

Introduction

As part of the wellhead protection area, drinking water supply management areas (DWSMAs) can be at-risk of drinking water contamination.

Nitrate has been found in unsafe levels in over 10% of Minnesota's private wells.

EPA safe drinking water = nitrate level < 10 mg/L

- Solar can mitigate contaminants through the replacement of nitrate-producing agriculture

Methods

Mapping data analysis for site identification; use of nitrate leaching calculator for site prioritization.

Identifying high-nitrate watersheds

- Mapping & data overlay of high-risk areas with areas of high ecological/resource value
- See: [mitigation level determination process](#)
- See: [species of greatest conservation need map](#)

Results

Collaborative effort has led to the identification and prioritization of several communities within high-risk DWSMAs as potential pilot, solar sites.

Prioritization of solar pilot sites

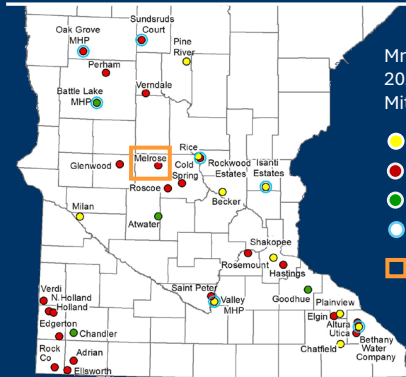
Conclusions

Nitrate calculator is critical in the process, as it demonstrates the benefits of solar within these highly specific groundwater sensitive locations.

Beneficial siting of solar in contamination areas

Solar for Nitrate Reduction & Improved Drinking Water

Exploring large-scale solar gardens to mitigate contaminants & improve drinking water quality in areas of elevated health risks.



Mn Department of Agriculture
2024 Drinking Water Supply
Mitigation Levels for Nitrates

- Level 1
- Level 2
- Level 3
- Non-Municipal Systems

Case Study / Pilot Site:
Melrose, Minnesota
- see land use scenario comparison tables

- Nitrate contamination is a risk for groundwater recharge areas and along hydrologic flows of drinking water systems
- 1.3 million acres in MN are identified as vulnerable to nitrate contamination; representing 14,000 MW of solar capacity
- Nitrate leaching meta-analysis and resulting calculator aids in strategically siting solar in areas where groundwater is prone to contamination (e.g., sandy soils or karst topography)
- Drinking water protection:** solar can aid in reducing nitrate contamination in drinking water supplies
- Water quality protection:** solar as green infrastructure can improve the water quality of ground and surface water

Nitrogen Calculator Summary: Comparison of agricultural land use vs. solar land use with prairie vegetation underneath panels

SCENARIO 1 (Corn) – Melrose Land Use Field Comparisons			
Land Cover: Corn		Land Cover: Bluestem Grass	
Leachable N (lb/acre)	114.2	Leachable N (lb/acre)	17.4
Nitrate-N (mg/L)	50.5	Nitrate-N (mg/L)	7.7
Scenario 1 Totals for Potential Leachable Nitrogen			
Leachable N (lb/acre)		65.8	
Field-Weighted Nitrate-N (mg/L)		29.1	

SCENARIO 2 (Soybeans) – Melrose Field Land Use Field Comparisons			
Land Cover: Soybeans		Land Cover: Bluestem Grass	
Leachable N (lb/acre)	190.5	Leachable N (lb/acre)	17.4
Nitrate-N (mg/L)	84.3	Nitrate-N (mg/L)	7.7
Scenario 2 Totals for Potential Leachable Nitrogen			
Leachable N (lb/acre)		103.9	
Field-Weighted Nitrate-N (mg/L)		46	

SCENARIO 3 (Rye) – Melrose Land Use Field Comparisons			
Land Cover: Rye		Land Cover: Bluestem Grass	
Leachable N (lb/acre)	132.7	Leachable N (lb/acre)	17.4
Nitrate-N (mg/L)	58.7	Nitrate-N (mg/L)	7.7
Scenario 3 Totals for Potential Leachable Nitrogen			
Leachable N (lb/acre)		75	
Field-Weighted Nitrate-N (mg/L)		33.2	

Nitrate Leaching Calculator - Dr. Kevin Masarik and Grant Moser
University of Wisconsin - Stevens Point



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