Final Abstract

Final Report Approved on November 3, 2026

M.L. 2023 Project Abstract

For the Period Ending June 30, 2026

Project Title: Protecting Water in the Central Sands Region of the Mississippi River Headwaters

Project Manager: Jessica Johnson

Affiliation: White Earth Band of Minnesota Chippewa Indians

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Website: https://whiteearth.com/home

Funding Source:

Fiscal Year:

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 04m

Appropriation Amount: $1,693,000

Amount Spent: $1,586,826

Amount Remaining: $106,174

Sound bite of Project Outcomes and Results

The project gathered extensive ground and surface water data and developed integrated hydrologic models to assess irrigation impacts in the Central Sands region. Findings support protection of treaty rights, groundwater sustainability, and surface water quality, while guiding state, tribal, and local decision-making on water management and restoration.

Summary of Project and Outcomes

Minnesota's Central Sands region has experienced rapid growth in irrigated agriculture, yet limited information existed on how these cumulative withdrawals affect groundwater, surface waters, and community uses. During recent drought years, wells dropped rapidly, and Indigenous and local residents expressed urgent concern about water sustainability. This project addressed the need for a scientifically grounded understanding of water quantity and quality impacts.
To meet this need, the project team collected new ground and surface water data across 10–15 river sites, installed groundwater monitoring wells, and gathered chemical and flow information throughout multiple seasons. These data were combined with climate records, geologic atlas information, and existing well data to construct the first fully integrated regional SWAT-MODFLOW hydrologic model for the Pineland Sands area. This model improves understanding of current conditions and allows scenario testing of future pumping, climate variability, and chemical loading.

Key outcomes include:
• Acquisition of critical hydrologic, chemical, and flow data across the region.
• Construction and calibration of coupled ground and surface water models, including sub-basins.
• Ongoing trend analyses showing pathways of water and nutrient movement.
• Sharing of monitoring data and modeling outputs with the Minnesota Department of Natural Resources and Minnesota Pollution Control Agency to support irrigation permitting and impaired waters assessments.
• Development of a public white paper identifying science-based policy opportunities to protect treaty rights, recreational uses, and sustainable agriculture.
• Engagement and education of local Native and non-Native communities to support shared stewardship and understanding of water resources.
Overall, the project provides a vital scientific foundation for long-term water management in the Central Sands region. Its data and tools will inform governmental decision-making, guide restoration and protection efforts, and help ensure healthy ecosystems and sustained treaty-reserved practices for future generations.

Project Results Use and Dissemination

Project findings were shared through stakeholder meetings, community events, intergovernmental briefings, and publication of monitoring data, hydrologic models, and final reports. A public white paper and project publications were posted online for broad access. Data were also shared with various partners to support ongoing discussions and decision-making related to water management.

Environment and Natural Resources Trust Fund

M.L. 2023 Approved Final Report

General Information

Date: November 4, 2026

ID Number: 2023-247

Staff Lead: Michael Varien

Project Title: Protecting Water in the Central Sands Region of the Mississippi River Headwaters

Project Budget: $1,693,000

Project Manager Information

Name: Jessica Johnson

Organization: White Earth Band of Minnesota Chippewa Indians

Office Telephone: (218) 935-3478

Email: jessica.johnson@whiteearth-nsn.gov

Web Address: https://whiteearth.com/home

Project Reporting

Final Report Approved: November 3, 2026

Reporting Status: Project Completed

Date of Last Action: November 3, 2026

Project Completion: June 30, 2026

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 04m

Appropriation Language: $1,693,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the White Earth Band of Minnesota Chippewa Indians to conduct a policy analysis and assess aggregate irrigation impacts on water quality and quantity in the Pineland Sands region of the state.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Enormous growth in irrigation in Minnesota's Mississippi Headwaters/Central Sands has occurred without assessment of water resource impacts. This project will assess aggregate irrigation water quality and quantity impacts/sustainability.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Minnesota has seen enormous growth in irrigated agriculture in its Central Sands region, with little attention paid to aggregate water quality and quantity impacts to groundwater and surface water. In part, aggregate impacts to water resources have not been addressed because of the region's complex hydrogeology consisting of sandy topsoils covering many layers of larger and smaller semi-confined and connected aquifers. The lack of hydrogeologic data and modeling has presented a problem for years, but the risk turned into crisis during the 2021 summer drought when indigenous and local communities watched water levels drop by feet in a matter of weeks, and the Department of Natural Resources experienced an influx of private well interference complaints. This project aims to shed new scientific light on aggregate impacts from irrigated agriculture in Minnesota's Central Sands. Through additional water monitoring and model construction, the project will demonstrate current and projected future water quantity and quality impacts. Project information will be used to protect hunting, fishing and gathering treaty rights, recreational water uses and agricultural uses for current and future generations. The scientific data will provide key information for diverse water users to unite in water use, restoration and protection efforts.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Project leaders will start by gathering substantial additional surface and groundwater data in Minnesota's Central Sands region. They will then proceed to use existing and newly gathered ground and surface water data to build a coupled Surface Water Assessment Tool (SWAT) and Modular three-dimensional finite-difference ground-water flow (MODFLOW) model. This predictive model will be the first of its kind to utilize updated information and modeling software to accurately capture and predict water quantity and quality impacts for Minnesota's Central Sands region. The project will also build on County Geologic Atlases developed with generous funding from the Legislative-Citizen Commission on Minnesota Resources. Project work will stitch together previously developed county-by-county geologic atlas maps and bring them to life through animated modeling. Project monitoring and modeling will show the impact of long-term changes in human groundwater consumption in the critical Central Sands region including patterns and pathways of water and chemical flow and solute/chemical loading to surface and groundwater resources. The calibrated regional model will also make possible future scenario-based simulations that can analyze the impact of proposed pumping and severe weather events on smaller water resource areas within the larger Pineland Sands region.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

1. Gather critical ground and surface water data in the Pineland Sands region

2. Complete an integrated ground and surface water model

3. Analyze monitoring data and modeling outputs

4. Share monitoring data and modeling outputs with the Department of Natural Resources and Pollution Control Agency for use in irrigation permitting and impaired waters evaluation

5. Provide a public white paper outlining scientific assessment and identifying opportunities to promote protection of treaty rights, recreational water uses and sustainable agriculture

6. Educate and engage native and nonnative local communities regarding water data as well as shared water restoration and protection opportunities

Project Location

What is the best scale for describing where your work will take place?

Region(s): Central

What is the best scale to describe the area impacted by your work?

Region(s): Central

When will the work impact occur?

During the Project

Activities and Milestones

Activity 1: Data gathering and modeling

Activity Budget: $1,238,500

Activity Description:
The objective of activity one is to gather new scientific data and conduct modeling to better understand current and potential future impacts of water appropriations on water resources and water resource sustainability in the modeled area in Minnesota's Central Sands Area, which encompasses the SE corner of the White Earth Reservation and a portion of the 1855 Treaty Territory. Project technicians will gather flow, stage and chemical samples from 10-15 river sites and install and monitor nested groundwater wells on two agricultural sites. Modelers will use newly gathered ground and surface water data, climate data, stratigraphic data from Minnesota County Geologic Atlases and existing well information to build and calibrate a regional, integrated ground and surface water model. Modelers will run scenarios assessing changes in ground and surface water quantity, patterns and pathways of water and chemical flow and solute/chemical loading to surface and groundwater resources. The outcome will be a more comprehensive picture of current and projected future groundwater pumping and aggregate impacts on water resources and treaty rights. See included map of surface water monitoring sites and model boundary.

Activity Milestones:

Description	Approximate Completion Date
review chemistry and other records; develop list of wild rice sampling sites	July 31, 2024
completion of surface water and groundwater trend analyses	March 31, 2025
completion of coupled regional scale surface water and groundwater model	April 30, 2025
completion of well contaminant source identification	June 30, 2025
completion of coupled surface water and groundwater model for subbasins	October 31, 2025
Install equipment, gather data, inform modeling	November 30, 2025

Activity 2: White paper; sharing of data and analysis

Activity Budget: $442,000

Activity Description:
The objective of activity two is to review, analyze and identify gaps and opportunities in state, federal and tribal policies bearing on high-capacity well development in the Central Sands project area. ENRTF funds will be used for development of a non-partisan, educational white paper, not for any lobbying for recommended policy changes. ENRTF funds will not be used to contact, or urge the public to contact, members or employees of the legislature for the purpose of proposing, supporting, or opposing legislation, or for directly advocating the adoption or rejection of legislation. The project white paper will identify opportunities for an integrated policy approach to protecting treaty rights, sustainable agriculture and recreational water use that is scientifically sound and based on a full and fair exposition of the pertinent facts. Project leader and junior attorney/ policy specialist will begin with a comprehensive review of existing state, federal and tribal laws bearing on high-capacity wells in Minnesota, including an assessment of strengths, weaknesses and gaps in the existing policy framework. After data is collected and model outputs are available, the project staff will work to identify opportunities for using new information to strengthen relevant policies to ensure balanced protection of water resources.

Activity Milestones:

Description	Approximate Completion Date
complete overview of applicable federal and state laws related to project	July 31, 2025

intermediate data, modeling and policy update w gov/ tribal agency partners	November 30, 2025
final data, modeling and policy update w gov/tribal agency partners	January 31, 2026
share draft white paper with collaborators	April 30, 2026
share final white paper w collaborators and public	June 30, 2026

Activity 3: Community education and engagement

Activity Budget: $12,500

Activity Description:
Project leaders will work with native and non-native experts and community members to assess land changes over time and perceived and experienced impacts and changes to water quantity and quality. Project leaders will engage native experts in gathering river and well data and share the same with native and non-native local government officials, community members and farmers. Lastly, project leaders will work with community members and community experts to analyze policy and program opportunities to better protect resources for current and future generations.

Activity Milestones:

Description	Approximate Completion Date
first community engagement meeting- Earth Summit	May 31, 2025
second community engagement meeting	October 31, 2025
third community engagement meeting	January 31, 2026
Final project update	May 31, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Research Professor, Joe Magner	Department of Bioproducts & Biosystems Engineering. University of Minnesota	Provide advice to field technicians and to graduate students on the setup of data acquisition systems and provide advice on the analysis of the data acquired during the project period.	No
John Nieber	Department of Bioproducts and Biosystems Engineering, University of Minnsota,	Provide guidance to graduate students in developing and applying groundwater and surface water hydrology and water quality models. Also, provide guidance to students in analysis of data, and will also conduct data analysis himself. Will be involved in writing of research results in reports and peer reviewed manuscripts.	No

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

- Share data and analysis with LCCMR-approved peer reviewers according to research plan/ schedule
- Incorporate data and analysis into peer reviewed publications
- Write and share project update and outcome documents with relevant state, federal and tribal governments and natural resources professionals
- Write and share white paper including research findings and policy recommendations with relevant governments, researchers/universities, non-governmental organizations and general public
- Formal educational briefings, as requested/appropriate, for Minnesota policymakers and relevant government officials
- Share relevant research and policy findings with interested media
- Share monitoring data and constructed hydrologic models with impacted community members and other state, federal and tribal agency experts who will build off of/ utilize modeling and monitoring information in the future

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

Once data and modeling outputs are made publicly available and shared with native and non-native government officials, they can be integrated into existing permitting policies/assessments, proposed policy reforms and future scientific research as needed. The model will also be available for use in more localized scenarios to better predict impacts to individual water resource areas within the larger Central/Pineland Sands region.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount	$ Amount Spent	$ Amount Remaining
Personnel										
Kellen McArthur		Assistance in field sampling			28%	0.38		$31,035	-	-
Jessica Johnson		Project Manager			26%	1.8		$45,264	-	-
Andrea Szabo		WEN Attorney- White Paper			19%	0.2		$24,200	-	-
Dustin Roy		WEN Division Director			24%	0.08		$13,135	-	-
							Sub Total	**$113,634**	**$70,225**	**$43,409**
Contracts and Services										
well contractor	Service Contract	install groundwater monitoring wells; 3				0.1		$12,965	$12,965	-
University of Minnesota	Subaward	professor oversight; model build and calibration; set up/maintain field monitoring equipment (piezometers; transducers); graduate/undergrad research; water sampling, travel, conferences, develop/utilize SWAT, MODFLOW and other models/methodologies; literature review, GIS mapping, data collection, analysis for monitoring and modeling; plant identification; drone survey. Modeling contract with Idaho State $15k				10.65		$912,585	$912,585	-
Jamie Konopacky, policy development and stakeholder engagement manager, Stafford Rosenbaum LLP	Service Contract	high-level project oversight; senior legal oversight; planning and carrying out external meetings with stakeholders; oversight and drafting of policy white paper				0.2		$25,620	$25,620	-

Amy Myrbo	Service Contract	assessing historic and current wild rice habitat First contract for 102,350 Second contract added for lab fees (pore water sulfide, total organic carbon, extractable iron, processing, and qPCR DNA lab analysis). This contract is for 16,921				0.3		$119,271	$113,683	$5,588
UC Davis lab (part of UofM Subaward)	Service Contract	isotope water sample analysis				0.3		$11,316	$11,316	-
RMB labs (part of UofM Subaward)	Service Contract	nitrogen, sulfate, phosphorus, chlorophyl A sample analysis				0.3		$59,085	$40,690	$18,395
saint paul labs (part of UofM Subaward)	Internal services or fees (uncommon)	water sample chemical analysis of ions				0.3		$24,543	$17,734	$6,809
UW Stevens Point lab (part of UofM Subaward)	Service Contract	water sample pesticide analysis				0.3		$38,880	$32,504	$6,376
Liminopro lab (part of UofM Subaward)	Service Contract	water sample analysis of algae				0.3		$4,100	$2,866	$1,234
Young Environmental Consulting Group	Service Contract	tracking and managing day-to-day project implementation; coordinating and reporting on the same among project team				1.5		$220,570	$213,015	$7,555
Caddis Fish LLC	Service Contract	Acquire and review existing agency data; review current or future stressors that negatively affect biological health. Support data Acquistion.				0.3		$5,000	$5,000	-
John Doherty	Service Contract	PEST++ model calibration consulting for MODFLOW and SWAT models				0.3		$13,000	$7,800	$5,200
Aquaveo	Service Contract	troubleshooting/consulting on novel MODFLOW construction issues				0.1		$400	$400	-
							Sub Total	**$1,447,335**	**$1,396,178**	**$51,157**

Equipment, Tools, and Supplies										
	Tools and Supplies	Miscellaneous materials for sampling and field work at $2,500 per year; sonde/water probe for water quality at $12,012.75. Flow Tracker Handheld, Flow Tracker 2 Probe, Clamp, Mounting and Wading Rod, level logger $14,230.51; Turbidity Sensor $1,928.5; Peristaltic pump $1,110.98; Exo 2, $1,306.25	Materials and supplies for setting up and maintaining field data systems; acoustic doppler samples are used for measuring streamflow at sample locations throughout the study area; YSI probe for measuring field water quality parameters	X				$47,758	$47,758	-
	Equipment	WEN Equipment (Supplies for Water Quality Sampling)	Expense related to Misc equipment and supplies necessary for WEN sampling. Original budget was 2,500. The budget increased to $6,000 to incorporate the need to purchase 1 barologger & 4 leveloggers.					$6,000	$5,895	$105
							Sub Total	**$53,758**	**$53,653**	**$105**
Capital Equipment										
		drone and lenses	team needs to purchase a drone and associated lenses to scope out monitoring locations for wild rice habitat component of the project as well as to look at invasive cattails and other biological indicators	X				$10,000	$8,584	$1,416
		UofM Capital Purchases: Teledyne StreamPro ADCP $37,680 (2 purchased total); Nitrate Probe (EXO NitraLED Kit-for EXO 2) $5,220.00; leveloggers from Fondriest $7,342.39	The Teledyne StreamPro ADCP is used to measure streamflow and water velocity in streams, particularly shallow waters. It allows users to determine discharge (flow	X				$50,242	$50,242	-

			rate) quickly and accurately. The EXO NitraLED probe is used to measure nitrate (NO_3-N) concentrations for water quality monitoring. Leveloggers are used for monitoring wells and evaluating water fluctuation.							
							Sub Total	**$60,242**	**$58,826**	**$1,416**
Acquisitions and Stewardship										
							Sub Total	**-**	**-**	**-**
Travel In Minnesota										
	Miles/ Meals/ Lodging	20k miles at .70	Mileage at Federal GSA Rate to conduct well and lake sampling					$6,425	$6,425	-
	Conference Registration Miles/ Meals/ Lodging	4-5 people, 4 meetings, Lodging $1,656, Hotel $2,000, Mileage $450	Meetings with project partners and stakeholders					$1,606	$1,519	$87
							Sub Total	**$8,031**	**$7,944**	**$87**
Travel Outside Minnesota										
							Sub Total	**-**	**-**	**-**
Printing and Publication										
	Publication	printing and publication of white paper	provide funding for formatting and printing hard copies of white paper outlining data analysis/ results and recommendations- to					$10,000	-	$10,000

			occur at end of project. This 10,000 was in the original contract and we decided to remove, and added it back in as it was determined all publication would be completed prior to expiration.							
							Sub Total	**$10,000**	**-**	**$10,000**
Other Expenses										
							Sub Total	**-**	**-**	**-**
							Grand Total	**$1,693,000**	**$1,586,826**	**$106,174**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Equipment, Tools, and Supplies		Miscellaneous materials for sampling and field work at $2,500 per year; sonde/water probe for water quality at $12,012.75. Flow Tracker Handheld, Flow Tracker 2 Probe, Clamp, Mounting and Wading Rod, level logger $14,230.51; Turbidity Sensor $1,928.5; Peristaltic pump $1,110.98; Exo 2, $1,306.25	The field equipment for sampling flow and water quality parameters will continue to be used by the White Earth Department of Natural resources for the life of the equipment
Capital Equipment		drone and lenses	this drone will continue to be used by the White Earth Department of Natural Resources for its useful life for the same purposes, i.e. biological monitoring relevant to water quality and quantity assessments **Additional Explanation :** this drone will continue to be used by the White Earth Department of Natural Resources for its useful life for the same purposes, i.e. biological monitoring relevant to water quality and quantity assessments
Capital Equipment		UofM Capital Purchases: Teledyne StreamPro ADCP $37,680 (2 purchased total); Nitrate Probe (EXO NitraLED Kit-for EXO 2) $5,220.00; leveloggers from Fondriest $7,342.39	This equipment will continue to be used by the White Earth Department of Natural Resources for its useful life for the same purposes, i.e. biological monitoring relevant to water quality and quantity assessments **Additional Explanation :** The field equipment for sampling flow and water quality parameters will continue to be used by the White Earth Department of Natural resources for the life of the equipment. Please note that 2 ADCP were purchased, and one will stay with the WEN and one will stay with the UofM. This is contractually agreed upon.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount	$ Amount Spent	$ Amount Remaining
State						
In-Kind	John Nieber P.H, P.E., Ph.D	provide advice on modeling of groundwater and surface water to supported graduate students	Secured	$20,000	$20,000	-
			State Sub Total	**$20,000**	**$20,000**	**-**
Non-State						
In-Kind	Chairman Michael Fairbanks and/or WE Community Leaders	provide advice on White Earth Band of Minnesota Chippewa Tribe's treaty rights and natural resources; valuation of volunteer hours, non-compensated	Secured	$15,000	$15,000	-
			Non State Sub Total	**$15,000**	**$15,000**	**-**
			Funds Total	**$35,000**	**$35,000**	**-**

Attachments

Required Attachments

Visual Component

File: 0c986fa4-608.docx

Alternate Text for Visual Component

Visual component...

Board Resolution or Letter

Title	File
white earth resolution	5c64df77-df9.pdf

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Letter of Support from 1855 Treaty Authority	1db1c9bb-d49.docx
Protecting Minnesota's Headwaters of the Mississippi/Pineland Sands	08b7cc6e-c8f.pdf
LCCMR Notes Revisions Needed 6-13-2024	e5042075-8a7.docx
One Page Project Description	8835fe89-828.docx
Two Virtual Stakeholder Engagement & Final in person Invite	04d4feeb-a96.pdf
Pineland Sands Final Stakeholder Meeting Agenda June 2, 2026	0b2c4e63-5b0.pdf
Final Stakeholder In-Person Event Flyer	a47913e5-dd1.pdf
June 2 stakeholder meeting small group discussion questions	e6dca907-708.pdf
Protecting Minnesota's Headwaters of the Mississippi and Pineland Sands (White paper)	4c7e28d2-7d1.pdf
Report A White Earth Nation History (White paper supplemental)	814781b6-d3a.pdf
Report B Water Laws in the United States (White paper supplemental)	39a8a6dd-40e.pdf
Report C Federal Indian Law Overview (White paper supplemental)	277d00a0-70a.pdf
Report D Federal Environmental Regulations in Indian Country (White paper supplemental)	96fd76a0-1b1.pdf
Report E An Overview of Water Law in Minnesota (White paper supplemental)	6bd4c060-e1c.pdf
Report F Characterizing Rooting Zone Chemistry in Wild Rice Lakes (White paper supplemental)	732f8d39-629.pdf
Report G Pineland Sands Field Study and Trend Analyses (White paper supplemental)	5b840385-311.pdf
Report H From Forest to Farmland in the Straight River Watershed (White paper supplemental)	dd7a16f7-8f7.pdf
Report I Groundwater Source Apportionment Using Baseyian (White paper supplemental)	f1ce2ff3-539.pdf
Report J Using a Groundwater Flow Model (White paper supplemental)	8fa3cc0c-368.pdf
Pineland Sands Project Executive Summary	cd659aa0-091.pdf
Pesticides of Concern in the Pineland Sands Region, Minnesota: Current and Historical Concentrations Above Ecological and Human-Health Screening Benchmarks	8b261b58-8c6.pdf
Investigating tradeoffs between competing agricultural objectives using multi-objective optimization under uncertainty	cd98c1c5-b67.pdf

From Forest to Farmland in the Straight River Watershed: What Has Changed Since 1850?	9ac72c45-291.pdf
Groundwater Nitrate Source Apportionment in the Pineland Sand Region Using Bayesian Modeling	b8be4c88-ef1.pdf
Protecting Minnesota's Headwaters of the Mississippi and Pineland Sands (White paper) compressed PDF	c6515ead-9be.pdf

Media Links

Title	Link
White Earth Nation Pineland Sands Final Report, Attachments Reports A-J, Executive Summary	https://www.whiteearth.com/divisions/natural-resources/lccmr-pineland-sands-study?token=21f567e27b1ff3668a923f1290926775c0943858

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

- edited budget to reflect appropriate benefits and shift some funding from field technicians to undergraduate research assistants who can aid field technicians and graduate researches with simpler tasks.

- edited budget to reflect increase in equipment costs overlooked during initial budget drafting.

- edited budget to include $10,000 for printing and publication of final white paper

- edited budget to increase junior policy associate to full time.

- edited budget to reflect benefits and salary for environmental counsel working .75 FTE/year

- edited proposal to designate White Earth Nation as submitting entity. White Earth Nation has robust capacity to administer grant funds and reimbursements from the DNR and has worked with the DNR previously on an LCCMR project.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

Yes

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the Commissioner's Plan applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

Yes, I understand

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Justification For Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Project Manager	Previous Manager: Jamie Konopacky (jamie.konopacky@whiteearth-nsn.gov) New Manager: Jamie Konopacky (jkonopacky@staffordlaw.com)	Updating account information with new email	December 6, 2023	Yes	December 6, 2023
2	Amendment Request	• General Information • Project Collaborators - Project Manager Info • Other • Budget - Personnel • Budget - Professional / Technical Contracts • Activities and Milestones • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Non-ENRTF Funds Contributed • Attachments	Requesting changes to remove biochar field component and add drone, wild rice habitat, and local community engagement meeting components, update information, and increase budget for professional technical contracts. There were delays that impacted implementation of this project and changed how we will complete some activities and milestones. See Additional status updates from January 2024 for explanation and justification for requested changes.	June 17, 2024	Yes	July 25, 2024
3	Project Manager	Previous Manager: Jamie Konopacky (jkonopacky@staffordlaw.com) New Manager: Jessica Johnson (jessica.johnson@whiteearth-nsn.gov)	LCCMR Admin change project manager	January 23, 2025	Yes	January 23, 2025
4	Amendment Request		Change in project manager needed address change and telephone number. New project manager information updated. Changed address and telephone number from prior project manager to current project manager from January 23.	January 23, 2025	Yes	January 23, 2025
5	Amendment Request	• Narrative • Budget - Professional / Technical Contracts • Budget - Travel and Conferences • Activities and Milestones	Budget changes occurred due to staffing changes during the first year. Changes as follows: Cost of groundwater monitoring less than anticipated	September 26, 2025	Yes	October 6, 2025

		• Budget - Personnel • Budget - Capital, Equipment, Tools, and Supplies • Budget - Printing and Publication • Budget - Non-ENRTF Funds Contributed	UofM additional support due to staffing changes with WEN Jamie K- no longer working with WEN; adjusted to WEN activity Nibi Center- leaders to provide support during engagement sessions (in kind) Josh J./Dallas H unable to enter into contract Caddis Fish- service description adjusted John D/Aquaveo efficiencies of services Printing-completed July 2026.			
6	Amendment Request	• Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Printing and Publication	Funds were adjusted to allow for the second contract with Amiable. This will allow additional sampling to occur, which will inform the results of the white paper. Other adjustments include the addition of one WEN staff member who is directly assisting the WEN Project Manager in completing project admin related activities and ensuring invoices are processed efficiently as well as tracked, and the contractors are able to continue efforts.	February 5, 2026	Yes	February 5, 2026
7	Amendment Request	• Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Printing and Publication	There is an additional technical review necessary of individual reports, edits to white paper, adding graphic summary to accompany white paper & ensure concise overview of the project above current scope of work from Young Environmental. Reduced conferences, meetings, and mileage, and employee Taylor Anderson for combined amount of $22,570 to increase Young Environmental service contract. Changed printing to publication.	May 27, 2026	Yes	May 29, 2026
8	Completion Date	Previous Completion Date: 06/30/2026 New Completion Date: 05/31/2027	LCCMR Staff changing in order to approve amendment request submitted.	May 29, 2026	Yes	May 29, 2026

9	Completion Date	Previous Completion Date: 05/31/2027 New Completion Date: 06/30/2026	LCCMR Staff changing back to original completion date after approving amendment.	May 29, 2026	Yes	May 29, 2026

Status Update Reporting

Final Status Update August 14, 2026

Date Submitted: August 14, 2026

Date Approved: September 30, 2026

Overall Update
Since the previous reporting period, the team has completed all field and monitoring activities and analyses of the data and modeling outputs. The results were written into report format and prepared for peer review publications. The team also put summaries of each project component into the main report and distributed the main report to the White Earth Nation Research and Review Board on June 9, 2026. The main report was written for a nontechnical audience. Authors also developed their own full reports in discipline specific language that are included as appendices of the main report. The third and final stakeholder meeting was held on June 2, 2026 (details below)

Activity 1
Data collection continued into late May/early June 2026 to allow sufficient time for data analysis and synthesis. Below is a status update for each task under Activity 1.

1.Completing a Coupled Regional Scale Surface Water and Groundwater Model – Complete

2. Developing a Regional Model Central Sands Region – Complete

3. Completing Well Contaminant Source Identification – Complete

4. Completing a Coupled Surface Water and Groundwater Model for Subbasins – Complete

5. Completing Surface Water and Groundwater Trend Analyses – Complete

6. Installing Equipment, Gathering Data, Informing Modeling – Complete

7. Completing an Alternative Sustainable Crop Production Experiment – Not applicable, task has been removed.
(This activity marked as complete as of this status update)

Activity 2
Since the last report period, all Activity 2 tasks have been accomplished:

1. Completing a Review of Current State, Federal, and Tribal Law Bearing on High-Capacity Wells – Complete

2. Updating Intermediate Data, Modeling, and Policy with Government/Tribal Agency Partners – Complete, virtual meeting occurred on April 2, 2026.

3. Updating Final Data, Modeling, and Policy with Government/Tribal Agency Partners – Complete, in-person meeting was held on June 2, 2026.

4. Sharing Draft White Paper with Collaborators – Complete.

5. Sharing Final White Paper with Collaborators and Public – Complete.
(This activity marked as complete as of this status update)

Activity 3
Two engagement events were held since the last reporting period. On April 2, 2026, a virtual meeting was held which focused on preliminary modeling and monitoring results. One comment and one question were posed by the audience that were later considered and adapted in the modeling approach.

-A DNR staff person asked a question/commented about bed tillage systems for potatoes, a system adopted by western states. Following the meeting, the bed tillage system was incorporated into the SWAT model, but it does not appear to benefit nitrate rates.

-The same DNR staffer made a comment that there is a three-year crop rotation in this area. The beans (one element of this crop rotation) receive nitrogen.

The final in-person stakeholder meeting occurred on June 2, 2026, in Ponsford, Minnesota. The meeting was organized with four lightning talks to share results. A discussion and question and answer session followed, allowing participants to ask questions about individual studies and discuss solutions for the study area.

Both meetings drew a wide range of interested individuals and organizations spanning White Earth Nation departments and elected leaders, the MPCA, MN DNR, MCEA, Izaak Walton League, Central Minnesota Irrigators, RD Offut Farms, and interested landowners.
(This activity marked as complete as of this status update)

Dissemination
Since the last reporting period, the project team developed a dissemination plan to share the final project results. The dissemination plan includes the following activities:

White Earth Nation created a webpage to host final project documents: https://www.whiteearth.com/divisions/natural-resources/lccmr-pineland-sands-study?token=21f567e27b1ff3668a923f1290926775c0943858

White Earth Nation announced the final project documents on social media and via email.

Additional Status Update Reporting

Additional Status Update August 14, 2026

Date Submitted: May 27, 2026

Date Approved: May 29, 2026

Overall Update

This is not the final report, a budget amendment is requested. Overall, the team has been working on disseminating research findings and preparing for the final stakeholder presentation next week, June 2, 2026. There is a Power Point and meeting rehearsal tomorrow. The team is also working diligently preparing the white paper for publication. There is additional review needed for white paper that Young Environmental has proposed to complete.

Activity 1

Activity 1: Data Gathering and Modeling

1. Completion of Coupled Regional Scale Surface Water and Groundwater Model – Done
2. Develop Regional Model to better understand impacts of water appropriations in Central Sands region- model has been developed, calibrated and tested (as stated above). Tests have been run to assess effects of appropriations- Done
3. Completion of Well Contaminant Source Identification- Additional constituents have been identified and sampled in October 2025. Historical wells have been identified for matching constituents. A preliminary run has been completed, and a preliminary set of values for nitrate source identification has been derived.
4. Completion of Coupled Surface Water and Groundwater Model for Subbasins- We have completed surface water and groundwater models for the Straight River, calibrated and tested. The Shell SWAT+ model is currently being calibrated.
5. Completion of Surface Water and Groundwater Trend Analyses- Sampled trend data have been collated and analyses are being performed. Preliminary analyses were presented March 2026.
6. Install Equipment, Gather Data, Inform Modeling- Sampling has occurred throughout the project. Done
7. Completion of Alternative Sustainable Crop Production Experiment- N/A, removed.

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Complete Review of Current State, Federal, and Tribal Law Bearing on High-Capacity Wells - UofM students/staff completed conduct a review of laws related to high-capacity wells.
2. Intermediate Data, Modeling, and Policy Update with Government/Tribal Agency Partners - Update partners on data, modeling results, and related policy. This is occurring with stakeholder events in March/April 2026.
3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - Present final updates to agency partners; meeting scheduled but will occur at end of project.
4. Share Draft White Paper with Collaborators - Share a draft of the white paper with project partners. Scheduled June, 2026
5. Share Final White Paper with Collaborators and Public - Meeting scheduled to occur at end of project life. Publish the final white paper outlining scientific findings and policy opportunities. Team members are currently evaluating the best options for the largest audience to see the paper results. As previously noted, a white paper subcommittee is incredibly active and has drafted significant portions of the paper. The team is currently reviewing the draft sections and placing sections into larger document for evaluation.

Activity 3

A significant degree of engagement has occurred since the last report. The team has completed multiple engagement events, with the most recent events focusing on providing preliminary results. The monitoring and modeling preliminary results were intentionally split out to two meetings due to the complexity of the subjects. The modeling meeting occurred April 2, 2026. The team has actively prepared and developed presentations.

In addition, an FAQ document, meeting summary, and marketing materials were developed for the events.
After the preliminary results meeting is completed, the final meeting will occur June 2, 2026. At this point, the group is expecting the white paper to be fully developed and in process of review and printing.

Dissemination

This is not the final update.

1. WEN Community Engagement Event- completed May 2025
2. Project Presentation- October 28- completed in Ponsford
3. Project Update and Preliminary Results Monitoring- Completed March 5, 2026
4. Project Update and Preliminary Results Modeling- Completed April 2, 2026
4. Final Project Update- June 2, 2026 (in person and planning underway)

Advertising was sent out in October for the last three events. Included within the material was a one pager describing the project, a place to put project related questions, and the Team has developed a Q/A document which will continue to be updated as the project progresses.

Status Update Reporting

Status Update April 1, 2026

Date Submitted: March 31, 2026

Date Approved: May 29, 2026

Overall Update

Since the previous reporting period, the team has focused on evaluating monitoring data, finalizing and reviewing data needs, calibrating models, and mobilizing as a group to draft the white paper. Significant portions of the white paper are developed (associated with history, law, methodology, and the group is in process of drafting the trends and findings sections. In addition, team members presented the initial monitoring results at a meeting in March, and prepared for the modeling presentation, that is scheduled to occur on April 2nd, 2026. The Pinelands Technical Group continues to meet frequently, and the University of Minnesota students and staff meeting internally to actively finalize modeling and develop narrative for the white paper.

Activity 1

Activity 1: Data Gathering and Modeling

1. Completion of Coupled Regional Scale Surface Water and Groundwater Model – Done
2. Develop Regional Model to better understand impacts of water appropriations in Central Sands region- model has been developed, calibrated and tested (as stated above). Tests have been run to assess effects of appropriations, this is set to be completed April 30, 26.
3. Completion of Well Contaminant Source Identification- Additional constituents have been identified and sampled in October 2025. Historical wells have been identified for matching constituents. A preliminary run has been completed, and a preliminary set of values for nitrate source identification has been derived.
4. Completion of Coupled Surface Water and Groundwater Model for Subbasins- We have completed surface water and groundwater models for the Straight River, calibrated and tested. The Shell SWAT+ model is currently being calibrated.
5. Completion of Surface Water and Groundwater Trend Analyses- Sampled trend data have been collated and analyses are being performed. Preliminary analyses were presented March 2026.
6. Install Equipment, Gather Data, Inform Modeling- Sampling has occurred throughout the project. Equipment was removed November 2025. Spring sampling will occur April 2026
7. Completion of Alternative Sustainable Crop Production Experiment- N/A, removed.

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Complete Review of Current State, Federal, and Tribal Law Bearing on High-Capacity Wells - UofM students/staff completed conduct a review of laws related to high-capacity wells.
2. Intermediate Data, Modeling, and Policy Update with Government/Tribal Agency Partners - Update partners on data, modeling results, and related policy. This is occurring with stakeholder events in March/April 2026.
3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - Present final updates to agency partners; meeting scheduled but will occur at end of project.
4. Share Draft White Paper with Collaborators - Share a draft of the white paper with project partners. Scheduled June, 2026
5. Share Final White Paper with Collaborators and Public - Meeting scheduled to occur at end of project life. Publish the final white paper outlining scientific findings and policy opportunities. Team members are currently evaluating the best options for the largest audience to see the paper results. As previously noted, a white paper subcommittee is incredibly active and has drafted significant portions of the paper. The team is currently reviewing the draft sections and placing sections into larger document for evaluation.

Activity 3

A significant degree of engagement has occurred since the last report. The team has completed multiple engagement events, with the most recent events focusing on providing preliminary results. The monitoring team presented to approximately 40 individuals representing a variety of interested and organizations (White Earth Nation Departments, MPCA, MnDNR, Minnesota Center for Environmental Advocacy, Irrigators Association, interested landowners, etc.). The monitoring and modeling preliminary results were intentionally split out to two meetings due to the complexity of the subjects. The modeling meeting will occur April 2, 2026. The team has actively prepared and developed presentations. In addition, an FAQ document, meeting summary, and marketing materials were developed for the events.
After the preliminary results meeting is completed, the final meeting will occur June 2, 2026. At this point, the group is expecting the white paper to be fully developed and in process of review and printing.

Dissemination

1. WEN Community Engagement Event- completed May 2025
2. Project Presentation- October 28- completed in Ponsford
3. Project Update and Preliminary Results Monitoring- Completed March 5, 2026
4. Project Update and Preliminary Results Modeling- in process to be completed April 2, 2026
4. Final Project Update- June 2, 2026 (in person and planning underway)

Advertising was sent out in October for the last three events. Included within the material was a one pager describing the project, a place to put project related questions, and the Team has developed a Q/A document which will continue to be updated as the project progresses.

Status Update Reporting

Status Update October 1, 2025

Date Submitted: February 5, 2026

Date Approved: February 5, 2026

Overall Update

Since the last reporting, both the UofM and WEN have actively worked together to conduct sampling. This intentional approach will WEN staff to develop the necessary skills to complete sampling once the project is completed. In addition, both the white paper subgroup and engagement subgroup have been meeting bi-weekly to both prepare for engagement events and make meaningful progress on completing the white paper. On the modeling front, students are working on the SWAT modeling for the Straight River. Calibration efforts are currently underway. Groundwater analysis/modeling is currently underway for the Straight River, and additional efforts are occurring on the denitrification analysis.

Activity 1

1. Regional model has been developed.
2. Additional evaluation is occurring related to the effects on appropriations.
3. Well Contamination Source Identification- MCMC simulation program was tested against published dataset in Water Resources Research Journal. Written report on method has been prepared. Team is surveying available chemistry data for wells in region and applying MCMC.
4. Complete Coupled Surface Water and Groundwater Model for Subbasins. We have surface water and groundwater models for Straight River and need to complete the model for Shell Lake River. A report outlining model development is being prepared and will be added to the appendix of the workplan report.
While a MODFLOW model for the Straight River was completed one year ago, the UofM will be adding additional area to the MODFLOW model. Work continue through Fall25.
5. Surface/Groundwater Trend Analysis- Data collection and preliminary trend analysis completed. Additional analysis to occur through 2025 as samples are collected.
6.Install Equipment, Gather Data, Inform Modeling- Equipment install, winterizing and field data gathering completed for 2024. 2025 field data collection will start in April and continue through November 2025.
7. Alternative Sustainable Crop Production Test-NA

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis
1. Review of Current State, Federal, and Tribal Law Related to High-Capacity Wells- previously identified as completed.
2. Stakeholder meetings occurred in May and are pending for October 28, January and May of 2026.
As related to the white paper development. An outline has been developed for the white paper, and individual tasks and responsible parties have been determined for drafting. Subgroups have been established to complete items that are most timely to accomplish (MN Water Law, WEN History, Legal Doctrines, etc.). Literature review is completed, Minnesota water law and federal law is completed, the case study subgroup has drafted an outline, and will complete both the study area and hypothesis sections by the October 6 deadline. This group is meeting consistently to draft/review white paper sections.
The subsequent activities are to occur at a later portion of this project.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026
4. Share Draft White Paper with Collaborators - March through May 31, 2026
5. Share Final White Paper with Collaborators and Public - June 30, 2026

Activity 3

As stated above, the group participated in the WEN Summit in May 2025. This gave Dr Nieber an opportunity to discuss the modeling side of the project. The project team is currently preparing for the October 28 in person project meeting. We have developed a flyer, project factsheet, overall project gantt chart and milestones document (to provide participants), as well follow up survey, etc. The stakeholder subgroup meets bi-weekly to prepare. The next event will be held January 2026 to provide the project update and overall results, and the final engagement meeting will occur in May 2026.

Dissemination

1. WEN Community Engagement Event- completed May 2025
2. Project Presentation- October 28- planning underway
3. Project Update and Preliminary Results- Meeting in January 2026
4. Final Project Update- May 2026

A flyer and gantt chart/milestones document have been developed for the October 28th WEN project meeting. Information has been reviewed by project partners and stakeholder list has been further prepared and vetted. Advertisement for the event will occur via the following means: general email and WEN listserv, newspaper, etc. To evaluate the design of the event, a short survey will also be provided to participants.

Additional Status Update Reporting

Additional Status Update August 14, 2025

Date Submitted: September 26, 2025

Date Approved: October 6, 2025

Overall Update

Accomplishments as of August 14 have focused on preparing for the engagement events and continue to align with sampling. Staff continue to meet regularly to discuss project updates, and additional focus has been made on coordinating sampling/data gathering between the White Earth Nation (WEN) and University of Minnesota (UofM) for the 2025 season as well determining a path forward for the white paper development. Strong efforts have occured with multiple developed subgroups including the White Paper Subgroup, Case Study Subgroup and Engagement Subgroup.

Activity 1

1. Regional model has been developed.
2. Additional tests occurred through April 30 to assess the effects on appropriations.
3. Well Contamination Source Identification- MCMC simulation program was tested against published dataset in Water Resources Research Journal. Written report on method has been prepared. Team is surveying available chemistry data for wells in region and applying MCMC.
4. Complete Coupled Surface Water and Groundwater Model for Subbasins. We have surface water and groundwater models for Straight River and need to complete the model for Shell Lake River. A report outlining model development is being prepared and will be added to the appendix of the workplan report.

While a MODFLOW model for the Straight River was completed one year ago, the UofM will be adding additional area to the MODFLOW model. Work continue through Fall25.

5. Surface/Groundwater Trend Analysis- Data collection and preliminary trend analysis completed. Additional analysis to occur through 2025 as samples are collected.
6.Install Equipment, Gather Data, Inform Modeling- Equipment install, winterizing and field data gathering completed for 2024. 2025 field data collection will start in April and continue through November 2025.
7. Alternative Sustainable Crop Production Test-NA

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Review of Current State, Federal, and Tribal Law Related to High-Capacity Wells- previously identified as completed.
2. Stakeholder meetings occurred in May and are pending for October, January and May of 2026.

As related to the white paper development. An outline has been developed for the white paper, and individual tasks and responsible parties have been determined for drafting. Subgroups have been established to complete items that are most timely to accomplish (MN Water Law, WEN History, Legal Doctrines, etc.). Literature review is completed, Minnesota water law and federal law is completed, the case study subgroup is beginning to draft their sections based off the outline approved/developed in August.

The subsequent activities are to occur at a later portion of this project.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026
4. Share Draft White Paper with Collaborators - March through May 31, 2026
5. Share Final White Paper with Collaborators and Public - June 30, 2026

Activity 3

Partners presented at the White Earth Nation summit in May. This provided an opportunity to discuss with the community the modeling approach and general overview of the project.

In addition, a subcommittee was formed for engagement. The subcommittee has met twice in preparation of the

October 2025 engagement event. Event design and flyer is currently underway. Additional engagement events are being prepared for January 2026 and May 2026.

Dissemination

Increased dissemination will occur in September and October as the group continues to prepare for the engagement portions of the project.

Additional Status Update Reporting

Additional Status Update August 14, 2025

Date Submitted: September 26, 2025

Date Approved: October 6, 2025

Overall Update

Accomplishments as of August 14 have focused on preparing for the engagement events and continue to align with sampling. Staff continue to meet regularly to discuss project updates, and additional focus has been made on coordinating sampling/data gathering between the White Earth Nation (WEN) and University of Minnesota (UofM) for the 2025 season as well determining a path forward for the white paper development. Strong efforts have occured with multiple developed subgroups including the White Paper Subgroup, Case Study Subgroup and Engagement Subgroup.

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Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Review of Current State, Federal, and Tribal Law Related to High-Capacity Wells- previously identified as completed.
2. Stakeholder meetings occurred in May and are pending for October, January and May of 2026.

As related to the white paper development. An outline has been developed for the white paper, and individual tasks and responsible parties have been determined for drafting. Subgroups have been established to complete items that are most timely to accomplish (MN Water Law, WEN History, Legal Doctrines, etc.). Literature review is completed, Minnesota water law and federal law is completed, the case study subgroup is beginning to draft their sections based off the outline approved/developed in August.

The subsequent activities are to occur at a later portion of this project.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026
4. Share Draft White Paper with Collaborators - March through May 31, 2026
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Activity 3

Partners presented at the White Earth Nation summit in May. This provided an opportunity to discuss with the community the modeling approach and general overview of the project.

In addition, a subcommittee was formed for engagement. The subcommittee has met twice in preparation of the

October 2025 engagement event. Event design and flyer is currently underway. Additional engagement events are being prepared for January 2026 and May 2026.

Dissemination

Increased dissemination will occur in September and October as the group continues to prepare for the engagement portions of the project.

Additional Status Update Reporting

Additional Status Update August 14, 2025

Date Submitted: September 26, 2025

Date Approved: October 6, 2025

Overall Update

Accomplishments as of August 14 have focused on preparing for the engagement events and continue to align with sampling. Staff continue to meet regularly to discuss project updates, and additional focus has been made on coordinating sampling/data gathering between the White Earth Nation (WEN) and University of Minnesota (UofM) for the 2025 season as well determining a path forward for the white paper development. Strong efforts have occured with multiple developed subgroups including the White Paper Subgroup, Case Study Subgroup and Engagement Subgroup.

Activity 1

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4. Complete Coupled Surface Water and Groundwater Model for Subbasins. We have surface water and groundwater models for Straight River and need to complete the model for Shell Lake River. A report outlining model development is being prepared and will be added to the appendix of the workplan report.

While a MODFLOW model for the Straight River was completed one year ago, the UofM will be adding additional area to the MODFLOW model. Work continue through Fall25.

5. Surface/Groundwater Trend Analysis- Data collection and preliminary trend analysis completed. Additional analysis to occur through 2025 as samples are collected.
6.Install Equipment, Gather Data, Inform Modeling- Equipment install, winterizing and field data gathering completed for 2024. 2025 field data collection will start in April and continue through November 2025.
7. Alternative Sustainable Crop Production Test-NA

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Review of Current State, Federal, and Tribal Law Related to High-Capacity Wells- previously identified as completed.
2. Stakeholder meetings occurred in May and are pending for October, January and May of 2026.

As related to the white paper development. An outline has been developed for the white paper, and individual tasks and responsible parties have been determined for drafting. Subgroups have been established to complete items that are most timely to accomplish (MN Water Law, WEN History, Legal Doctrines, etc.). Literature review is completed, Minnesota water law and federal law is completed, the case study subgroup is beginning to draft their sections based off the outline approved/developed in August.

The subsequent activities are to occur at a later portion of this project.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026
4. Share Draft White Paper with Collaborators - March through May 31, 2026
5. Share Final White Paper with Collaborators and Public - June 30, 2026

Activity 3

Partners presented at the White Earth Nation summit in May. This provided an opportunity to discuss with the community the modeling approach and general overview of the project.

In addition, a subcommittee was formed for engagement. The subcommittee has met twice in preparation of the

October 2025 engagement event. Event design and flyer is currently underway. Additional engagement events are being prepared for January 2026 and May 2026.

Dissemination

Increased dissemination will occur in September and October as the group continues to prepare for the engagement portions of the project.

Status Update Reporting

Status Update April 1, 2025

Date Submitted: September 26, 2025

Date Approved: October 6, 2025

Overall Update

Accomplishments during this reporting season have focused on alignment of goals, and coordination of efforts between partners. Staff continue to meet regularly to discuss project updates, and additional focus has been made on coordinating sampling/data gathering between the White Earth Nation (WEN) and University of Minnesota (UofM) for the 2025 season as well determining a path forward for the white paper development.

Various presentations have been developed during this reporting season, including a presentation to onboard individuals to the project, and a presentation to provide project updates on information on groundwater modeling and optimization, groundwater (well) sampling, and SWAT+ Modeling (Evaluating Hydrologic and Water Quality Responses to Land Use Changes in the Straight River Watershed Using SWAT+). Additional visuals were provided on specific sampling sites and the importance of data and parameters measured.

Regarding Modeling, the SWAT model has been completed for the Straight River watershed. Current activity involves the calibration of the model for the hydrology and then calibration for chemistry. A MODFLOW model for the Straight River was completed one year prior, UofM will be focusing on adding additional area to the MODFLOW model.

Activity 1

1. Regional model has been developed.
2. Additional tests to occur through April 30 to assess the effects on appropriations.
3. Well Contamination Source Identification- MCMC simulation program was tested against published dataset in Water Resources Research Journal. Written report on method has been prepared. Team is surveying available chemistry data for wells in region and applying MCMC. June 30, 2025 completion.
4. Complete Coupled Surface Water and Groundwater Model for Subbasins. We have surface water and groundwater models for Straight River and need to complete the model for Shell Lake River. A report outlining model development is being prepared and will be added to the appendix of the workplan report.

While a MODFLOW model for the Straight River was completed one year ago, the UofM will be adding additional area to the MODFLOW model. Work continue through Fall25.

5. Surface/Groundwater Trend Analysis- Data collection and preliminary trend analysis completed. Additional analysis to occur through 2025 as samples are collected.
6.Install Equipment, Gather Data, Inform Modeling- Equipment install, winterizing and field data gathering completed for 2024. 2025 field data collection will start in April and continue through November 2025.
7. Alternative Sustainable Crop Production Test-NA

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Review of Current State, Federal, and Tribal Law Related to High-Capacity Wells- previously identified as completed.
2. Although mentioned previously, the Intermediate Data, Modeling, and Policy Update with Government/Trial Agency Partners has not occurred. Partners did develop a series of PowerPoint presentations for meetings, as well a one-pager (attached in the portal) describing the project. The stakeholder meetings are proposed to occur in Fall 2025.

As related to the white paper development. An outline has been developed for the white paper, and individual tasks and responsible parties have been determined for drafting. Subgroups have been established to complete items that are most timely to accomplish (MN Water Law, WEN History, Legal Doctrines, etc.). The literature review section is close to

being finalized and is expected to be completed by June 2025.
The subsequent activities are to occur at a later portion of this project.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026
4. Share Draft White Paper with Collaborators - March 31, 2026
5. Share Final White Paper with Collaborators and Public - June 30, 2026

Activity 3

On March 7th, University of Minnesota, White Earth Nation, and Young Environmental met for a one-day workshop. The purpose of the workshop was to plan out all activities for the 2025 season, and remainder of the project. This includes field work, modeling, stakeholder engagement, and white paper development.

Community Education and Engagement

During the meeting it was determined the first meeting will be the Water Summit in May 2025. WEN staff and UofM are currently preparing for the event.

The next community engagement event will occur during October of 2025. The team currently has the identified stakeholders list and intends to use the event to kick off the activities that have occurred to date. The second engagement event will occur January 2026. At this time the 2025 field season will have wrapped up, and UofM will be in process of completing analysis of data received in the field. The final Project update is proposed to occur May 2026. This is aligned with the completion of the project and finalization of the white paper.

Dissemination

We have attached a copy of a one-page document that provided project purpose and updates. This was used for project partners to update interested parties. While we did not focus on dissemination, the partners did work together to develop an onboarding presentation and video for individuals that may be introduced into the project. It is expected that additional project updates will occur by the next reporting season.

Status Update Reporting

Status Update October 1, 2024

Date Submitted: October 17, 2024

Date Approved: October 23, 2024

Overall Update

Accomplishments during this reporting season have focused around developing ongoing coordination and communication (via regularly scheduled meetings), surface water and ground water modeling, data gathering, and installation of equipment. Staff have been actively working to complete efforts, and to establish the appropriate modeling/analysis procedures. The surface water and groundwater models for the Straight River are completed, with the Shell Lake River efforts in process.

The development of the ongoing meetings has served as an opportunity to problem solve and discuss difficulties. In addition, during those times, team members have actively worked together to prepare for future engagement meetings. Stakeholder lists have been developed, and the group has walked through the presentation in preparation.

Activity 1

Data Gathering and Modeling.

1. Coupled Regional Scale Surface Water and Groundwater Model is done.
2. The development of a regional model to better understand impacts of water appropriations in Central Sands region. The model has been developed. Additional tests are being run to assess the effects of appropriations. Proposed completion by April 30th, 2025.
3. Well Contamination Source Identification activity is in process. Staff continue to work on the modeling/analysis procedure. The intent is a Bayesian analysis, which requires a Monte-Carlo simulation procedure. Difficulties have arisen in the Monte-Carlo simulation which is being fixed. Staff also need to assess the well data, and determine if chemicals constituent identifiers will be available from existing data. Proposed completion June 30th, 2025.
4. Complete Coupled Surface Water and Groundwater Model for Subbasins. Staff have surface water and groundwater models for the Straight River and still need to complete the models for Shell Lake River. Proposed completion March 31, 2025.
5. Surface and Groundwater Trend Analysis. New graduate students are assisting. Data will still be collected in 2026.
6. Install Equipment, Gather Data, Inform Model. Monitoring equipt and wells installed. Pressure transducer to be installed.
7. Alternative Sustainable Crop Production Test-NA

Activity 2

Activity 2: White Paper and Sharing of Data and Analysis

1. Review of Current State, Federal, and Tribal Law Bear on High-Capacity Wells has been completed by staff.

The subsequent activities are to occur at a later portion of this project.

2. Intermediate Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2025

Purpose: To update partners on data, modeling results, and related policy.

3. Final Data, Modeling, and Policy Update with Government/Tribal Agency Partners - January 31, 2026

Purpose to: present final updates to agency partners.

4. Share Draft White Paper with Collaborators - March 31, 2026

Purpose: To share a draft of the white paper with project partners.

5. Share Final White Paper with Collaborators and Public - June 30, 2026

Purpose: To publish the final white paper outlining scientific findings and policy opportunities.

Activity 3

Community Education and Engagement

1. First Community Engagement Meeting - Original Proposed December 31, 2023 – Planning is underway. The team has developed a stakeholder list for various meetings, and also prepared a presentation, which the group has reviewed and walked through. The purpose of the meeting is to engage community members and experts on land and water issues. Engagement meeting to occur prior to December 31, 2024.
2. Second Community Engagement Meeting - Proposed December 31, 2024

This will be a follow-up meeting to assess ongoing project impacts and community input. This event is proposed to occur over the winter of 24/25.

3. Third Community Engagement Meeting - Proposed December 31, 2025

The purpose of this meeting will be to discuss results and identify opportunities for water restoration and protection efforts.

Planning for both the first and second community engagement meeting is underway and is expected to occur shortly.

Dissemination

This effort is pending. We expect that a greater number of dissemination updates will be provided during the subsequent reporting session.

Status Update Reporting

Status Update April 1, 2024

Date Submitted: June 17, 2024

Date Approved: July 25, 2024

Overall Update

The project encountered delays in getting the contract signed, which has pushed back some expected completion dates. MODFLOW (groundwater) and SWAT (surface water) model construction has begun. Models are being built, calibrated and integrated. Methodology for testing contaminant sources is underway. We have had an initial stakeholder meeting with the irrigators association and will hold our first official stakeholder meeting during the first week of June, 2024. Participant list and topics have been finalized. Field equipment has been purchased (acoustic doppler samplers) and our first field sampling team is on board and trained. Our junior policy specialist is no longer available after delays, but we reworked the division of labor between a new project implementation lead and senior policy specialist that will enable one person to move forward with white paper and more technical stakeholder meetings and another person to handle day-to-day project management. With money reduced from field staff budget (it was determined that we needed less full-time help/ wouldn't provide benefits for hourly work), we are bringing on 3 people from the tribal community to lead and report on community engagement meetings. We will start info sharing w DNR and PCA at 1st stakeholder mtg.

Activity 1

The modeling team has completed calibration of the steady-state regional model (i.e. model covering the entire project area, 592 sq. mi.) and calibration of the transient regional model is in process. The sub-model covering the shell river watershed has been constructed but not calibrated, and the sub-model covering the straight river has been constructed and steady-state calibration is in process. The team is conducting additional site assessment to determine feasibility of constructing a third sub-model focused on the southeast corner of the reservation. SWAT models have been constructed for the straight and shell river watersheds and reasonably fit historical data, exploring use of PEST calibration for SWAT as well as MODFLOW models. Preliminary results from initial runs of transient regional model are available and being analyzed by the team. The field monitoring team for this season has been trained and conducted monthly chemical and flow sampling at established river sites. The team also installed shallow groundwater monitoring sites. Sampling occurred Sept-Nov 2023 and Feb-May 2024. U of MN is in the process of identifying sites for deeper groundwater monitoring wells that will help establish baseline groundwater conditions.

Activity 2

Comprehensive policy assessments are underway, and an outline of policy paper has been provided to the team. Recent reports by MN DNR in straight river groundwater management area and little rock creek being carefully reviewed as part of overarching policy analysis. Policy team is meeting with field and modeling teams to understand real-time information being gathered and modeled and assessments of the same and determining appropriate integration of the same into the policy white paper.

Activity 3

A first preliminary stakeholder meeting was held with the irrigator's association and a slide deck was prepared for the same; preparations are underway for the first formal stakeholder meeting now scheduled to be held in the second week of June; a list of individuals, organizations, and entities to invite has been compiled and invitations for the online meeting will go out the first week of June; science and policy teams have begun putting together a slide deck to be shared at the first formal stakeholder meeting that will provide a project overview, status update, and some preliminary findings; we anticipate and are also preparing to answer a significant number of questions at the first formal stakeholder meeting regarding how our project overlaps and/ or intersects with ongoing work by the state of Minnesota in the

Straight River Groundwater Management Area as well as the relationship to recent policy changes that went into effect during the 2023 legislative session.

Dissemination

Dissemination activities, other than the first meeting with the irrigators association, have not started.

Additional Status Update Reporting

Additional Status Update January 15, 2024

Date Submitted: June 17, 2024

Date Approved: July 25, 2024

Overall Update
Amendments: when the project was developed, the lead policy person/ project leader was housed in-house with the Tribe, she has since moved to a firm and works as outside counsel, accordingly, the Band would like to switch her to a contract position; the junior policy person was no longer available when the project belatedly got started, so the lead policy person will do all major white paper and stakeholder meeting work and a separate contractor/ project implementation lead is needed for day-to-day management; the added wild rice habitat component will ensure sufficient data and information are gathered and assessed in order to carry out one of the main project objectives, which is protecting the treaty right to harvest wild rice; relatedly, the biochar component was not originally part of the project and the project team determined it would be better incorporated as part of a subsequent project; conferences were adjusted to remove out of state travel and incorporate local and online opportunities that are critical for the modeling and field teams to share information and receive feedback and/or learn modeling construction and calibration techniques; 4 conferences will be attended by grad and undergrad students, supervising professors and tribal staff.

Activity 1
Tailoring the project to better understand past and potential future impacts to wild rice requires building out a more comprehensive wild rice habitat assessment; a foremost expert will review existing state agency and tribal records to identify recommended sites for sampling and evaluation within the regional model area, sample water column sulfate, pore water sulfide, sediment, total organic carbon, sediment extractable iron, and sediments for wild rice DNA; identify appropriate labs for processing samples; help develop and train field staff in sampling protocols and provide field sampling equipment and supplies; join field work for up to 12 days; and provide interim and final assessments of findings that can be incorporated into the final policy white paper and stakeholder meetings; as the team has been finalizing sample sites and labs capable of running analyses of necessary samples, it was determined that the budget for lab costs needed to be increased to cover isotope, ion, pesticide and algae sampling at expanded lake and river sites as well as in shallow groundwater monitoring wells; several labs must be contracted with because no single lab can run all the necessary tests for the project team; U of MN also required additional model consulting funds

Activity 2
Additional activity 1 update: field budget is being reduced because after further analysis, the team determined that we did not need full time field employees for the life of the project; field staff will be part time, paid on an hourly basis and not receive benefits; accordingly, less money is needed for the field staff line item; additional explanation of how funds will be shifted is included above in overall update of April report; lab budgets were increased after field team did further assessment and determined that additional sampling points and/or sampling parameters were necessary to successfully carry out the project

Activity 3
After the first preliminary stakeholder meeting with the irrigator's association and preparing content for the first formal stakeholder meeting, it became apparent that a large portion of previously planned stakeholder meetings will be highly technical in nature, covering complex science, law, and policy components; however, there is a significant need to help bridge the gap between more technical conversations and members of the impacted Tribal and local communities; accordingly, the team feels we would benefit from having trusted local leaders, well versed in the subject matter and familiar with community members and some of their shared experiences, create a parallel space for sharing stories and concerns of locally impacted individuals; local community members will still, of course, be encouraged to attend and

welcomed at the more technical, interdisciplinary stakeholder meetings; the nibi center is a trusted center for water research and policy on the reservation that is accessible and interested in engaging with the project;as with technical stakeholder meetings, the leaders of the local community meetings would record/ share findings, to be incorporated into the final white paper; $15,817 covers three weeks/ 40 hrs each of work for 3 community leaders to prepare for, host, and prepare takeaways.

Dissemination

dissemination activities have not started.