Final Abstract

Final Report Approved on November 14, 2025

M.L. 2022 Project Abstract

For the Period Ending June 30, 2025

Project Title: Strategic Framework to Guide Local Water Storage Implementation

Project Manager: Henry Van Offelen

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Website: https://bwsr.state.mn.us

Funding Source:

Fiscal Year:

Legal Citation: M.L. 2022, Chp. 94, Sec. 2, Subd. 03o

Appropriation Amount: $200,000

Amount Spent: $200,000

Amount Remaining: -

Sound bite of Project Outcomes and Results

This project delivered a science-based, locally informed framework and GIS tools to identify and prioritize water storage sites. Two pilot watersheds were used to develop storage strategies with these tools which continue to be refined and prepared for broader deployment to strengthen watershed planning and accelerate multi-benefit water storage statewide.

Overall Project Outcome and Results

This project successfully delivered a science-based, systematic framework for identifying, prioritizing, and evaluating multi-benefit water storage opportunities across Minnesota's watersheds. The framework was developed using existing data, advanced GIS tools, hydrologic modeling, and extensive engagement with conservation and water management professionals. It provides a repeatable, scalable process that local partners can use to develop watershed-specific water storage strategies to improve water quality, reduce flooding, enhance habitat, and build climate resiliency.

Work focused on two demonstration watersheds—the Buffalo-Red and Yellow Medicine—where complete water storage opportunity datasets were developed, reviewed, and refined through a series of facilitated meetings. Local

practitioners contributed site-specific information that improved prioritization and narrowed thousands of potential storage sites to hundred of priority candidates. Each watershed now has draft water storage data that includes a prioritized list of project opportunities grounded in hydrologic modeling and local knowledge.

The project also produced a suite of GIS tools capable of: (1) identifying candidate storage sites, (2) generating site attributes to support prioritization, and (3) evaluating the hydrologic effects of implementing different storage scenarios. A user manual, technical documentation, meeting materials, agendas, and presentation templates accompany the tools, enabling other watershed groups to apply the framework.

Although the third demonstration watershed (Cedar) was not fully completed during the project period, the hydrologically conditioned DEM and finalized GIS tools are now being used to generate its storage dataset. These tools are currently being refined for release on BWSR's PTMApp website pending MnGeo/MNIT review.

BWSR staff are now learning to use and apply this framework to identify water storage opportunities in additional watersheds and are preparing statewide communication and dissemination efforts. The project's results position land and water managers to more strategically identify and invest in multi-benefit water storage projects across the state to meet watershed plan goals.

Project Results Use and Dissemination

Project results have been disseminated increase awareness and support use by watershed partners and resource managers. GIS tools, user guides, data and attribute catalogs, and a package of model watershed meeting agendas and slideshows were developed for sharing with BWSR staff for ongoing use and refinement. Results were presented internally within BWSR, at two recent conferences and will be shared at the 2026 Minnesota Watersheds Conference. Several watershed groups have expressed interest in applying the framework during updates to their comprehensive watershed plans. The tools, user manual, and project information will be added to the BWSR website pending internal review.

Environment and Natural Resources Trust Fund

M.L. 2022 Approved Final Report

General Information

Date: December 2, 2025

ID Number: 2022-081

Staff Lead: Tiffany Schaufler

Project Title: Strategic Framework to Guide Local Water Storage Implementation

Project Budget: $200,000

Project Manager Information

Name: Henry Van Offelen

Organization: Board of Water and Soil Resources

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Project Reporting

Final Report Approved: November 14, 2025

Reporting Status: Project Completed

Date of Last Action: November 14, 2025

Project Completion: June 30, 2025

Legal Information

Legal Citation: M.L. 2022, Chp. 94, Sec. 2, Subd. 03o

Appropriation Language: $200,000 the second year is from the trust fund to the Board of Water and Soil Resources to create a framework for prioritizing water storage projects throughout the state. The framework will use existing data and local stakeholder input, be scalable, and emphasize projects that provide multiple benefits, including for water quality, flood control, and habitat.

Appropriation End Date: June 30, 2025

Narrative

Project Summary: Framework to prioritize water storage projects strategically throughout the state. The framework will use existing data, local stakeholder input, be scalable, and emphasize multi-benefit water storage (water quality, flooding, habitat).

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

Adding water storage to the landscape is critical to improving watershed conditions (reduced flooding and erosion, improved water quality, improved habitat quality, increased resiliency to climate change). Local governments and landowners are interested in putting water storage practices on the land, but there is no comprehensive framework to guide decision-making to strategically invest local, state, and federal dollars. A science-based, systematic approach that local governments and citizens can use to evaluate water storage opportunities is essential to improving watershed conditions. There currently is no comprehensive approach to prioritize, identify, and assess water storage projects and their ability to achieve multiple benefits, including: improve water quality, improve habitat, reduce flood damages, and increase landscape resiliency to climate change.

An implementation framework is needed now more than ever as the state considers funding water storage programs. The framework will provide critical information to bridge the gap between ongoing watershed planning processes (e.g., One Watershed One Plan) and local governments' desire to implement multiple-benefit projects that spend public and private funds wisely. This framework will empower citizens and local governments to make well informed science-based decisions, help remove current implementation barriers, and accelerate implementation of water storage practices.

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.

This project will develop a scientifically sound process with integrated information and communication strategies (i.e. "Framework") to engage and educate local conservation professionals so they can achieve water storage goals. The framework will systematically guide users through: 1) problem identification and goal setting, 2) creation and use of a water storage opportunities dataset to identify, compare, and prioritize storage projects for multiple benefits, and 3) a streamlined process that local decision-makers can use to implement water storage scenarios in their watershed.

The framework will include tools to create and evaluate potential water storage datasets along with education materials, workbooks, and step-by-step instructions that local planners can use to engage landowners and measure progress toward achieving multipurpose watershed goals. The framework will be tested and refined in three Minnesota watersheds (HUC8) with different levels of available data and plans. Local water planners, citizens, and state agency staff will be engaged to apply the framework and select an optimal set of water storage projects within each their watersheds.

The final framework components, including communication strategies, will be distributed statewide for use in training local partners in their watersheds.

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?

Project outcomes will increase water storage within Minnesota's watersheds which is essential to future conservation and enhancement of Minnesota's water resources, improved water quality, reduced flooding, and increased resiliency. Outcomes include: 1) increased local understanding of watershed hydrology and storage needs, 2) refined data, tools, and models to identify, prioritize, and evaluate water storage opportunities, 3) systematic process that local conservation professionals can use to produce plans with prioritized multipurpose projects to meet goals, 4) local engagement and buy-in to water storage implementation strategies in three watersheds, and 5) a framework directly transferable for use in all Minnesota watersheds.

Project Location

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

Statewide

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

Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Develop implementation framework

Activity Budget: $145,000

Activity Description:
Develop the technical information for the water storage framework in three watersheds. The framework data, maps, GIS tools, models and materials (flow charts, workbooks, guidance documents) crafted in this activity are critical to guiding local participants through a systematic process from problem identification to water storage project selection. Activities include:

- Identifying the extent, frequency, and duration of flooding and related hydrology issues
- Establishing practical and defensible goals, tied to specific outcomes;
- Establishing and weighing successful implementation factors;
- Developing and evaluating various water storage scenarios (e.g., ability to achieve multipurpose outcomes);
- Evaluating the order of project implementation within the watershed (e.g., where to work first);
- Establishing methods to determine outcomes (e.g., public versus private);
- Developing realistic estimates of funding needs;
- Developing methods for tracking progress and adapting as needed to ensure the expected outcomes are realized.

The technical products created in this activity will use and build on existing watershed data and hydrologic modeling, are consistent with current watershed plans, and help overcome common barriers to water storage implementation. Common barriers include a lack of technical tools and capacity needed to establish local water storage priorities and evaluate water storage projects relative to multipurpose goals.

Activity Milestones:

Description	Approximate Completion Date
Assemble base watershed data	October 31, 2022
Develop water storage opportunities database	January 31, 2023
Evaluate water storage scenarios	October 31, 2023
Data dissemination and report	June 30, 2025

Activity 2: Test Implementation Framework in Demonstration Watersheds

Activity Budget: $55,000

Activity Description:
Test the framework by partnering with local watershed teams in three diverse watersheds (HUC8). Watersheds from different areas of the state with a variety of available data and models will be selected to ensure the framework is transferable to other watersheds. The teams will work step by step through the framework in a series of facilitated meetings that use the products created in Activity 1.

The team will use Activity 1 products and available models (e.g. LiDAR, HSPF, PTMApp) to identify, explore, and evaluate potential water storage sites (e.g. impoundments, drainage water management, wetland restoration, increased soil health). Team members will use the characteristics of potential sites to screen their potential to meet hydrology, water quality, and habitat goals. Hydrological screening metrics include peak and annual flow reduction potential and storage volume needed to create non-contributing areas. Water quality screening metrics include sediment and nutrient reduction potential. Habitat screening metrics are based on proximity to MN wildlife action network priorities. Additional screening metrics (e.g life-cycle costs, permit likelihood) will also be derived. These metrics enable local

watershed teams to objectively compare and prioritize water storage sites and create water storage scenarios to meet multipurpose goals.

Activity Milestones:

Description	Approximate Completion Date
Kickoff meetings and project orientation with local implementation teams	December 31, 2022
Develop scenarios, evaluate scenarios, and select preferred water storage scenario in each watershed.	December 31, 2023
Package framework materials for distribution and use in other watersheds	June 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Charles Fritz	International Water Institute	The International Water Institute team will provide technical expertise in LiDAR, GIS, and hydrologic modeling needed to derive and refine decision support data needed for this project as well as their on-the-ground experience of working with local governments and landowners to implement conservation practices.	Yes

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.
Dissemination efforts will be targeted at core audiences responsible for implementing water storage projects including soil and water conservation districts, watershed districts, and local government officials. Efforts will include production of a water storage framework workbook that will be provided on BWSR's water storage webpage. The results of this work will be presented at annual conferences for these audiences including the MASWCD conference, BWSR Academy, MAWD conference, MN Water Resources Conference, MNGeo conference, and MN drainage work group. Additional presentation of the project will be provided to regional workshops and to watershed groups interested in implementing water storage. All publications and materials will use the trust fund logo and/or attribution language consistent with ENRTF acknowledgement guidelines.

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?
This framework (systematic process, packaged information, communication strategies) will give local governments the tools, information, and strategic step-by-step process to meet their watershed water storage goals required in comprehensive watershed management plans. Once established, the framework tools and processes are directly transferrable to all watersheds. Local conservation professionals, state agency staff, and citizens will use the framework to evaluate and implement storage projects and ensure that local, state, and federal funds are used wisely to evaluate and implement projects with multipurpose outcomes. The framework will add value to ongoing watershed planning efforts and be integrated into implementation efforts throughout Minnesota.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount	$ Amount Spent	$ Amount Remaining
Personnel										
							Sub Total	**-**	**-**	**-**
Contracts and Services										
International Water Institute	Subaward	International Water Institute staff will compile and create most of Activity 1 data and will package this information into understandable information for Activity 2. They will be a partner in presentation, recording, and evaluating Activity 2 scenarios. This is a sole source contract to the project partner.				0.38		$85,139	$85,139	-
Houston Engineering, Inc.	Service Contract	Adapt and refine existing hydrologic models and best management practice prioritization tool to readily evaluate and report outcomes of water storage scenarios developed by local watershed groups. Contract will be selected via RFP or competitive bidding following Department of Administration's contracting guidelines. Sole source contract in place for PTMAPP contract.				0		$114,861	$114,861	-
TBD	Service Contract	Develop professional communication materials for local government staff use in outreach efforts to landowners that promote water storage implementation projects. Contract will be selected via RFP or competitive bidding following Department of Administration's contracting guidelines.				0		-	-	-
							Sub Total	**$200,000**	**$200,000**	**-**
Equipment, Tools, and Supplies										

							Sub Total	**-**	**-**	**-**
Capital Expenditures										
							Sub Total	**-**	**-**	**-**
Acquisitions and Stewardship										
							Sub Total	**-**	**-**	**-**
Travel In Minnesota										
							Sub Total	**-**	**-**	**-**
Travel Outside Minnesota										
							Sub Total	**-**	**-**	**-**
Printing and Publication										
							Sub Total	**-**	**-**	**-**
Other Expenses										
							Sub Total	**-**	**-**	**-**
							Grand Total	**$200,000**	**$200,000**	**-**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount	$ Amount Spent	$ Amount Remaining
State						
In-Kind	Funding for BWSR staff that will manage this project and staff that participate in Activities 1 and 2 including the chief engineer, clean water specialists, and board conservationists.	Staff time to manage the project and to participate on technical teams in development, review, and packaging of materials in Activity 1. Staff time to participate in three local watershed teams in scenario development and evaluation process as part of Activity 2.	Secured	$63,000	$63,000	-
In-Kind	Funding for BWSR staff travel expenses associated with this project.	Travel related expenses associated with BWSR staff	Secured	$6,000	$6,000	-
			State Sub Total	**$69,000**	**$69,000**	**-**
Non-State						
			Non State Sub Total	**-**	**-**	**-**
			Funds Total	**$69,000**	**$69,000**	**-**

Attachments

Required Attachments

Visual Component

File: 3c0276ff-50a.pdf

Alternate Text for Visual Component

Overview of proposed water storage implementation framework including process steps, information, and anticipated multipurpose outcomes....

Supplemental Attachments

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

Title	File
Background Check form	e39d2f2e-8ee.pdf
WaterStorage_MN_Watersheds_2025	4d9bf6d7-a51.pdf
Hydrologytool_ usersguide_draft 724	8ec67dd7-98d.docx
Hydrology Tool User's Guide	39834a24-6a0.pdf
Hydrology Tool Data Catalog	2c609d2b-b8a.pdf
Hydrology Toll Attribute Catalog	a1d5ebab-dff.pdf
Water Storage Strategy Presentation to UCOWR conference	4445b2d9-fdc.pdf

Media Links

Title	Link
New Tool Article	https://bwsr.state.mn.us/sites/default/files/2024-07/snapshots_story_2_august_2024_bwsr_water_storage_strategy_tool.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Minor text edits. Updates to address reviewer comments. Remove state staff as personnel in budget. Adjusted budget to accommodate allocation.

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?

N/A

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?

N/A

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?

No

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	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Completion Date	Previous Completion Date: 06/30/2024 New Completion Date: 06/30/2025	LCCMR work around to address final reporting system logic conundrum	July 30, 2024	Yes	July 30, 2024
2	Completion Date	Previous Completion Date: 06/30/2025 New Completion Date: 06/30/2024	LCCMR work around to address final reporting system logic conundrum	July 30, 2024	Yes	July 30, 2024
3	Amendment Request	• Other • Activities and Milestones • Budget - Professional / Technical Contracts • Attachments	Amendment request based remaining work needed to fully complete the project as indicated in original work plan. Work by IWI was incomplete and did not use all budgeted funds ($19,861 remains). This amendment request that these funds and the remaining $10,000 originally for communications be repurposed to complete the project. Specifically, for additional technical work needed for full completion of GIS water storage tool development, testing, and training.	January 14, 2025	Yes	January 14, 2025
4	Completion Date	Previous Completion Date: 06/30/2024 New Completion Date: 06/30/2025	This change is needed to fully complete the project with available funds. Contract work for GIS tool development will be fully completed based on beta testing, local governments in three watershed will receive final data and training to refine their water storage strategies, training and guidance materials will be updated to readily expand tool use throughout the state.	January 8, 2025	Yes	January 8, 2025

Status Update Reporting

Final Status Update August 14, 2025

Date Submitted: November 10, 2025

Date Approved: November 12, 2025

Overall Update
This project achieved the outcomes stated in the narrative. A framework system was developed that uses existing data and local stakeholder input to develop a water storage strategy in a watershed area of interest. The framework was developed by engaging local conservation and water management professionals in the Buffalo-Red and Yellow Medicine watersheds. The framework is scalable to other watersheds and can be used to emphasize multi-benefit water storage (water quality, flooding, habitat). The systematic framework process and advanced GIS tools developed in this project increased the understanding of watershed hydrology and storage needs. The project engaged local practitioners to refine the data/tools/models needed to identify, prioritize, and evaluate water storage opportunities in their watershed. This GIS model is now available including a user manual and technical documentation. The systematic framework process can be used by local water management and conservation professionals throughout Minnesota to identify and prioritize water storage sites to meet local goals. BWSR staff are using the framework and supporting materials in other watersheds to identify and prioritize water storage opportunities and develop water storage strategies for use in comprehensive watershed management plans.

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
Activity two milestones are complete. A set of GIS tools were developed to: 1) identify water storage sites within a watershed of interest, 2) derive attributes for the storage sites to help local staff prioritize them, and 3) to evaluate the hydrologic effects of different water storage scenarios for a watershed. In addition to these data and the modeling capacity, a framework process was developed to engage a local watershed group to develop their own water storage strategy. This process includes materials (model agendas, presentations) to facilitate four to six meetings with watershed groups. Conservation and water management staff in the Buffalo-Red and Yellow Medicine watersheds were engaged in this project to refine data development, refine the hydrology model, and to create the model process to engage local staff in developing a water storage strategy. These GIS tools, example data, and package of meeting materials (agendas, slideshows, prioritization process) are now available for use and continued refinement in other watersheds. BWSR staff are now working to train key staff to deploy these tools and the framework to other watersheds. The GIS tools are available from BWSR staff as they continue to be used and refined.
(This activity marked as complete as of this status update)

Dissemination
GIS tools are complete and will be available on the BWSR PTMApp website once fully vetted by MnGeo and MNIT. We presented the results of the work to the Universities Water Resources Conference in July. Multiple watershed groups are interested in using the tools and process during updates to their comprehensive watershed plans. BWSR will highlight this work in future publications. Results will also be presented at the 2025 MN Watersheds and there are ongoing discussions within BWSR of using the tools to develop water storage data statewide when PTMApp data for watersheds is updated.

Status Update Reporting

Status Update March 1, 2025

Date Submitted: April 2, 2025

Date Approved: June 10, 2025

Overall Update
This project has generally achieved the first four proposed outcomes in two watersheds. Work since the last report has generally focused on achieving the fifth proposed outcome. We are currently working on refining the tools and models used to develop water storage data and engage watershed groups and will add the final tools to the guidance document that will become the proposed "framework" to directly transfer what we learned in this project for use in other Minnesota watersheds.

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
Since the last update, a working GIS plug-in toolbar for ArcPro has been completed and tested. The toolbar is currently under additional refinement based on experiences in the two test watersheds. Specifically, we have scoped out a set of additional needs to help local users prioritize water storage sites. The toolbar is being modified to create a set of additional attributes for each water storage site. These additional tools will soon be tested for inclusion in the framework. At the same time, work is ongoing to complete "water storage strategy" documents for the two completed watersheds. Water storage sites data for a 3rd watershed are under consideration.

Dissemination
This project has been shared internally within BWSR since the last update. Several additional watersheds groups have contacted BWSR staff to go through the framework process and develop a water storage strategy.

Additional Status Update Reporting

Additional Status Update January 14, 2025

Date Submitted: January 14, 2025

Date Approved: January 14, 2025

Overall Update
This project has met most of the outcomes described in the project narrative. A water storage strategy development process was initiated and completed for two watersheds. BWSR staff now continue to refine and apply the "framework" process for a third watershed area. The final version of the framework is based on lessons learned creating the water storage data and holding the series of local meetings to help set water storage site priorities and develop a water storage strategy for the two watersheds. The framework includes a model set of meeting materials (agenda, slide shows, sites prioritization worksheets) and GIS tools with hydrologic model and a user's guide. This information continues to be tested and applied by BWSR staff in several other areas to ensure it can be used effectively in other Minnesota watersheds interested in developing a water storage strategy. A BWSR snapshots article about this project was recently published and several other watersheds have expressed interest in the framework. A presentation and a technical workshop about the project was accepted for the BWSR academy and for the Minnesota Watersheds conference. Work remains in final testing and refinement of GIS tools and completion of storage strategy final reports.

Activity 1
This activity was previously marked complete.
(This activity marked as complete as of this status update)

Activity 2
The methods and data developed in Activity One were used to develop draft water storage strategies that are still in the process of final refinement with local watershed groups. The framework process has been completed which includes a systematic approach to develop water storage data, engage local watershed groups to review and prioritize water storage data, discuss goals and opportunities, and evaluate water storage scenarios.
Final meetings have been held with watershed groups in two demonstration watersheds (Buffalo-Red, Yellow Medicine). Draft water storage strategy reports for these two watersheds are in the process of being completed by BWSR staff. The new tools developed in this project are available as an ArcPro toolbar with a complete Users' Guide. An additional automated tool is needed to develop complete attributes to help users prioritize sites. The final tools will be used to develop a water storage strategy for the Cedar watershed.
The materials developed in this project are still being packaged for use in other watersheds. These products include series of meeting agendas with clear objectives, model powerpoint presentations, example water storage strategies from the pilot watersheds, and a guidance document that outlines the water storage strategy planning.

Dissemination
A BWSR snapshots article was complete for this project in early August (https://bwsr.state.mn.us/sites/default/files/2024-07/snapshots_story_2_august_2024_bwsr_water_storage_strategy_tool.pdf). This article has generated interest in the tools and their use in other watersheds. BWSR staff were updated on the project at a regional operations meeting in June. An abstract is being prepared in collaboration with Houston Engineering for the MN Watersheds Conference and it is anticipated that abstracts will be submitted for the MN GIS/LIS conference. A technical workshop on use of the tools and model has been scheduled for BWSR Academy in October in addition to a non-technical presentation on water storage at this event. The GIS toolbar and user's guide is available for use to select users for further testing. Once additional testing is complete, this new toolbar will be available on the PTMApp webiste and references to all final

resources will be linked to the water storage page on the BWSR website. Additional training for users will be scheduled in conjunction with ongoing training for the PTMApp application.

Additional Status Update Reporting

Additional Status Update August 14, 2024

Date Submitted: January 14, 2025

Date Approved: January 14, 2025

Overall Update

This project has met most of the outcomes described in the project narrative. A water storage strategy development process was initiated and completed for two watersheds. BWSR staff now continue to refine and apply the "framework" process for a third watershed area. The final version of the framework is based on lessons learned creating the water storage data and holding the series of local meetings to help set water storage site priorities and develop a water storage strategy for the two watersheds. The framework includes a model set of meeting materials (agenda, slide shows, sites prioritization worksheets) and GIS tools with hydrologic model and a user's guide. This information continues to be tested and applied by BWSR staff in several other areas to ensure it can be used effectively in other Minnesota watersheds interested in developing a water storage strategy. A BWSR snapshots article about this project was recently published and several other watersheds have expressed interest in the framework. A presentation and a technical workshop about the project was accepted for the BWSR academy and for the Minnesota Watersheds conference. Work remains in final testing and refinement of GIS tools and completion of storage strategy final reports.

Activity 1

This activity is complete for two watersheds where base watershed data and a water storage opportunities database have been developed and used in a series of watershed meetings to draft a water storage strategy. A process has been developed to engage a local watershed group to review the storage data and add site attributes that help set local priorities (i.e. site specific factors to score sites and narrow down storage sites from thousands to dozens). The two watersheds now have a draft water storage strategy that includes a list of highest priority water storage sites that can now use to make local decisions about implementation. The project did not complete work in a third demonstration watershed; however, the digital elevation model for the Cedar watershed has been hydrologically conditioned and the final version of the GIS tools are now being used to create the water storage data for this third watershed. Methods and GIS tools to evaluate the hydrologic effects of implementing water storage projects were established and used in the draft strategies. Work will continue in Activity 2 to turn some manual GIS tools developed in this activity to automated tools.

(This activity marked as complete as of this status update)

Activity 2

The methods and data developed in Activity One were used to develop draft water storage strategies that are still in the process of final refinement with local watershed groups. The framework process has been completed which includes a systematic approach to develop water storage data, engage local watershed groups to review and prioritize water storage data, discuss goals and opportunities, and evaluate water storage scenarios.

Final meetings have been held with watershed groups in two demonstration watersheds (Buffalo-Red, Yellow Medicine). Draft water storage strategy reports for these two watersheds are in the process of being completed by BWSR staff. The new tools developed in this project are available as an ArcPro toolbar with a complete Users' Guide. An additional automated tool is needed to develop complete attributes to help users prioritize sites. The final tools will be used to develop a water storage strategy for the Cedar watershed.

The materials developed in this project are being packaged for use in other watersheds. These products include series of meeting agendas with clear objectives, model powerpoint presentations, example water storage strategies from the pilot watersheds, and a guidance document that outlines the water storage strategy planningt

Dissemination

A BWSR snapshots article was complete for this project in early August (https://bwsr.state.mn.us/sites/default/files/2024-07/snapshots_story_2_august_2024_bwsr_water_storage_strategy_tool.pdf). This article has generated interest in the tools and their use in other watersheds. BWSR staff were updated on the project at a regional operations meeting in June. An abstract is being prepared in collaboration with Houston Engineering for the MN Watersheds Conference and it is anticipated that abstracts will be submitted for the MN GIS/LIS conference. A technical workshop on use of the tools and model has been scheduled for BWSR Academy in October in addition to a non-technical presentation on water storage at this event. The GIS toolbar and user's guide is available for use to select users for further testing. Once additional testing is complete, this new toolbar will be available on the PTMApp webiste and references to all final resources will be linked to the water storage page on the BWSR website. Additional training for users will be scheduled in conjunction with ongoing trainng for the PTMAppp application.

Additional Status Update Reporting

Additional Status Update August 14, 2024

Date Submitted: July 12, 2024

Date Approved: July 30, 2024

Overall Update
Place holder text to submit April 1, 2024, reporting status update. Final update will be submitted accordingly

Activity 1
Place holder text to submit April 1, 2024, reporting status update. Final update will be submitted accordingly

Activity 2
Place holder text to submit April 1, 2024, reporting status update. Final update will be submitted accordingly

Dissemination
Place holder text to submit April 1, 2024, reporting status update. Final update will be submitted accordingly

Status Update Reporting

Status Update March 1, 2024

Date Submitted: July 12, 2024

Date Approved: July 30, 2024

Overall Update

Good progress has been made in achieving the five outcomes specified in the narrative. Updated GIS-based tools have been used to create complete water storage datasets in two watersheds. The data have been presented in a series of meetings with local government staff and their boards in the Buffalo Red River and the Yellow Medicine watersheds. These groups have engaged in the processes of setting their hydrology goal and attributing and prioritizing sites to narrow down the list of sites for potential implementation. In the third watershed, a digital elevation model (DEM) is being hydrologically conditioned for testing of the final GIS tools. The hydrology model is now being used to evaluate the effects of priority water storage projects. Meetings have been scheduled to review these results to further refine the final lists of water storage sites for each watershed's water storage strategy.

All materials and processes used with each watershed group are being documented and refined to create final guidance for the process. Stand alone working versions of the GIS tools and hydrology model have been transferred to the consultant to program a professionally packaged toolbar and user's guide.

Activity 1

This activity is largely complete. Base watershed data and water storage opportunities database is available for two watersheds and in process for the third. The digital elevation model for the Cedar watershed upstream of Austin is being hydrologically conditioned. Water storage scenarios are in the process of being evaluated with the refined hydrology model in two watersheds. Meetings with all three watershed groups have been scheduled to further refine the water storage scenarios for final reporting.

Activity 2

A series of meetings has been held in the Buffalo Red River watershed and the Yellow Medicine watershed to introduce the process and data being developed in this project. The outcomes of these meetings include 1) agreement to develop a water storage strategy to reduce flows at priority resource points, 2) review water storage data developed in Activity 1 and develop a consistent set of attributes for each site in order to create a screening and ranking system, 3) iterative review of attributes and development of a storage site ranking index, 4) refinement of slide presentation and data presentations to watershed groups 5) documentation and refinement of all materials presented to the groups.

Evaluation of water storage scenarios in these two watersheds is ongoing. The process in the Cedar watershed will be completed once the conditioned DEM is available and the final set of tools that are being programmed are available. Based on what has been learned in the other two watersheds, we anticipate the process in the Cedar to be completed in two meetings compared to five and six meetings in the other pilot areas.

Dissemination

Updates on this project have been provided to an interagency team working and at internal BWSR meetings. These presentations have generated a great deal of interest in the project. BWSR staff on behalf of a couple other watershed groups have requested to start the process once this project is complete. A BWSR Snapshots article is scheduled for August

Status Update Reporting

Status Update September 1, 2023

Date Submitted: September 11, 2023

Date Approved: December 4, 2023

Overall Update

Overall, good progress is being made to ensure that this project is complete by June 30, 2024. Work related to task 1 is mostly complete. Methods to develop water storage data has been developed and refined. The hydrology model has been tested and partially refined to evaluate the effects of water storage practices. The single source contract is in place to complete the hydrology model with grant funds. Oversight and technical team meetings have taken place. Meetings with two watershed groups are being set up for engagement in early October. The framework to strategically engage watershed groups is in early development for use and refinement with watershed groups.

Activity 1

Most of the work since the last progress report has focused on completing Activity 1. A work flow for developing and processing GIS data has been tested, refined, and is ready to apply in demonstration watersheds. The result of this work is a comprehensive set of potential water storage sites with associated attributes to help users prioritize and select water storage sites to include in a water storage scenario. Similarly, the hydrology model to evaluate the effects of water storage sites at a user defined point of interest has been tested and partially refined using resources allocated by BWSR to the Prioritize Target and Measure Application (PTMApp) contract. Additional work to complete the hydrology model has been authorized by the Department of Administration under a single source contract to Houston Engineering, Inc as a specific task in the new contract for PTMApp which started September 1. The scope for additional hydrology model refinements is under development and will be submitted as a ticket for completion in the contracting system soon. Project update meetings with technical and oversight groups have been hosted and will continue as we move into additional testing and evaluation of scenarios with demonstration watershed groups.

Activity 2

Board conservationists in two demonstration watersheds have been contacted to initiate activity 2. Work with local partnerships in the Buffalo-Red and the Yellow Medicine watersheds will begin by the middle of October. The outline for strategic approach to meeting with these groups has been developed and support materials (specific meeting objectives/agendas, slide presentation templates) are currently being crafted so that demonstration watershed groups can complete development of their preferred water storage implementation plan within a 4 to 6 meeting timeframe. DIscussions with a third and potentially fourth watershed group will be initiated soon.

Dissemination

No work related to this task has been completed.

Status Update Reporting

Status Update March 1, 2023

Date Submitted: March 2, 2023

Date Approved: March 28, 2023

Overall Update

The majority of work completed to date relates to item 2 listed in the outcome section of the project narrative. A contract with the International Water Institute was initiated and existing GIS tools have been tested and refined to produce a complete suite of potential water storage sites in a test watershed area. These data are now being refined so that they can be used directly in a watershed hydrology model. A contract for development of the watershed hydrology model should be in place soon.

Four potential demonstration watersheds have been identified. Direct work with watershed groups will begin once the water storage data creation and assembly are complete and a working version of the hydrology model is available. The systematic process for working with watershed groups has been outlined, meeting materials drafted, and all work products will be further vetted in discussions with oversight and technical work groups.

Activity 1

A contract with the International Water Institute was initiated to begin to complete this task. A list of base watershed data has been developed and continues to be refined. Established GIS tools that identify water storage opportunities have been tested and refined in a pilot watershed area. These GIS tools have been proven effective to identify a complete suite of water storage opportunities in a watershed area. Methods to quantify the attributes for these water storage sites (e.g, retention volume, expected runoff from contributing watershed, etc) are now being refined and assessed to ensure they are accurate and can be used to integrate the data into the watershed hydrology model. Contract options to develop the hydrology model to evaluate water storage scenarios have been discussed with Mnit and BWSR staff and a contract for this work should be in place soon. The systematic process for working with watershed groups has been outlined, meeting materials drafted, and all work products will be further vetted in discussions with oversight and technical work groups. Technical and oversight groups have been established and have received updates on project progress. Meetings with these groups are being scheduled.

Activity 2

BWSR staff have been consulted to identify three pilot watersheds. Four candidate watersheds have been identified.

Dissemination

No work related to dissemination has been completed.