amendments to this Agreement to the governing bodies of the parties. Amendments shall be adopted by a two-thirds majority vote of the

governing bodies of the parties within 90 days of referral. Amendments shall be evidenced by appropriate resolutions of the governing bodies of each party filed with the Organization and shall, if no effective date is contained in the amendment, become effective as of the date all such filings have been completed.

SECTION VIII

Counterparts

8.1 This Agreement may be executed in several counterparts and all so executed shall constitute one Agreement, binding on all of the parties hereto notwithstanding that all of the parties are not signatory to the original or the same counterpart.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day of complete execution hereof by the parties.

BURNS TOWNSHIP

SEAL
Dated: 9/9/97

By: _____
Chairman of Town Board

By: _____
Town Clerk

TOWN OF BURNS

By: _____
Chairman of Town Board

By: _____
Town Clerk

CITY OF BETHEL

SEAL
Dated: 9/3/97

By: _____
Mayor

By: _____
City Clerk

CITY OF EAST BETHEL

By: _____
Mayor

SEAL
Dated: Sept. 3, 1997

By: _____
City Clerk

CITY OF HAM LAKE

By: _____
Mayor

SEAL
Dated: 9/2/97

By: _____
City Clerk

CITY OF OAK GROVE

By: _____
Mayor

SEAL
Dated: 9-8-97

By: _____
City Clerk

CITY OF ST. FRANCIS

By: _____
Mayor

SEAL
Dated: 9/3/97

By: _____
City Clerk



TOTAL P.20