



Drinking Water Model Update

Erin Daugherty, Wood Environment & Infrastructure Solutions Inc.

April 16-17, 2019

☐ Potable Water Supply (PWS) System – Hydraulic Models

- Evaluate current water supply systems and potential integration
- Hydraulic Model as a tool for development and evaluation of water supply alternatives
- Evaluate feasibility of these alternatives for 2020 through 2040 conditions.
- Collaboration with groundwater modeling efforts

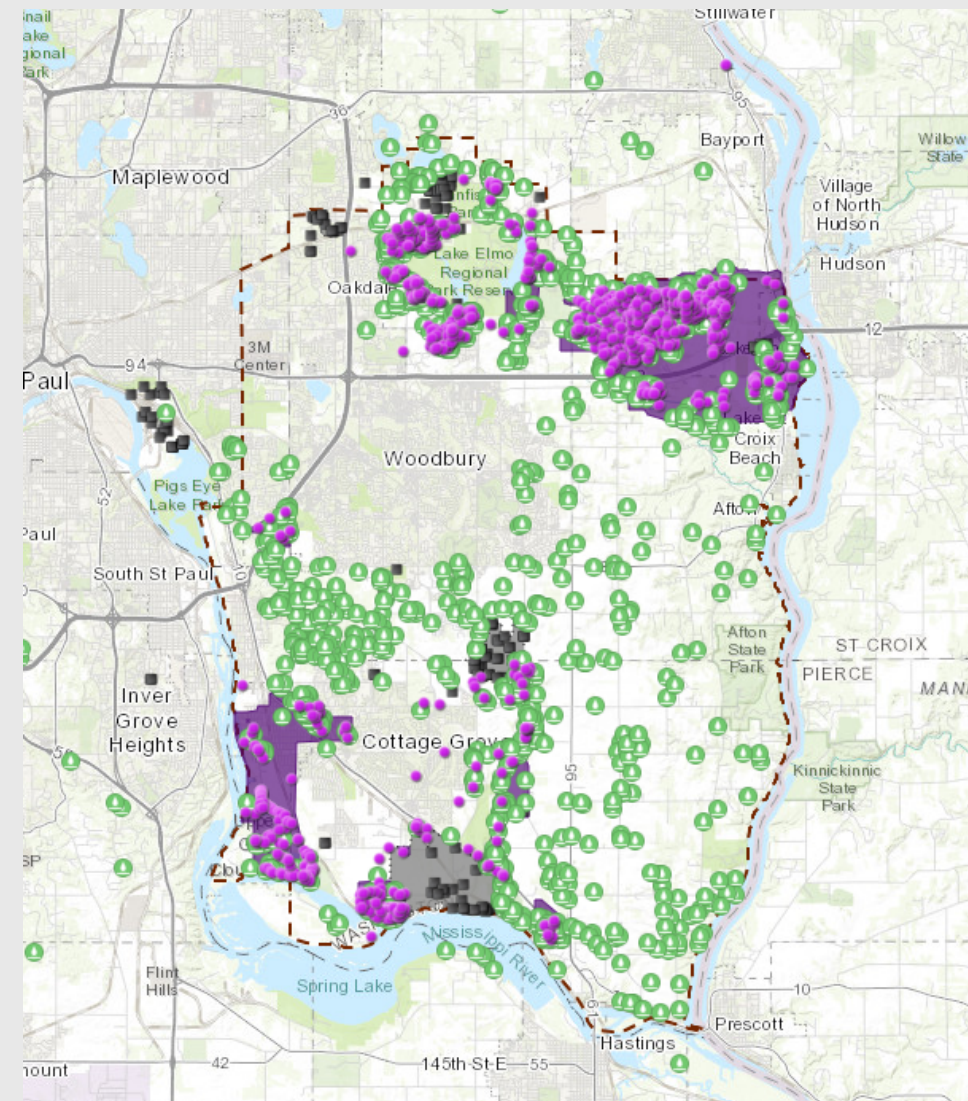
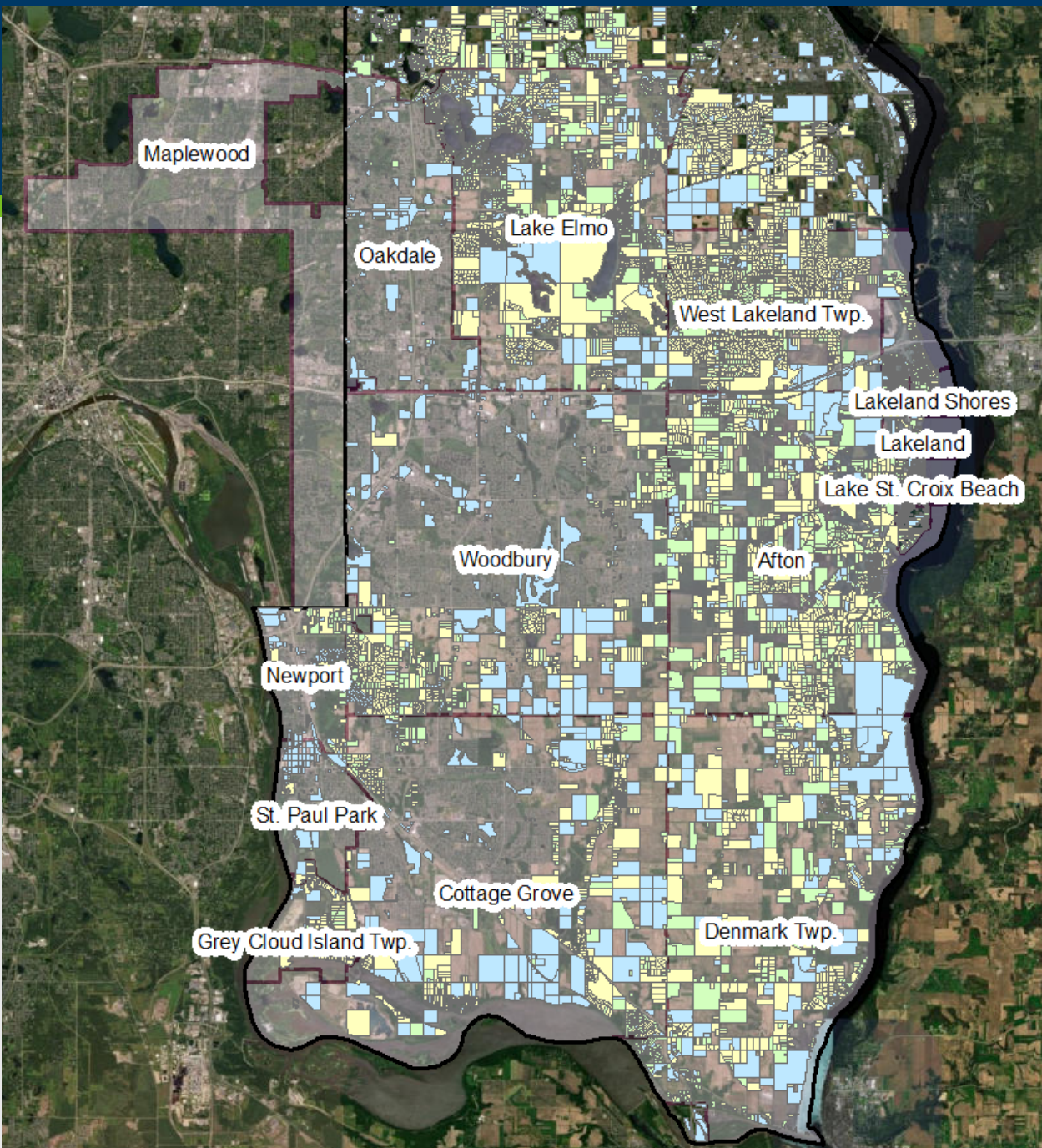
Public Water Supply Model Schedules

- Task 1 – Construct integrated depiction of existing infrastructure
 - Complete setup of initial base model of existing infrastructure and demands by May 3, 2019
- Task 2 – Use models to evaluate alternatives

Community Categories

- Private Wells Only – mostly rural townships

❖ Private Wells



☐ Community Categories

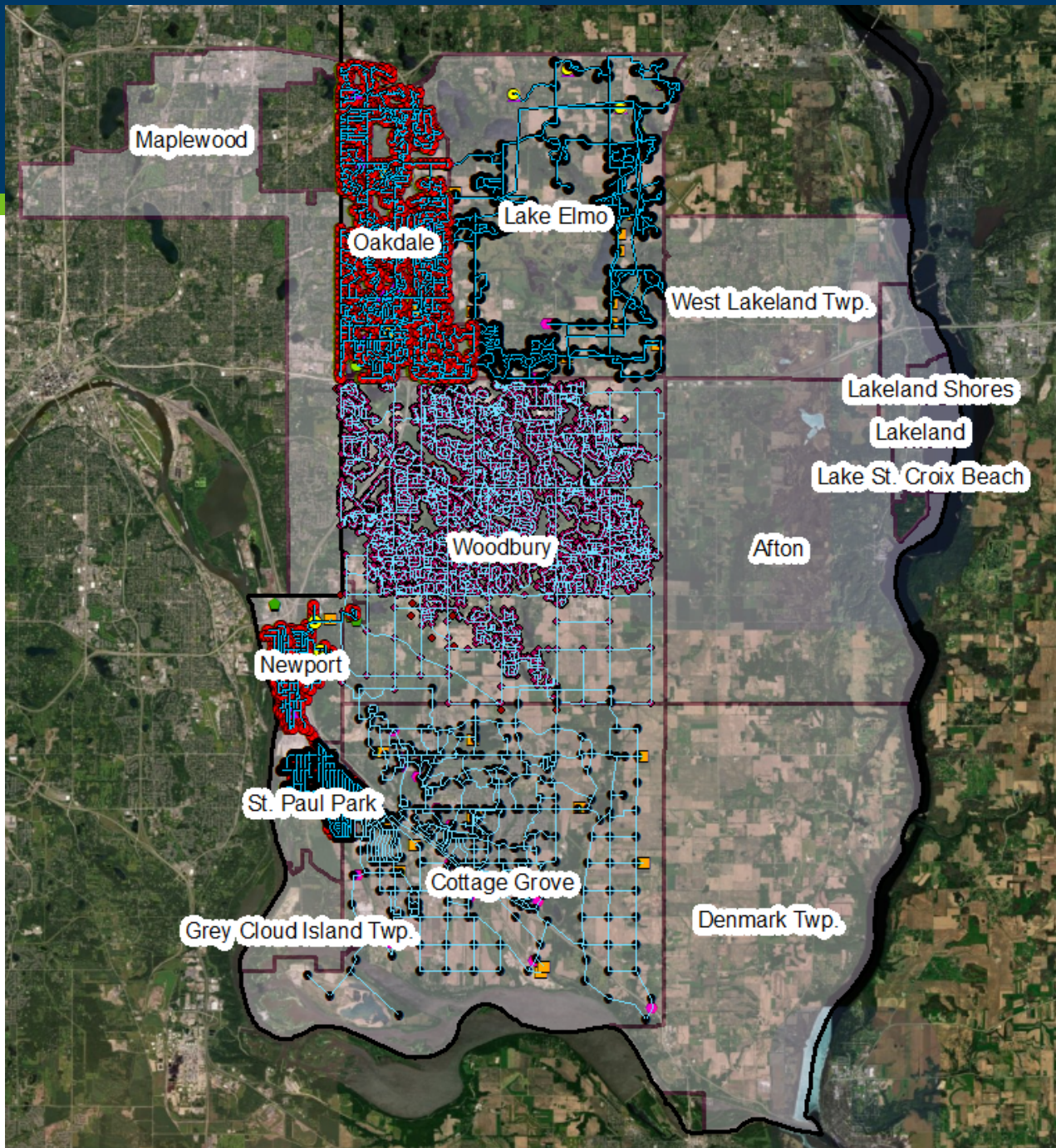
- Public Water Supply and Private Wells – suburban and rural residential
 - Cottage Grove – WaterCAD and GIS
 - Oakdale – WaterCAD and GIS
 - Newport – GIS
 - Lake Elmo – InfoWater/GIS
 - St. Paul Park – InfoWater/GIS
 - Woodbury – InfoWater/GIS Requested Additional Files
 - Lakeland – SEH Gathering Old WaterCAD
 - Maplewood – GIS

❖ INFORMATION REQUEST TRACKING UPDATE

❑ Information Requested from Communities

- Task Objective – collect system information necessary to populate data fields for Existing Infrastructure Base Model
- Initial Data Request List
- GIS Mapping
- Working with communities:
 - Request missing information
 - Clarify operational data
 - Verify assumptions with communities and gather feedback
- Tracking spreadsheet available on SharePoint Site

❖ GIS Mapping



- Importance of GIS Mapping:
 - Need to map PWS in GIS for spatial analysis
 - GIS intermediary between InfoWater and WaterCAD
 - GIS mapping simplified WaterCAD import process.
- GIS Process:
 - GIS data was organized for consistency between communities and formatted for WaterCAD

- Work with communities and consultants to collect any missing data and verify assumptions
- Gather feedback
- Calibrate model and perform QA/QC
- Provide completed initial base model by May 3rd

- Develop and evaluate feasibility of alternatives
- Work with communities for 2040 scenarios
- Incorporate groundwater modeling efforts

Thank you!

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Overview of Groundwater Modeling

Jim Feild, PhD, Wood Environment & Infrastructure Solutions Inc.

April 16-17, 2019

Main Concerns

- Mobilizing groundwater contamination from pumping activities that could adversely impact unaffected portions of the aquifer, particularly during transient peak demand periods;
- Avoiding negative surface water and wetland impacts;
- Aquifer safe yield.

1. Discuss Value of Groundwater Modeling
 - What questions can modeling address?
 - How are questions addressed?
2. Overview of Available Models/Information
 - Metro Model 3 (MM-3)
 - DNR transient Northeast Metro Lakes-Groundwater (NMLG) model
 - USGS NMLG model
 - South Washington County model
3. Next Steps
 - Development of Conceptual Site Model (CSM)

Value of Groundwater Modelling

- ✓ Groundwater models are effective tools for:
 - Understanding the dynamics of the groundwater flow system;
 - Gaining insight to key parameters controlling the groundwater flow system;
 - Evaluating and managing groundwater resources (Over allocation, Safe Yield);
 - Supporting decisions regarding remedial actions for contaminated groundwater; and,
 - Predicting groundwater response to hydrologic changes applied to the groundwater system (such as pumping, injection/recharge, agricultural practices, etc.)

Watershed Districts SG-1 Participation

SCOPE

The following scope of work is anticipated for and requested of watershed districts (WSD) to help inform the agencies (MPCA, DNR, MDH, and MGS) and their consultant (Wood) related to the groundwater model:

1. **Data Requests-** Correspond with and respond to the agencies and their consultant to provide information about the watershed.
2. **Drinking Water Supply Subgroup (SG)-1 Meetings**
3. **Interim reviews and feedback of modeling efforts**
4. **Groundwater model workshops**
5. **SharePoint Communication**

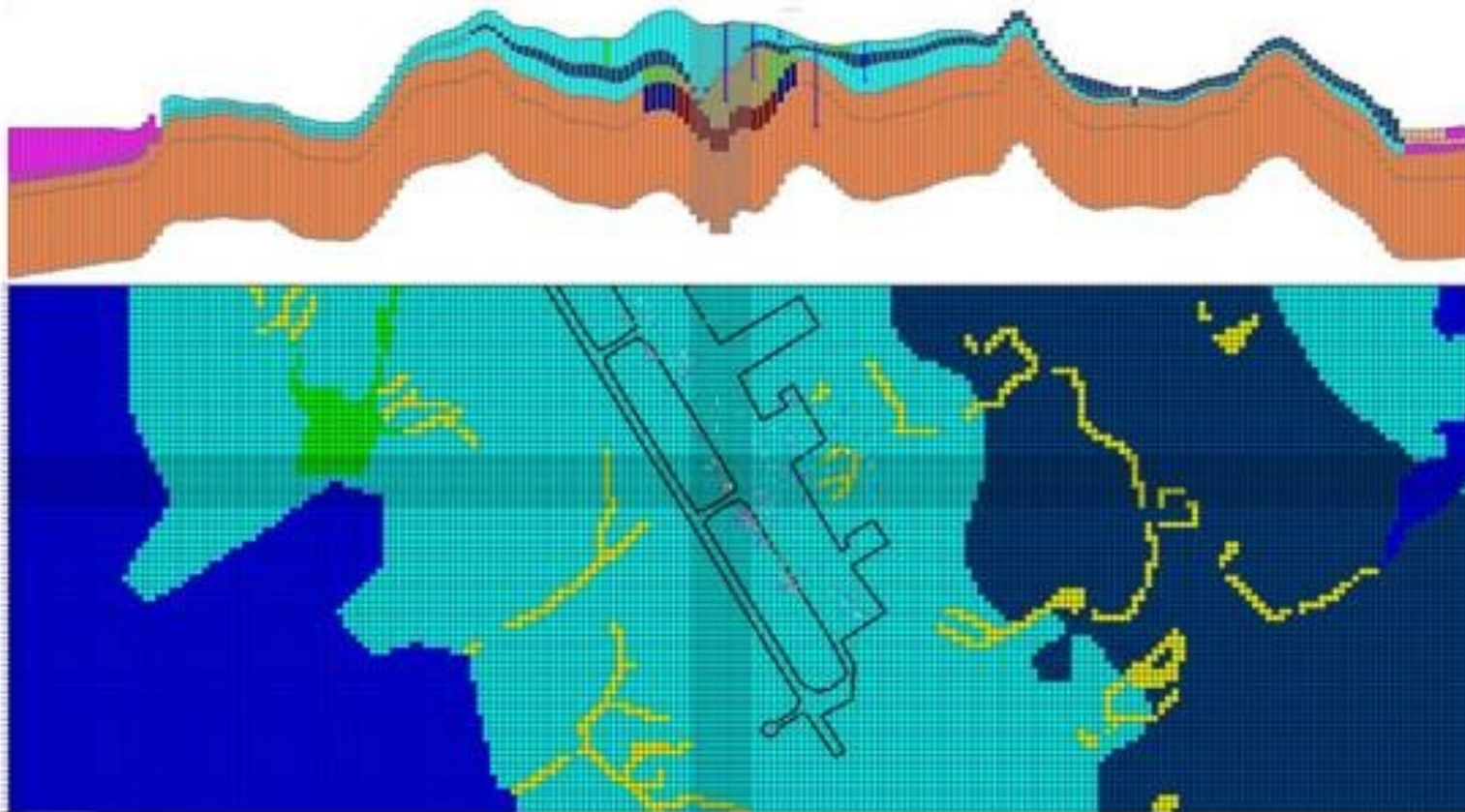
All data requested should be delivered in native file formats that can be easily used/integrated into modeling efforts (i.e., CAD, GIS, MS Access Database, etc). This specific request is assumed to be provided no more than one week from request by the agencies/consultant team.

Potential Groundwater Model Objectives

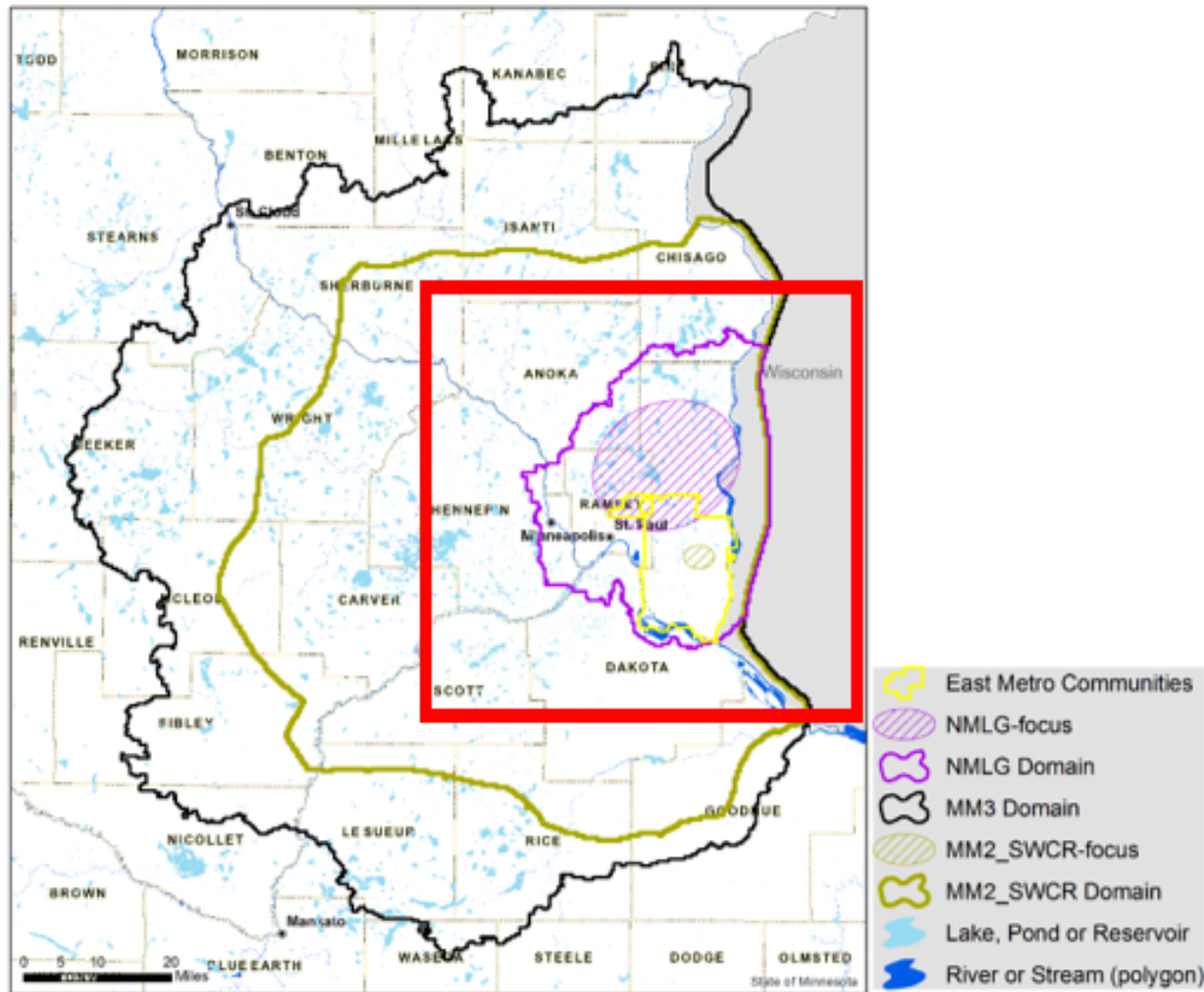
Objectives	SG-1 Responses		Objective will be met?	Explanation of Current GW Model
	AVERAGE	RANGE		
1) General:				
Combine all current models, data from the previous models, and new data (i.e., Washington County Geologic Atlas) to build a new regional model. This new regional model would then be the basis for an infinite series of sub-models that could be used for local issues in the future and aid in answering questions specific to each area.	H	Unk-H	Yes	A water budget analysis will be used to evaluate and compare recharge, groundwater withdrawals from pumping, and baseflow within the model domain. Sections of the new and improved model can be cut out, enlarged, re-gridded and used to answer small scale but very important questions that are local area specific
4) Transport of actual contaminants.	H	H	No	<p>Scenarios will be addressed and very site specific needs. The current groundwater model will be the basis for these smaller site-specific models. Specific data needs:</p> <ol style="list-style-type: none"> 1) Geochemical data <ol style="list-style-type: none"> a. Organic carbon content b. Mineralogy 2) Source area identification 3) Source area concentrations 4) Evaluate how agricultural practices such as application of fertilizers could affect groundwater quality
5) Implications to Surface Water Bodies:				

Definitions – Grids and Cells

Groundwater Model



Approximate Area of Model Domain



Metro Model 3 (MM-3)
DNR Northeast Metro Lake-
Groundwater (NMLG) Model
USGS NMLG Model

South Washington County
Wellhead Protection Areas (WHPA)
delineations (various models and
other approaches)

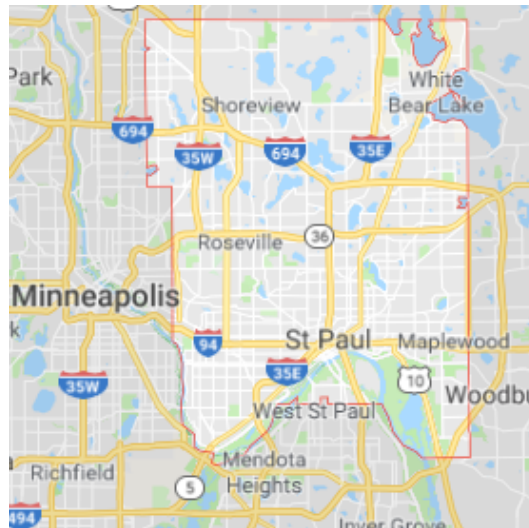
Areal Coverage of Model – Geological Inputs

Counties currently ~~missing~~ ^{included} in GW Model Lithological Surfaces

Hennepin



Ramsey



Dakota



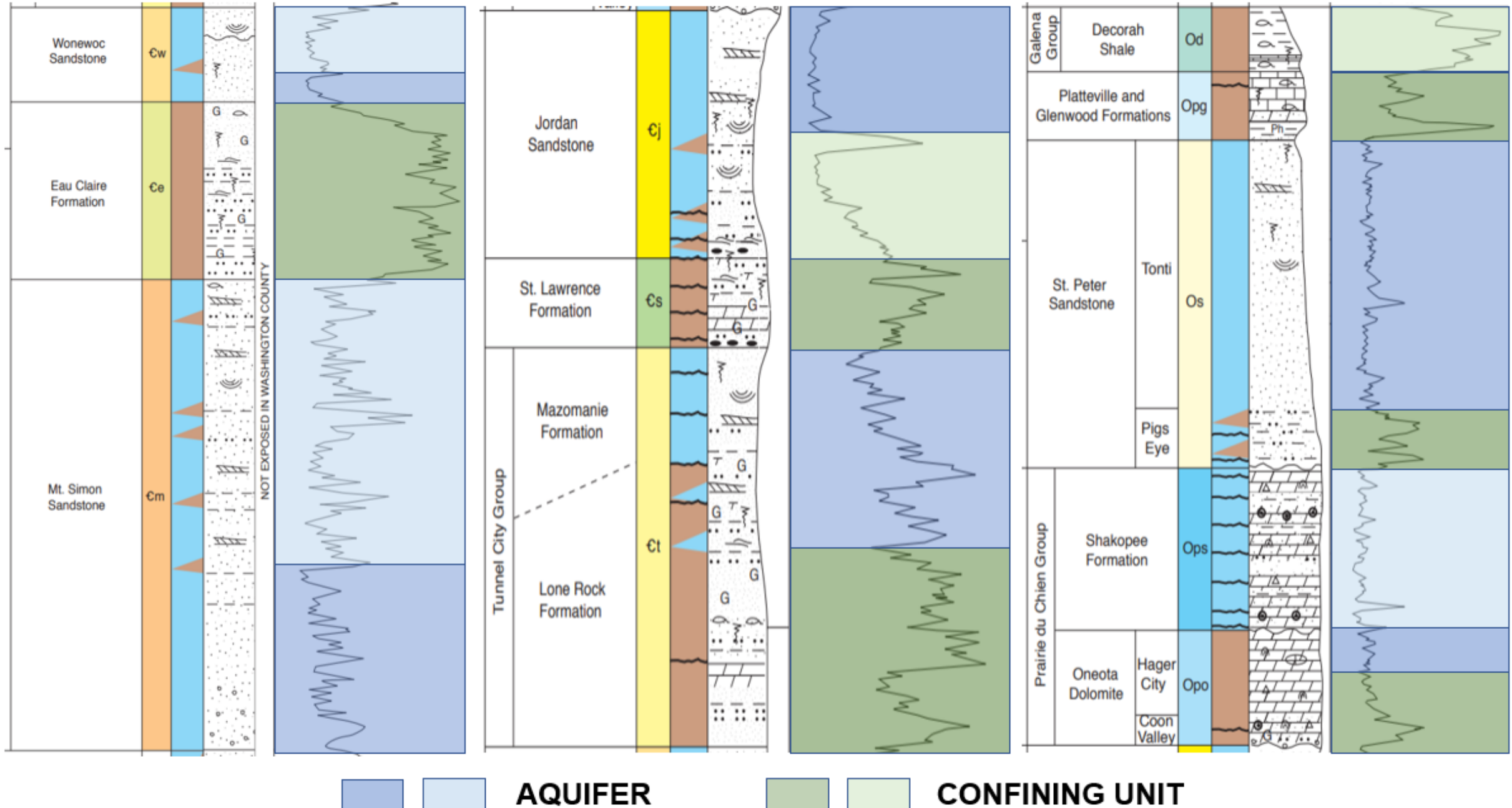
- Plume Definition – to be defined by others?
- Sources – to be defined by others?
- Concentration Data?

HYDROSTRATIGRAPHIC FRAMEWORK AND PROPOSED MODEL LAYERS FOR BEDROCK

YOUNGER



OLDER



Next Steps



Compiling watertable
elevation data
for model
calibration/verification

Climatological Analysis
Presentation in
May 2019

Tritium Qualitative
Analysis

Thank you!

Jim Feild, PhD

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