

3M Settlement: Project 1007 Feasibility Study Progress



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Project 1007 high-level process

"The MPCA shall conduct a source assessment and feasibility study regarding the role of the Valley Branch Water District's project known as Project 1007 in the conveyance of PFCs in the environment." - 3M Settlement



Feasibility study: goals and components

GOALS

Identify areas where treatment of surface water, sediment, or groundwater is required.

Evaluate applicable treatment options.

Recommend solutions to address PFAS impacts in surface water, sediment, and groundwater.



Surface water investigation

Sediment investigation

Groundwater investigation

Model results

Multi-benefit well array evaluation

Water pilot study

PFAS pathways: Two source areas and primary pathways





Deep Groundwater Impacts

Surface water and shallow groundwater: Horseshoe Lake and West Lakeland Ponds



Water Quantity meets Water Quality Concerns



Pre-Project 1007



Post-Project 1007 installation/enhancements



Current conditions



Surface to Deep Bedrock AOC: West Lakeland



Plume migration pathways

Impacts in the deeper Jordan aquifer appear to be farther east and north from those in the shallow PDC Aquifer, suggesting a northeasternly migration path of the West Lakeland groundwater impacts.



Link to surface water AOC

PFAS impacts in groundwater appear to be directly connected to surface water infiltration



Map features

PFOS in Groundwater >0.75 ppb 0.15-0.749 ppb 0.075-0.149 ppb 0.015-0.0749 ppb 0.0112-0.0149 ppb 0.004-0.01119 ppb <0.004

🔥 AOC Outline

Notes

PFOS Health Risk Limit (HRL) = 0.015 pbb

Blank areas indicate insufficient well data to generate plume imagery (i.e., no wells within 0.75 miles).

Project 1007 Models

Groundwater — Calibrated, Particle Tracking

Surface Water — Calibrated

Combined — Calibrated

Fate and Transport → Coming second half 2023

PFAS Fate and Transport Model



Objectives of Fate and Transport Model

- Identify source areas and probably migration pathways to receptors
- Identify hydrologic conditions that may modify migration pathways
- Identify anthropogenic activities that may modify migration pathways
- Develop numeric modelling tool to support future plume capture

Particle tracking: 30 years time



Pathline color corresponding aquifer N Quaternary Aquifer N Decorah Shale N Shallow Fractured Bedrock N Platteville Aquifer N St Peter Aquifer N PDC Aquifer N Jordan Aquifer N St Lawrence and Deeper

Particles were released from the Oakdale Disposal Site (ODS), Washington County Landfill (WCL), Ideal Avenue Wetland Complex (IAWC), Eagle Point Lake, Horseshoe Lake, and West Lakeland Storage Pond.

Particle tracking: 50 years time



Pathline color corresponding aquiferNQuaternary AquiferNDecorah ShaleNShallow Fractured BedrockNPlatteville AquiferNSt Peter AquiferNPDC AquiferNJordan AquiferNSt Lawrence and Deeper

Particles were released from the Oakdale Disposal Site (ODS), Washington County Landfill (WCL), Ideal Avenue Wetland Complex (IAWC), Eagle Point Lake, Horseshoe Lake, and West Lakeland Storage Pond.

Particle tracking: 100 years time

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Pathline color corresponding aquifer **Quaternary Aquifer Decorah Shale** Shallow Fractured Bedrock **Platteville Aquifer** St Peter Aquifer PDC Aquifer Jordan Aquifer St Lawrence and Deeper

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3D visualization leapfrog: Ideal Avenue Wetland Complex secondary source mass



0.015

0.0112 0.004





Model 3D visualization: West Lakeland infiltration



Multi-benefit well array definition and objectives

What is the multi-benefit well array?

Network of high-capacity extraction and injection wells selected to provide the dual purpose of PFAS mitigation and drinking water supply.

What are the key MBWA objectives?

- Capture PFAS-impacted groundwater.
- Prevent the continued migration of PFAS impacts.
- Provide safe drinking water to impacted communities.



MBWA draft configuration



Modifying the MBWA configuration: Example of Prairie du Chien particle tracking





On-Going Improvements

Numerous configurations are being evaluated for optimized PFAS capture in the PDC and Jordan aquifers

Theoretical MWBA timeline



ners:

UofM, VBWD, EPA Cities, Washington cil and Settlement M SGS