

# Conceptual Drinking Water Supply Plan: Scenario Development Update

Hannah Albertus-Benham and Shalene Thomas, Wood  
3M PFC Settlement Subgroup 1 Meeting  
November 20, 2019

# Agenda – Part A

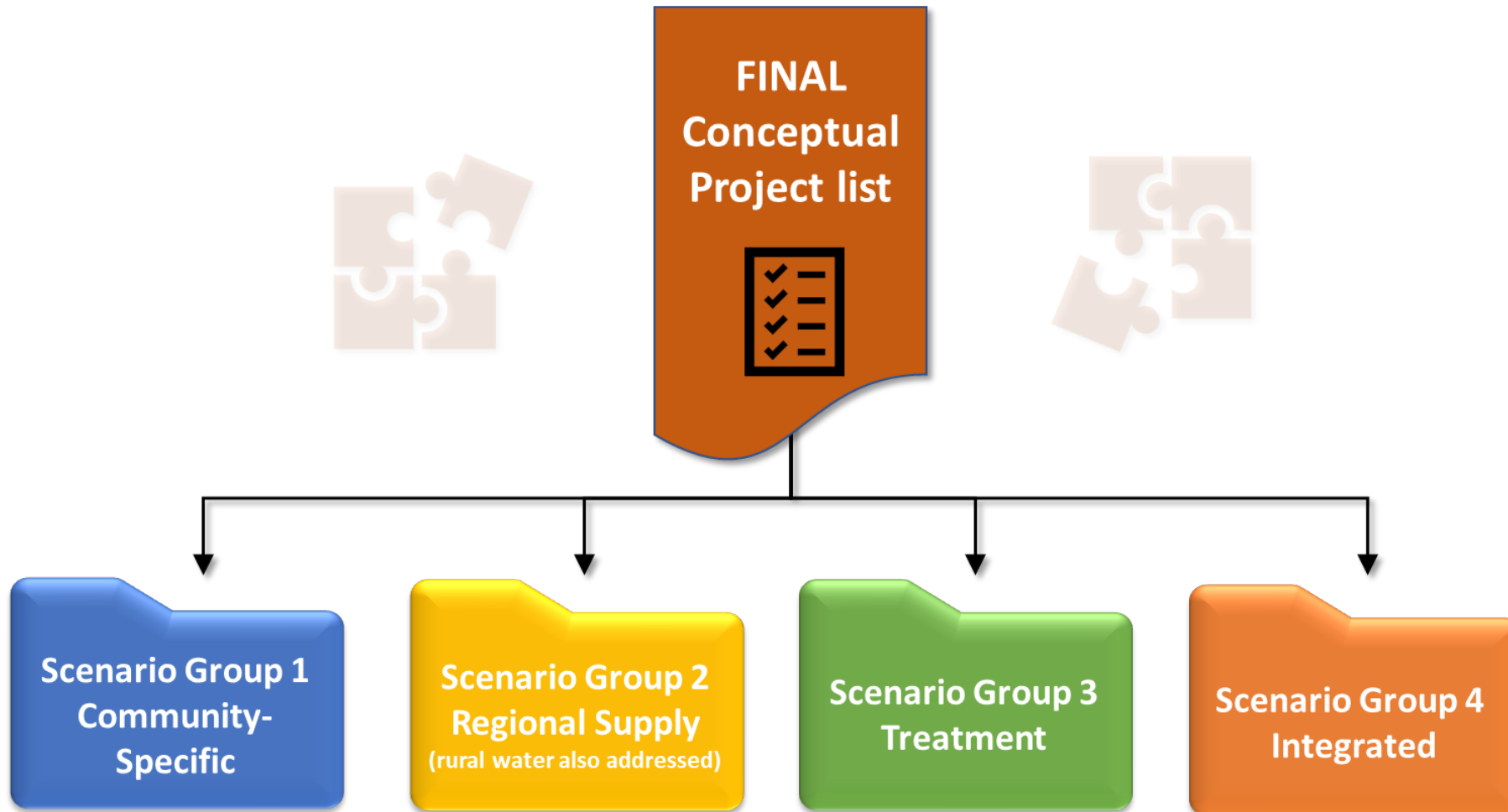
- ❑ Scenario Development Recap and Progress Update
- ❑ Assumptions and basis for costs
- ❑ Preliminary Results Summary – what costs will be included?
- ❑ Groundwater Model update- obstacles and options

## **Scenario Development – discussion and feedback**

- Regional Scenario considerations and layouts
- Treatment Scenario considerations and well counts

# SCENARIO DEVELOPMENT RECAP

SCENARIO DEVELOPMENT – September-October



Reviewed Community-specific, Regional, and Treatment scenario layouts in 1:1 meetings

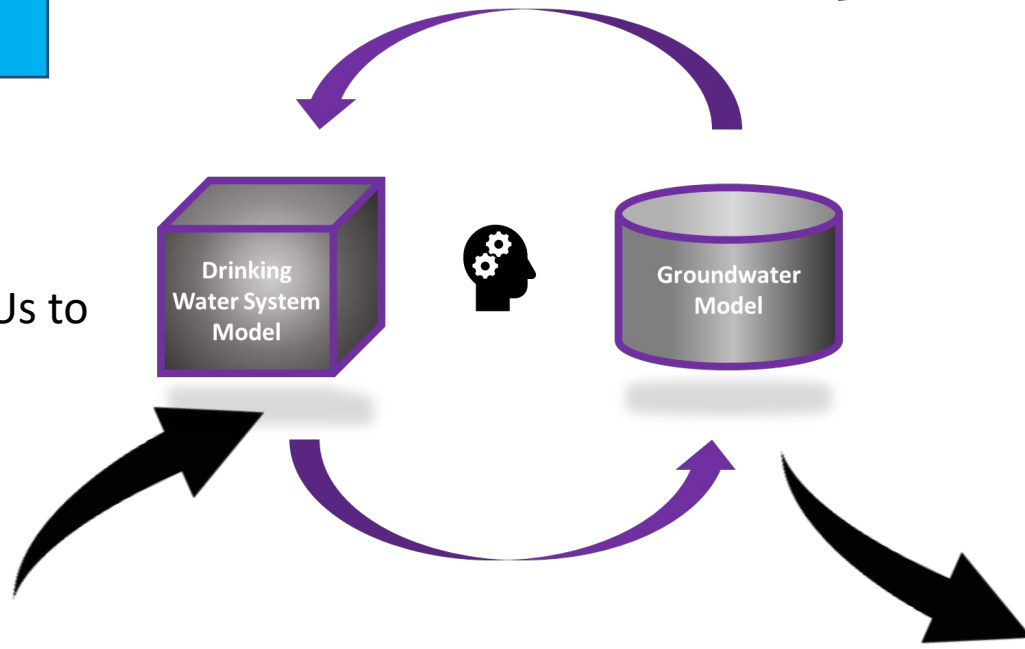
LGU Q&A:

- Wood to reach out as necessary during refinement of scenarios

- Phone meetings with Maplewood and SPRWS
- Email follow-up with other communities
- Updating SharePoint with scenario layouts as they become available

LGU Meetings:

- Wood will meet with LGUs to ensure appropriate infrastructure
- Concurrent with other scenario modeling



Wood Progress Update – November meetings:

- Opportunity for discussion

## SCENARIO DEVELOPMENT (revised explanation - UPDATED)

### Scenario Group 1 Community- Specific

- A. This scenario will consist of the projects submitted by the LGUs.
- B. To be determined based on the initial Community Scenario A projects and identifying the overlapping projects that were left out of Group A. Overlapping projects to be included here. This grouping may consider centralized treatment of municipal wells versus individual treatment of municipal wells.
- C. As needed to work through overlapping projects that cannot be dismissed.

### Scenario Group 2 Regional Supply (rural water also addressed)

#### Surface Water

- A. One surface water plant that feeds all impacted communities
- B. One surface water plant on the Mississippi River and one on the St. Croix (two water delivery options for Woodbury)
- C. Extend St. Paul Regional Water System to ~~western communities, with a surface water plant on the St. Croix for the eastern communities~~ all impacted communities

#### Groundwater

- A. One well field, likely with treatment, and distribute throughout the East Metro region using a combination of existing and new infrastructure
- B. Multiple well fields...

All supplemented by POET or cluster systems for rural areas if extending water mains is not cost effective

## SCENARIO DEVELOPMENT (revised explanation - UPDATED, cont'd)

### Scenario Group 3 Treatment

Includes treatment for wells with Health Index (HI) of:

- A.  $HI(\text{PFAS}^*) > 0$
- B. Detection of [PFOS] OR [PFOA] OR [PFHxS]
- C.  $HI(\text{PFAS}^*) > 0.5$
- D.  $HI(\text{PFAS}^*) > 1.0$

Each:     Year 2020 with GAC  
           Year 2020 with IX  
           Year 2040 with GAC  
           Year 2040 with IX

Note: this is a desktop exercise to determine relative costs associated with each level of contamination. The priority of safe drinking water only includes wells impacted above health risk limits, as calculated by the HI.

### Scenario Group 4 Integrated

Wood will create scenarios to maximize the projects when bundled and incorporate shared/regional systems wherever possible (above and beyond LGU priorities) for a final integrated scenario grouping.

\*This does not include ALL PFAS, but rather only those that have health risk limits or health based values, as defined by the Minnesota Department of Health – PFOS, PFOA, PFHxS, PFBA, and PFBS.

# SCENARIO DEVELOPMENT PROGRESS UPDATE

## Progress Overview

- Primarily working on Regional, Community-Specific and Treatment scenarios
  - Piping layouts
  - Costing, block flow diagrams, getting quotes from vendors
- Worked through assumptions on well counts with MDH for Treatment Scenarios
- Finalized GW model and began calibration- obstacles and options
- Updated Chapters 1-3 and provided Draft Chapters 4-6



# Groundwater Model Update

## Steps to functioning GW model:

- Data gathering – COMPLETE ON SCHEDULE
- Model build – COMPLETE ON SCHEDULE
- Calibration – in progress
  - While beginning calibration phase, a **software error** was discovered
  - Actively addressing the issue
    - Have identified a preferred option (patch from software developer), with back up options
    - Will send an **email update next week** with plan moving forward

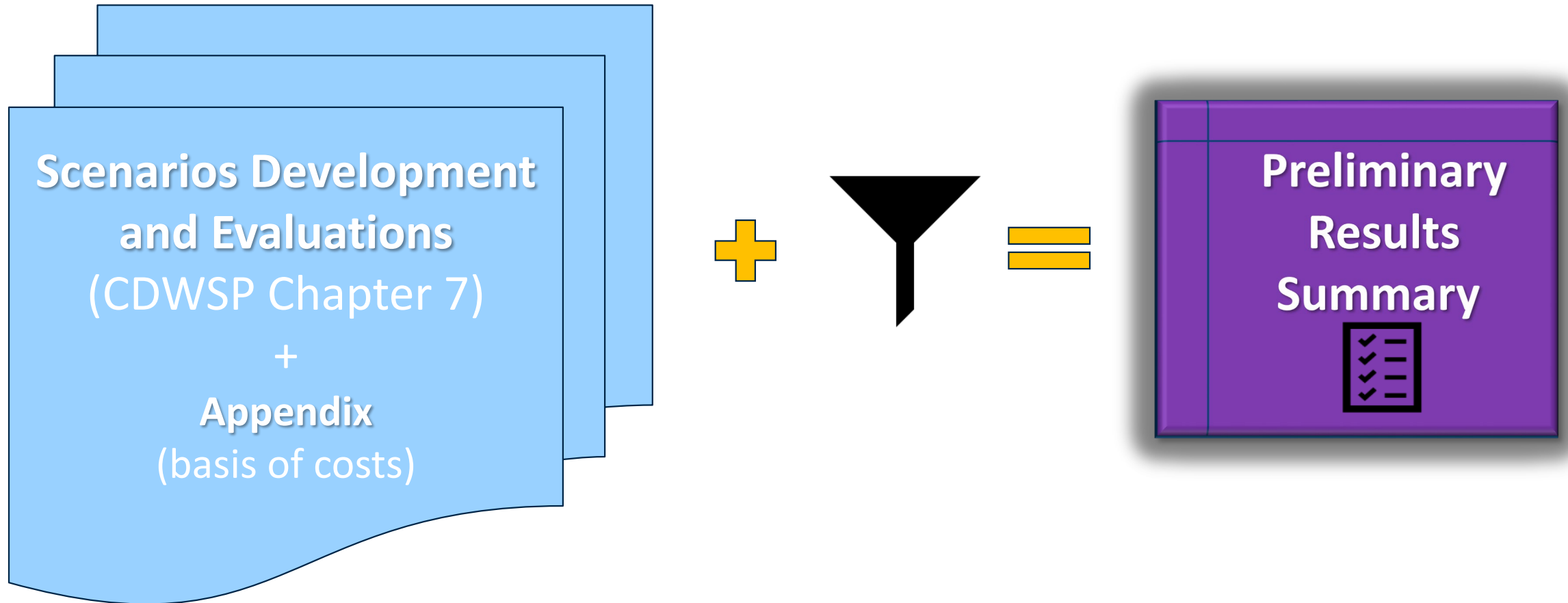
# December Meeting Options

1. Hold all three December meetings and present partial preliminary results summary
2. Cancel December work group meetings, but hold Subgroup 1 meeting (work group members can attend)
3. Cancel all December meetings and provide an update via email

Work groups have decided to not meet in December

# PRELIMINARY RESULTS

## Overview



# PRELIMINARY RESULTS SUMMARY

## Results Summary

- ❖ Scenario overviews – linked to full results with maps
- ❖ Cost Summary (across all scenarios/projects) – example table

Scenario Alternatives	Cap Cost	O&M Cost	Total 20 Year NPW	Cost/1000 gal
Community Scenario 1A				
Community Scenario 1B				
Community Scenario 1C				
Regional Scenario 2A				
Regional Scenario 2B				
Regional Scenario 2B-1				
Regional Scenario 2B-2				
Regional Scenario 2C				
...				

# PRELIMINARY RESULTS

## Preliminary Results Outline (per scenario)

- ❖ Scenario Description – assumptions, siting, treatment components, distribution system
- ❖ Map/Layout
- ❖ Hydraulic Modeling Considerations – 2020 to 2040 (line sizing, booster pumps, storage, pressure zones, etc.)
- ❖ Groundwater Modeling Considerations – safe yield, PFAS movement (related to public and private wells)
- ❖ Cost Estimate – cost per component as well as overall costs

# PRELIMINARY RESULTS SUMMARY

## Scenario Costs Example – One Surface Water Plant:

- Total cost of plant (via vendor from block flow diagrams), lump sum
- Land acquisition cost
- Distribution system:
  - Pipe – depends on size (diameter and length) and % of road/pavement disturbance (0%, 50%, or 100%) vs. jack and bore
  - Booster pump station
  - Water Storage Tank
  - Pipeline easements
- Contingency (20%)
- Engineering/Administration/Legal (15%)

# SCENARIO MODELING AND DEVELOPMENT

Community	2020 Population Total (Served)	2040 Population Total (Served)	Peaking Factor	2020 ADD (MGD)	2020 MDD (MGD)	2020 Per Capita Demand (gpcd)	2040 ADD (MGD)	2040 MDD (MGD)	2040 Per Capita Demand (gpcd)	Source	Comments
Afton	3,070 (0)	3,140 (0)	3	0.289	0.866	94	0.3	0.89	94	Met Council 2015 System Statement Populations	
Cottage Grove	38,400 (38,400)	47,000 (47,000)	3	3.8	11.5	100	4.7	14.1	100	WSP June 2018	
Denmark	1,920 (0)	2,410 (0)	3	0.18	0.541	94	0.23	0.69	94	Met Council 2015 System Statement Populations	
Grey Cloud Island	300 (0)	270 (0)	3	0.028	0.085	94	0.03	0.09	94	Met Council 2015 System Statement Populations	
Lake Elmo	11,020 (7,302)	22,304 (21,165)	3	0.657	2	90	1.799	5.4	85	WSP June 2019	
Lakeland/Lakeland Shoes/Lake St. Croix Beach	3,110 (2,587)	3,710 (3,710)	3	0.25	0.75	97	0.36	1.08	97	WSP 2018	
Maplewood											
Newport	4,400 (4,087)	4,939 (4,587)	1.55	0.335	0.521	82	0.376	0.585	82		
Oakdale	29,600 (30,360)	36,000 (36,740)	2.23	2.67	5.95	87.95	3.12	6.96	84.91	WSP January 2019	2040 Population Served includes Landfall Community
Prairie Island Indian Community											
Saint Paul Park	6,000 (6,000)	7,900 (7,900)	2.05	0.63	1.292	105	0.83	1.7	105	WSP August 2018	
West Lakeland	4,200 (0)	3,980 (0)	3	0.395	0.948	94	0.37	0.888	94	Met Council 2015 System Statement Populations	Approved Comp Plan Draft 1-14-19 States they will be built-out with a population of 4,500 by 2020
Woodbury	72,500 (67,839)	87,800 (83,139)	2.6	7.8	19.2	115	7.9	19.5	95	April 2019 Comp Plan	April 2019 Comp Plan
<b>Regional (Totals)</b>	<b>174,520 (156,575)</b>	<b>219,453 (204,241)</b>	<b>2.68</b>	<b>17.03</b>	<b>43.65</b>	<b>95.7</b>	<b>20.02</b>	<b>51.88</b>	<b>93.2</b>		

# SCENARIO MODELING AND DEVELOPMENT

## Assumptions and basis for costs

### Raw Materials:

- a. Assuming ductile iron pipe for piping over 6" diameter.
- b. Assuming PVC pipe for piping under 6" diameter
- c. Obtained Schedule of Values and Construction Drawings associated with the installation of the 2200 gpm GAC system for PFAS treatment. Will be used as cost basis for the buildings, yard piping, and site work associated with the treatment systems.

### Installation:

- a. Obtained private well and municipal well installation costs from well drillers in the East Metro area
- b. Preparing pipeline estimates for Rural vs Urban Areas, and further categorized by impact on existing roadways as either; 0% roadway, 50% roadway, and 100% roadway.



# SCENARIO MODELING AND DEVELOPMENT

## Assumptions and basis for costs (cont'd)

### 2. Groundwater Treatment Systems

- a. Obtained costs (installation and annual servicing) associated with GAC installations on private well systems from MPCA.
- b. Utilized past experience and information from current GAC systems installed in East Metro area to determine treatment capacity and media removal capacity of GAC.
- c. Basis of IX treatment costs from past experience and previous installations

# SCENARIO MODELING AND DEVELOPMENT

## Assumptions and basis for costs (cont'd)

3. Surface Water Treatment Systems
  - a. Redundancy from existing GW systems only
  - b. Corrosion control
  - c. No water softening
  - d. Pump stations
  - e. Requesting vendor quotes

# SCENARIO MODELING AND DEVELOPMENT

## Assumptions and basis for costs (cont'd)

### 4. SPRWS

- a. Reviewing options to cover demand for entire east metro (52 MGD through 2040)
- b. Redundancy from existing GW systems only
- c. Bulk water rates similar to current rates for other communities
- d. Distribution system costs will be separate
- e. Metering required at community tie-in points

# SCENARIO MODELING AND DEVELOPMENT

## Assumptions and basis for costs (cont'd)

### General:

- Researched bid tabs in the east metro area and bringing costs forward to present day using the Engineering News Record (ENR) Construction Cost Index
- Including land acquisition costs for the treatment systems (based on location-specific property values).

# SCENARIO DEVELOPMENT – DISCUSSION AND FEEDBACK

Break to view maps

Questions or Comments?

# Thank you!

**Erin Daugherty, PE**

**Wood Environmental & Infrastructure Solutions**

*Erin.daugherty@woodplc.com*

602.733.6077

**Hannah Albertus-Benham, PE**

**Wood Environmental & Infrastructure Solutions**

*Hannah.albertus@woodplc.com*

612.252.3657

**Brian Hamrick, PE**

**Wood Environmental & Infrastructure Solutions**

*Brian.hamrick@woodplc.com*

602.733.6053

**Shalene Thomas**

**Wood Environmental & Infrastructure Solutions**

*shalene.thomas@woodplc.com*

612.252.3697