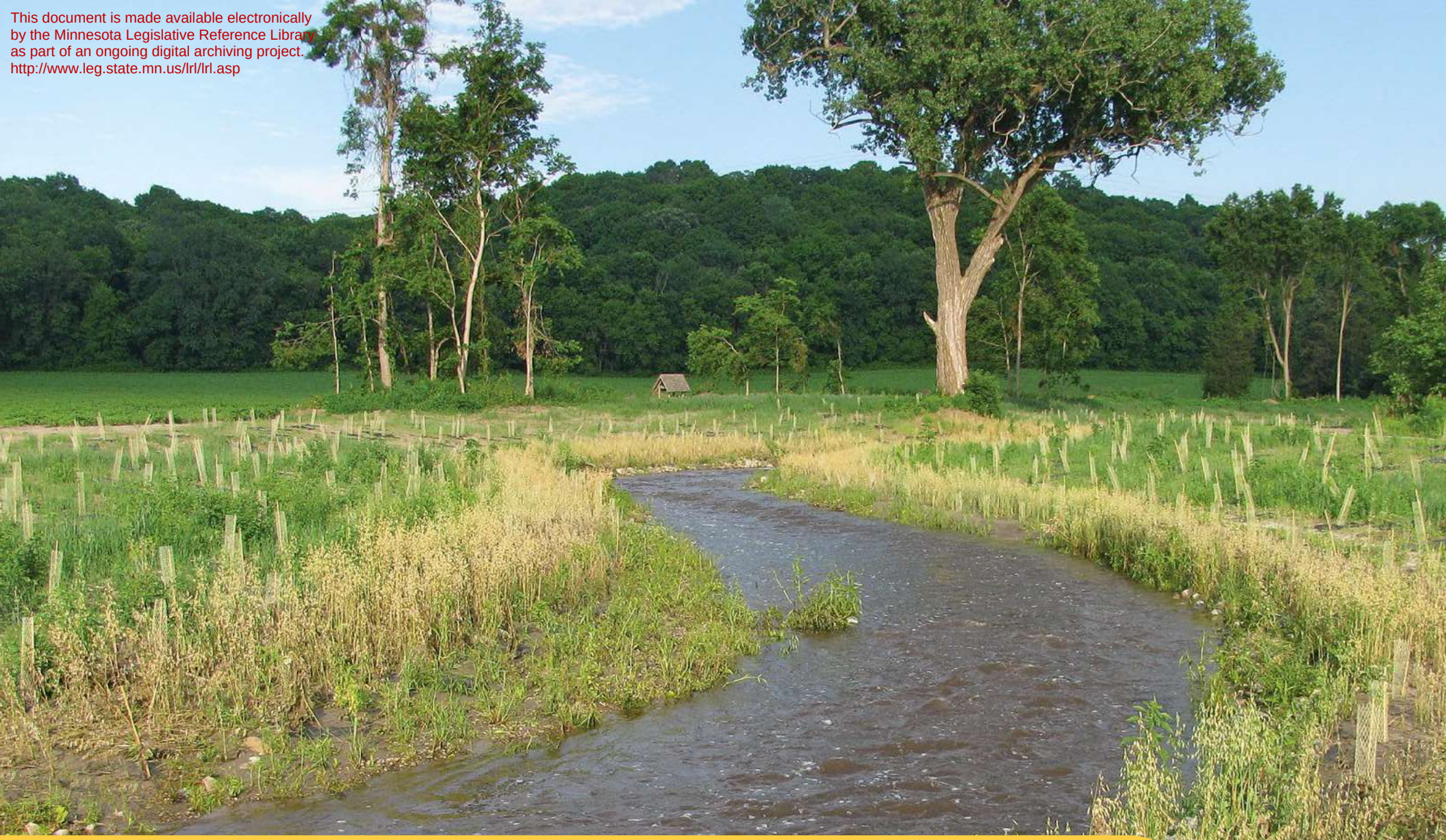

2017 **LEGACY FUND** RESTORATION EVALUATION REPORT

Technical Panel Findings and Recommendations

MINNESOTA

May 2018
Report To The Minnesota Legislature

Senate Finance Committee, Subcommittee on Legacy

House Environment and Natural Resources Policy and Finance Committee

House Legacy Funding Finance Committee

Lessard-Sams Outdoor Heritage Council

Clean Water Council

Parks and Trails Legacy Advisory Committee

Submitted by the Department of Natural Resources and the Board of Water and Soil Resources

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Legislative Charge

Parks and Trails Fund: M.S. 85.53, Subd. 5

Outdoor Heritage Fund: M.S. 97A.056, Subd. 10

Clean Water Fund: M.S. 114D, Subd. 6

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EXECUTIVE SUMMARY

When Minnesotans passed the Clean Water, Land and Legacy Amendment in 2008, they did so with high expectations. As projects have moved forward throughout the state, so too have efforts to ensure that the projects are meeting those expectations.

This report summarizes annual work to evaluate restorations. It is intended to support project managers in maximizing outcomes. The Department of Natural Resources (DNR), Board of Water and Soil Resources (BWSR) (agencies), and the evaluation panel (panel), have worked together with a goal of improving restorations throughout the state.

This report reviews evaluations of eight projects with 24 individual project sites, and the panel recommendations based on 111 site evaluations conducted to date.

All projects in this report are on track to meet stated goals with ongoing maintenance, and comply with applicable laws.

The majority of projects used current science. The panel considered specific instances of non-native plant use inconsistent with current science. DNR, BWSR and project managers discussed these practices and identified opportunities for improving future planning to avoid inconsistencies.

Recommendations

EXPANDED RECOMMENDATIONS IN THE 2017 REPORT:

- Improved Project Teams—improve ecological outcomes through the use of more interdisciplinary project teams.
- Improved Documentation—ensure that details of implemented actions (materials, dates) are recorded and coupled with the initial plan.

ONGOING RECOMMENDATIONS FROM PREVIOUS REPORTS (2012-2017) ARE:

- Improved Restoration Training
- Evaluation Process Improvement
- Improved Design Criteria for Lakeshore Projects

EVALUATIONS SUMMARY

Restoration Evaluation Project Pool

	Clean Water	Outdoor Heritage	Parks and Trails	All Funds
Projects sites evaluated; this report	10	11	3	24
Projects sites evaluated; reported to date	44	53	14	111
Project sites in evaluation program pool.	200	283 restore 2,604 enhance	807	3,894

TRACKING PROGRESS

Program staff communicate these recommendations to restoration practitioners through reports, presentations, and targeted trainings. Project manager surveys are currently being developed to track trends in restoration and implementation of the panel's recommendations. As information is collected on how recommendations are being implemented, those results will be shared with the panel and updates provided in future reports.

As statute directs, projects are evaluated relative to: *the law, current science and stated goals.* Statute also directs the panel to determine: *any problems with the implementation.* A high-level summary of these criteria for 2017 is shown below. Detailed project evaluations are provided in *Appendix D. Project Evaluations.*

PROJECT FUNDS

Restorations are completed utilizing three Legacy Funds:

- Clean Water Fund (CWF)
- Outdoor Heritage Fund (OHF)
- Parks and Trails Fund (PTF)

EVALUATIONS SUMMARY continued

Evaluated Projects

	Clean Water	Outdoor Heritage	Parks and Trails
Complied With Applicable Laws	All projects	All projects	All projects
Utilized Current Science	Predominantly	Predominantly	All projects
Fulfilled/On Track to Meet Planned Goals	All projects	All projects	All projects
Problems with Implementation	Some Instances	Some Instances	None

CURRENT SCIENCE

Most projects utilized state of the art site-specific treatments and best practices within the range of current science. However the panel considered instances where regionally native plant species were utilized considerably north of their native ranges as inconsistent with current restoration science. The panel also noted vegetative quality would have benefited on some project sites from improved site preparation and management for weedy invasive species.

PROBLEMS WITH IMPLEMENTATION

Most projects had no major implementation problems. However the panel identified situations where projects would have benefited from more diverse ecological consultation when developing or adapting planting plans/species lists.

Projects Featured in this Report

DOTS MAY REPRESENT MORE THAN ONE PROJECT SITE

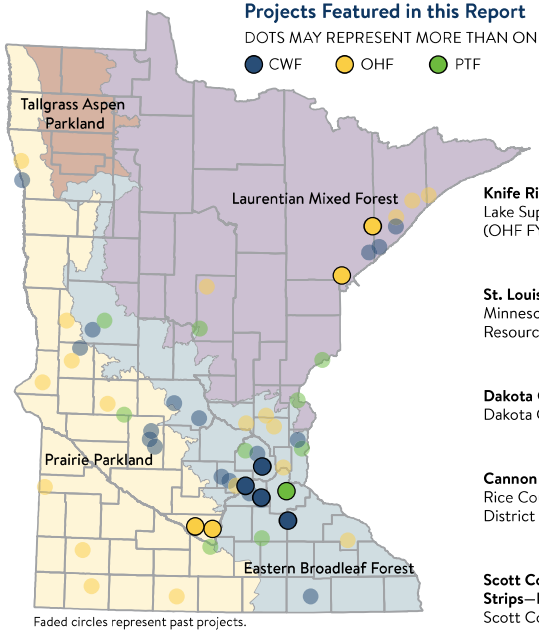
CWF OHF PTF

9 Mile Creek Stream Restoration—Revisit
9 Mile Creek Watershed District (CWF FY 2010)

Swan Lake Wildlife Management Area Pollinator Planting
Pheasants Forever Conservation Partners Legacy Grant (OHF FY 2015)

Swan Lake Wildlife Management Area Enhancement
Nicollet Conservation Club Conservation Partners Legacy Grant (OHF FY 2011)

Picha Creek Stream Restoration—Revisit
Scott Watershed Management District (CWF FY 2010)



Faded circles represent past projects.

Knife River Habitat Rehabilitation
Lake Superior Steelhead Association (OHF FY 2011 and 2013)

St. Louis River Estuary Restoration
Minnesota Department of Natural Resources (OHF FY 2011 and 2013)

Dakota County Parks Enhancement
Dakota County Parks (PTF FY 2012-2014)

Cannon River Watershed Buffer Strips
Rice County Soil and Water Conservation District (CWF FY 2010)

Scott County Grasslands Buffer Strips—Revisit
Scott County (CWF FY 2010)

RECOMMENDATIONS

A critical component of restoration evaluations is identifying issues and providing guidance to project managers to improve future restorations.

Statute for restoration evaluations directs the panel to determine:

> *...any problems with the implementation of restorations, and if necessary, recommendations on improving restorations.*

The emphasis of reporting is also directed in statute:

> *...the report shall be focused on improving future restorations.*

The panel expanded on two previous recommendations based on evaluations in this report. Summaries are provided for other continuing recommendations.

Expanded Recommendation—Improved Project Teams

CONTINUED RECOMMENDATION—FIRST DETAILED IN 2015 REPORT

The panel recommends the use of more comprehensive project teams to improve ecological outcomes and better meet fund goals. Using a more multidisciplinary planning process, and bringing more sets of expertise to the table, will ideally:

- minimize instances of non-native plant use.
- identify plan components with high risk of limited success.
- help plan contingencies for potential challenges.
- expand limited project goals.

Project components and design specifications, such as plant materials, require careful consideration during planning and are often modified when projects reach the installation phase based on availability of materials, current site conditions, balancing project priorities and budget constraints. It is important that project managers identify contingencies and engage appropriate expertise from a project team during planning and when modifications are needed during installation.

The panel noted instances where plant species were used considerably outside of their native range including actions of "assisted migration" of tree species native to Southeast Minnesota to Northeast Minnesota. Acknowledging that this is an ongoing area of research and discussion, the panel recommended that project teams may be especially valuable when considering assisted migration to ensure plans are within the range of best practices.

Roles

Project Managers	• Use a multidisciplinary project team when planning/designing restorations of a significant scale and/or complexity that contain multiple habitats. • Engage state agency, local government units and other technical experts early in the project planning phase.
Funding Agencies:	• Identify in request for proposals as appropriate: › Project team credentials and project type experience › Ecologist/planting design consultant › Opportunities/needs for collaborative technical review with agency technical experts (e.g. BWSR/DNR clean water specialist, DNR stream habitat specialists) • Continue to make appropriate technical staff available to consult with project managers at key project phases: planning, design and/or installation
Land Managers	• Consult with implementing project managers regarding technical specifications such as plant materials (e.g. state land managers consult and provide technical assistance/oversight to local organizations implementing projects on state lands).

TRACKING PROGRESS

Request for proposals will be monitored for inclusion project teams. The use of ecological expertise will also be tracked in project manager surveys which are currently being developed. As the number of projects that effectively use this multi-disciplinary project team approach increases, so too should the potential ecological outcomes. As information is collected on how project teams are being improved, those results will be shared with the panel and updates provided in future reports.

RECOMMENDATIONS continued

Improved Documentation

CONTINUED RECOMMENDATION—FIRST DETAILED IN 2012 REPORT

The panel believes proper documentation is critical for understanding, tracking and achieving successful restorations. Documenting clear outcome based goals in the plan is crucial for establishing a common understanding and tracking progress. Project managers should clearly state both ecologically based goals and other goals that may exist for the project (e.g. citizen or club/chapter engagement) and note how they may adjust methods or outcomes. The panel recommends that the agencies work to improve documentation through targeted trainings and grant guidance for project managers.

Roles

Project Managers	• Consistently document restoration project data in a simple accessible format. • Ensure that details of implemented actions (materials, dates) are recorded and coupled with the initial plan. • Designate one project partner to permanently store project data.
Funding Agencies	• Develop checklist of key project data to be archived by project managers.

TRACKING PROGRESS

A template and example of project data is available in the FY2014 evaluation report. Best practices in documentation are being promoted by the agencies through restoration training and technical assistance. Progress in promotion and adoption of documentation best practices will be tracked through project manager surveys which are currently being developed. Information on how project documentation is being improved will be shared with the panel and updates provided in future reports.

Improved Restoration Training

CONTINUED RECOMMENDATION—FIRST DETAILED IN 2012 REPORT

The panel believes continued development and implementation of training is essential to promote best practices and improve restorations. The agencies and panel will identify specific opportunities to develop and disseminate trainings. It is recommended that the agencies track and report progress in integrating evaluation recommendations and lessons learned into new and existing trainings.

Roles

Agencies/Panel	• Compare needs identified from evaluations with existing trainings. • Identify gaps and opportunities for targeted trainings. • Prepare restoration case studies to support training. • Integrate program findings and recommendations into existing trainings.

TRACKING PROGRESS

The agencies will track how and when evaluation program guidance is used in trainings. Improvement will be tracked using through project manager surveys which are currently being developed. Information collected on how restoration training is being improved will be shared with the panel and updates provided in future reports.

Evaluation Process Improvement

CONTINUED RECOMMENDATION—FIRST DETAILED IN 2012 REPORT

The panel believes the Restoration Evaluation Program should implement strategic processes to achieve the stated goal of improving future restorations. The panel has made recommendations including revisiting evaluated sites, producing case studies, tracking factors of success, and tracking panel evaluation recommendation.

Roles

Agencies/Panel	• Revisit evaluated sites to inform the accuracy of initial assessments and refine assessment methods. • Produce case studies highlighting decision making, challenges, and successes in project implementation. • Track environmental, social and operational factors that influence success of projects to guide future policy and practice. • Track panel recommendations through project data and project manager surveys to gauge application of recommended actions.

TRACKING PROGRESS

Agencies are revisiting evaluated sites and producing case studies. This information will be provided to stakeholders while tracking distribution of the materials. Factors that influence project success, as well application of panel recommended actions, will be tracked through project manager surveys which are currently being developed. Trends, indicators of project success and areas for improvement should emerge over time as more projects are evaluated. The results will be shared with the panel and updates provided in future reports.

Improved Design Criteria for Lakeshore Projects

CONTINUED RECOMMENDATION—FIRST DETAILED IN 2014 REPORT

The panel recommends that all project managers establish consistent minimum design criteria for lakeshore projects if not already established. These criteria will allow screening for projects that provide a base level of environmental benefit aligning with fund goals. While lakeshore projects are primarily small in size and include voluntary best practices, this is a specific area for improvement where viable solutions are available.

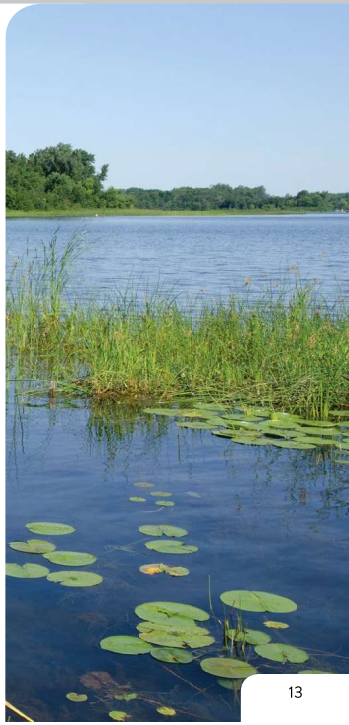
Design criteria should accommodate local, regional and site conditions, and specific project types. This recommendation addresses the need for a consistent level of performance for publicly-funded projects.

Roles

Project Managers	• Establish minimum design criteria based on programmatic goals and local conditions that integrate with existing direction for shoreline restoration from total maximum daily load or local water plan. Use guidance from state agencies to identify appropriate criteria. • Promote the value/technical need for established criteria. • Specify minimum design in criteria agreements with landowners. • Use improved criteria when recruiting and screening projects.

TRACKING PROGRESS

The use of design criteria will be tracked through project manager surveys which are currently being developed. As further evaluations are conducted, the number of projects using consistent criteria should increase. As information is collected on how lakeshore design criteria is being improved, those results will be shared with the panel and updates provided in future reports.



CWF PROJECT PROFILE

Scott County Watershed Management Organization—Picha Creek Restoration

CLEAN WATER FUND

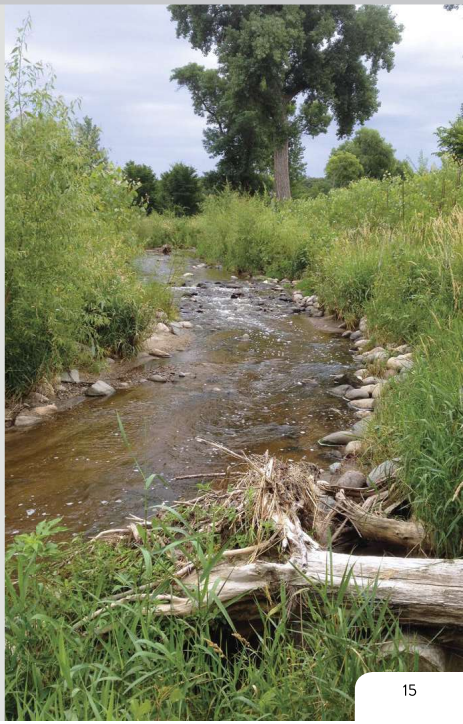
High levels of suspended sediments in the Minnesota River degrades its aquatic habitat and quality of recreational uses. Streambank erosion is identified as a key sediment contributor. In an effort to mitigate sediment contributions and improve aquatic habitat, Scott County Watershed Management Organization (WMO) conducted a Stream habitat assessment of Sand Creek and its tributaries which identified priority sites of bank erosion. Picha Creek was identified as a priority concern for ongoing bank erosion and impaired fish habitat caused by excessive sediment and a fish migration barrier.

In 2010 Scott WMO received a Clean Water Fund grant to reduce erosion and improve habitat along a half-mile reach of Picha Creek. This project involved elevating the deeply incised channel bed with boulders and cobblestone to create riffles and pools, broadening the floodplain and installing natural structures such as root wads for stabilization. A concrete barrier to fish migration was also effectively removed when the channel was raised.

Since its installation the project has received several high water flows from large storm events. The installed channel project not only maintained its stability, preventing further erosion, the high flows allowed the channel to develop in a manner that further benefited fish habitat.

RESTORATION HIGHLIGHTS

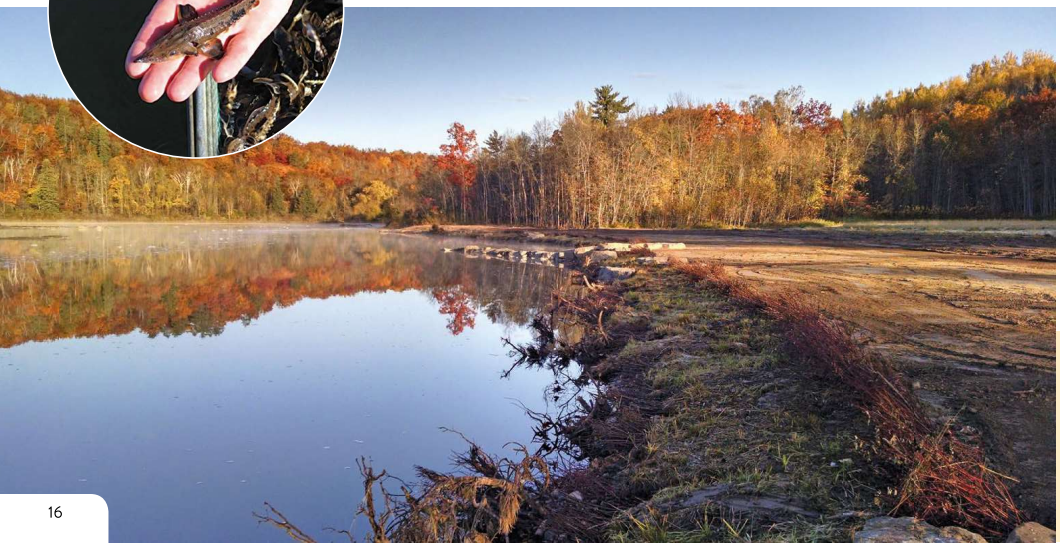
- Multidisciplinary project teams utilized to plan and prioritize watershed restorations.
- Documented prioritized, targeted and measureable restoration goals.
- Strategic planning including long-term management is practical for meeting proposed outcomes.



OHF PROJECT PROFILE

St. Louis River Estuary—Aquatic Habitat Restoration

OUTDOOR HERITAGE FUND



Over a century of unregulated dumping of waste has left a legacy of pollution impacting the 12,000 acres of wetlands, streams and bays making up the St. Louis River Estuary. The extreme degradation of the estuary resulted in it being designated an "Area of Concern" by the United States Environmental Protection Agency. With polluted soils and bays littered with wood waste, the river and estuary were not a safe or healthy place for the citizens of Minnesota or the natural communities that once thrived there.

As a part of the coordinated efforts to restore the estuary, the shoreline at Chamber's Grove was reconstructed to once again provide fish habitat and recreational opportunities. Additionally 115,000 cubic yards of wood waste was pulled out of Radio Tower Bay.

Lake sturgeon *(Acipenser fulvescens)*, a once common species, had disappeared from the area in the 19th century. Restoration efforts funded with Legacy dollars, like those at Chamber's Grove and in Radio Tower Bay, along with re-introduction programs have brought the fish back.

Tackling a restoration of this scale and complexity has required long-term commitment to collaboration and funding from local, state, federal, tribal and non-profit groups. While there is work to be done on the path to delisting the estuary as an "Area of Concern," continuing to undertake the big projects will shift the legacy of the St. Louis River Estuary to one of a healthy river, a healthy harbor, and a resource for Minnesota for generations to come.

RESTORATION HIGHLIGHTS

- Multidisciplinary project teams utilized to plan and coordinate complex restorations.
- Comprehensive and ongoing documentation of project goals, methodology and outcomes.
- Project partners had appropriate restoration background and training.
- Strategic planning including long-term management is practical for meeting proposed outcomes.

PTF PROJECT PROFILE

Dakota County Parks—Woody Invasive Species Management

PARKS AND TRAILS FUND

The Dakota County Parks system contains 6,000 acres of parkland with diverse landscapes including forests, savannahs, prairies, and wetlands. These natural resource-based parks not only provide outdoor recreation opportunities for the citizens of Minnesota, but are home to some of the state's unique and threatened plants and animals including the Blanding's turtle *(Emys blandingii)* and the blunt-lobed grapefern *(Botrychium oneidense)*.

Maintaining the quality of the parks is an ongoing priority guided by system wide and park specific natural resource management plans. The county has capitalized on Parks and Trails, as well as Outdoor Heritage Legacy Funds to implement these strategic efforts. In this report we reviewed brush management in Spring Lake Park Reserve (Spring Lake) and Lebanon Hills Regional Park (Lebanon Hills). In some areas, like Archery Trail in Spring Lake, woody removal was necessary before prairie and savanna habitats could be restored. In other areas, including large parts of Lebanon Hills, removal of woody invasive species such as buckthorn *(Rhamnus cathartica)* is a critical step in enhancing and restoring existing prairie and woodlands.

The restoration and enhancement work done with Legacy funds is on track to meet the stated goals. Further restoration efforts are ongoing throughout the park system. With continued thoughtful planning and implementation from the natural resources staff, these parks can be a resource for Minnesota for years to come.

RESTORATION HIGHLIGHTS

- Detailed and organized documentation of park-wide restoration activities.
- Appropriate restoration training for staff, contractors, and volunteers.
- Strategic planning including long-term management is practical for meeting proposed outcomes.

APPENDIX A: STATUTORY REQUIREMENTS

Parks and Trails Fund: M.S. 85.53, Subd. 5.

Restoration evaluations. The commissioner of natural resources may convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two other representatives with expertise related to the project being evaluated. The commissioner may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the commissioner may assign a coordinator to identify a sample of up to ten habitat restoration projects completed with parks and trails funding. The coordinator shall secure the restoration plans for the projects specified and direct the technical evaluation panel to evaluate the restorations relative to the law, current science, and the stated goals and standards in the restoration plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. **The coordinator shall summarize the findings of the panel and provide a report to the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the parks and trails fund.** The report shall determine if the restorations are meeting planned goals, any problems with the implementation of restorations, and, if necessary, recommendations on improving restorations. The report shall be focused on improving future restorations. Up to one-tenth of one percent of forecasted receipts from the parks and trails fund may be used for restoration evaluations under this section.

Outdoor Heritage Fund: M.S. 97A.056, Subd. 10.

Restoration and enhancements evaluations. The commissioner of natural resources and the Board of Water and Soil Resources must convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two representatives with expertise in the project being evaluated. The board and the commissioner may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration or enhancement, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the board and the commissioner may assign a coordinator to identify habitat restoration or enhancement projects completed with outdoor heritage funding. The coordinator shall secure the plans for the projects specified and direct the technical evaluation panel to evaluate the restorations and enhancements relative to the law, current science, and the stated goals and standards in the project plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. The coordinator shall summarize **the findings of the panel and provide a report to the chair of the Lessard-Sams Outdoor Heritage Council and the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the outdoor heritage fund.** The report shall determine if the restorations and enhancements are meeting planned goals, any problems with the implementation of restorations and enhancements, and, if necessary, recommendations on improving restorations and enhancements. The report shall be focused on improving future restorations and enhancements. At least one-tenth of one percent of forecasted receipts from the outdoor heritage fund must be used for restoration and enhancements evaluations under this section.

APPENDIX A: STATUTORY REQUIREMENTS continued

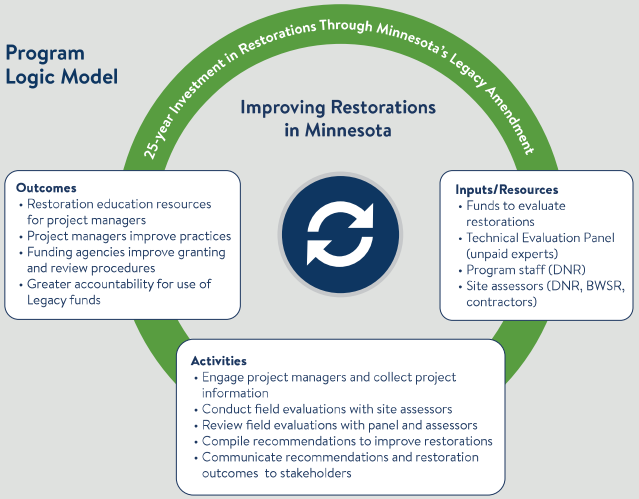
Clean Water Fund: M.S. 114D.50, Subd. 6.

Restoration evaluations. The Board of Water and Soil Resources may convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two representatives with expertise related to the project being evaluated. The board may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the board may assign a coordinator to identify a sample of up to ten habitat restoration projects completed with clean water funding. The coordinator shall secure the restoration plans for the projects specified and direct the technical evaluation panel to evaluate the restorations relative to the law, current science, and the stated goals and standards in the restoration plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. **The coordinator shall summarize the findings of the panel and provide a report to the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the clean water fund.** The report shall determine if the restorations are meeting planned goals, any problems with the implementation of restorations, and, if necessary, recommendations on improving restorations. The report shall be focused on improving future restorations. Up to one-tenth of one percent of forecasted receipts from the clean water fund may be used for restoration evaluations under this section.

APPENDIX B: EVALUATION PROCESS

State law directs the (DNR) and (BWSR) to convene an expert panel to evaluate restorations completed with Clean Water, Land and Legacy Funds. The evaluations include directly engaging project managers and review by third party experts to identify gaps and capture lessons learned from restorations. The agencies use this valuable information to improve restorations throughout the state. This unique third party evaluation program provides a "value added" benefit to Legacy-funded restorations.

Program Logic Model



A large part of Minnesotans investment in the states legacy is being used to restore wetlands, prairies, forests, and fish, game, and wildlife habitat. The Restoration Evaluation Program was developed with the ultimate goal of improving restorations throughout the state. The diagram below outlines the inputs, activities, and outcomes of the program and our continued investment in improving restorations.

APPENDIX B: EVALUATION PROCESS continued

Roles and Responsibilities

EVALUATION PANEL

Statute directs the evaluation panel to:

- Evaluate restorations relative to the law, current science, and the stated goals and standards in the restoration plan
- Provide findings on the evaluations, determining whether restorations are meeting planned goals, identify problems with implementation of restorations and, provide recommendations on improving restorations

Members of the panel are unpaid experts chosen to fulfill statutory requirements and provide needed expertise in a variety of ecosystems and restoration techniques. Additionally panel members may seek advice from others to help in its work.

PROGRAM STAFF

The program staff are responsible for coordinating site assessments, program administration and managing the work of the panel. They are directed in statute to:

- Identify restoration projects completed with Parks and Trails, Outdoor Heritage, and Clean Water Funds
- Secure restoration plans for selected projects
- Summarize the findings of the panel
- Provide reports to the legislature

The staff also promote and document continuous improvement in restorations. Staff work with the panel and agencies to identify actions and provide guidance for implementing improved restorations and delivers this information to agencies, project managers and partner organizations.

DNR and BWSR have assigned staff to ensure consistency in program implementation. A proportionate amount of the three Legacy Funds is used to support the staff. The staff are currently housed in DNR's Ecological and Water Resources Division.

SITE ASSESSORS

The site assessors are responsible for conducting field evaluations. Site assessors are selected based on knowledge of restoration practices and work closely with program staff in assessing project plans, conducting site evaluations, and participating in panel reviews. Site assessors include:

- State agency staff
- Local government staff
- Federal agency staff
- Private contractors

Services provided by assessors are negotiated through the use of contracts, state interagency agreements, or work assignments.

PROJECT MANAGERS

Project managers are expected to actively participate in the evaluation process. Project managers provide the necessary project background and attend field evaluations when possible to:

- Identify project work sites
- Provide project context
- Answer assessor questions

Example Project Managers for the Three Legacy Funds

Clean Water Fund	Outdoor Heritage Fund	Parks and Trails Fund
• Soil and Water Conservation District (SWCD) manager or technician • Watershed District (WD) staff • Watershed Management Organization (WMO) staff • County Water Resources of Environmental Services staff • City Water Resource staff	• State agency staff (DNR, BWSR) • Federal agency staff (USFWS) • County conservation and land management staff • County conservation and land management staff • Watershed District staff • Nongovernmental wildlife organizations	• DNR Parks and Trails Division, resource management staff • Metro Regional Parks managers, including county park systems and Three Rivers Park District • Greater Minnesota park managers

Evaluation Methods

PROJECT SELECTION

Program staff update the pool of eligible restoration projects on an annual basis. For each fund, projects are considered to be eligible if they are complete and contain restoration or enhancement work. Projects evaluated represent a variety of habitat types and geographic distributions of restorations in the state.

Projects are selected in relative proportion to each fund's appropriation to restoration evaluations. Many grants and appropriations fund restoration activities at multiple project sites. A smaller subsample of project sites is typically evaluated.

APPENDIX B: EVALUATION PROCESS continued

SITE ASSESSMENTS

DNR, BWSR and the panel developed a simple and consistent process to facilitate evaluations. To the extent possible the evaluation process engages project managers in conducting site visits and communicating lessons learned. Facilitating an inclusive evaluation process with project managers increases the transfer of knowledge between field practitioners and agencies, ultimately improving restorations.

A site evaluation form was developed to provide project information and address evaluation requirements directed by law. This form describes site assessors' observations of project effectiveness, estimated outcomes based on current conditions and application of current science.

Project sites are evaluated by third party assessors. Field visits include inspecting the project's structural components and plant communities. Restored plant communities may take several years or even decades to mature. Evaluations are based on observations of the present and projected conditions relative to the project goals. Assessments of project sites do not represent an overall evaluation of the larger program or fund.

Restoration science is continually evolving. Best practices are an area of ongoing discussion between practitioners, researchers, agencies and stakeholders. Site assessors and the panel evaluate projects based on methods commonly considered to be within the range of current science.

Legacy Fund Attributes and Requirements

Each of the Legacy Funds has a distinct focus on restoration and specific requirements for projects. Legacy Fund attributes and appropriation laws applicable to restoration projects.

	Clean Water Fund	Outdoor Heritage Fund	Parks and Trails Fund
Fund Purpose	*protect, enhance, and restore water quality in lakes, rivers, and streams and protect groundwater from degradation*	*restore, protect, and enhance wetlands, prairies, forests, and habitat for fish, game, and wildlife*	*support parks and trails of regional or statewide significance*
Primary Restoration Goal	Restore water quality	Restore specific wildlife habitat types	Ecological restoration of specific habitat types
Guidance for project types and locations	Local water management plan, Total Maximum Daily Load Implementation plans, or Watershed Restoration and Protection Strategies	Statewide or national wildlife habitat plans	State or Regional Park natural area management plans
Funding source for restoration projects	Competitive grants administered by BWSR	Appropriation to project manager; recommended by Outdoor Heritage Council, or Conservation Partners grants administered by DNR	DNR appropriation: resource management, or Met Council appropriation: County Regional Park System, Three Rivers Park District

continued

APPENDIX B: EVALUATION PROCESS continued

Legacy Fund Attributes and Requirements continued from page 27

	Clean Water Fund	Outdoor Heritage Fund	Parks and Trails Fund
Statutory Requirements	MS 114D.50 Subd. 4. (a) include measurable outcomes, as defined in section 3.303, subdivision 10, and a plan for measuring and evaluating the results. A project must be consistent with current science and incorporate state-of-the-art technology.	Different appropriation years are subject to different requirements but all include: • *Prepare and retain an ecological restoration and management plan* • *Use current conservation science to achieve the best restoration* • *Establishment of diverse plant species* Swan Lake WMA North Star and Mackenzie Units: ML 10, c. 361, article 1, sec 2. subd 5 (i) and subd 9 (b, d and g) • *Plant vegetation or sow seed only of ecotypes native to Minnesota (North Star and Mackenzie Units only).* Swan Lake WMA Peterson Lake and Nicollet Bay Units: ML 11, c. 361, article 1, sec 2. subd 5 (g) and subd 9 (c, f) St. Louis River Estuary Radio Tower Bay, Knowlton Creek and Knife river Habitat Rehabilitation 2nd Falls, Tree Planting: ML 12 c. 264, article 1, sec. 2 subd 5 (d or g) and sec. 4 subd 13 (c, f) St. Louis River Estuary Chambers Grove and Knife River Habitat Rehabilitation Reaches 9 and 12, Tree Plantings: ML 14 c. 256, article 1, sec. 2 subd 5 (g or h) / sec 5 subd 13 (c, f) OHF St. Louis River Estuary, Chambers' Grove	MS 85.53 Subd. 2 include measurable outcomes, as defined in section 3.303, subdivision 10, and a plan for measuring and evaluating the results. A project or program must be consistent with current science

APPENDIX C: FUND EVALUATIONS

As directed in statute, projects are evaluated relative to: *the law, current science and stated goals.* Statute also directs the panel to determine: *any problems with the implementation.* An overview of the panels review is presented in this section. Detailed evaluations are provided in *Appendix D. Project Evaluations.*

All Funds

Projects described in this report include:

- four Clean Water Fund grants with 10 project sites—five of which were revisits
- three Outdoor Heritage Fund programs/appropriations, including two Conservation Partners Legacy grants, with 11 project sites
- two Parks and Trails Fund projects with three project sites

Project habitat types of sites featured in this report include:

- 13 prairie/savannah/grassland project sites
- six aquatic project sites
- three wetlands
- two forests

Each of the three Legacy Funds has specific requirements pertaining to restoration projects *(Appendix B, Legacy Fund Attributes and Requirements).* The requirements most directly related to restorations are addressed for each fund in the tables below.

Clean Water Fund

Statutory Direction	Compliance Method	Evaluated Project Compliance
Measureable outcomes	Typically modeled pollutant load reduction included in standard reporting in BWSR E-link system.	All projects reported measureable water quality outcomes for the specific project.
Plan for measuring and evaluating results	Routine, inspections conducted by local project management staff (typically annual) to confirm installation and maintenance per plan. Inspection forms are kept on file by project managers.	All projects had plans to monitor on a routine schedule and evaluate results.
Consistent with current science incorporating state-of-the-art technology	Planning and design are completed by professional engineers, or local technical/ water resource specialists and reviewed by BWSR Conservationists, Clean Water Specialists and/or area technical assistance staff.	All projects evaluated utilized state of the art methods. However, site assessors and the panel considered specific instances where vegetative quality would have benefited from improved site preparation and management for weedy invasive species.

continued

APPENDIX C: FUND EVALUATIONS continued

Outdoor Heritage Fund

Statutory Direction	Compliance Method	Evaluated Project Compliance
Prepare and retain restoration plans	Project manager's preparation and access to restoration plans.	In all but one instance project managers provided plans to evaluators.
Establish diverse plant species *Planting of native vegetation for North Star and Makenzie units*	Project managers maintain	Diverse species were established on project sites with instances of species being planted outside of their regional native range.
Use current conservation science	Project managers record restoration methods with current science.	All practices evaluated were within the range of current conservation science.

Parks and Trails Fund

Statutory Direction	Compliance Method	Evaluated Project Compliance
Measureable outcomes	Typically acres/feet of habitat type restored or treated for each project.	The three sites reported measurable outcomes in acres of habitat treated.
Plan for measuring and evaluating results	Project manager's documentation of ongoing monitoring and adaptive management activities.	Project managers maintained logs of work completed and updated maps of project area.
Consistent with current science	Project managers record and systematically refine restoration methods with current science.	All practices evaluated were consistent with current restoration science.

APPENDIX D: PROJECT EVALUATIONS

Appendix D: Project Evaluations is available online at:
leg.state.mn.us/edocs/edocs?oclcnumber=823766285

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Project Evaluations

Appendix D: 2017 Legacy Fund Restoration Evaluation Reports

May 2018

Minnesota Department of Natural Resources
Minnesota Board of Soil and Water Resources
Restoration Evaluations
500 Lafayette Rd,
St. Paul, MN 55155-4040
888-646-6367 or 651-296-6157
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mn.gov

Legislative Charge
Parks and Trails Fund: M.S. 85.53, Subd. 5.
Outdoor Heritage Fund: M.S. 97A.056, Subd. 10.
Clean Water Fund: M.S. 114D.50, Subd. 6.

As requested by Minnesota Statute 3.197: This report cost $7,900 to prepare, including staff time, printing and mailing expenses.

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Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

1 - CWF Revisit - Scott County Grasslands, Erickson Property

Legacy Fund Restoration Evaluations

See Appendix A for Project Background and Initial Project Evaluation

Project Name: Native Grass Cost Share and Incentives for Runoff Reduction (Erickson Property)

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott

Fund: CWF ***Fiscal Year Funds:*** 2010

Follow Up Site Assessment

Field Review Date: **5/24/2017**

Field Visit Attendees: Alyssa Alness, Scott SWCD; Carol Strojny, MN BWSR; Wade Johnson, MN DNR

1. ***Please note any substantive changes to the site characteristics since last site assessment.***
   At the time of our initial site visit, August 2012, the 6.9 acre restoration was one year into establishment following seeding in 2011. In 2012 the seeding was establishing well with all 6 grasses species and 9 of 11 forbs seeded present. The site was clipped in 2012, 2013 and 2015. The first prescribed burn took place in early May 2017, three weeks prior to the site visit. Due to the recentness of the burn and relative slow rate of re-sprout growth (compared to the Whipps site which was also burned May 3rd and visited by assessors May 24th) observations of plant communities are uncertain. As such, the site should be revisited during peak growing season. Based on observable re-sprouts, seeded warm season grasses appeared dominant >60% across the site, primarily Big Bluestem and Little Bluestem. Re-sprouts of seeded forbs were also common: Bee Balm Monarda, Yellow Coneflower, Common Ox-eye, Purple Prairie Clover, Stiff Goldenrod, Ironweed and Canada Milkvetch.
   Volunteer Canada Goldenrod was very common throughout the site and should be monitored for potential aggressive competition with seeded species. Reed Canary Grass was present in two low moist areas at the edge of the woodland. These patches will likely stay confined by the soil moisture gradient.

Landowner and project managers should monitor and manage the Reed Canary patches as needed. Dandelion and Curly Dock were also scattered throughout the site; these will likely not interfere with further development and dominance of the warm season tallgrass plant community. Other problem invasives were not visible at the time of the site visit.

2. ***Is the plan based on current science?*** Yes
   Site prep (planting into RoundUp ready soybean stubble) and maintenance during the first 6 years (noted in #1) is consistent with current best practices for establishing a grassland planting.
3. ***List indicators of project outcomes at this stage of the project.***
   2017 observations were made 3 weeks after a nearly complete burn and would benefit from follow up assessments later in the year and in following seasons. 6 years into establishment of a grassland planting of this type it is typical for warm season grasses (i.e. Big Bluestem, Little Blue) to become dominant. This appears to be the case with on the Erickson site. Seeded forbs also appear to have adequate density and spread across the site. These indicators suggest a successful planting at this stage, however this determination is guarded based on the recently burned conditions.
4. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
   Proposed project outcome of establishing dense perennial cover to reduce runoff and associated sediment and nutrients has been achieved. Ongoing maintenance per landowner contract and technical assistance from SWCD staff indicate positive outcomes for the quality of the planting.
   A 10 year contract was completed with each landowner to facilitate compliance. In addition, the Scott SWCD inspects years 1, 5 and 9 of the contract, the Scott SWCD is on call to assist the landowner, and each landowner was provided an explanation of maintenance needs and a copy of NRCS specification CP25 Restoration of Rare and Declining Habitat – Tallgrass Prairie and most were responsible for a portion of the establishment cost so they were vested in the outcome. NRCS specification CP25 served as Operation and Maintenance guidance for all projects.
5. ***Are corrections or modifications needed to meet proposed outcomes?***
   Overall the establishment and density of desired grasses and forbs is appears satisfactory at this stage (6 years) and proposed outcomes for runoff reduction have been achieved.
   Continuation of planned maintenance (prescribed burning, monitoring/management of weedy species) is appropriate. The site should be monitored for potential tree seed rain from adjacent woodland.
6. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
   Ongoing monitoring and landowner communication by Scott SWCD staff has been taking place at least annually. Staff have worked to build capacity of the landowner to manage the grassland moving forward. Given the 10 year contract term of this agreement, landowner knowledge and capacity will be vital to maintaining the grassland conditions.
7. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
   Landowner may consider burning in patches in improve heterogeneity in the planting composition and structure. This may also benefit insect survivorship and habitat on the site. Relatively small scale of the site may make patch burning less desirable logistically.
8. ***Are follow-up assessments needed? Explain.***

The SWCD and WMO should continue to monitor the project and work with the landowner to ensure adequate maintenance moving forward. It would be insightful to re-visit the site in the summer or 2018 or 2019 to assess vegetation composition, as the recent burn made assessment difficult.

9. ***Additional comments on the restoration project.***
   Scott SWCD staff have done an exceptional job in communicating and educating landowners on stewardship of their sites. Through regular phone communications and site visits, SWCD staff have established positive relationships and worked to build landowner capacity to care for their properties in the future.
   Runoff reduction is estimated based on a reduction per acre basis. These measures include reductions for total phosphorus lb./yr., sediment tons/yr. and runoff acre feet/yr. In the planning phase it would have benefited the projects to also provide an indication of the landscape context of the sites with relation to water resource of concern i.e. where did/does runoff flow from the site? Intercept upland flow running on to the site? The planting sites on the Erickson property appear to be well suited for intercepting runoff from active upland row crop sites.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

10. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
11. ***Provide explanation of reason(s) for determination.***
    The grassland sites have established per plan and have achieve stated goals for runoff reduction on these sites.
12. ***Site Assessor(s) Conducting Review:***
    Wade Johnson DNR, Carol Strojny BWSR

Site maps, Project plans or Vegetation tables

Table 1-1 – Seeded species installed in May 2011. The mix was a custom mesic seed mix PLS Qty (seed only) 72.105 lbs, Bulk Qty 89.062 lbs.

Common Name	Scientific Name	Lot #	PLS Qty (seed only)	Bulk Qty	Unit
Common Milkweed	*Asclepias syriaca*	743N	0.550	0.659	lb
Smooth Blue Aster	*Aster laevis*	796L	0.550	0.682	lb
Canada Milkvetch	*Astragalus Canadensis*	724L	1.100	1.160	lb
Early Sunflower	*Heliopsis helianthoides*	472L	1.100	1.320	lb
Meadow Blazing Star	*Liatris ligulistylis*	529L	0.550	0.673	lb
Wild Bergamot	*Monarda fistulosa*	831P	0.825	0.887	lb
Purple Prairie Clover	*Petalostemum purpureum*	760L	1.265	1.305	lb
Gray-headed Yellow coneflower	*Ratibida pinnata*	833P	1.100	1.150	lb
Stiff Goldenrod	*Solidago ridida*	776L	0.880	0.974	lb
Blue Vervain	*Verbena hastate*	836P	0.825	0.867	lb
Ironweed	*Vernonia fasciculata*	772L	0.880	1.056	lb
Big Bluestem	*Andropogon gerardii*	524-2L	15.400	18.013	lb

Common Name	Scientific Name	Lot #	PLS Qty (seed only)	Bulk Qty	Unit
Canada Wildrye	*Elymus canadensis*	774L	4.400	5.387	lb
Virginia Wildrye	*Elymus virginicus*	409-3L	4.400	5.155	lb
Switchgrass	*Panicaum virgatum*	839P	4.400	4.604	lb
Little Bluestem	*Schizachyrium scoparium*	840P	18.480	26.879	lb
Indian Grass	*Sorghastrum nutans*	761L	15.400	18.290	lb

Site Photographs

Photo 1-1 - Erickson grassland planting, right side of photo, August 2012.

Photo 1-2 - Planting prior to Burn, May 3, 2017.

Photo 1-3 - Erickson grassland planting May 24, 2017, three weeks after perscribed burn. Re-sprouts primarily seeded species.

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Appendix 1A: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Native Grass Cost Share and Incentives for Runoff Reduction, Erickson

Project Location: Scott County

Township/Range Section: Township 113N Range 22W Section 36

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott WMO, Ryan Holzer

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Treatment/Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Convert 6.9 acres of cropland to native grasses; reduce runoff. Create habitat.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   File stored at SWCD office with conservation plan, seeding plan, operations and management plan, and communications record.
3. ***What are the stated goals of the project?***

Convert 6.9 acres of cropland to native grasses; reduce runoff. Create habitat.

4. ***Were measures of restoration success identified in plans? Yes***
   If yes, list specific measurements.
   Establish permanent vegetative cover which will result in reductions in sediment and phosphorus runoff (expect reduction in 29.67 tons sediment/yr, 29.67 lbs total phosphorus/yr, and 3.22 acre feet /yr of runoff. (10 year practice)
5. ***Are plan Sets available?*** Choose an item. ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Click here to enter text.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **8/9/2012**

9. ***Surrounding Landscape Characteristics:***
   Two fields, formerly in row-crops, adjacent to a woodland and row crop field. Woodland buffers ravines and waterway. Seeded in 2011. Residential, agriculture (annual crop, pasture), woodland, waterways.
10. ***Site Characteristics:***
    a. Soils:
    Loamy soils
    b. Topography:
    Gently rolling; property adjacent to ravines and waterways
    c. Hydrology:
    Over 95% of area reviewed was upland; county average precipitation (reported) for May and June wetter than normal, July was dry.
    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:
    Approximately 60-70% cover in native vegetation (native cool season grasses 40%, native forbs 15%, warm season grasses 5-10% cover). Observed adequate native spacing (native stems every 2-3 ft). Non-aggressive agricultural weeds had about 30% cover (ragweeds, horseweed, curly dock, wooly cupgrass, alfalfa, fleabane). Invasive plant cover was low overall (<1% bull thistle and hoary allysum).

A small low spot in the field had reed canarygrass cover. Implementation and management are still in progress.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes
    Plan includes techniques to establish clean seed bed and to establish a diverse, permanent cover of grasses and forbs.
12. ***List indicators of project outcomes at this stage of project:***
    Percent cover and spacing of native species; success of control of weedy and invasive vegetation; vegetative cover.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes, native vegetation is establishing at a density (every 2-3 feet) to adequately meet goals of sediment and phosphorus reductions.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    No
17. ***Are follow-up assessments needed? Explain.***
    Yes, the vegetative community typically shifts towards a higher dominance of native warm season grasses towards the 3rd or 4th growing season. This site was seeded in 2011. Therefore a follow-up assessment during a later phase in establishment would be beneficial to determine success.
18. ***Additional comments on the restoration project.***

There was no evidence of soil erosion, and the site is progressing as planned (as expected for the first few growing seasons).

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    A high confidence level is selected because the project is on target for success. During our assessment, we observed 9 of the 11 forbs planted and all six of the native grasses seeded. The high interest levels, involvement and dedication of landowners as well as commitment by the district staff improve the likelihood of achieving successful establishment.

Because perennial cover is already well-established on this site, the project should meet proposed outcomes for runoff reductions as calculated by the district.

21. ***Site Assessor(s) Conducting Review:***

    Carol Strojny, Dan Shaw, Greg Larson, BWSR; Wade Johnson, MN DNR

    In attendance: project manager Ryan Holzer

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

2 - CWF Revisit - Scott County Grasslands, Sitcha Property

Legacy Fund Restoration Evaluations

See Appendix A for Project Background and Initial Project Evaluation

Project Name: Native Grass Cost Share and Incentives for Runoff Reduction (Sitcha Property)

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott

Fund: CWF ***Fiscal Year Funds:*** 2010

Follow Up Site Assessment

Field Review Date: **5/24/2017**

Field Visit Attendees: Alyssa Alness, Scott SWCD; Carol Strojny, MN BWSR; Wade Johnson, MN DNR

1. ***Please note any substantive changes to the site characteristics since last site assessment.***

   At the time of our initial site visit to this 2 acre parcel in August 2012 the restoration was one year into establishment following seeding in 2011. In 2012 the seeded species were establishing, with Virginia Wild Rye, Canada Wild Rye and Indian Grass being the most common grasses. Agricultural weeds (Common and Giant Ragweed, Marestail, White Clover, Dandelion, Fleabane, Burdock, Giant Foxtail) were also prevalent, comprising 40-60% cover. The site was clipped in 2013 and one other year. The site has not been burned and the landowner is hesitant conduct burning due to close adjacency to downslope woodland along entire length of the planting. Common grasses comprising >40% cover at the time of the 2017 site visit (growing and senesced from the prior year) were Big Bluestem, Indian Grass, Switch Grass, Canada Wild Rye and Giant Foxtail. Seeded forbs present included: Yellow Coneflower, Common Ox-eye, Golden Alexanders, Maximillian Sunflower, Purple Prairie Clover, New England Aster, Stiff Goldenrod, Showy Goldenrod, Rattlesnake Master, Purple Coneflower, and cultivars unknown to the evaluator presumed to be 'Perennial Lupine', and 'African Daisy'. Canada Goldenrod was common >20% cover. Other weedy forbs species included Dandelion and Canada thistle. Throughout the site were scattered seedlings of Box Elder, Siberian Elm, American Elm, Green Ash and Buckthorn. As noted

under #5 these Canada Thistle and all of the tree species must be controlled for the long term success of the grassland planting.

2. ***Is the plan based on current science?*** Portions

Site prep (planting into RoundUp ready soybean stubble) and clipping during the first 2 years is consistent with current best practices for establishing a grassland planting. Monitoring and management of problem invasives (noted in #5) will be essential for success.
Seed varieties and origins for seed used included cultivated varieties and seeds with origins listed from CA, OR, ID, NE, KS. The provenance, or provenance of plants that produced the cultivated hybrid, for some species e.g. 'African Daisy', 'Perennial Lupine' are not certain and may pose a threat to native plant communities and/or native plant genetics. The use of non-native seed including ornamental cultivars is strongly discouraged for planting in natural areas and is not consistent with current science.

3. ***List indicators of project outcomes at this stage of the project.***
Six years into establishment of a grassland planting of this type it is typical for warm season grasses (Big Bluestem, Switch Grass, Indian Grass) to become dominant. It appears that patches of seeded grasses are present and persisting. However, the relative abundance of Canada Thistle and tree seedlings coupled with no plans for controlled burning indicates a significant threat to the site continuing to be a grassland or a grassland of relative floristic quality. As noted under #5 Canada Thistle and trees species must be managed to support the potential a successful planting.
4. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
Proposed project outcome of establishing dense perennial cover to reduce runoff and associated sediment and nutrients has been achieved. Implementation of maintenance per landowner contract and technical assistance from SWCD staff should help support a successful planting.
A 10 year contract was completed with each landowner to facilitate compliance. In addition, the Scott SWCD inspects years 1, 5 and 9 of the contract, the Scott SWCD is on call to assist the landowner, and each landowner was provided an explanation of maintenance needs and a copy of NRCS specification CP25 Restoration of Rare and Declining Habitat – Tallgrass Prairie and most were responsible for a portion of the establishment cost so they were vested in the outcome. NRCS specification CP25 served as Operation and Maintenance guidance for all projects. Significant follow through on implementing the maintenance agreement will be needed to steer the project away from a potential weedy forest condition.
5. ***Are corrections or modifications needed to meet proposed outcomes?***

Overall the proposed outcomes for establishing dense vegetation to reduce runoff have been achieved. However, weedy trees and invasive forbs will require considerable management to attain a desirable quality of vegetation. Patches of Canada Thistle must be managed aggressively to prevent its spread. Density of Canada Thistle across the site was difficult to assess at the time of site visit due to the earliness in the season. Based on observable patches, spot treatment with appropriate herbicide is likely the best control option. Spot treatment with aminopyralid (e.g. Milestone) or clopyralid (e.g. Transline) based herbicides when thistle flower buds or flowers are present is typically the most effective herbicide control method.
Likely the greatest threat to this site persisting in a grassland condition is the relative abundance of weedy tree seedlings scattered throughout the site: Box Elder, Siberian Elm, American Elm, Green Ash

and Buckthorn. These seedlings are the result of 'seed rain' from a forest consisting of these species immediately adjacent and along the entire length of the planting. Mechanical removal (e.g. weed wrench) when soils are adequately moist would be most effective at the present size of most seedlings. However, mechanical removal may be a prohibitive amount of labor across the entire 2 acre site and depending on the established root structure, especially Siberian Elm taproots. Cutting and herbicide options should also be employed. In addition to mowing the site, landowners should be encouraged to establish a burn break sufficient to manage prescribed burns through this small strip.

6. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
   Ongoing monitoring and landowner communication by Scott SWCD staff has been taking place at least annually. Staff have worked to build capacity of the landowner to manage the grassland moving forward. Given the 10 year contract term of this agreement, project managers are encouraged to help landowners implement further management for weedy species and trees, including as described in #5. The management plan for these grassland projects described in NRCS specification *CP25 Restoration of Rare and Declining Habitat – Tallgrass Prairie* provides a minimal level of guidance and must be augmented by County and area technical assistance.
7. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
   As noted in #2, the use of non-native species for seeding has the potential to degrade native plant communities and may detract from habitat for native plants and animals.
8. ***Are follow-up assessments needed? Explain.***
   The SWCD and WMO should continue to monitor the project and work with the landowner to ensure adequate maintenance moving forward. It would be insightful to re-visit the site in the summer or 2018 or 2019 to assess vegetation composition and woody/invasives control.
9. ***Additional comments on the restoration project.***
   Scott SWCD staff have done an exceptional job in communicating and educating landowners on stewardship of their sites. Through regular phone communications and site visits, SWCD staff have established positive relationships and worked to build landowner capacity to care for their properties in the future. This will be important to continue in light of known issues with this planting, noted in #2 and #5. To help preserve local native seed genetic integrity and prevent potential negative impacts of aggressive seed from non-regional sources, project managers are encouraged to utilize seed sources from as close as possible to the site. Runoff reduction is estimated based on a reduction per acre basis. These measures include reductions for total phosphorus lb/yr, sediment tons/yr and runoff acre feet/yr. In the planning phase it would have benefited the projects to also provide an indication of the landscape context of the sites with relation to water resource of concern i.e. where did/does runoff flow from the specific site? Intercept upland flow running on to the site?

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

1. ***The project will:***
   Minimally meet proposed outcomes
   Confidence of outcome determination:
   Medium
2. ***Provide explanation of reason(s) for determination.***
   This project site is located down slope of an active annual row crop field. The dense grass and forb cover that have been established for this project provide an effective vegetated buffer to slow and absorb runoff potentially carrying sediment and nutrients from an adjacent upland agricultural field. To date the goal of reducing runoff has been achieved. The determination that the site will minimally meet proposed outcomes is based on the current vegetative quality and assumed trajectory based on current management. Specifically the invasion of weedy tree species (i.e. Box Elder, Buckthorn) could transform the site in the coming years from dense grass and forb ground cover to relatively bare ground with a dense shade canopy. Although, this condition could provide direct rainfall interception, runoff from the uplands would flow through largely unimpeded, substantially reducing its function as a grassed buffer.
3. ***Site Assessor(s) Conducting Review:***
   Wade Johnson, MN DNR

Site Photographs

Photo 2-1 - Sticha grassland site one year after seeding, August 2012.

Photo 2-2 - Sicha grassland site May 24, 2018. Seeded grass/forbs are majority cover on site, however Canada Thistle (foreground) and weedy tree invasion (background) present management issues.

Site maps, Project plans or Vegetation tables

Table 2-1 - One of four mixes of species seeded in 2011. The mix was wilderness tall prairiegrass mix lot: 13460. Total Purity: 87.98% CROP: .04% INERT 11.97% WEEDS: .01% TESTED: 12-2009 NOXIOUS WEEDS: NONE AMS 5761 NET WT: 5LB Varieties not stated. In MN, sell by 12/2010. Producer's Choice 16690 Greystone Lane, Jordan, MN 55352.

Item	Purity	Tot Germ	ORIG
Indiangrass	16.92%	80%	NE
Big Bluestem	16.30%	90%	NE
Little Bluestem	15.76%	93%	Ne
Switchgrass	9.96%	80%	NE
Virginia Wildrye	9.90%	95%	NE
Canada Wildrye	9.85%	68%	MN
Sideoats Grama	9.29%	73%	MN

Table 2-2 - One of four mixes of species seeded in 2011. The mix was Farmscapes® Meadow mix lot: 13753. Total Purity: 96.78% CROP: .05% INERT 3.08% WEEDS: .08% TESTED: 02/2010 NOXIOUS WEEDS: 0% AMS 5761 NET WT: 6LB Varieties not stated. In MN, sell by 02/2011. Producer's Choice 16690 Greystone Lane, Jordan, MN 55352.

Item	Purity	GERM	DS	TOTAL	ORIG
Sideoats Grama	15.89%	85%	0%	85%	LS
Hard Fescue	9.73%	76%	0%	76%	OR
Little Bluestem	9.61%	78%	0%	78%	NE
Annual Baby's Breath	6.95%	95%	0%	95%	OR
Scarlet Flax	6.95%	90%	0%	90%	OR
Perennial Lupine	6.95%	41%	43%	84%	OR
Buffalograss	5.94%	95%	0%	95%	NE
Dwarf Cosmos	4.65%	95%	0%	95%	CA
Dwarf Blue Cornflower	4.65%	93%	0%	93%	OR
Lance-leaved Coreopsis	4.62%	62%	3%	65%	OR
Purple Coneflower	4.62%	91%	3%	94%	ID
Blue Grama	6.90%	85%	0%	85%	MN
Shasta Daisy	2.32%	89%	1%	90%	OR
Sand Lovegrass	2.00%	70%	0%	70%	NE
African Daisy (stick type)	1.14%	85%	0%	85%	OR
African Daisy Stick	1.13%	83%	14%	97%	OR
Dwarf Evening Primrose	1.17%	79%	13%	99%	CA

Item	Purity	GERM	DS	TOTAL	ORIG
Corn Poppy	1.17%	99%	0%	99%	OR
Greyheaded Coneflower	1.12%	92%	0%	92%	NE
Plains Coreopsis	0.55%	93%	0%	93%	OR
Prairie Coneflower	0.57%	77%	0%	77%	OR
Black-eyed Susan	0.57%	80%	4%	84%	OR
Mexican Hat	0.58%	88%	0%	88%	OR

Table 2-3 - One of four mixes of species seeded in 2011. The mix was Midwest Wildflower mix lot: 13522. Total Purity: 99.36% CROP: .00% INERT .56% WEEDS: .08% TESTED: 02/2010 NOXIOUS WEEDS: 0% AMS 5761 NET WT: 8LB Varieties not stated. In MN, sell by 02/2011. Producer's Choice 16690 Greystone Lane, Jordan, MN 55352.

Item	Purity	GERM	DS	TOTAL	ORIG
Annual Baby's Breath	13.90%	95%	0%	95%	OR
Scarlet Flax	13.91%	90%	0%	90%	OR
Perennial Lupine	13.91%	41%	43%	84%	OR
Dwarf Cosmos	9.30%	95%	0%	95%	CA
Dwarf Blue Cornflower	9.29%	93%	0%	93%	OR
Lance-leaved Coreopsis	9.23%	62%	3%	65%	OR
Purple Coneflower	9.23%	91%	3%	94%	ID
Shasta Daisy	4.63%	89%	1%	90%	OR
African Daisy (Stick Type)	2.28%	85%	0%	85%	OR
African Daisy Stick	2.25%	83%	14%	97%	OR
Dwarf Evening Primrose	2.33%	79%	18%	99%	CA
Corn Poppy	2.33%	99%	0%	99%	OR
Greyheaded Coneflower	2.23%	92%	0%	92%	NE
Plains Coreopsis	1.11%	93%	0%	93%	OR
Prairie Coneflower	1.14%	77%	0%	77%	OR
Black-eyed Susan	1.14%	80%	4%	84%	OR
Mexican Hat	1.15%	88%	0%	88%	OR

Table 2-4 - One of four mixes of species seeded in 2011. Seed mixture name Custom – Wildflowers. MISTURE LOT NO.: DSTICHA11061402 ORDER BLUK WT. (LB): 4.05 ORDER PLS WT. (LB): 3.0 Prairie Meadows Native Seed 10850 Echo Ave. Lonsdale, MN 55046. No noxious weed seeds present in any germination tests (completed May-10 for lead plant and Mar-11 for all other species. Sell by date Aug011 for lead plant and Jun-12 for all other species.

% of MIX pls wt.	Kind-Common Name	Kind- Latin Name	LOT NO.	GENETIC ORIGIN	PURITY	GERM.	Dor. and Hard Seed	TZ	TOTAL VIABLE %	PURE LIVE SEED %	OTHER CROP %	INERT MATTER %	WEED SEED
4.17	Lead Plant	Amorpha canescens	552L	Dakota Co., MN	97.90%	92%	0%	NA	92	90.07	2.1	0	%
4.17	New England Aster	Aster novae-angliae	799L	Dakota Co., MN	94.10%	71%	17%	NA	88	82.81	0	5.49	0
9.33	Rattlesnake Master	Eryngium yuccifolium	764L/ 771L	Dakota Co., MN	94.97%	0%	0%	84%	84	79.75	0	5.06	0.41
33.33	Early Sunflower	Heliopsis helianthoides	700L	Dakota Co., MN	99.20%	18%	37%	NA	55	54.56	0.01	0.79	0
33.33	Purple Prairie Clover	Petalostemum purpuruem	760L	Rice Co., MN	99.93%	0%	0%	97%	97	96.93	0	0.07	0
8.33	Stiff Goldenrod	Solidago rigida	776L	Rice Co., MN	99.26%	88%	3%	97%	91	90.33	0	0.74	0
4.17	Hoary Vervain	Verbena stricta	762L	Rice Co., MN	99.61%	78%	8%	NA	86	85.66	0	0.39	0

% of MIX pls wt.	Kind-Common Name	Kind- Latin Name	LOT NO.	GENETIC ORIGIN	PURITY	GERM.	Dor. and Hard Seed	TZ	TOTAL VIABLE %	PURE LIVE SEED %	OTHER CROP %	INERT MATTER %	WEED SEED
4.17	Golden Alexanders	Zizia aurea	717L	Rice Co., MN	99.68%	6%	71%	NA	77	76.75	0	0.32	0

Minnesota Department of Natural Resources
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Appendix 2A: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Native Grass Cost Share and Incentives for Runoff Reduction (Sitcha Property)

Project Location: Scott County

Township/Range Section: Township 113N Range 22W Section 31

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott Co. Ryan Holzer

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Treatment/Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

4. ***What are the specific project components and treatments?***
   Convert 2 acres of cropland to native grasses; reduce runoff. Create habitat.
5. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   File stored at SWCD office with conservation plan, seeding plan, operations and management plan, and communications record.

6. ***What are the stated goals of the project?***
   Convert 2 acres of cropland to native grasses; reduce runoff. Create habitat.
7. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Establish permanent vegetative cover which will result in reductions in sediment and phosphorus runoff (expect reduction of 7.4 tons sediment/yr, 7.4 lbs total phosphorus/yr, and 0.93 acre feet /yr of runoff. (10 year practice)
8. ***Are plan Sets available?*** Choose an item. ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
9. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Click here to enter text.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

10. ***Were alterations made to the original plan during construction?***
    Yes
    Some additional species planted from what was originally planned.
11. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
    Click here to enter text.

Site Assessment

Field Review Date: **8/9/2012**

12. ***Surrounding Landscape Characteristics:***
    Single 2 acre field, formerly in soybeans, adjacent to a woodland, steep slope leading to ditched wetland adjacent to waterway. Row crop field upslope. Seeded in 2010 and 2011. Residential, agriculture (annual crop, pasture), woodland, waterways.
13. ***Site Characteristics:***
    a. Soils:
    Loamy soils
    b. Topography:
    Gently rolling; property adjacent to ravines and waterways
    c. Hydrology:
    100% of area reviewed was upland; county average precipitation (reported) for May and June wetter than normal, July was dry.
    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:
    Observed adequate native spacing (native stems every 2-3 ft). Cool season native grasses (wild ryes) had about 30% cover. Planted forb cover was about 15% (common plants: purple coneflower, black-eyed susan, coneflower, coryopsis, goldenrods, asters). Agricultural weeds had 40-60% cover

(ragweeds, horseweed, white clover, dandelion, fleabane, burdock, foxtail - the latter with 15% cover). Invasive plant cover was low overall (<1% Canada thistle).

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

14. ***Is the plan based on current science?*** Yes
    Plan includes techniques to establish clean seed bed and to establish permanent cover of native grasses and forbs.
15. ***List indicators of project outcomes at this stage of project:***
    Percent cover and spacing of native species; success of control of weedy and invasive vegetation; vegetative cover.
16. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes, native species were establishing at a sufficient density (every 2-3 feet) to accomplish goals of sediment and phosphorus reductions.
17. ***Are corrections or modifications needed to meet proposed outcomes?***
    No
18. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes
19. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    Yes, some species in seed mix are not meeting native vegetative guidance regarding source material (e.g. non-native seed sourced from California and Oregon).
20. ***Are follow-up assessments needed? Explain.***
    Yes, the vegetative community typically shifts towards a higher dominance of native warm season grasses towards the 3rd or 4th growing season. This site was seeded in 2010 and 2011. Therefore a follow-up assessment during a later phase in establishment would be beneficial to determine success.
21. ***Additional comments on the restoration project.***
    There was no evidence of soil erosion, and the majority of areas are progressing as planned (as expected for the first few growing seasons).

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

22. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
23. ***Provide explanation of reason(s) for determination.***

A medium confidence level is selected because the project is overall on target for success. Because the project is in the early stages of establishment, predicting which way establishment will proceed is difficult. The high

interest levels, involvement and dedication of landowners as well as commitment by the district staff improve the likelihood of achieving successful establishment. Because perennial cover is becoming well established on this site, the project should meet proposed outcomes for runoff reductions as calculated by the district.

24. Site Assessor(s) Conducting Review:

Carol Strojny, BWSR

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

3 - CWF Revisit - Scott County Grasslands, Whipps Property

Legacy Fund Restoration Evaluations

See Appendix A for Project Background and Initial Project Evaluation

Project Name: Native Grass Cost Share and Incentives for Runoff Reduction (Whipps Property)

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott WMO

Fund: CWF ***Fiscal Year Funds:*** 2010

Follow Up Site Assessment

Field Review Date: **5/24/2017**

Field Visit Attendees: Alyssa Alness, Scott SWCD; Carol Strojny, MN BWSR; Wade Johnson, MN DNR

1. ***Please note any substantive changes to the site characteristics since last site assessment.***
   The revisited site in 2017 was the 10 acre former row crop parcel. At the time of our initial site visit, August 2012, the restoration was one year into establishment following seeding in 2011. In 2012 the seeding was establishing well and showed a dominance of seeded Canada Wild Rye. The site was clipped in 2012, 2013 and 2015. The first prescribed burn took place in early May 2017, three weeks prior to the site visit. Based on observable re-sprouts, seeded warm season grasses appeared dominant >60% across the site, primarily Big Bluestem and Indian Grass. Re-sprouts of seeded forbs were also common: Yellow Coneflower, Common Ox-eye, Golden Alexanders, Purple Prairie Clover, and Maximillian Sunflower.
   Resprouts and seedlings of Canada Thistle (*Cirsium arvense*) Box Elder (*Acer negundo*) are present in patches. As noted under #5 these must be controlled for the long term success of the grassland planting.
   The 2.7 acre former hay field parcel that was noted in the 2012 evaluation was not visited in 2017 (referred to as 5.9 acre hay field seeding in 2012 evaluation; only a 2.7 acre parcel of this was visited)

2. ***Is the plan based on current science?*** Yes

   Site prep (planting into RoundUp ready soybean stubble) and maintenance during the first 6 years (noted in #1) is consistent with current best practices for establishing a grassland planting. Monitoring and management of problem invasives (noted in #5) will be essential for success.

3. ***List indicators of project outcomes at this stage of the project.***

   Six years into establishment of a grassland planting of this type it is typical for warm season grasses (Big Bluestem, Indian Grass) to become dominant and the previously dominant cool season grasses (Canada Wild Rye) to fade. This appears to be the case with on the Whipps site. Seeded forbs also appear to have adequate density and spread across the site. These indicators suggest a successful planting at this stage. 2017 observations were made 3 weeks after a nearly complete burn and would benefit from follow up assessments later in the year and in following seasons. As noted under #5 Canada Thistle and trees species must be managed to support a successful planting.

4. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

   Proposed project outcome of establishing dense perennial cover to reduce runoff and associated sediment and nutrients has been achieved. Ongoing maintenance per landowner contract and technical assistance from SWCD staff indicate positive outcomes for the quality of the planting.

   A 10 year contract was completed with each landowner to facilitate compliance. In addition, the Scott SWCD inspects years 1, 5 and 9 of the contract, the Scott SWCD is on call to assist the landowner, and each landowner was provided an explanation of maintenance needs and a copy of NRCS specification CP25 Restoration of Rare and Declining Habitat – Tallgrass Prairie and most were responsible for a portion of the establishment cost so they were vested in the outcome. NRCS specification CP25 served as Operation and Maintenance guidance for all projects.

5. ***Are corrections or modifications needed to meet proposed outcomes?***

   Overall the establishment and density of desired grasses and forbs is satisfactory at this stage (6 years) and proposed outcomes for runoff reduction have been achieved.

   However, weedy trees and invasive forbs will requiring continued management to maintain the vegetative quality of the grassland planting. Patches of Canada Thistle must be managed aggressively to prevent its spread. Density of Canada Thistle across the site was difficult to assess at the time of site visit due to the recent burn. Based on observable patches, spot treatment with appropriate herbicide is likely the best control option. Spot treatment with aminopyralid (e.g. Milestone) or clopyralid (e.g. Transline) based herbicides when thistle flower buds or flowers are present is typically the most effective herbicide control method.

   Re-sprouts of Box Elder tree seedlings were also scattered across the site. Although above ground growth of these trees appears to be have been set back by a sufficiently hot burn, re-sprouts from the roots will persist. Mechanical removal (e.g. weed wrench) when soils are adequately moist would be most effective at the present seedling size. Mechanical removal may be a prohibitive amount of labor across the 10 acre+ site. Herbicide options should also be explored. To adequately manage the persistence of tree seedlings on site the potential for removal of adjacent trees (upslope to the Northwest along property line) should also be explored.

6. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

   Ongoing monitoring and landowner communication by Scott SWCD staff has been taking place at least annually. Staff have worked to build capacity of the landowner to manage the grassland moving

forward. Given the 10 year contract term of this agreement, landowner knowledge and capacity will be vital to maintaining the grassland conditions.

7. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
   Landowner may consider burning in patches in improve heterogeneity in the planting composition and structure. This may also benefit insect survivorship and habitat on the site. Relatively small scale of the site may make patch burning less desirable logistically.
8. ***Are follow-up assessments needed? Explain.***
   The SWCD and WMO should continue to monitor the project and work with the landowner to ensure adequate maintenance moving forward. It would be insightful to re-visit the site in the summer or 2018 or 2019 to assess vegetation composition and woody/invasives control.
9. ***Additional comments on the restoration project.***
   Scott SWCD staff have done an exceptional job in communicating and educating landowners on stewardship of their sites. Through regular phone communications and site visits, SWCD staff have established positive relationships and worked to build landowner capacity to care for their properties in the future. Runoff reduction is estimated based on a reduction per acre basis. These measures include reductions for total phosphorus lb/yr, sediment tons/yr and runoff acre feet/yr. In the planning phase it would have benefited the projects to also provide an indication of the landscape context of the sites with relation to water resource of concern i.e. where did/does runoff flow from the site? Intercept upland flow running on to the site? Seed varieties and origins for seed used included cultivated varieties and seeds whose origins were only defined as USA. To help preserve local native seed genetic integrity and prevent potential negative impacts of aggressive seed from non-regional sources, project managers are encouraged to utilize seed sources from as close as possible to the site.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

10. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
11. ***Provide explanation of reason(s) for determination.***
    The grassland sites have established per plan and have achieve stated goals for runoff reduction on these sites.
12. ***Site Assessor(s) Conducting Review:***
    Wade Johnson DNR, Carol Strojny BWSR

Site maps, Project plans or Vegetation tables

Table 3-1 - One of two mixes of species seeded in 2011. The mix was CP 25 mix lot: 15281. Total Purity: 95.19% CROP: .05% INERT 4.74% WEEDS: .02% TESTED: 04/2011 NOXIOUS WEEDS: 0% AMS 5761 NET WT: 30LB Varieties not stated. Producer's Choice 16690 Greystone Lane, Jordan, MN 55352. John Whipps – 15.9 Acres.

Item	Purity	GERM	HS	TOTAL	ORIG
Bison Big Bluestem	19.67%	90%	0%	90%	MN
Virginia Wildrye	10.48%	90%	0%	90%	MN
Mandan Canada Wildrye	10.62%	90%	0%	90%	MN
Tomahawk Indiangrass	20.13%	90%	0%	90%	MN
Itasca Little Bluestem	30.30%	90%	0%	90%	MN
Dakota Switchgrass	3.99%	90%	0%	90%	MN

Table 3-2 - One of two mixes of species seeded in 2011. The mix was CP 25 forbs mix – John Whipps lot: 15282. Total Purity: 98.99% CROP: .03% INERT 0.97% WEEDS: .01% TESTED: 04/2011 NOXIOUS WEEDS: NONE AMS 5761 NET WT: 17.97LB PLS 91.37 Varieties not stated. Producer's Choice 16690 Greystone Lane, Jordan, MN 55352. John Whipps – 15.9 Acres.

Item	Purity	GERM	HS	TOTAL	ORIG
Yellow Coneflower	17.85%	92%	6%	9%	USA
Common Ox-eye	12.09%	51%	36%	8%	USA
Tall Blazingstar	11.99%	84%	3%	8%	USA
Hoary Vervain	11.94%	03%	95%	95%	USA
Purple Prairie Clover	9.10%	97%	0%	0%	USA
Golden Alexanders	9.08%	8%	89%	98%	USA
Black-eyed Susan	9.08%	81%	0%	0%	USA
Butterfly Milkweed	6.05%	82%	8%	8%	USA
Joe-pye weed	6304%	24%	70%	70%	USA
Maximillian Sunflower	5.77%	40%	55%	55%	USA

Site Photographs

Photo 3-1 - Whipps grassland planting August 2012, One and one half years after seeding. Cool season Canada Wild Rye dominates.

Photo 3-2 - Whipps grassland pre-burn May 3, 2017.

Photo 3-3 - Whipps grassland planting May 24, 2017, three weeks after perscribed burn. Warm season prairie grasses dominate the vegetative cover.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

Appendix 3A: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Native Grass Cost Share and Incentives For Runoff Reduction (Whipps Property)

Project Location: Scott County

Township/Range Section: Township 114N Range 23W Section 32

Project Manager / Affiliated Organization: Paul Nelson/Natural Resources Program Manager/Scott WMO

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Treatment/Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Convert 15.9 acres of cropland to native grasses; reduce runoff. Create habitat.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   File stored at SWCD office with conservation plan, seeding plan, operations and management plan, and communications record.
3. ***What are the stated goals of the project?***
   Convert 15.9 acres of cropland to native grasses; reduce runoff. Create habitat.

4. ***Were measures of restoration success identified in plans? Yes***
   If yes, list specific measurements.
   Establish permanent vegetative cover which will result in reductions in sediment and phosphorus runoff (expect reduction in 14.31 tons sediment/yr, 14.31 lbs total phosphorus/yr, and 4.7 acre feet /yr of runoff. (10 year practice)
5. ***Are plan Sets available?*** Choose an item. ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Click here to enter text.
   Click here to enter text.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Click here to enter text.

Site Assessment

Field Review Date: **8/9/2012**

9. ***Surrounding Landscape Characteristics:***
   Multiple fields, total of 15.9 acres (10 acres converted from row crop and 5.9 acres converted from hay); seeded in 2011. Adjacent to ravine areas of Sand Creek watershed. Rural landscape of woodland, annual crop, pasture, and residential areas. Residential, agriculture (annual crop, pasture), woodland, waterways.
10. ***Site Characteristics:***
    a. ***Soils:***
    Loamy soils
    b. ***Topography:***
    Gently rolling; property adjacent to ravines and waterways
    c. ***Hydrology:***
    Over 90% of area reviewed was upland; county average precipitation (reported) for May and June wetter than normal, July was dry.
    d. ***Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:***
    Dominant species varied by field parcel. For fields converted from row cropping, observed adequate native cover (60-75% native grasses, mostly cool season; 5-15% native forbs) and spacing (native stems every 2-3 ft). Non-native and weed cover (estimated 10%) included ragweed, prickly lettuce,

dandelions, clovers, and alfalfa. Invasive plant cover was low overall (<2% bull thistle, Canada thistle, perennial sow thistle, wild parsnip - single stem observed). Where seed was installed into fields that were previously hayed, a lower percent cover of natives was observed (5-15%). High cover of annual weeds, clovers, and pasture grasses (including reed canary grass, quackgrass, and brome) were observed in these fields. Implementation and management are still in progress.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes
    Plan includes techniques to establish clean seed bed and to establish a diverse, permanent cover of grasses and forbs.
12. ***List indicators of project outcomes at this stage of project:***
    Percent cover and spacing of native species; success of control of weedy and invasive vegetation; vegetative cover.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes, vegetation establishment is sufficient to to adequately meet goals of sediment and phosphorus reductions.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    Yes, continue efforts to establish native perennial cover in the fields that were previously hayed.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes, SWCD staff are working closely with the landowner to ensure proper management of the project.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    Click here to enter text.
17. ***Are follow-up assessments needed? Explain.***
    Yes, the vegetative community typically shifts towards a higher dominance of native warm season grasses towards the 3rd or 4th growing season. We reviewed parcels in their 1st full growing season (seeded in 2011). Therefore a follow-up assessment during a later phase in establishment would be beneficial to determine success.
18. ***Additional comments on the restoration project.***

There was no evidence of soil erosion, and the majority of areas are progressing as planned (as expected for the first few growing seasons). Landowner should continue monitoring the site for wild parsnip, removing plants as they are found.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:

Medium

20. ***Provide explanation of reason(s) for determination.***

    A medium confidence level is selected because the project is overall on target for success. Because the project is in the early stages of establishment, predicting which way establishment will proceed is difficult. The high interest levels, involvement and dedication of landowners as well as commitment by the district staff improve the likelihood of achieving successful establishment.

    Because perennial cover is becoming well established on this site, the project should meet proposed outcomes for runoff reductions as calculated by the district.

21. ***Site Assessor(s) Conducting Review:***

    Carol Strojny, Dan Shaw, Greg Larson, BWSR; Wade Johnson, MN DNR

    In attendance: project manager Ryan Holzer and property owner Mr. Whipps

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

4 - CWF Cannon River Watershed Buffer Strips, Warsaw Township

Legacy Fund Restoration Evaluations

Project Background

Project Name: Buffer Strips in the Cannon River Watershed, Remme Hayable Buffer (Warsaw Township, Goodhue County) project.

Project Location: Rice County

Township/Range Section: Township Warsaw Range Click here to enter text. Section 30 and 31

Project Manager / Affiliated Organization: Rice County SWCD

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010-2011

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Forest, Riparian Woodland and recently cropped field. Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Planting of “Riparian Vegetated Buffer” using approved seed types Rice SWCD required landowners to plant grasses or alfalfa mix.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Project map shows the project boundaries for Warsaw Township Section 30 riparian buffer areas. 1.7 acres were seeded in Section30. 1.8 acres were seeded in Section 31. Total acreage for this buffer project was 3.5 acres.
3. ***What are the stated goals of the project?***
   Establish grassed buffers along streams to provide improved water quality through reduced sediment, nutrients, and chemicals. Creation of a riparian buffer to prevent sediment from entering streams in the Cannon River Watershed.
4. ***Were measures of restoration success identified in plans? No***
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Project Map for Sections 30 and 31, Warsaw Township, Goodhue County, Project Map
   Section 30 Warsaw Township, Goodhue County aerial photograph 1991
   Section 30 Warsaw Township, Goodhue County aerial photograph 2015
   Section 30 Warsaw Township, Goodhue County LiDAR image
   Section 30 Warsaw Township, Goodhue County aerial photograph 2016 Google Earth image
   Section 31 Warsaw Township, Goodhue County aerial photograph 1991
   Section 31 Warsaw Township, Goodhue County aerial photograph 2015
   Section 31 Warsaw Township, Goodhue County LiDAR image
   Section 31 Warsaw Township, Goodhue County aerial photograph 2016 Google Earth image
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   NA

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **11/5/2015**

9. ***Surrounding Landscape Characteristics:***

   The buffer project area is adjacent to an unnamed stream. The land use for the project area is annually crop agricultural fields.

10. ***Site Characteristics:***

    a. Soils:

    Section 30: Colo silt loam, channeled, 0 to 2 percent slopes, frequently flooded.

    Section 31: Maxfield silty clay loam, 0 to 2 percent slopes, occasionally flooded

    b. Topography:

    Level, 0 to 2 percent slopes.

    c. Hydrology:

    Adjacent to unnamed stream.

    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

    Planted grasses and wildflowers are dominant cover.

    e. Vegetation B: Meander Search Species List (as appropriate for site)

    Click here to enter text.

11. ***Is the plan based on current science?*** Yes

    The species planted have become well established and provide the services desired by this project. A greater reliance on native wet meadow species would further enhance this successful buffer project.

12. ***List indicators of project outcomes at this stage of project:***

    Field review showed continuous vegetative cover.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes, buffer planting area shows well establish cover.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    No, though control of established invasive species wild parsnip is an important follow up activity.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Yes, annual hay cutting will be useful for maintain the buffer areas. Control of invasive species, especially wild parsnip, will be a necessary follow up activity.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Regular hay cutting and control of invasive species, especially wild parsnip in Section 31, will enhance the project. The timing of hay cutting before seed set of wild parsnip and herbicide treatment of parsnip rosettes are important follow up management activities. Hay with wild parsnip in it has much less value than hay without this invasive plant in it. Also, if hay is cut after viable seed is present, there is increase potential to spread wild parsnip to other locations.

17. ***Are follow-up assessments needed? Explain.***

    The planting was successful but since this site floods regularly, major flood events could threaten the integrity of the planting. Field checks should made after flood events. Control of the invasive species will be necessary for the long term success of this project.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Grasses and other ground layer plants are well established and are continuous across the project area.
21. ***Site Assessor(s) Conducting Review:***
    DNR: Mark Cleveland, Wade Johnson & BWSR: Carol Strojny

Appendix 4A: Site maps, Project plans or Vegetation tables

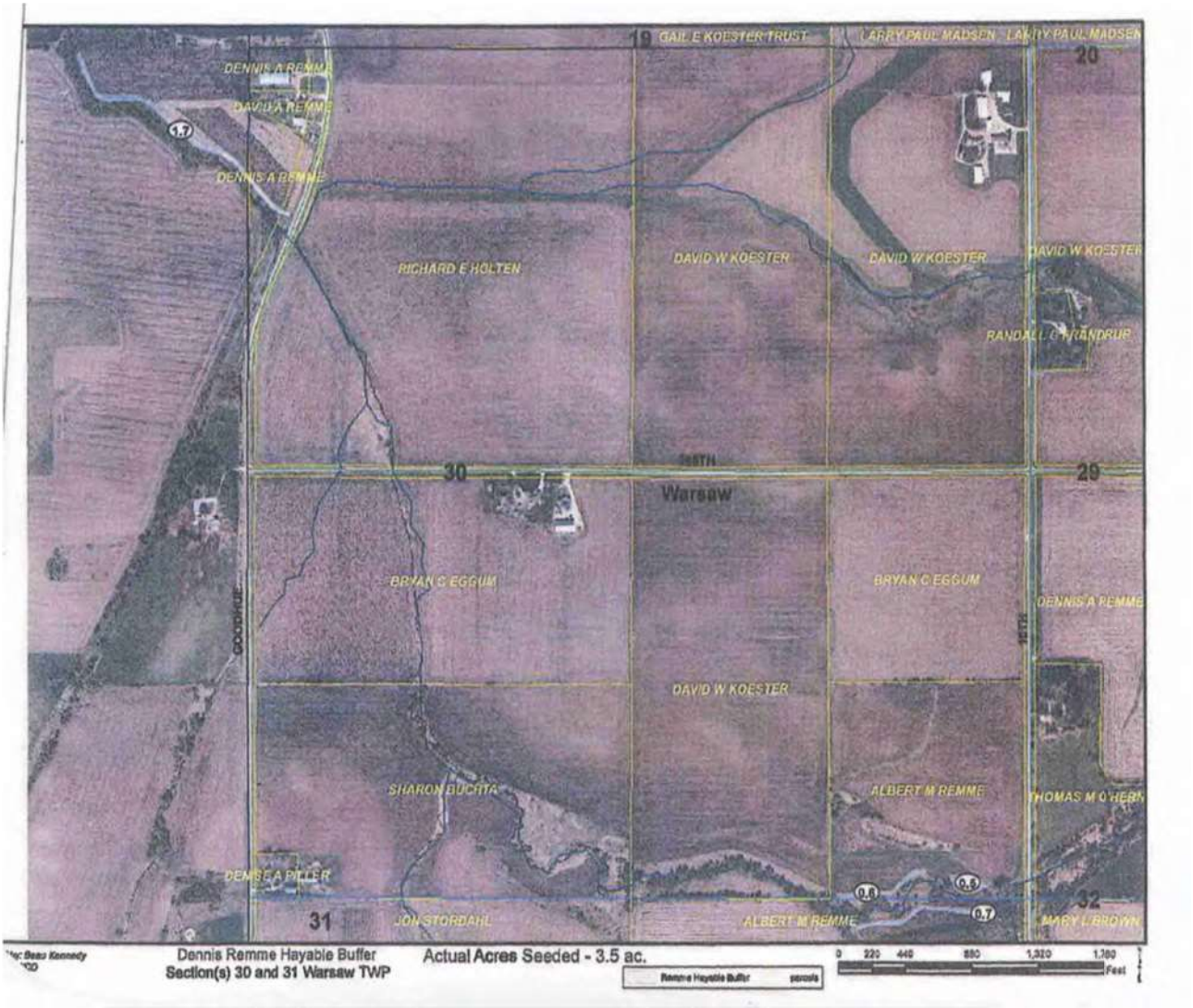


Figure 4-1 - Sections 30 and 31 Warsaw Township, Goodhue County Project Area Map.

Figure 4-2 - Section 30 Warsaw Township, Goodhue County aerial photograph 1991.

Figure 4-3 - Section 30 Warsaw Township, Goodhue County aerial photograph 2015.

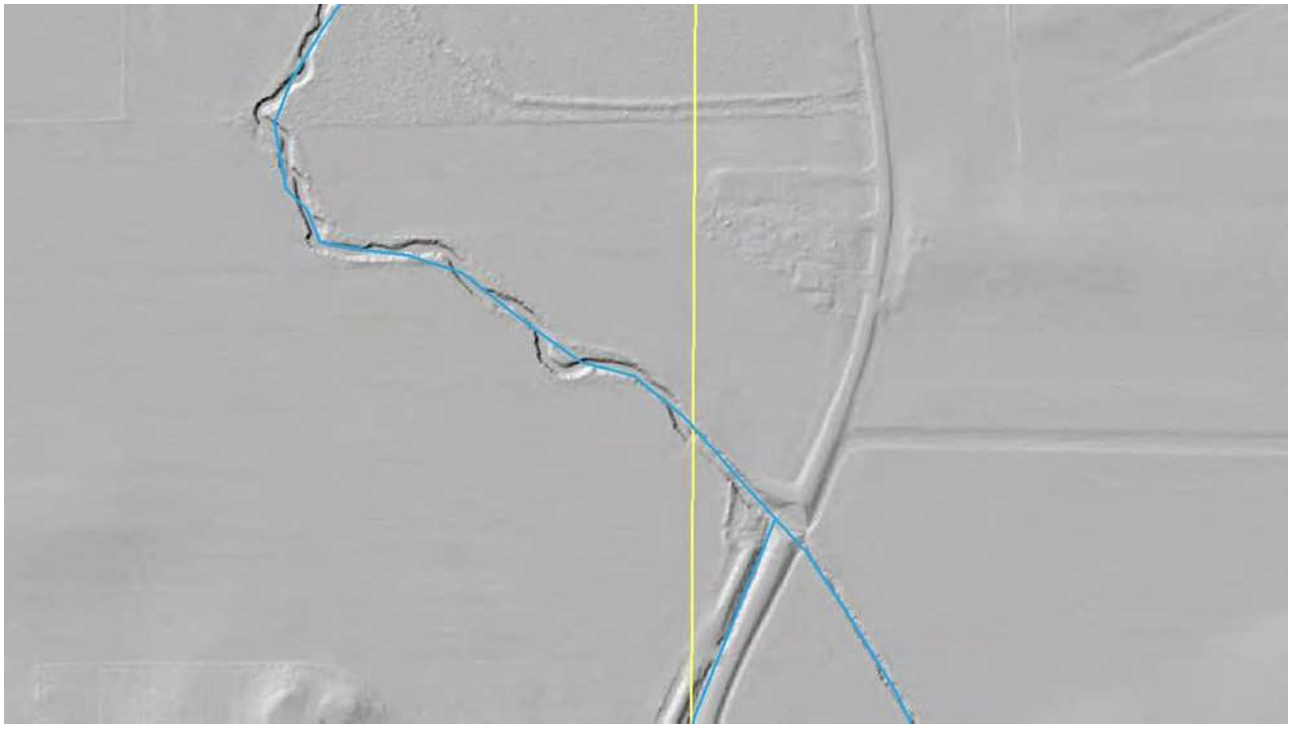


Figure 4-4 - Section 30 Warsaw Township, Goodhue County Lidar imagery.

Figure 4-5 - Section 30 Warsaw Township, Goodhue County aerial photograph 2016 Google Earth image Buffer is on north side of the wooded riparian corridor.

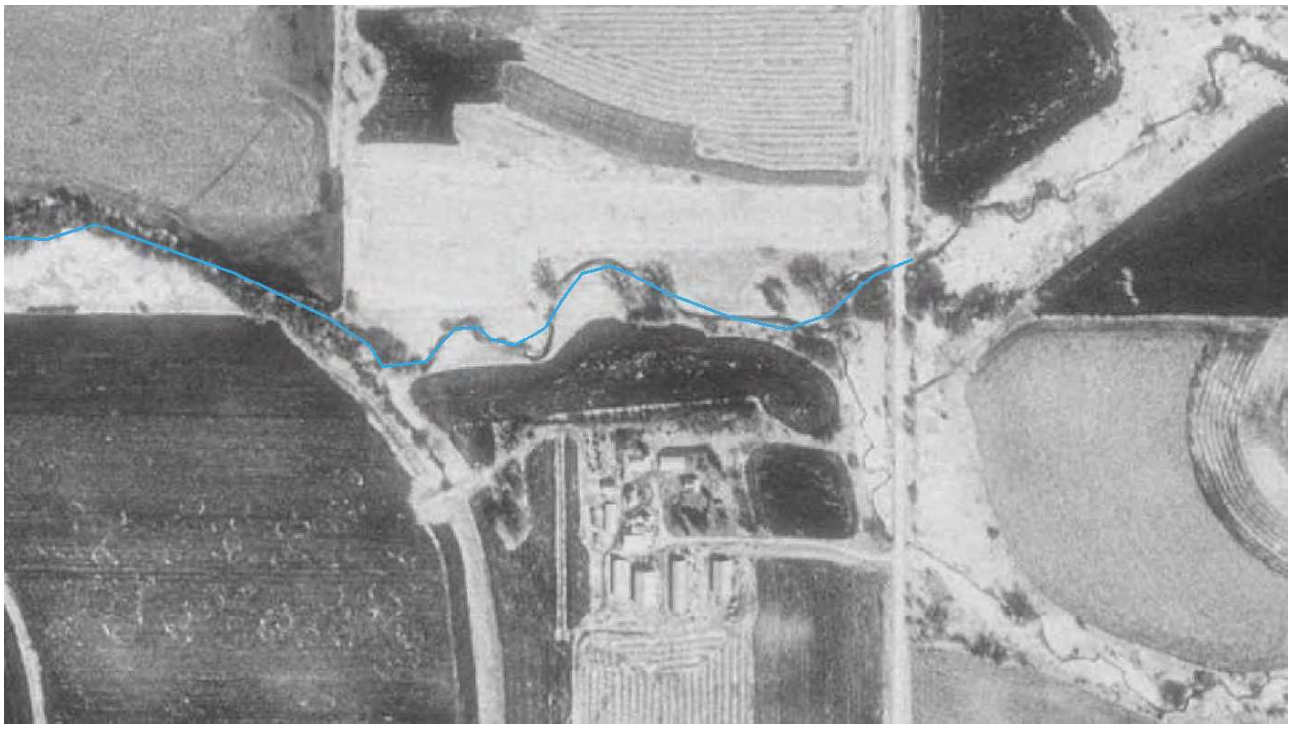


Figure 4-6 - Section 31 Warsaw Township, Rice County aerial photograph 1991.

Figure 4-7 - Section 31 Warsaw Township, Rice County aerial photograph 2015.

Figure 4-8 - Section 31 Warsaw Township, Goodhue County, County LiDAR image.

Figure 4-9 - Section 31, Warsaw Township, Goodhue County, Aerial photograph, Google Earth image 2016.

Appendix 4B: Site Photographs

Photo 4-1 - Section 30 Warsaw Township Goodhue County, Looking west from Goodhue Avenue showing well established buffer 11/5/2015.

Photo 4-2 - Section 30, Warsaw Township Goodhue County, west of Goodhue Avenue: well established vegetation showing grasses and clover 11/5/2015.

Photo 4-3 - Section 31, Warsaw Township, Goodhue County: View of buffer looking west from 10th Avenue, South side of stream, Buffer is well established. Buffer has a significant amount of invasive nonnative species Wild Parsnip.

Photo 4-4 - Section 31, Warsaw Township, Goodhue County: View of buffer looking west from 10th Avenue, North side of stream, Well established hayable buffer after recent cutting.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

5 - CWF Cannon River Watershed Buffer Strips, Northfield Township

Legacy Fund Restoration Evaluations

Project Background

Project Name: Buffer Strips in the Cannon River Watershed, Tracy Hayable Buffer (Northfield Township, Rice County) project.

Project Location: Rice County

Township/Range Section: Township Northfield Range Click here to enter text. Section 12

Project Manager / Affiliated Organization: Rice County SWCD

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010-2011

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Riparian Woodland and Recently Cropped Field, Forest

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Planting of “Riparian Vegetated Buffer” using approved seed types. Rice SWCD required landowners to plant grasses or alfalfa mix.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Project map shows the project boundaries for Northfield Township Section 12 riparian buffer areas. 6.13 acres were seeded in Section.
3. ***What are the stated goals of the project?***
   Establish grassed buffers along streams to provide improved water quality through reduced sediment, nutrients, and chemicals. Creation of a riparian buffer to prevent sediment from entering streams in the Cannon River Watershed.
4. ***Were measures of restoration success identified in plans? No***
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Project Map for Sections 12, Northfield Township, Rice County, Project Map
   Project Map for Sections 12, Northfield Township, Rice County 1991
   Project Map for Sections 12, Northfield Township, Rice County 2013
   Project Map for Sections 12, Northfield Township, Rice County 2015
   Project Map for Sections 12, Northfield Township, Rice County 2016 Google Earth image
   Project Map for Sections 12, Northfield Township, Rice County LiDAR image
   Soil Map for project area
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   NA

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **11/5/2015**

9. ***Surrounding Landscape Characteristics:***

The buffer project area is adjacent to an unnamed tributary of Prairie Creek. The land use for the project area is annually crop agricultural fields. Some crop fields have been converted to perennial hay crops. Some of the buffer area is adjacent to maintained lawn grass around a rural residence.

10. ***Site Characteristics:***

    a. Soils:

    Colo silt loam, channeled, 0 to 2 percent slopes, frequently flooded.

    b. Topography:

    Level, 0 to 2 percent slopes.

    c. Hydrology:

    Adjacent to unnamed tributary to Prairie Creek.

    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

    Planted grasses are dominant cover. This does include reed canary grass. Also present in the buffer strip are woody species including red osier dogwood and native willow species.

    e. Vegetation B: Meander Search Species List (as appropriate for site)

    NA

11. ***Is the plan based on current science?*** Yes

    The species planted have become well established and provide the services desired by this project. A greater reliance on native wet meadow species would further enhance this successful buffer project.

12. ***List indicators of project outcomes at this stage of project:***

    Field review showed continuous vegetative cover.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes. Buffer planting area shows well establish cover.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    The increasing establishment of the woody species seems to indicate that the buffer has not been cut for hay in the last year (or possibly 2 years).

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Annual hay harvest will help control dominance of woody species, though the woody species can provide stabilization along the creek.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Regular hay cutting and possible control of the reed canary grass areas may enhance the project.

17. ***Are follow-up assessments needed? Explain.***

    The planting was successful but since this site floods regularly, major flood events could threaten the integrity of the planting. Field checks should made after flood events. Control of the woody species may be useful to the long term success of this project.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Grasses and other ground layer plants are well established and are continuous across the project area. Woody plants are including red osier dogwood and willow species are becoming established.
21. ***Site Assessor(s) Conducting Review:***
    DNR: Mark Cleveland, Wade Johnson & BWSR: Carol Strojny

Appendix 5A: Site maps, Project plans or Vegetation tables

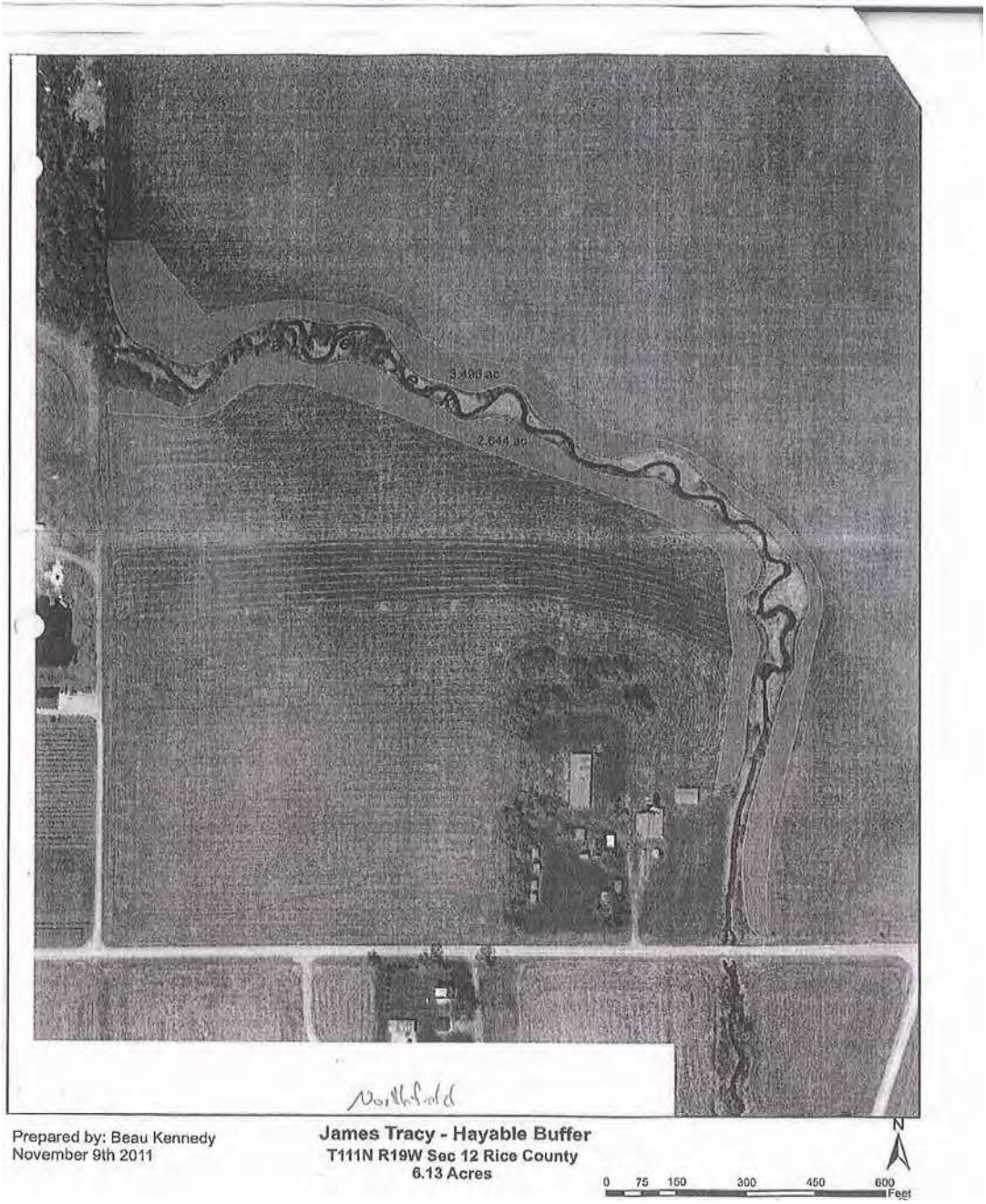


Figure 5-1 - Section 11 and 14 Warsaw Township Project Area Map.

Figure 5-2 Section 12 Northfield Township, Rice County aerial photograph 1991.

Figure 5-3 - Section 12 Northfield Township, Rice County aerial photograph 2013.

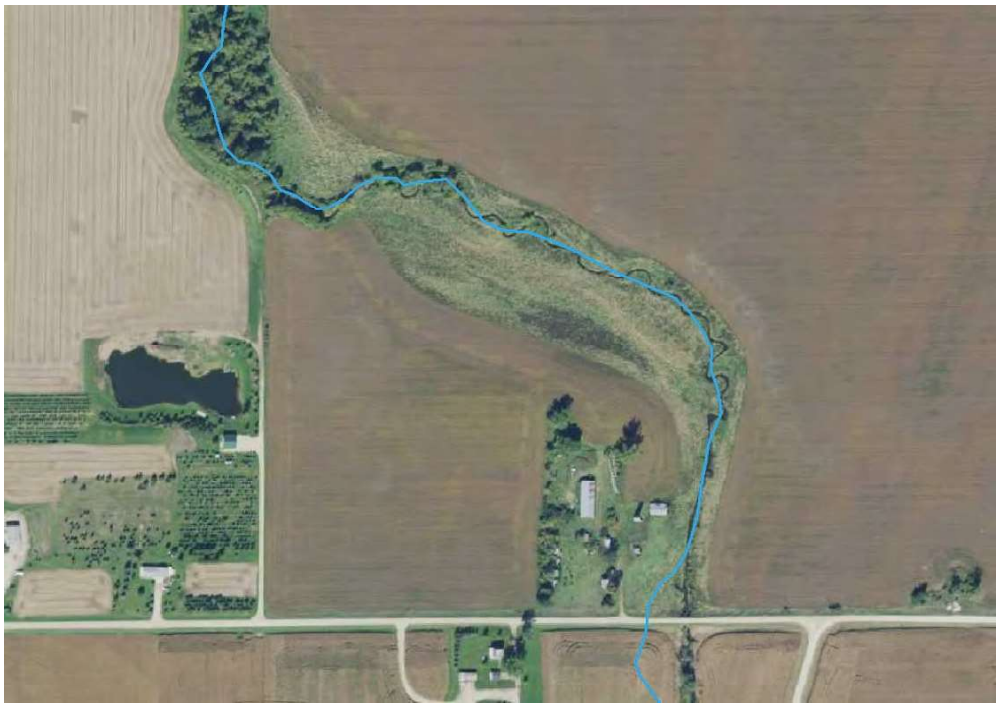


Figure 5-4 - Section 12 Northfield Township, Rice County aerial photograph 2015.

Figure 5-5 - Section 12 Northfield Township, Rice County aerial photograph 2016 Google Earth image.

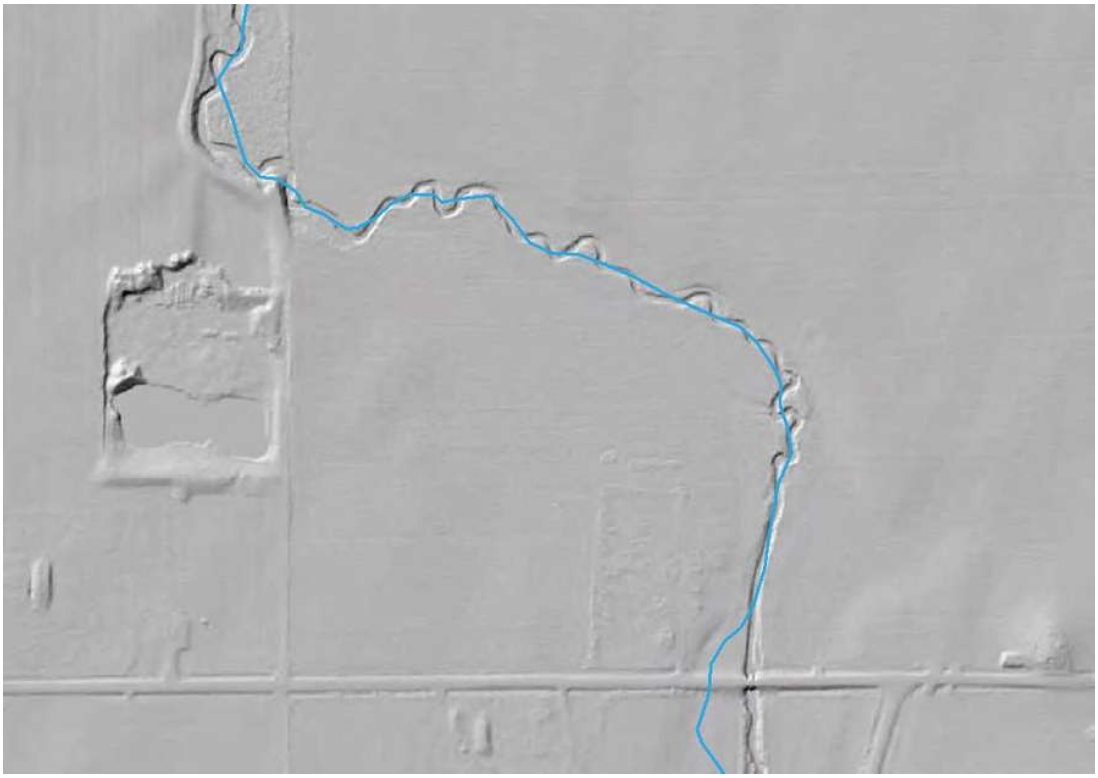


Figure 5-6 - Section 12 Northfield Township, Rice County LiDAR image.

Appendix 5B: Site Photographs

Photo 5-1 - Section 12 Northfield Township: well established buffer looking north from 110th Street East 11/5/2015.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

6 - CWF Cannon River Watershed Buffer Strips, Bell Creek 17

Legacy Fund Restoration Evaluations

Project Background

Project Name: Buffer strips in the Cannon River Watershed, T. Hokanson Parcels

Project Location: Goodhue County

Township/Range Section: Township Bell Creek Range Click here to enter text. Section 17

Project Manager / Affiliated Organization: Rice County SWCD

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010-2011

Predominant Habitat type: Prairie / Savanna / Grassland, Riparian Upland recently cropped

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Planting of "Riparian Vegetated Buffer" using approved seed types. Rice SWCD required landowners to plant grasses or alfalfa mix.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Project map shows the project boundaries for both Section 17 and Section 20 riparian buffer areas. 9.6 acres were seeded in both Sections.
3. ***What are the stated goals of the project?***
   Establish grassed buffers along streams to provide improved water quality through reduced sediment, nutrients, and chemicals. Creation of a riparian buffer to prevent sediment from entering streams in the Cannon River Watershed.
4. ***Were measures of restoration success identified in plans? No***
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Project Map for Section 17 of Belle Creek Township
   Project Map for Section 20 of Belle Creek Township
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   NA

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **11/5/2015**

9. ***Surrounding Landscape Characteristics:***
   Downslope of annual cropped fields; immediately adjacent, upslope of waterway. The Section 17 project area is adjacent to crop field, with a small section adjacent to young deciduous woodland.
10. ***Site Characteristics:***
    a. Soils:
    Kennebec-silt loam, 0 to 2 percent slopes, occasionally flooded.
    b. Topography:
    Level, 0 to 2 percent slopes.
    c. Hydrology:
    Adjacent to Belle Creek.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Planted grasses and clover are dominant cover. Creeping Charlie and wild parsnip are common in the planted areas.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes

    The species planted have become well established and provide the services desired by this project. A greater reliance on native wet meadow species would further enhance this successful buffer project.

12. ***List indicators of project outcomes at this stage of project:***

    Field review showed continuous vegetative cover.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes, buffer planting area shows well establish cover.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    No

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Control of invasive species currently present on the site will enhance the quality of this project as well as potentially have few impacts of spread these invasive species downstream in the watershed

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Current nonnative species including wild parsnip and potential new invasive species such as garlic mustard may detract from the habitat benefits of the project. Using hay from the buffer in areas where wild parsnip is present may not be advisable. Encroachment of scrub and tree species into the buffer may impact the level of ground cover present.

17. ***Are follow-up assessments needed? Explain.***

    The planting was successful but control of wild parsnip will be an important follow up management action. Monitoring vegetative cover to evaluate the impact for creeping Charlie on the long term success of this project should be done every 2 to 3 years. Monitoring for another invasive species is also recommended.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***

    Meet proposed outcomes

    Confidence of outcome determination:

    High

20. ***Provide explanation of reason(s) for determination.***

Grasses and other ground layer plants are well established and are continuous across the project area.

21. ***Site Assessor(s) Conducting Review:***

DNR: Mark Cleveland, Wade Johnson & BWSR: Carol Strojny

Appendix 6A: Site maps, Project plans or Vegetation tables

Figure 6-1 – Section 17 of Belle Creek Township.

Figure 6-2 – Section 17 Bell Creek Township aerial photograph 1991.

Figure 6-3 – Section 17 Bell Creek Township aerial photograph 2015.

Appendix 6B: Site Photographs

Photo 6-1 – Section 17 buffer project looking west from Goodhue County Road 8 11/5/2017.

Photo 6-2 – Section 17 well established buffer 11/5/2017.

Photo 6-3 – Buffer with grass base, with clover and creeping Charlie 11/5/2017.

Photo 6-4 – Buffer with abundant invasive wild parsnip along edge of planting 11/5/2017.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

7 - CWF Cannon River Watershed Buffer Strips, Bell Creek 20

Legacy Fund Restoration Evaluations

Project Background

Project Name: Buffer strips in the Cannon River Watershed, T. Hokanson Parcels

Project Location: Goodhue County

Township/Range Section: Township Bell Creek Township Range Click here to enter text. Section 20

Project Manager / Affiliated Organization: Rice County SWCD

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010-2011

Predominant Habitat type: Prairie / Savanna / Grassland, Riparian Upland recently cropped

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Planting of "Riparian Vegetated Buffer" using approved seed types. Rice SWCD required landowners to plant grasses or alfalfa mix.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Project map shows the project boundary of Section 20 riparian buffer areas. 5.7 acres were seeded.
3. ***What are the stated goals of the project?***
   Establish grassed buffers along streams to provide improved water quality through reduced sediment, nutrients, and chemicals. Creation of a riparian buffer to prevent sediment from entering streams in the Cannon River Watershed
4. ***Were measures of restoration success identified in plans? No***
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Project Map for Section 20 of Belle Creek Township.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   NA

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **11/5/2015**

9. ***Surrounding Landscape Characteristics:***
   Downslope of annual cropped fields; immediately adjacent, upslope of waterway. The Section 17 project area is adjacent to crop field, with a small section adjacent to young deciduous woodland.
10. ***Site Characteristics:***
    a. Soils:
    Kennebec-silt loam, 0 to 2 percent slopes, occasionally flooded.
    b. Topography:
    Level, 0 to 2 percent slopes.
    c. Hydrology:
    Adjacent to Belle Creek.
    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:
    Planted grasses and clover are dominant cover.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes
    The species planted have become well established and provide the services desired by this project. A greater reliance on native wet meadow species would further enhance this successful buffer project.
12. ***List indicators of project outcomes at this stage of project:***
    Field review showed continuous vegetative cover.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes. Buffer planting area shows well establish cover.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Control of invasive species currently present on the site will enhance the quality of this project as well as potentially have few impacts of spread these invasive species downstream in the watershed.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    Current non-native species in the area and upstream of the project area including wild parsnip and potential new invasive species such as garlic mustard may detract from the habitat benefits of the project. Using hay from areas where wild parsnip is present may not be advisable. Encroachment of scrub and tree species into the buffer may impact the level of ground cover present.
17. ***Are follow-up assessments needed? Explain.***
    The planting was successful but monitoring for invasive species that are found upstream should be completed early in the growing season so treatments can be done before seed set of species such as wild parsnip.
18. ***Additional comments on the restoration project.***
    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Well establish vegetative cover. No significant problem invasive species observed during 2015 field evaluation.
21. ***Site Assessor(s) Conducting Review:***
    DNR: Mark Cleveland, Wade Johnson & BWSR: Carol Strojny

Appendix 7A: Site maps, Project plans or Vegetation tables

Figure 7-1 – Section 17 and 20 of Belle Creek Township.

Figure 7-2 – Section 20 Belle Creek Township aerial photograph 1991.

Figure 7-3 – Section 20 Belle Creek Township aerial photograph 2015.

Appendix 7B: Site Photographs

Photo 7-1 - Section 20 buffer project looking north from south edge of project area (east of Goodhue County Road 8) 11/5/2015.

Photo 7-2 – Section 20 well established buffer at field edge 11/5/2015.

Photo 7-3 – Buffer with grass base looking east, showing riparian woodland 11/5/2015.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

8 - CWF Cannon River Watershed Buffer Strips, Bridgewater Site

Legacy Fund Restoration Evaluations

Project Background

Project Name: Buffer Strips in the Cannon River Watershed, Bridgewater Buffer site

Project Location: Rice County

Township/Range Section: Township Bridgewater Range Click here to enter text. Section 15

Project Manager / Affiliated Organization: Rice County SWCD

Fund: CWF ***Fiscal Year Funds:*** 2010

Project Start Date: 2010 - 2011

Predominant Habitat type: Prairie / Savanna / Grassland, Riparian Woodland and recently cropped

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Planting of "Riparian Vegetated Buffer" using approved seed types. Rice SWCD required landowners to plant grasses or alfalfa mix.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Project map shows the project boundaries for Section 15 riparian buffer area. 0.7 acres were seeded in the project area.
3. ***What are the stated goals of the project?***
   Establish grassed buffers along streams to provide improved water quality through reduced sediment, nutrients, and chemicals. Creation of a riparian buffer to prevent sediment from entering streams in the Cannon River Watershed
4. ***Were measures of restoration success identified in plans?*** *No*
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Project Map for Section 15 of Bridgewater Township
   Section 15 Bridgewater Township aerial photograph 1991
   Section 15 Bridgewater Township aerial photograph 2013
   Section 15 Bridgewater Township Lidar image
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Not applicable

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **11/5/2015**

9. ***Surrounding Landscape Characteristics:***
   Crop field adjacent to buffer project area on eastern boundary. Narrow riparian edge on the western boundary of the buffer project area.
10. ***Site Characteristics:***
    a. Soils:
    Estherville sandy loam, 0 to 2 percent slopes, occasionally flooded.
    b. Topography:
    Level, 0 to 2 percent slopes.

*c. **Hydrology:***

Adjacent to Cannon River.

*d. **Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:***

Planted grasses and other graminoids

*e. **Vegetation B: Meander Search Species List (as appropriate for site)***

Click here to enter text.

11. ***Is the plan based on current science?*** Portions

    The species planted have become well established and provide the services desired by this project. A greater reliance on native wet meadow species would further enhance this successful buffer project.

12. ***List indicators of project outcomes at this stage of project:***

    Field review showed continuous vegetative cover over the majority of the site. Sediment can and does appear to enter the river at the southwest. The crop field does slope from the north eats towards the southwest where the river levee that runs through the riparian forested edge is no longer present. This area may have been used to access the river edge to accomplish river log removal. The potential of sediment reaching the river is high from this single point in the project area.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes and No. Buffer planting area shows well establish cover. However the southwest corner of the site will continue to be a source of sediment entering the river.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    Yes

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Reestablishment of the natural river levee or similar action will be necessary for this buffer project to be effective. Changes to cropping pattern may also help with sediment control, as would establishing a wider buffer at the south west end of the project site

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Encroachment of scrub and tree species into the buffer may impact the level of ground cover present.

17. ***Are follow-up assessments needed? Explain.***

    The planting was mostly successful but will require further work to eliminate crop field sediment from entering the Cannon River.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***

    Minimally meet proposed outcomes

    Confidence of outcome determination:

Medium

20. ***Provide explanation of reason(s) for determination.***

    Grasses and other ground layer plants are well established across the majority of project area, but the project will only be successful if the sedimentation issue dealt with and the riparian edge levee is reestablished.

21. ***Site Assessor(s) Conducting Review:***

    DNR: Mark Cleveland, Wade Johnson & BWSR: Carol Strojny

Appendix 8A: Site maps, Project plans or Vegetation tables

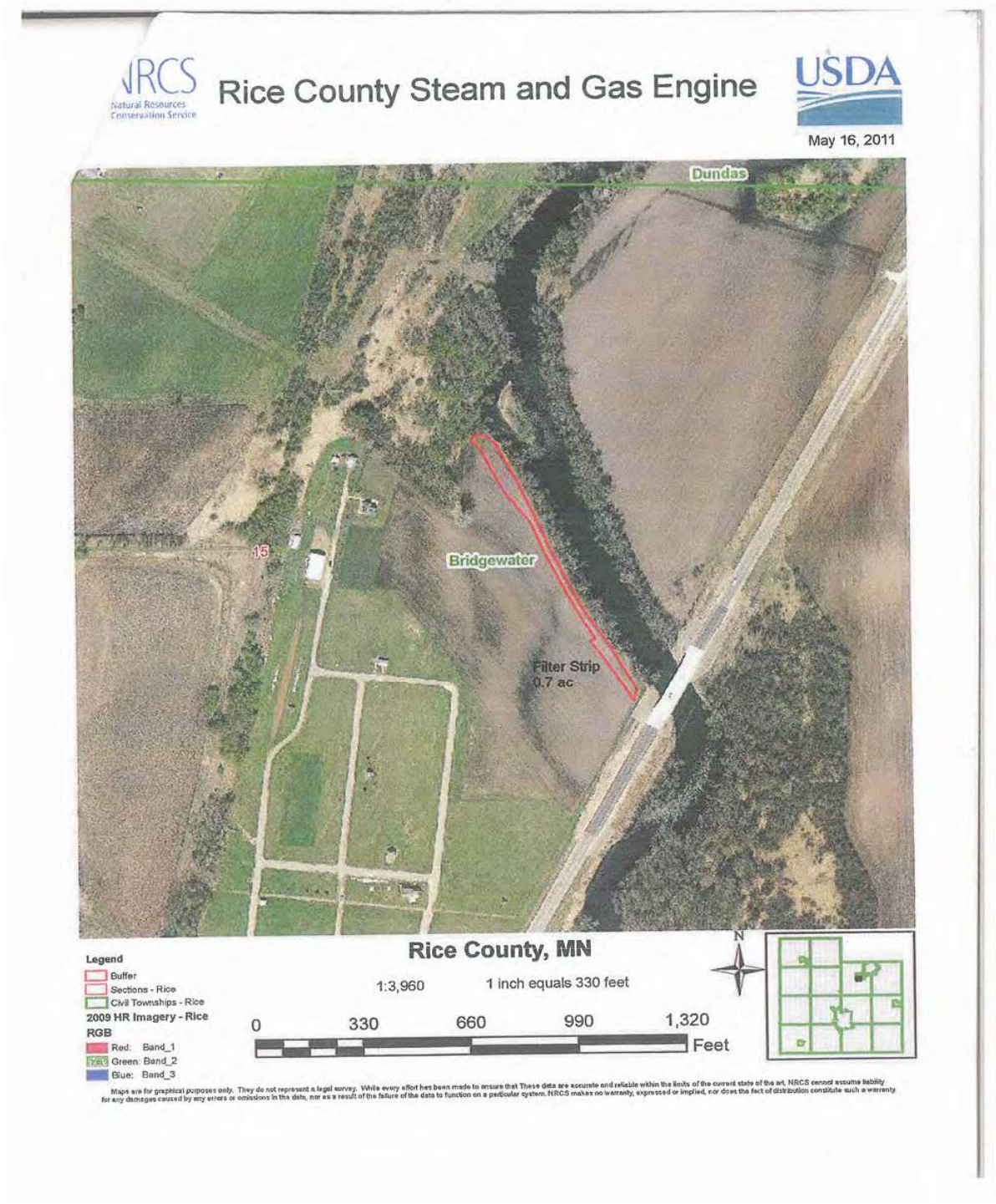


Figure 8-1 - Bridgewater Township Buffer project map.

Figure 8-2 – Section 15 Bridgewater Township aerial photograph from 1991.

Figure 8-3 – Section 15 Bridgewater Township aerial photograph from 2013.

Figure 8-4 – Section 15 Bridgewater township Lidar image.

Appendix 8B: Site Photographs

Photo 8-1 - Established buffer strip looking north east from SW corner of project site.

Photo 8-2 – Example of well-established graminoid cover in buffer planting November 2015.

Photo 8-3 - Buffer strip area showing moderate establishment with recent sediment observed. Looking south toward Minnesota Highway 3 November 2015.

Photo 8-4 – Southwest corner showing recent sedimentation at river edge.

MINNESOTA

CLEAN WATER LAND & LEGACY AMENDMENT

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

9 - CWF Revisit - 9 Mile Creek Stream Restoration

See Appendix A for Project Background and Initial Project Evaluation

Project Name: 9 Mile Creek Stream Restoration

Project Manager / Affiliated Organization: Randy Anhorn / 9 Mile Creek Watershed District

Fund: CWF ***Fiscal Year Funds:*** 2010

Follow Up Site Assessment

Field Review Date: **11/23/2016**

1. ***Please note any substantive changes to the site characteristics since last site assessment.***
   At the time of our initial visit, the new channel at the downstream end of the project was constructed but had not yet been connected to flow in order to give vegetation time to stabilize the banks. The new channel has now been taking flow for several years, giving a chance now to more fully evaluate that channel. The upstream portion of the newly re-meandered channel appears to have higher banks than at the downstream end. The higher banks upstream also have signs of some bank erosion occurring relative to downstream, suggesting that the upstream portion may be entrenched. This may be due to uneven floodplain elevations in the upstream end that cuts through spoils from past dredging of the old channel. Designers acknowledged that they did not have complete topographic surveys of the wetland area where the channel was cut, but instead relied on less accurate LiDAR elevations. The project may have benefitted from additional surveying that may have identified the issue. Design remedies could have set the bed elevation of riffles in the upstream area relative to the floodplain, and held those elevations through additional grade controls. Channel widths appear to be appropriate, as the downstream cross section is functioning well. The stream pattern (meander lengths, belt width, meander radii, etc.) also appears to be functioning well, based on the stable downstream reach, diversity of depths between riffles and pools, and the demonstrated ability of the channel to move its sediment through this reach.

The straight reach immediately upstream of the newly re-meandered one is showing signs of sediment deposition in the channel (aggradation). This can be caused by an over-abundant supply of sediment, or by the stream lacking the power to move sediment that is input from upstream. There are two ditches that enter just upstream from the aggrading reach. It is unclear if these ditches are a source of excess sediment. However, their relatively low slope does not suggest that their transport competency would be greater than the mainstem of 9 Mile Creek. A more likely explanation for the aggradation is that the channel width of 9 Mile Creek in this reach is greater than upstream. A greater width reduces the stream's power, so that it is not as able to transport sediment. If aggradation continues to be an issue, the watershed may want to consider a small project to narrow this reach to better match the channel upstream.

One grade-control riffle in the upstream portion of the project is showing signs of flanking. That is, the stream is beginning to cut a path around the grade control at high flows that may eventually result in the stream flowing around the structure at all flows. Should that happen, the bed elevation of the stream would be lowered by 6 inches or more. This would create an entrenched channel upstream that may begin to have issues with streambank stability, and deeper pools may be lost. It appears that this riffle was not adequately keyed into the bank. Rock should be buried several feet into the bank, and up to the bankfull elevation to reduce the likelihood of flanking. A small project to correct this issue should be considered by the watershed district.

Vegetation around the newly constructed channel has become more established, especially the vegetatively reinforced soil stabilization (VRSS) along a reach of the channel that falls in a narrow corridor between the road and a paved path. Willows and dogwoods are very well established, and are providing excellent stability to a reach where stream velocity is higher. The design and installation in this section was very well done.

2. ***Is the plan based on current science?*** Yes

The project design followed standards and best practices for stream restoration. Consideration of channel cross section, profile, and pattern were all included, and it appears that the design for the most part was appropriate. The project used structural elements (grade control riffles, some riprap around bridge abutments) where appropriate, but not overly so. The VRSS appears to have been an excellent choice in the straight reach between the road and trail. However, the re-meander section would have benefitted from better topographic survey information about floodplain elevations. In addition, during the construction phase elevation surveys of the channel bed and floodplain elevations at riffles would have shown the entrenchment issue. A small change based on survey information during construction could have allowed the addition of a grade control structure, preventing entrenchment. Similarly, it appears that during construction the reach which is currently undergoing aggradation was constructed too wide. Measurements during construction could have caught this, and resulted in corrections at that point. This flanking issue at one of the grade control riffles also suggests that construction oversight might have missed that the structure was not well enough keyed into the bank. All of these issues highlight the critical role that construction oversight can play in a project, where a good design plan on paper may have issues when things are not caught in the field.

Streambanks in the upstream portion of the project all appear to have been stabilized using erosion fabric that included plastic netting. Although these products are claimed to be photo-degradable, that process takes many years to play out. In the meantime, the netting can be seen hanging off of channel banks in many places. It is also a potential hazard to wildlife, especially snakes that can become

entangled in the netting. Truly biodegradable alternatives that utilize natural materials such as jute or coir are available, and should be used in future projects.

3. ***List indicators of project outcomes at this stage of the project.***
   Revisiting stream restoration projects several years post-construction allows one to see how the project has handled higher flows, as well as how the channel has adjusted to sediment transport through the reach. Although the restoration is currently meeting goals for improved channel stability and aquatic habitat, issues identified in section 1 show where lessons can be learned for future projects. The watershed may want to consider a small follow-up project to correct these issues with the 9 Mile Creek restoration project, so that the project better meets objectives and has increased longevity.
4. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
   As mentioned in question 2, the design plan was done for the most part according to standards. Additional survey work prior to the project, as well as during the project's construction, could have identified issues with entrenchment, channel dimensions, and riffle construction that are detracting from the project reaching its full potential.
5. ***Are corrections or modifications needed to meet proposed outcomes?***
   A small project to repair the riffle that is showing signs of flanking, that narrows the aggrading reach of stream, and installation of additional grade control riffles in the upstream portion of the re-meandered section would all serve to improve outcomes for this project.
6. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
   Ongoing monitoring of the project has been taking place, including the channel, riparian vegetation, and the biotic community. This will be adequate both to assess the success of the project, and to identify any issues requiring.
7. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
   See question #2.
8. ***Are follow-up assessments needed? Explain.***
   The watershed should continue to monitor the project, and consider a small repair project if conditions continue to worsen at the locations identified in question #2.
9. ***Additional comments on the restoration project.***
   Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

10. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High

11. ***Provide explanation of reason(s) for determination.***
    The stream has had an opportunity to adjust since construction to its flow and sediment regime, and has for the more part remained stable. Instream habitat diversity is much greater than was present pre-project.
12. ***Site Assessor(s) Conducting Review:***
    Brian Nerbonne, MN DNR

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

Appendix 9A: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Nine Mile Creek

Project Location: Hennepin County

Township/Range Section: Township 111 Range 22 Section 25

Project Manager / Affiliated Organization: Kevin Bigalke

Fund: CWF ***Fiscal Year Funds:*** 2011

Project Start Date: Click here to enter text.

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Address channel instability and sedimentation to address aquatic life impairment.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Engineering plans for project construction, Clean Water Fund project description provided by Nine Mile Creek Watershed District and Barr Engineering (project designer).
3. ***What are the stated goals of the project?***
   Click here to enter text.

4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Bedload and turbidity measurements to monitor reductions in sediment, invertebrate and fish IBI scores to track improvements in biotic community.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Engineering plans for project construction, Clean Water Fund project description provided by Nine Mile Creek Watershed District and Barr Engineering (project designer).
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Click here to enter text.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   NA

Site Assessment

Field Review Date: **8/15/2012**

9. ***Surrounding Landscape Characteristics:***
   Urban setting. Road right-of-way along a significant reach of project area, with City Park or open space in all other areas. Road and bike/walking path created constraints on project footprint. Lower portion of project flows through type2 wetland (degraded by dominant reed canary and hybrid cattail). Pre-project stream channel was almost straight (likely due to past channelization) and was actively eroding into road right-of-way. Channel had previously been diverted to flow through a pond near the downstream end of the project. This lead to rapid filling of the pond with sediment, reducing its effectiveness at treating storm water runoff from contributing areas.
10. ***Site Characteristics:***
    a. Soils:
    Houghton, a poorly drained muck that is high in organic content.
    b. Topography:
    Low-gradient area, especially in downstream reach of the project.
    c. Hydrology:
    Stream flow is flashy due to prevalence of impervious surfaces in watershed, and lack of rate and volume controls for storm water runoff. Riparian vegetation in upstream reach through park land will experience periodic inundation, interspersed with mesic conditions during dry periods. Soils in downstream reach in type 2 wetland will be consistently saturated, with periodic inundation.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Riparian area in upstream area is a mixture of reed canary grass, giant ragweed, and willow. Planted vegetation is in early phase of establishment, so it is not expected that those species will be evident. Willow and dogwood stakes are sprouting in places, but survival appears to be 50% or less. Weed control maintenance was being performed during our site visit. Downstream new channel reach flows through reed canary/hybrid cattail meadow.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes

Channel design utilized HEC-RAS and XP-SWIM modeling of flows. New channel was designed to accommodate bankfull discharge, with higher flows dispersed across the flood plain. No explicit modeling of sediment transport. At a minimum, channel design should consider the competency of the channel to transport sediment to reduce the potential for channel agradation or degradation. The site may have limited sediment inputs due to urban infrastructure, which could affect project success. Stabilizing banks to reduce erosion in a sediment-starved system may lead to channel degradation. This risk is reduced by the presence of grade control structures (cross-vanes) that will prevent or limit downcutting.

12. List indicators of project outcomes at this stage of project:

Due to the early establishment/incomplete status of the project, no quantitative measures of project success on achieving ultimate goals for sediment reduction and aquatic life improvements. Channel cross sections and profile of project areas currently receiving flow appear to be functioning as design, increasing channel stability and improving habitat. Vegetation establishment is ongoing and success is yet to be determined. Weed control maintenance is being done to aid in establishment of plantings.

13. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

Yes, project design is appropriate to accommodate the flow and sediment that must be transported through the project reach based on modeling. Construction phasing to allow for vegetation establishment in new channel reaches, and toe protection in areas where flow was maintained throughout the project, will increase initial stability of the channel. The more appropriate channel dimensions, pattern, and profile created, as well as improved riparian vegetation, should increase channel stability, and improve habitat for aquatic life.

There are some limitations of the project that may prevent full achievement of project goals. Aquatic life impairments are likely not caused solely by local habitat degradation. Instead, watershed-scale impacts from untreated storm water runoff from an urbanized area created a flashy hydrograph that is not desirable for sensitive aquatic biota. In addition, urban runoff can have elevated levels of pollutants that impair aquatic life. This project will not address those stressors on the aquatic community. Instead, continued work will be needed to improve storm water management in the watershed through retrofits and redevelopment opportunities that will reduce runoff volumes and pollutant levels, and control the rate of storm water runoff.

Establishment of permanent native vegetation will be challenging at this location. There is an established seed bank of invasive plants, and abundant source populations of those species upstream. Only through continued maintenance of invasives will the riparian community likely sustain predominantly native species. It is possible that more resilient species such as willow sp. and dogwood sp. will be able to be self-sustaining.

14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No, as mentioned above, I do not feel that changes are needed to the channel modifications that comprise this project. However, to meet improvements in the aquatic life of Nine Mile Creek, continued work will be needed to address watershed impacts on stream flow and pollutant levels. This work will be difficult given the fully-developed status of the watershed.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Long-term management of riparian vegetation for shrub species such as willow and dogwood will likely have the best chance of long term success in meeting goals for improved bank stability. Control of invasive species such as reed canary grass will be needed annually until a shift away from a grassland habitat type occurs.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    No
17. ***Are follow-up assessments needed? Explain.***
    Yes, new channel sections have not been connected to flow at the time of the assessment. Permanent vegetation has not become established in any of the project reaches. Evaluation in 3 years' time should allow for a better assessment of project success, especially if turbidity and bedload measurements are taken or if biological monitoring information is available.
18. ***Additional comments on the restoration project.***
    This is a challenging location to do a project that can show measurable improvements in biotic community, given the legacy of urban land use in the watershed.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Minimally meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    Given the constraints of the project location, the design is adequate to create a channel with improved stability and aquatic habitat. The lack of sediment transport assessment leaves greater uncertainty about outcomes, but grade control will limit any potential channel degradation. Reductions in sediment input are likely. However, improvements in the biotic community are uncertain. Because physical habitat is only one aspect that shapes biotic community, improvements may be limited by other factors such as water quality or hydrology that are being affected by watershed land use. Continued work will be necessary to increase treatment of storm water, and to reduce the rate and volume of storm water runoff. Invasive species may limit the ability for native riparian plants to become established.
21. ***Site Assessor(s) Conducting Review:***
    Brian Nerbonne, Stream Habitat Consultant, DNR Fisheries

Site maps, Project plans or Vegetation tables

Figure 9-1 - You can add captions to tables and figures by selecting “Insert Caption” in the References tab.

Site Photographs

Photo 9-1 – Facing South, August 2012. New channel not connected to flow.

Photo 9-2 - Facing South November 2016. New channel connected to flow 2013-2016.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

10 - CWF Revisit - Picha Creek Stream Restoration

See Appendix A for Project Background and Initial Project Evaluation

Project Name: Picha Creek Stream Restoration

Project Manager / Affiliated Organization: Scott Watershed Management Organization

Fund: CWF ***Fiscal Year Funds:*** 2010

Follow Up Site Assessment

Field Review Date: **8/12/2016**

1. ***Please note any substantive changes to the site characteristics since last site assessment.***
   The stream restoration is holding up well. As was noted in the previous visit, the stream channel has narrowed and formed a baseflow channel within the larger bankfull channel. This has enhanced habitat within the stream, and will also improve sediment transport through the reach. The riparian vegetation that was planted has shown adequate survival, although the site has abundant cottonwood seedlings that were not part of the planting plan. This suggests an eventual shift from a grass/forb/shrub community to a shrub/tree community over time. I do not view this succession as an issue with the long-term viability of the project.
2. ***Is the plan based on current science?*** Yes
   Structural solutions were required around road and bridge infrastructure. The boulder toe in these areas remains stable. In other reaches the pre-project channel had issues with entrenchment that were causing streambank erosion. The project raised the channel bed elevation as well as graded a new floodplain at a lower elevation to address the entrenchment issue. This addressed the root cause of the erosion problem, rather than patching in stabilization measures that would have only addressed a symptom. I feel that the project as designed was a good solution to the problems that were present.
3. ***List indicators of project outcomes at this stage of the project.***

Revisiting stream restoration projects several years post-construction allows one to see how the project has handled higher flows, as well as how the channel has adjusted to sediment transport through the reach. Looking at channel geomorphology, the stream has formed a multi-stage channel (baseflow, bankfull, flood-flow) that is indicative of a stable form for this valley type. Aquatic habitat in the new channel is good, providing a mixture of depths, velocities, and substrates that are important for fish and invertebrates. Riparian vegetation has established will enough to maintain streambank stability.

4. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
   The project plan addressed the root cause of streambank erosion by creating adequate floodplain around the stream. Structural measures used around roads/bridges were needed because site constraints did not allow for full restoration of the stream.
5. ***Are corrections or modifications needed to meet proposed outcomes?***
   No corrective measures are needed.
6. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
   Allowing the succession of riparian vegetation from grass/forbs to shrubs/trees will shift the riparian habitat, but will not compromise the long-term stability of the project.
7. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
   The project adequately addressed the issues present.
8. ***Are follow-up assessments needed? Explain.***
   No, the project has had minor self-adjustments that have improved habitat over the conditions immediately post-project. This is not unusual in stream habitat projects, and reflects a good design that has allowed natural processes to form habitat rather than relying on structures created during construction.
9. ***Additional comments on the restoration project.***
   Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

10. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
11. ***Provide explanation of reason(s) for determination.***
    The stream has had an opportunity to adjust since construction to its flow and sediment regime, and has resulted in minor changes that have been a positive for aquatic habitat. Natural channel processes are now functioning well, and should continue to do so now that riparian vegetation will maintain streambank stability. Projects that reach this stage will persist in a stable state with good habitat, even if significant disturbance such as a major flood were to occur.

12. Site Assessor(s) Conducting Review:

Brian Nerbonne, MN DNR

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

Appendix 10A: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Picha Creek Stream Restoration

Project Location: Scott County

Township/Range Section: Township 115 Range 23 Section 33-34

Project Manager / Affiliated Organization: Scott WMO

Fund: CWF ***Fiscal Year Funds:*** 2012

Project Start Date: Click here to enter text.

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Click here to enter text.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Initial site evaluation used to identify project need, including pre-project photos. Project plans indicated pre and post-project topography, location and design of structural elements added for habitat.
3. ***What are the stated goals of the project?***
   1) Stabilize stream channel to reduce sediment loading, 2) Enhance fish habitat, 3) Create fish passage.

4. ***Were measures of restoration success identified in plans?*** *Choose an item.*
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** Choose an item. ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Click here to enter text.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   N/A

Site Assessment

Field Review Date: **8/15/2012**

9. ***Surrounding Landscape Characteristics:***
   Picha Creek is a small tributary to Sand Creek. The stream appears to maintain some baseflow throughout the year, but flow is flashy due to upstream agricultural land use. Sediment inputs appear high, suggesting bank erosion and channel degradation may be occurring upstream of the project location. Pre-project the stream was an incised, straight (likely artificial) channel flowing through a narrow riparian corridor of early-successional trees. Channel condition was fairly uniform, with a wide and shallow cross section lacking in instream cover. Substrate was predominantly sand. A road crossing at the upstream end had been armored to serve as grade control to halt the upstream progression of a headcut. This grade control functioned as a fish barrier during most flows. Upland areas are in agricultural use, either as tree nursery or row crops.
10. ***Site Characteristics:***
    f. Soils:
    Alluvial soils. Loamy sand that is moderately well drained.
    g. Topography:
    Site is located on a relatively flat terrace within the Minnesota River Valley, downstream of a reach of higher gradient where the stream flows down the valley wall from the adjoining uplands. Pre-project the steam was highly incised, likely due to past straightening. Streambanks were near vertical and eroding, with inadequate floodplain area.
    h. Hydrology:

Land use in the watershed is predominantly row crop agriculture, with a few wetlands and low-density residential developments. Based on recent deposition in the floodplain of the stream, flows are flashy with a high bedload of sediment. During dry periods, the stream appears to maintain a minimal amount of flow that supports small-bodied fish species.

i. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Floodplain areas adjacent to the stream were seeded with a native prairie mix, and planted with bare root trees. The seeding has not established will, likely due to successive floods that have flowed across newly planted areas. A follow-up seeding was done this past summer, but it too had flooding issues. Vegetation is predominantly weeds at present, such as ragweed, giant ragweed, reed canary grass, smartweed, and volunteer cottonwoods. Bare root tree seedlings appear to be surviving well. Scott County has expressed a willingness to continue managing vegetation to discourage weed growth and establish native vegetation.

j. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Choose an item.
    Click here to enter text.
12. ***List indicators of project outcomes at this stage of project:***
    The stream channel appears to be functioning as designed. It was withstood multiple flood events in the first year with little to no change in plan form or bed elevation. There appears to be some deposition in the channel occurring that is creating a smaller low-flow channel within the larger bankfull channel. This type of adjustment is common in stream restoration projects, where the stream creates minor adjustments to establish an equilibrium with the new boundary conditions.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes, the channel appears to be stable, and should significantly reduce the amount of sediment loss from streambanks. Fish habitat is improved, as evidenced by schools of minnows in the project reach that anecdotally were not present pre-project. Fish passage has been addressed at the bridge, which is no longer a barrier to upstream movement.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    Yes, continued maintenance and perhaps additional plantings will be needed to properly establish native vegetation in riparian areas. Scott County has expressed a commitment to achieving that goal. Channel design appears sufficient that even modest success at establishing permanent native vegetation will still allow the project to meet goals.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes and no, Scott County is still deciding what will be done to address issues with establishing native vegetation. It is unclear at this point whether future management will be successful.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    No
17. ***Are follow-up assessments needed? Explain.***
    Yes, follow up on vegetation establishment.
18. ***Additional comments on the restoration project.***

This was an innovative project that addressed multiple problems in one project. Raising the stream bed of an incised channel is not easy, and it appears that the project team pulled it off well.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Channel design used sound methodology, and produced a project that has proven to be stable even in the face of multiple floods just after project completion, the most vulnerable stage for stream restoration projects because rooted vegetation has yet not taken hold to prevent erosion. As vegetation work by Scott County progresses, project stability should increase. The stream channel's design has already shown that even a moderate establishment of deep-rooted vegetation will allow the channel to be stable, meeting the goal of reduced sediment input. Fish habitat appears improved, with a heterogeneous mix of riffles, pools, fine and large substrate that will provide habitat for a diverse array of species. Fish passage has also been addressed by raising the bed of the stream to eliminate the drop at the bridge crossing.
21. ***Site Assessor(s) Conducting Review:***
    Brian Nerbonne, MN DNR

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

11 - OHF Knife River Habitat Rehabilitation, 2nd Falls

Legacy Fund Restoration Evaluations

Project Background

Project Name: Knife River – Second Falls

Project Location: Saint Louis County

Township/Range Section: Township 52 Range 12W Section 25

Project Manager / Affiliated Organization: Lake Superior Steelhead Association

Fund: OHF ***Fiscal Year Funds:*** 2011

Project Start Date: 2012

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Strategic placement and securing of large rocks to alter a physical barrier commonly referred to as Second Falls (Photo 11-1). Select boulders were imported and positioned to lessen the gradient of the barrier to improve fish passage, specifically Steelhead.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

   The following information/documentation was available to evaluators:
   - Minnesota Department of Natural Resources (MNDNR) Public Waters Work Permit (2014-0033) - Issued Date of 7/26/2013
   - 7/11/2013 Letter to the Director of Minnesota Trout Unlimited (John Lenczewski) from MNDNR Lake Superior Area Supervisor (Donald R. Schreiner) articulating an agreed upon approach with the Lake Superior Steelhead Association (LSSA). The letter contained a schematic figure of the boulder configuration (Figure 11-1)
   - Email correspondence between MNDNR personnel on subject of key design parameters
3. ***What are the stated goals of the project?***
   Amend barrier falls and in so doing, connect Steelhead (*Oncorhynchus mykiss*) to "prime spawning and rearing habitat" above Second Falls.
4. ***Were measures of restoration success identified in plans?*** Yes
   If yes, list specific measurements.
   Project success is a product of lessening the barrier to Steelhead by means of increasing pool depth to facilitate steelhead passage over the falls for a longer period of time under suitable flow and temperature conditions.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   A formal plan set was not available to the evaluator and may not have been necessary for this project. A received graphic of the installation can be seen in Figure 11-1.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Utilization of native stone/boulders to elongate the profile and provide jumping pools is a current approach to alleviate fish barriers. Securing the boulders via pinning and compression (fitting the boulders within bedrock confinement) is of current science and a novel approach.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Choose an item.

   Plans were not made available.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   No alterations are known to the evaluators.

Site Assessment

Field Review Date: **6/29/2017**

9. ***Surrounding Landscape Characteristics:***

The Knife River (USGS designations: Latitude 46°56'49", Longitude 91°47'32", Hydrologic Unit 04010102) drains an area of 83.6 sq. miles along the north shore of Lake Superior. It is contained in Lake and St. Louis Counties with about half the drainage coming from each of these counties. The river discharges into Lake Superior along the north shore of the lake to the southwest of Two Harbors.

The watershed is mostly upland deciduous forest (71%). The rest of the watershed consists of rural residential and some pasture land.

The USGS record for the Knife River extends from July 1974 until the present. For that period of time the following flow statistics were determined:

- Largest annual peak flow = 9,100 cfs
- Smallest annual peak flow = 1,410 cfs
- Mean annual peak flow = 3,147 cfs
- Mean annual daily discharge = 90.6 cfs = 0.04 in/day = 14.71 inches/year

The river was placed on the state impaired waters list in 1998, with the impairment being turbidity caused by suspended sediment. The impaired waters listing led to a TMDL study to assess the sources of sediment transported along the main stem of the Knife River.

10. ***Site Characteristics:***

a. Soils:

Project is entirely completed in channel, which consists of cobble, boulders and bedrock. The geology and soils of the watershed play significant roles in hydrology and turbidity of the river. The presence of clay soils in the lower part of the watershed is a dominant feature contributing sediment to the river.

b. Topography:

The mainstem of the Knife River has gradients that range from 1.5% to 0.6% above the "lake clays", 0.3% to 1.1% above Hawk Hill Road and 1.2% below Hawk Hill Road.

c. Hydrology:

See response to Question #9.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

N/A – other than the construction access, which is adequately vegetated, this project had no significant vegetation impacts or inputs.

e. Vegetation B: Meander Search Species List (as appropriate for site)

N/A

11. ***Is the plan based on current science?*** Yes

Strategic placement of rock/boulders & construction of riffles to amend slope to provide fish passage is current science. Similar installations have been built in Europe since the 1970s and the practice has been common in the Midwest since the 2000s.

12. ***List indicators of project outcomes at this stage of project:***

Based on review of pre and post construction images during varying flow conditions Second Falls is more passable for Salmonids.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

Yes – see response to question #20.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

No – see response to question #20.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    No future steps are known and maintenance is not necessary unless the installation shows signs of instability.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    No detractions are known/understood at this time.
17. ***Are follow-up assessments needed? Explain.***
    The installation is static and has no logical need for further evaluation other than to ensure it remains stable.
18. ***Additional comments on the restoration project.***
    It is not germane to this evaluation and the evaluators have no opinion on the matter, but it is worth noting that there was dispute among industry professionals as to whether mitigating the barrier would benefit Steelhead and the fishery in general. The boulders utilized (Photo 11-4) matched the in situ rock and were placed in a manner that produced a natural aesthetic. The single construction access route was stable despite being now utilized by snowmobiles. Downed timber was positioned to discourage access and control erosion (Photo 11-4 & Photo 11-5).Clean Water Land & Legacy Amendment signage was in place.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    While no data was provided to substantiate, there are anecdotal reports of more frequent Steelhead passage and based on professional judgement the barrier falls is passable under most flow conditions. Predictably, the installation should be stable and should be able to withstand substantial flood events.
21. ***Site Assessor(s) Conducting Review:***
    Kevin Biehn - EOR

Appendix 11A: Site maps, Project plans or Vegetation tables

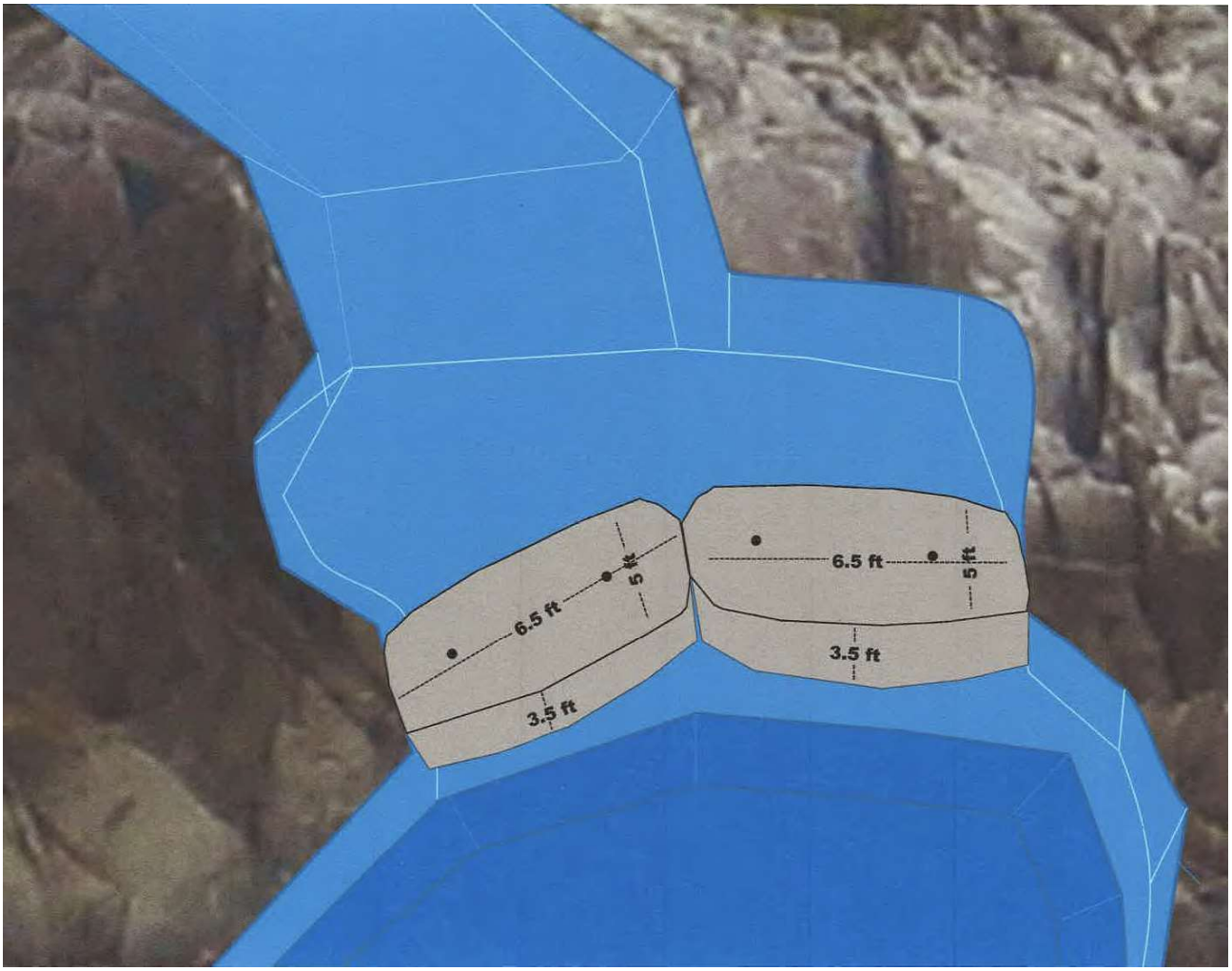


Figure 11-1 MNDNR Schematic of boulder placement and dimensions.

Appendix 11B: Site Photographs

Photo 11-1 - Second Falls pre-construction photograph - date unknown. Image from Lake Superior Steelhead Association.

Photo 11-2 - Photograph of "pinned boulder fix" – dated unknown. Image from Lake Superior Steelhead Association.

Photo 11-3 - June 29, 2017 photograph of Second Falls, during high flow event.

Photo 11-4 - Access route (looking down slope).

Photo 11-5 - Access route (looking upslope). Note positioned timber intended to discourage recreational vehicle use.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

12 - OHF Knife River Habitat Rehabilitation, Reaches 9 & 12

Legacy Fund Restoration Evaluations

Project Background

Project Name: Knife River – Reaches 9 & 12

Project Location: Lake County

Township/Range Section: Township 53 Range 11W Section 33

Project Manager / Affiliated Organization: Lake Superior Steelhead Association

Fund: OHF ***Fiscal Year Funds:*** 2013

Project Start Date: 2016

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Forest , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   The following is an excerpt of the Main Knife River Habitat Rehabilitation Phase II Reaches 9 and 12 report authored by the Lake Superior Steelhead Association:

"The project's scope of work is to use Natural Channel Design concepts to stabilize the slumping streambanks and provide better in-stream trout habitat. This concept uses a combination of logs, root wads and boulders salvaged on-site or brought to the site and strategically placed to alter the stream's directional flow away from its banks toward the center of its channel. By focusing the current's flow toward the center of the stream, sediment is transported leaving a scoured low flow stream channel that is more conducive to juvenile trout rearing. This altering of the stream's flow also alleviates the current velocity on the streambanks, which reduces erosion."

"Streambank erosion is further reduced by creating a floodplain. The floodplain is created by realigning the stream channel. This realignment is accomplished by excavating soil from a filled in channel and placing the material along the eroding streambank to create a bench. This bench is then used to place root wads along the newly created bank and covering them with soil. The elevation of the new streambank is set at the bankfull height so flood waters can swell over the bank and dissipate the stream's floodwater energy. The height of the bank, or bankfull elevation, is set from the assessment survey data. This elevation is critical to avoid creating a bank that is too high resulting in a new down-cutting stream channel."

"Root wads are placed at a 45 degree upstream angle with the root material facing into the stream's current. By placing the root wads into the current, the root material acts as a current break further dissipating the energy of the floodwater. This root material also creates turbulence that has a scouring effect on the stream bottom and creates undercut streambanks. This scouring and undercutting provides additional habitat features for trout and a cooling effect on the stream's water temperature."

"Finally, the bank is stabilized using matting and is seeded to promote rapid vegetative regeneration. For seed a standard MN/DOT wetland mix will be used and willow stakes will be pounded through the mat to hold it in place and provide a willow canopy. Other reforestation plantings will also be utilized throughout the project footprint."

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   7/2016 Design Drawings authored by Cardno
   Main Knife River Habitat Rehabilitation Phase II Reaches 9 and 12 report dated 6/2016 authored by the Lake Superior Steelhead Association.
3. ***What are the stated goals of the project?***
   The general goal of the collection of Knife River projects funded by OHF is to enhance trout habitat in the watershed. While not specially stated, the readily assumed goals of this project are to improve the trout fishery by reducing sediment contributions and enhancing/ maintaining Steelhead habitat.
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Pre and post project evaluations of morphology, total suspended solids (TSS), and temperature and trout surveys were proposed. These measures were not yet completed at the time of this evaluation.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   Selected pages of 12 sheet construction documents dated 7/2016 included in Appendix A (Figure 1-5).

6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   The following bank stabilization and habitat practices were implemented: toe wood, bank grading, root wad, j-hook vane, cross vane and wetland scrapes. Each practice and particular implementation approach is of current industry science.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   No substantial deviations are known.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   N/A

Site Assessment

Field Review Date: **6/29/2017**

9. ***Surrounding Landscape Characteristics:***

   The Knife River (USGS designations: Latitude 46°56'49", Longitude 91°47'32", Hydrologic Unit 04010102) drains an area of 83.6 sq. miles along the north shore of Lake Superior. It is contained in Lake and St. Louis Counties with about half the drainage coming from each of these counties. The river discharges into Lake Superior along the north shore of the lake to the southwest of Two Harbors.

   The watershed is mostly upland deciduous forest (71%). The rest of the watershed consists of rural residential and some pasture land.

   The USGS record for the Knife River extends from July 1974 until the present. For that period of time the following flow statistics were determined:
   Largest annual peak flow = 9,100 cfs
   Smallest annual peak flow = 1,410 cfs
   Mean annual peak flow = 3,147 cfs
   Mean annual daily discharge = 90.6 cfs = 0.04 in/day = 14.71 inches/year

   The river was placed on the state impaired waters list in 1998, with the impairment being turbidity caused by suspended sediment. The impaired waters listing led to a TMDL study to assess the sources of sediment transported along the main stem of the Knife River.
10. ***Site Characteristics:***
    a. Soils:
    The floodplain and streambanks are predominately comprised of Miskoaki-Fluvaquents, frequently flooded, complex, 0 to 45 percent slopes.
    b. Topography:
    Typical stream gradient across the project is ~0.5%. Adjacent stream banks reach heights of ~15’.

c. Hydrology:

See response to Question #9.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

The project area occupies a forested floodplain of the Knife River. Dominate species include the following: Quaking Aspen (*Populus tremuloides*), Black Ash (*Fraxinus nigra*), Black Spruce (*Picea mariana*) and American Cranberry bush (*Viburnum trilobum*). Glossy Buckthorn (*Frangula alnus*) was present.

e. Vegetation B: Meander Search Species List (as appropriate for site)

With a Fall/Winter 2016 sowing it was too early at the time of the assessment to thoroughly evaluate the "Slope stabilization Seed Mix". See Figure 6 for composition of the seed mix, which did not include forbs. The cover crop of Oats and Annual Rye was coming in – more densely in areas of adequate moisture/soils.

Per construction plans Live Cuttings were an optional component of the Toe wood installation, but appear not to have been used or did not survive.

Existing tree and shrub plantings, which were not specified in the Construction Documents, were carried out by volunteers. Predominate species include Bur Oak (*Quercus macrocarpa*), Black Spruce (Picea *mariana*), Silver Maple (*Acer saccharinum*) and Tamarack (*Larix laricina*).

11. *Is the plan based on current science?* Yes

The following bank stabilization and habitat practices were implemented: toe wood, bank grading, root wad, j-hood vane, cross vane and wetland scrapes. Each practice and particular implementation approach is of current industry science.

12. List indicators of project outcomes at this stage of project:

These indicators were available at the time of the evaluation:

Connectivity: near bankfull event had accessed a portion of the floodplain;

Water Quality: relocation of stream away from high, unstable banks should decrease sediment contribution;

Biology: the addition of wood, large rock and pool forming/holding structures should increase the amount and quality of habitat and cover for trout and other aquatic organisms.

Stream width to depth ratios

13. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

The design and executed project can reasonably address the core hydrology, geomorphology, connectivity, water quality and biology criteria. The intended long-term monitoring should be sufficient and documenting success and any shortcomings.

14. Are corrections or modifications needed to meet proposed outcomes?

It appears that the landowner on the upper reach is mowing and clearing vegetation to the water's edge. Further dialog with the landowner is necessary to curtail practice and ensure stated outcomes.

15. Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?

Only apparent challenge noted was the landowner practice noted in Question #14.

16. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No long-term detraction apparent

17. Are follow-up assessments needed? Explain.

Yes – there would be significant value in reevaluating this project in 3-5 years. A follow up evaluation after vegetation has established and the project has experienced ≥ 2 channel forming discharges will be more telling of probable outcome, especially if the monitoring plan is executed as planned.

18. ***Additional comments on the restoration project.***
    The project was not complete at time of evaluation – components of "Area 2" as detailed in the construction plans have not been initiated (this is known to the project lead). Clean Water Land & Legacy Amendment signage was in place. It's not necessarily detrimental, but there is a substantial difference in the toe wood elevation. Area 2 (Figure 8) appears to be too low relative to flow elevations. In comparison Area 4 (Figure 9) is at or slightly above the bankfull elevation.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Low
20. ***Provide explanation of reason(s) for determination.***
    Given that the project is in the very early stages of establishment confidence of outcome determination is low. The designed and executed project has indicators of success, but it is premature to determine whether goals have been met.
21. ***Site Assessor(s) Conducting Review:***
    Kevin Biehn - EOR

Appendix 12A: Site maps, Project plans or Vegetation tables

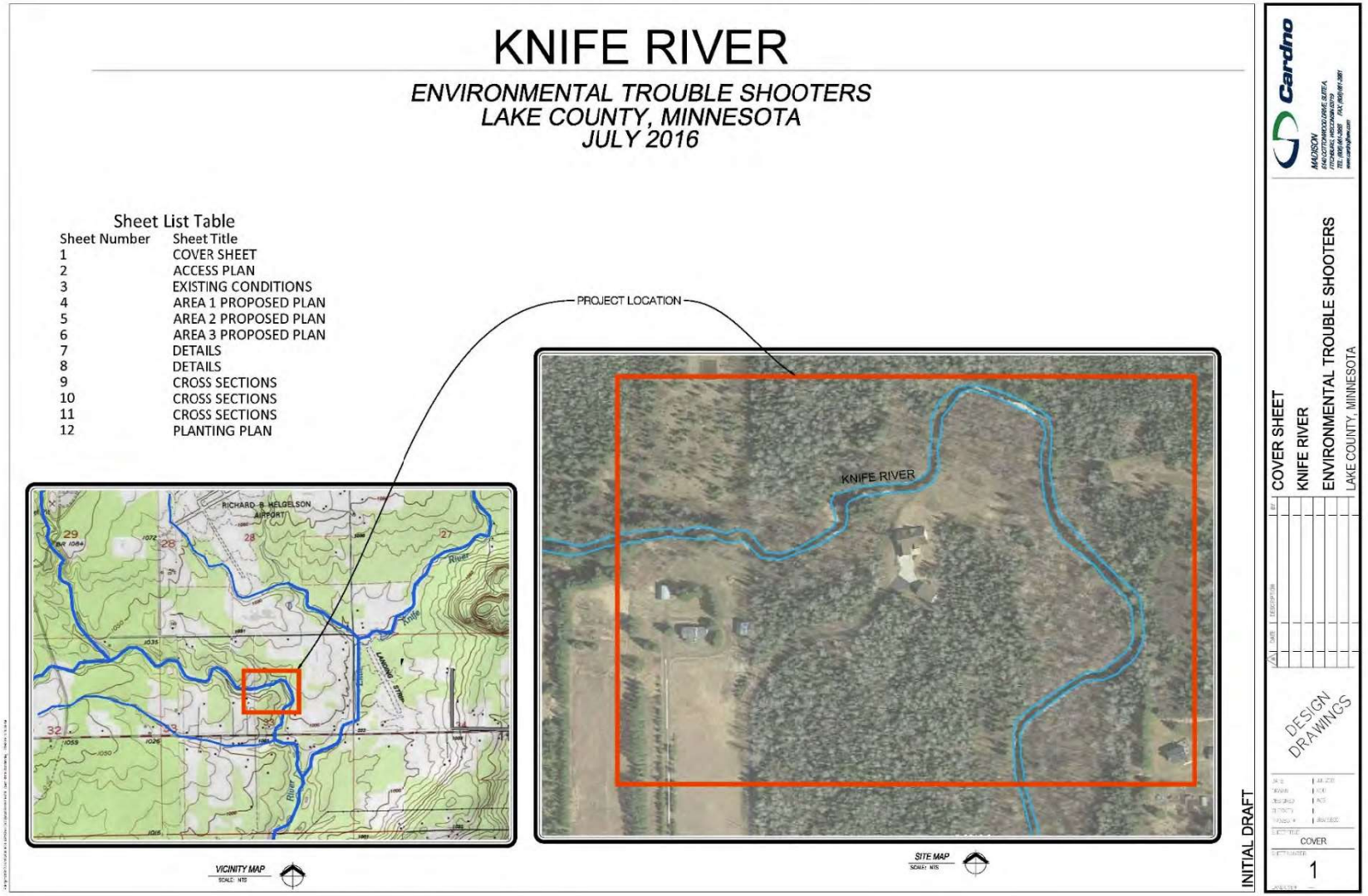


Figure 12-1 - Construction Plan Set: Sheet 1 of 12.

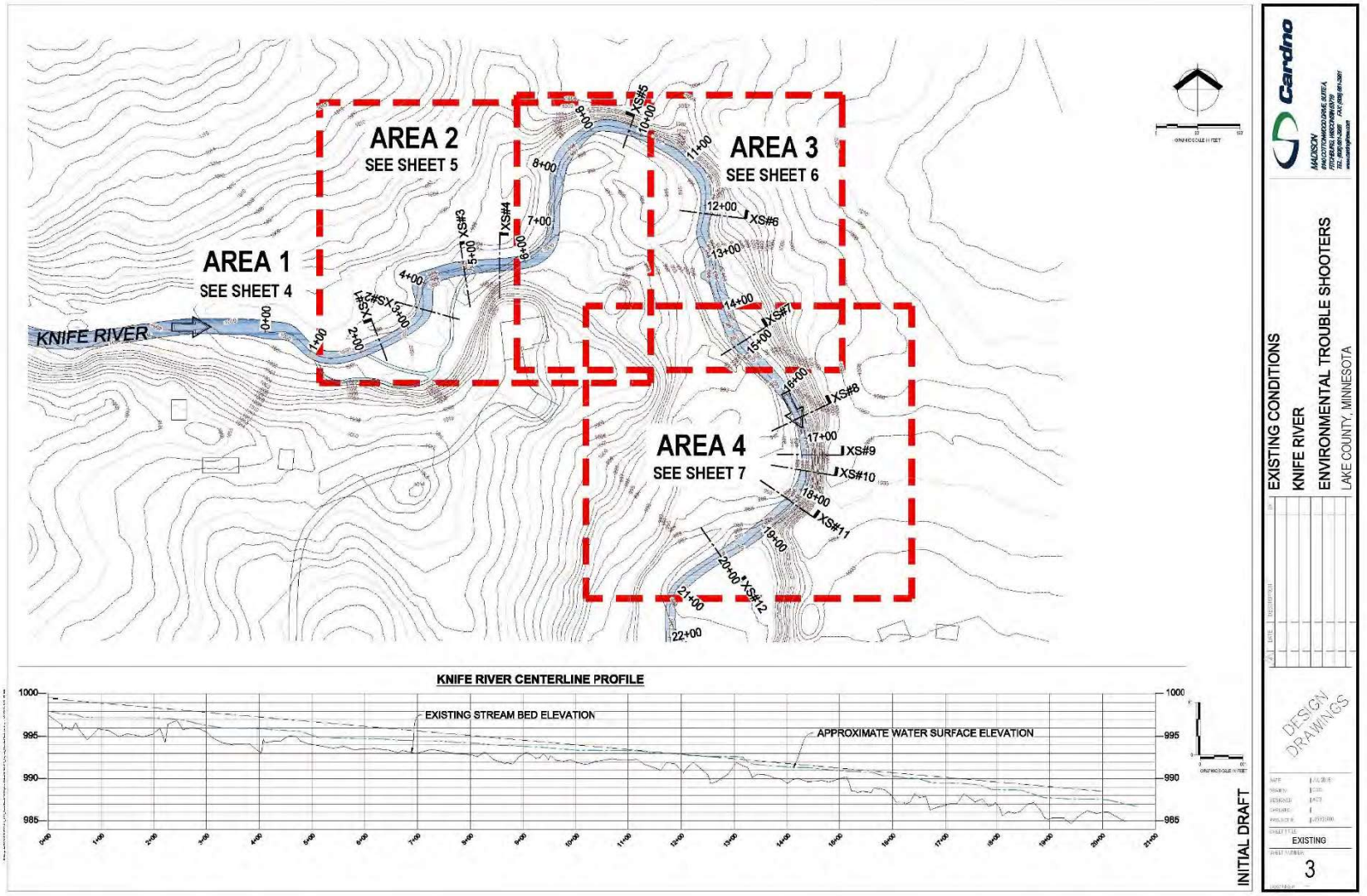


Figure 12-2 - Construction Plan Set: Sheet 3 of 12.

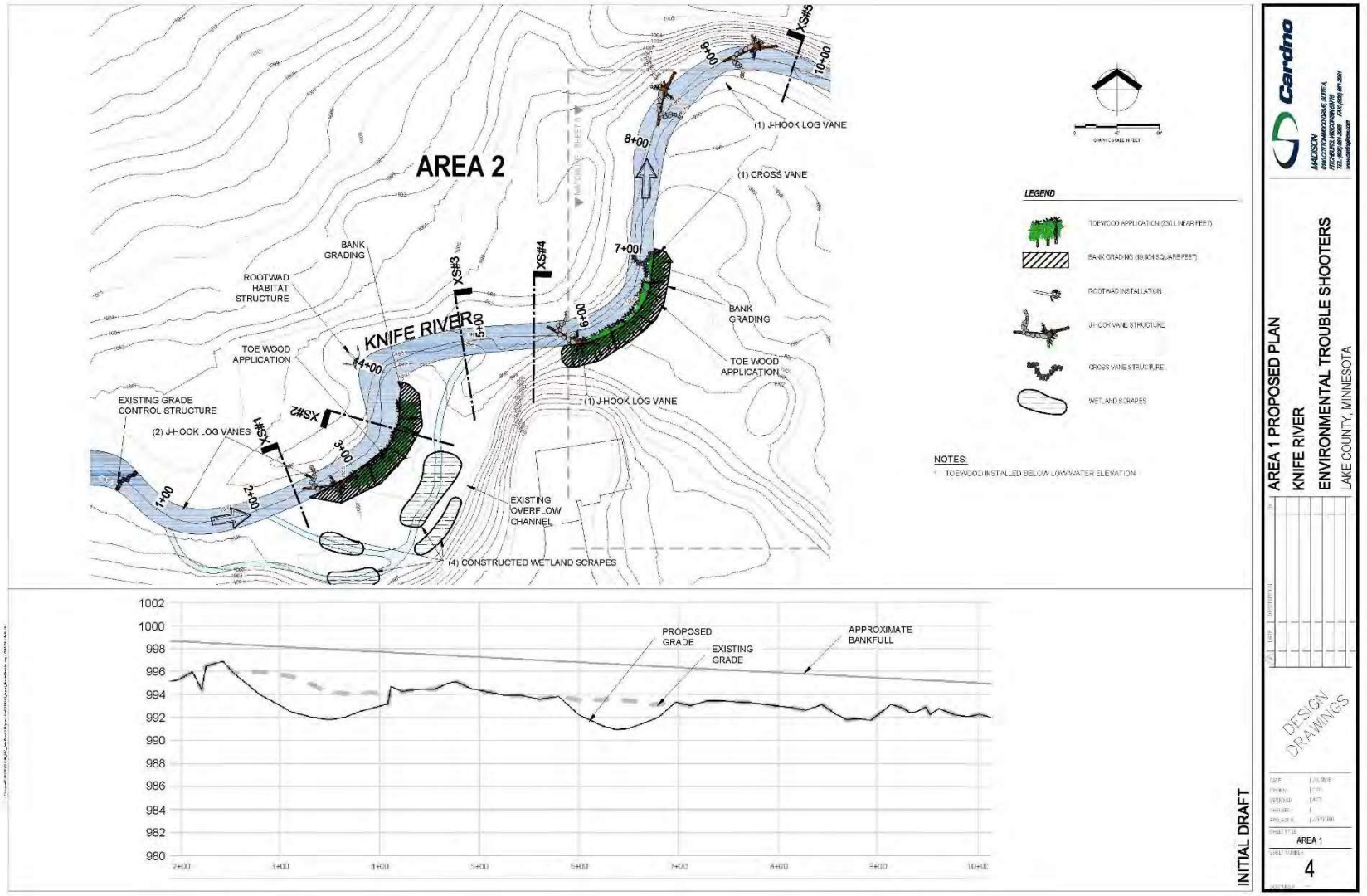


Figure 12-3 - Construction Plan Set: Sheet 4 of 12.

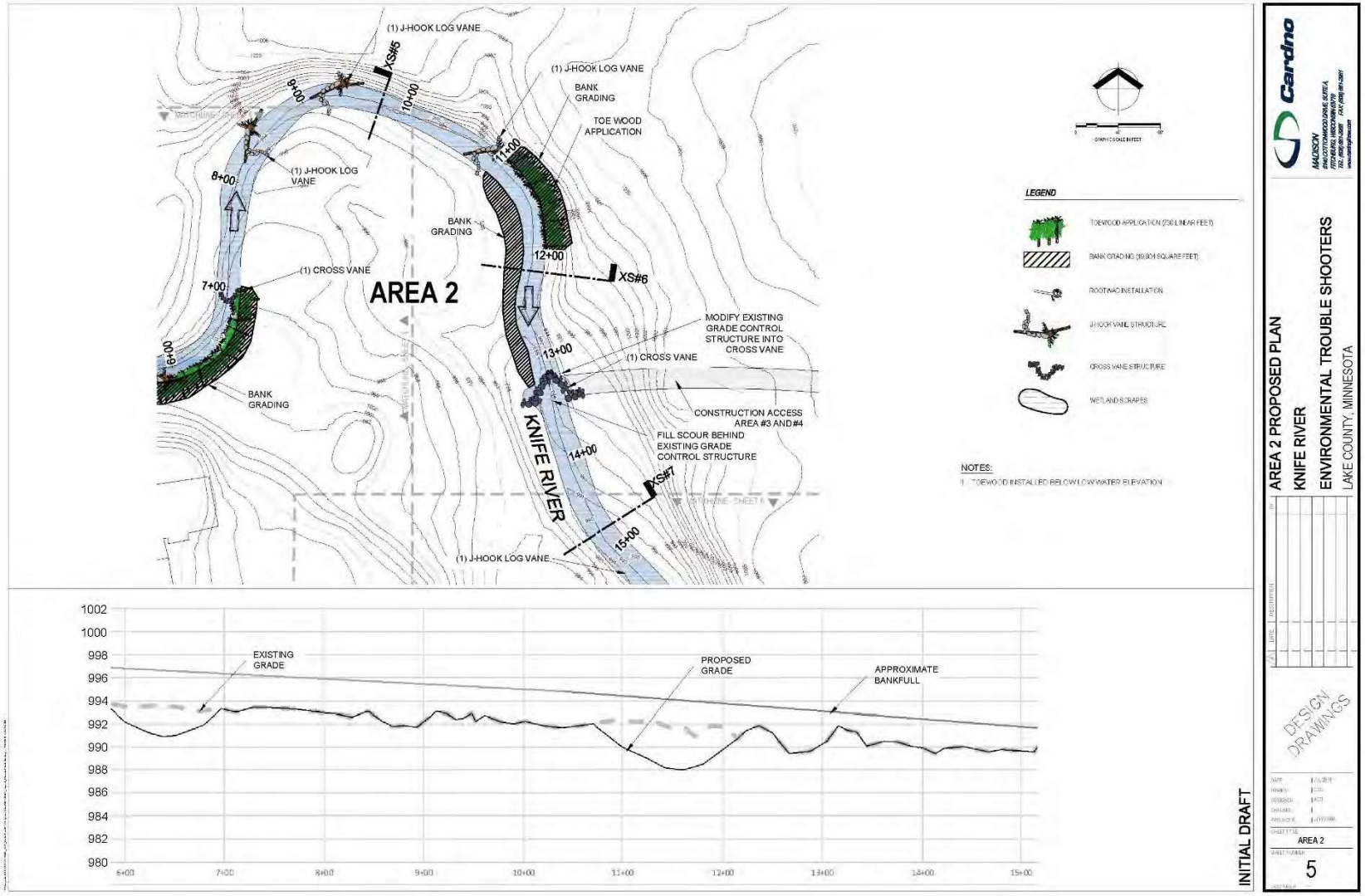


Figure 12-4 - Construction Plan Set: Sheet 5 of 12.

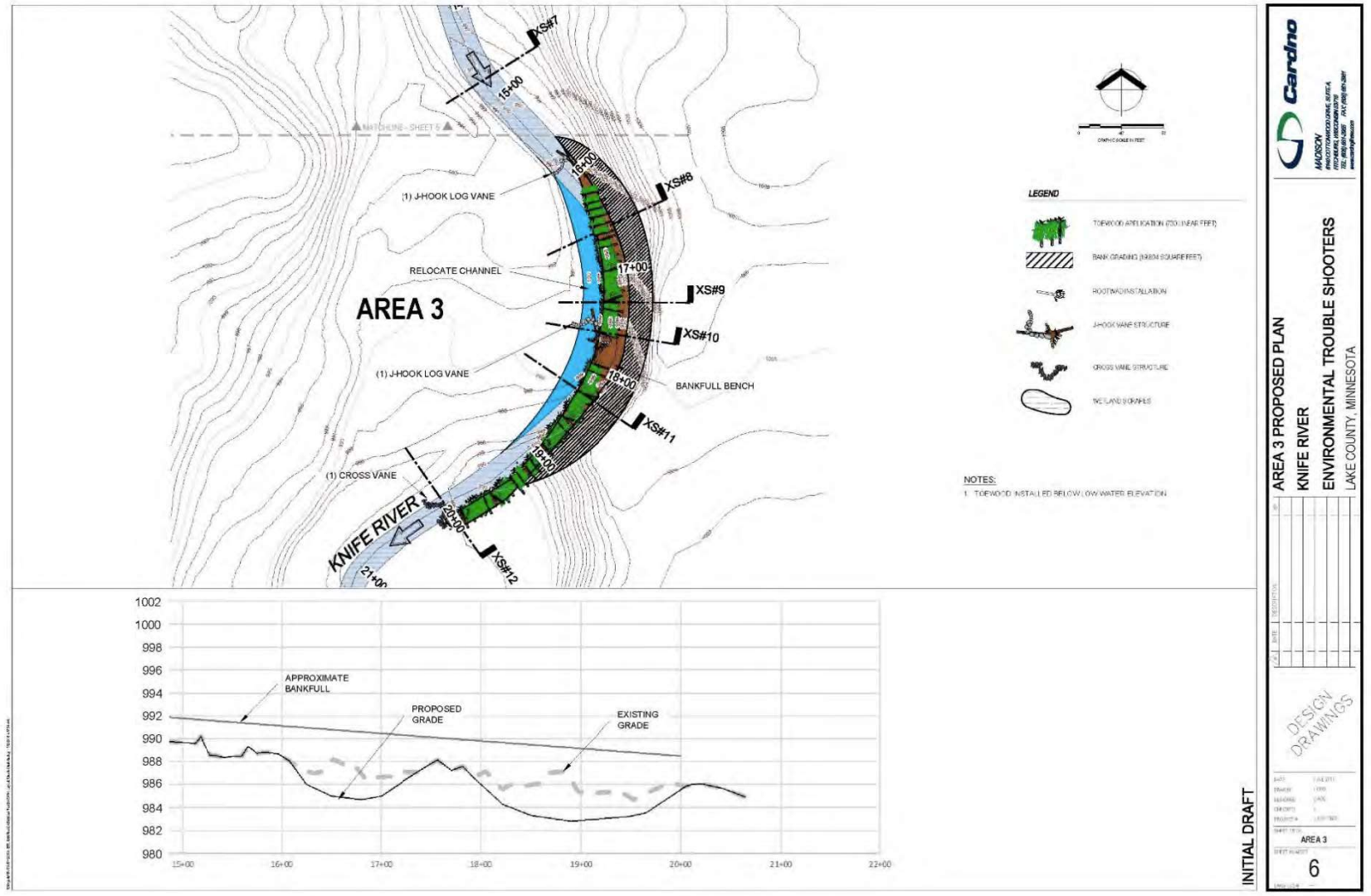


Figure 12-5 - Construction Plan Set: Sheet 6 of 12.

Table 12-1 – Slope stabilization project specified seed mix for disturbed areas.

Botanical Name	Common Name	Cover Type	Ounces/Acre
Andropogon gerardii	Big Bluestem	Permanent Grass	48
Bouteloua curtipendula	Side-Oats Gramma	Permanent Grass	16
Carex spp.	Prairie Sedge Mix	Permanent Grass	4
Elymus Canadensis	Canada Wild Rye	Permanent Grass	32
Elymus virgatum	Switch Grass	Permanent Grass	12
Elymus virgatum	Switch Grass	Permanent Grass	32
Sorghastrum nutans	Indian Grass	Permanent Grass	32
Avena sativa	Common Oat	Temporary Cover	512
Lolium multiflorum	Annual Rye	Temporary Cover	240

Appendix 12B: Site Photographs

Photo 12-1 - 6/29/2017 panoramic photograph of "Area 4".

Photo 12-2 - 6/29/2017 photograph of “Area 2” facing upstream. Note undesirable landowner vegetation maintenance and toe wood installation well-below bankfull stage.

Photo 12-3 - 6/29/17 photograph of “Area 4” facing downstream.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

13 - OHF Knife River Habitat Rehabilitation, Tree Plantings (2 sites)

Legacy Fund Restoration Evaluations

Project Background

Project Name: Knife River Watershed –Tree Plantings

Project Location: Saint Louis County

Township/Range Section:

Site 1 - Township 53 Range 12W Section 27 “Gordy’s Memorial Forest Site” (GMF)

Site 2 - Township 53 Range 12W Section 16 “White Landing Site” (WL)

Project Manager / Affiliated Organization: Lake Superior Steelhead Association

Fund: OHF ***Fiscal Year Funds:*** 2011 – GMF, 2013 - WL

Project Start Date: 2013 – GMF, 2017 - WL

Predominant Habitat type: Wetland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

The scope of these projects consisted of planting coniferous and deciduous trees in riparian meadows. Predominate species planted were white spruce, tamarack, swamp white oak, river birch and silver maple. Size/type ranged from bare-root to 3-gallon potted stock. The trees were matted (primarily polypropylene) and most had tubes and/or caging for protection (Figure 1).
The GMF site was executed by volunteer labor and the WL site was completed by Conservation Corps. Related project activities also included the removal of beaver and dam remnants from the watershed.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   April 2015 Tree Planting Project Report – West Branch of the Knife River Habitat Rehabilitation Project authored by the Lake Superior Steelhead Association.
3. ***What are the stated goals of the project?***
   The following is a direct excerpt from a 4/2015 Project Report West Branch of the Knife River Habitat Rehabilitation Project authored by the Lake Superior Steelhead Association:
   "The primary goal of this project is to rehabilitate the West Branch trout habitat. To reach this goal, our focus is to reestablish consistent in-stream base flow, decrease water temperature, improve instream habitat components, decrease stream instability and restore the riparian tree growth. Project activities may also remove beaver and dam remnants from the watershed to protect the restored trout habitat."
   "The Tree Planting project consisted of replanting two sites to restore the lost riparian forested wetland."
4. ***Were measures of restoration success identified in plans?*** *No*
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   The matting for weed control and moisture retention along with the "grow tubes" and caging for herbivore protection are aligned with current practices.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   No significant deviations
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   N/A

Site Assessment

Field Review Date: **6/29/2017**

9. ***Surrounding Landscape Characteristics:***
   Both sites are within the North Shore Highlands (212Lb) ecological subsection and within the Knife River Watershed. The sites are both confined to riparian meadows dominated by graminoids & sedges and have experienced recent hydrologic fluctuations due to beaver activity.
10. ***Site Characteristics:***
    a. Soils:
    The "White Landing" site is predominately composed of Bowstring and Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded (Map Unit 1020A); "Gordy's Memorial Forest" is comprised of Udifluvents, loamy, 0 to 2 percent slopes, occasionally flooded (Map Unit 1026A).
    b. Topography:
    Both sites are relatively flat riparian wetlands with direct connectivity to river stage.
    c. Hydrology:
    Soil is usually waterlogged and is frequently inundated by natural flooding events. Hydrology is further altered/impacted by beaver dams.
    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:
    A thorough inventory was not completed as a part of this evaluation.
    e. Vegetation B: Meander Search Species List (as appropriate for site)
    Specific plant schedule of species and numbers used was not obtained. Via observations from site walk, planting appeared to be predominately composed of the following species, which are also listed for the "Gordy's Memorial Forest" site in Tree Planting Project Report, West Branch of the Knife River, Habitat Rehabilitation Project: White Spruce (*Picea glauca*), Tamarack (*Larix laricina*), Swamp White Oak (*Quercus bicolor*), River Birch (*Betula nigra*) and Silver Maple (*Acer saccharinum*).
11. ***Is the plan based on current science?*** Portions
    The approach to establishing a forested wetland was of current science. The site suitability for one or both sites may be in question – see response to Question #20 for further information.
    River Birch (*Betula nigra*) and Swamp White Oak (*Quercus bicolor*) were used considerably north of their native range (~150 miles). Project managers addressed this out of range planting as a climate change adaptation technique, bringing MN regionally native trees north of their historic range where suitable conditions exist. This practice is not based in established restoration science and not applied with a research methodology to test the practice.
12. ***List indicators of project outcomes at this stage of project:***
    The following are indicators of project outcomes at this stage of the project. The GMF site, which is four years mature, was on positive trajectory for establishing a forested canopy. The WL site was recently planted and too early to draw conclusions from:
    - Plant survival
    - Condition of herbivore protection
    - Adjacent plant competition
    - Beaver activity
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

This may be in question – see response to Question #20

14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes. The predictable vegetation competition and herbivore damage potential has been accounted for and plans are in place to establish/manage accordingly. Beaver management, as planned for, will be critical.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    No detractions are known/understood at this time.
17. ***Are follow-up assessments needed? Explain.***
    A follow up within a ten year time frame to assess forest canopy establishment is warranted.
18. ***Additional comments on the restoration project.***
    Noted plant mortality at the WL site was attributed to inadequate material handling and/or insufficient watering. Clean Water Land & Legacy Amendment signage is in place.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Minimally meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    The primary goal of the tree planting is to reduce instream temperatures via shading from trees. Both sites have experienced historic beaver activity and it is probable that the conditions that attracted historic beaver activity will draw future activity. Given the timeline (15+ years) to start realizing shade from the planted trees and the elevated risk of tree loss due to beaver activity, (both in terms of cutting and prolonged flooding associated with dams) as well as the elevated risk of wind damaged (due to high water table and soil composition) there is a high probability of tree loss even with diligent beaver management.
    Furthermore, it is questionable whether hydrology and soils are suitable to a coniferous and/or deciduous stand. Historic aerial photography illustrates that both sites have been predominately void of trees since the earliest photography of the area. A comparison of 1939 and 2003 can be seen in Figure 4 & Figure 5.
    The adjacent river sections have favorable width-to-depth ratios and over-bank cover for habitat and refugia. The establishment of a forested canopy may alter this geomorphology.
    Given these inherent risks the project is anticipated to minimally meet proposed outcomes.
21. ***Site Assessor(s) Conducting Review:***
    Wade Johnson – MN Department of Natural Resources & Kevin Biehn - EOR

Appendix 13A: Site maps, Project plans or Vegetation tables

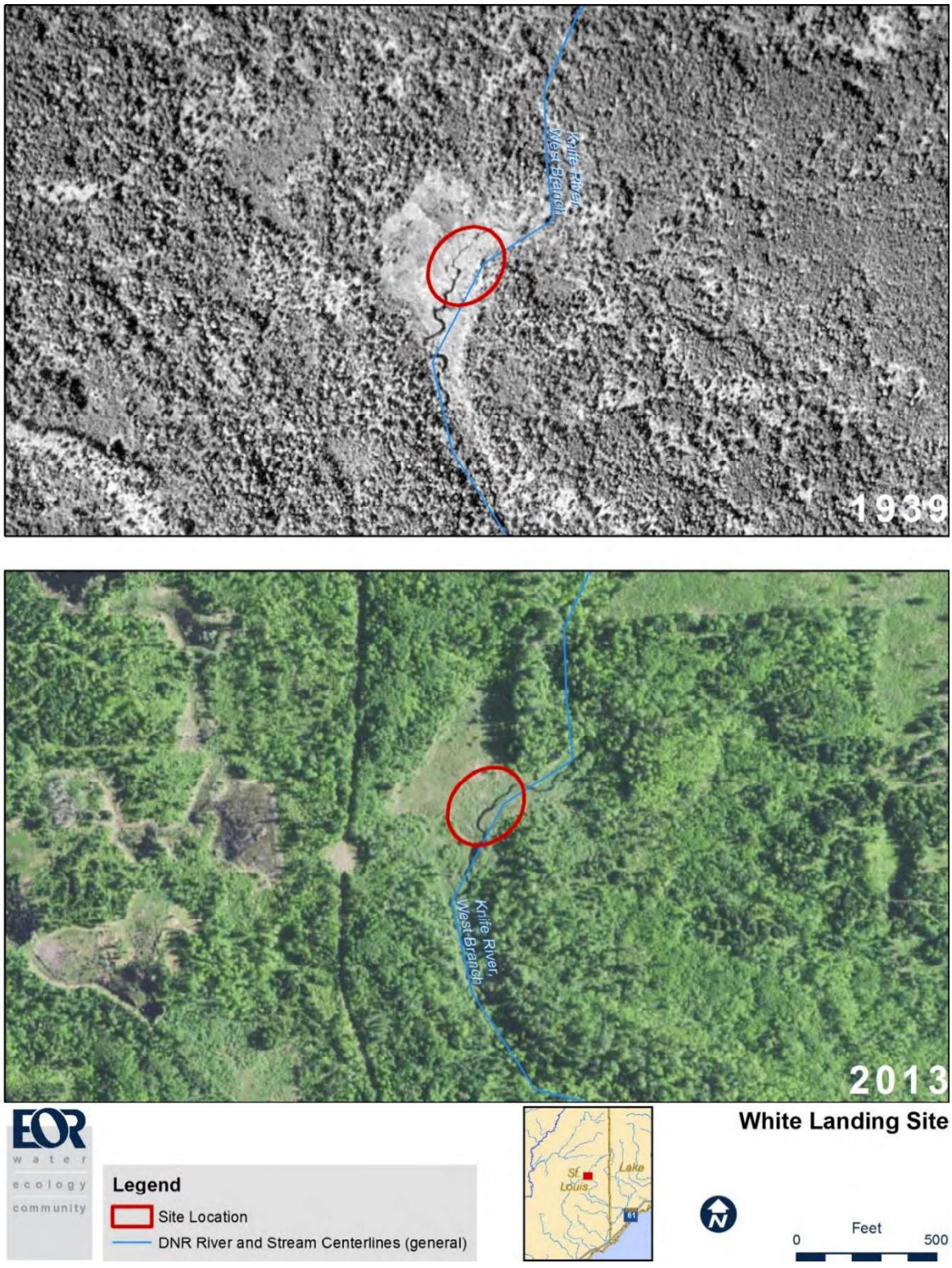


Figure 13-1 - 1939 & 2003 aerial photography of White Landing site.

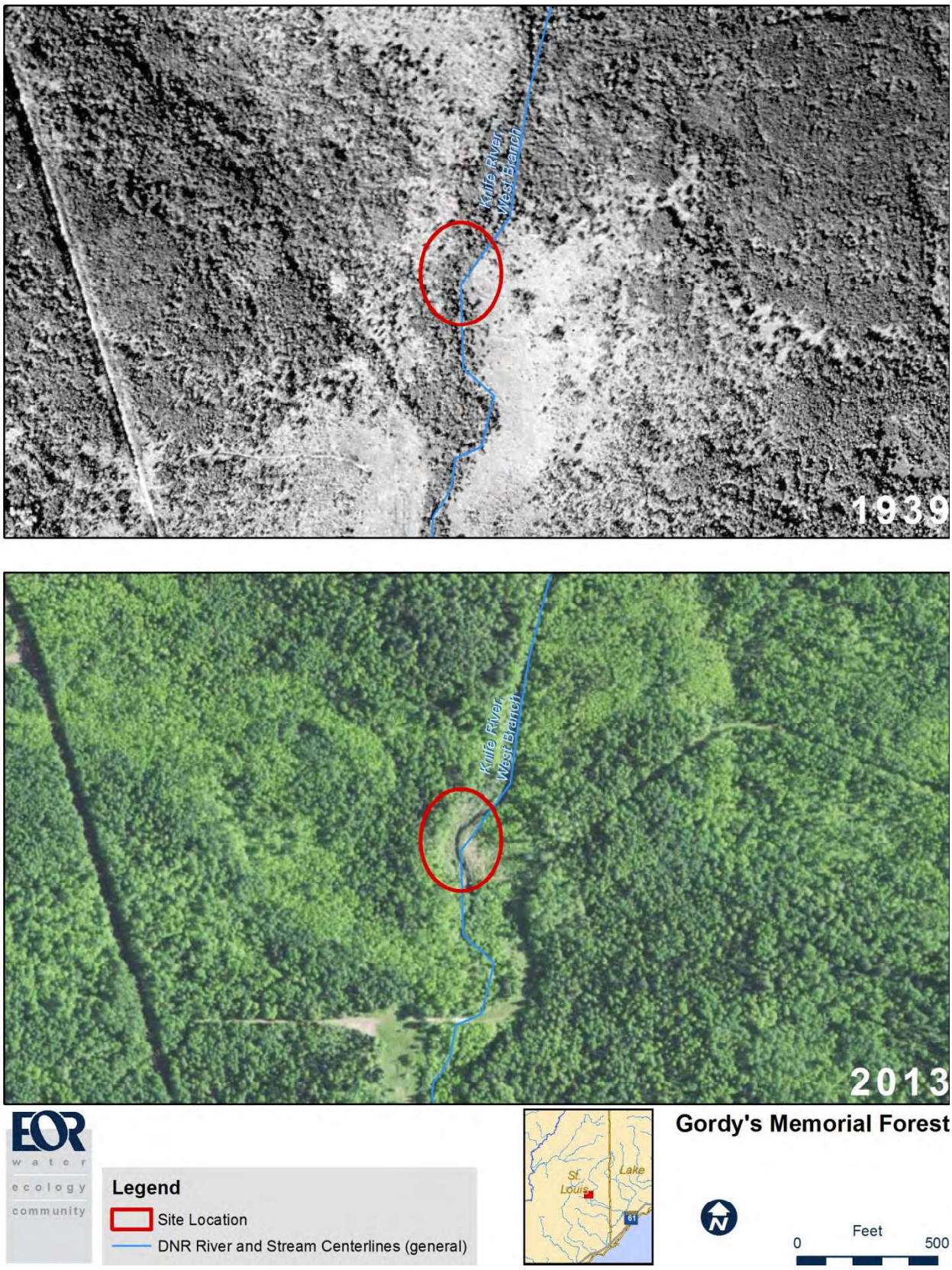


Figure 13-2 - 1939 & 2003 aerial photography of Gordy's Memorial Forest site.

Appendix 13B: Site Photographs

Photo 13-1 - 6/29/2017 photograph of Silver Maple planting at the White Landing site.

Photo 13-2 - 6/29/2017 photograph of establishing tree species at Gordy's Memorial Forest site. West Brank of the Knife River on the left (looking upstream).

Photo 13-3 - 6/29/2017 photograph of establishing tree species at Gordy's Memorial Forest site.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

14 - OHF St. Louis River Estuary, Chambers' Grove

Legacy Fund Restoration Evaluations

Project Background

Project Name: Chambers' Grove Aquatic Habitat Enhancement Project

Project Location: Duluth and Fond du lac, St. Louis County, MN

Township/Range Section: Township 48N Range 15W Section 7

Project Manager / Affiliated Organization: John Lindgren / MN DNR

Fund: OHF ***Fiscal Year Funds:*** 2013

Project Start Date: Mid-July 2015

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Forest , Wetland

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

   An existing 1000-linear foot retaining wall constructed of sheet pile, gabions, boardwalk and safety fence was removed along the riverfront of Chambers' Grove Park (a City of Duluth Park) and the shoreline (littoral zone) was stabilized with Toe Wood (Figure 5).

The bank's riparian area above the Toe Wood and the ordinary high water level (OHWL) was naturalized with native vegetation.

Construction of a boulder weir and two j-hook vanes about 1.4 miles below the Fond du Lac Dam to create small scale cascades that increase hydraulic complexity (Figure 6).

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Environmental Assessment Worksheet (5/19/2015), Construction Plan Set (6/24/2015), and Specifications (7/13/2015).
3. ***What are the stated goals of the project?***
   The main objectives of the Chambers' Grove Aquatic Habitat Enhancement Project are: 1) reestablish favorable spawning habitat for migratory fishes of Lake Superior (specifically sturgeon), by constructing rock riffles; 2) improve flow regime and stability of side-channel; 3) naturalize shoreline by removing artificial structures; and 4) improve access for outdoor recreational opportunities, such as fishing and launching canoes, while achieving Americans with Disabilities Act (ADA) compliance for proposed shorefront access structures.
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   If successfully constructed, about 1.5 acres of good to excellent spawning habitat will be created by the project.
   Project will increase the availability of high quality spawning habitat by 20 percent in the St. Louis River below Fond du Lac Dam. However, the exact amount and quality spawning habitat will vary depending on river flows and Lake Superior water levels.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   Construction Plan Set (noted sheets are included in Appendix A):
   Site Location (Figure 1)
   Existing Conditions (Figure 2)
   Demolition Plan
   General Plan View (Figure 3)
   Stone Weir
   J-Hook Vane #1
   J-Hook Vane #2
   Slope Naturalization (Figure 4)
   In-Stream Boulder Placement
   Woody Debris Placement
   Fishing Platform and Walkway Details
   Section B Fishing Platform
   Canoe/Kayak Access Ramp Plan
   Planting Plan and Details
   Sediment and Erosion Control BMPs

6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***

Design BMPS:
Natural Channel Design (NCD) methodology was reportedly implemented to inform analysis and design. NCD is a standard industry methodology for stream restoration, most associated with Wildland Hydrology Consultants and its founder Dave Rosgen.
The practices employed, such as Toe Wood and sod mat instillation, are common practices used in stream restoration/stabilization in Minnesota and suitable to "North Shore" streams.
Erosion Control BMPs (partial list includes most meaningful BMPs stated to have been employed):
Preparation of a SWPPP
Work will be administered during a period when flows rarely reach or exceed bankfull levels.
Timely monitoring of river flow and downstream conditions will be carried out to alert construction crews of impending increases in river flows. Work stoppage of in-water construction will occur if flows exceed suitable conditions (5000 cfs) or river level exceeds 604-foot elevation (North American Vertical Datum of 1988-NAVD88). Actual workable flows will depend on type and location of in-water work.
Phasing of excavation, fill and demolition will minimize duration and extent of soil disturbance.
The in-water construction activities will be scheduled in a manner that minimizes the amount of days necessary for disturbances to occur in the river.
Construction activities that will disturb soils on the river bank that are below the OHWM shall be conducted in phases to minimize soil exposure and erosion.
Best Management Practices to minimize soil erosion will be incorporated into project designs and specified to the contractor in the engineering plans. The BMPs will include silt fence, fabric logs, seeding/mulching, limiting the size of disturbed soil areas, turbidity curtains, and upstream diversions.
Structures to minimize sediment discharge to the St. Louis River during bank construction activities will be installed and maintained.
Seeding/mulching and erosion control blanket cover will be installed immediately and phased as sectors of construction are completed.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   The landscape / site restoration plan above the Toe Wood installation was deferred to a later date and executed by the City of Duluth in association with park improvements.
   J-Hook installations were extended further into the bank to adequately integrate with Toe Wood.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Landscape / site restoration deferral not likely to impact stream work but based on inputs, may result in less habitat area/value. J-Hook modifications were a prudent change to ensure stability.

Site Assessment

Field Review Date: **11/14/2017**

9. ***Surrounding Landscape Characteristics:***

The project is located on a side channel adjacent to the City of Duluth Chambers' Grove Park. The project is bounded on the southern (downstream) end by the MN State Highway 23 Bridge across the St. Louis River and on the west by an undeveloped island (Bayliss Island) under private ownership. The nearest residential/commercial development is a private campground and neighborhood located eastward from Highway 23, approximately 900 feet from the project area. The project area is used exclusively as natural environment and public recreation.

Project is located in the Lake Superior Plain Subsection. The area is dominated by aspen forest and well-developed drainage networks that have cut deep valleys. The proposed project is also within an area that the Minnesota Biological Survey (MBS) has identified as a Site of High Biodiversity Significance, indicating the area contains very good quality occurrences of the rarest species, high quality examples of rare native plant communities, and/or important functional landscapes. The following rare native plant communities: Gravel/Cobble Beach (River), Estuary Marsh (Lake Superior), and Black Ash – Silver Maple Terrace Forest were identified on Bayliss Island, within the project area.

10. ***Site Characteristics:***

a. Soils:

NRCS Soil types for the shoreline are classed as Udifluvents and Fluvaquents, loamy with 0 to 2% slopes rarely flooded (100-year floodplain). The instream channel bed is composed of cobble, gravel and sandy fluvial deposits. Red lacustrine clays deposited in the bed of glacial Lake Duluth and bedrock are the dominant components of hillside areas.

b. Topography:

The project area is located at the lower end of a higher gradient canyon section of the St. Louis River, where the river valley initially widens to include a broader floodplain bench. Adjacent uplands rise approximately 150 feet above the valley floor. Between the dam and Lake Superior, river gradient becomes lower and the valley becomes much wider beginning about the location of the project area.

c. Hydrology:

Large tributary - St. Louis River: MPCA Hydrologic Unit Code 04010201. The average yearly flow of the St. Louis River at Scanlon (~12 river miles above project site) is 2,284 cubic feet per second (cfs). Average yearly high and low flows are 14,617 and 465 cfs, respectively.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Gravel/Cobble Beach (River) Estuary Marsh (Lake Superior) Black Ash – Silver Maple Terrace Forest

e. Vegetation B: Meander Search Species List (as appropriate for site)

No formal evaluation completed as part of this assessment.

11. ***Is the plan based on current science?*** Yes

Construction of boulder weir and j-hook vanes to create small scale cascades that increase hydraulic complexity is current science, as is the replacement of a failing sheet pile and gabion retaining wall with Toe Wood. Additionally instillation of live stakes and sod mats from adjacent wetland increases vegetation establishment and natural bank stabilization.

12. ***List indicators of project outcomes at this stage of project:***

River bank stability

Desirable establishing vegetation

Indication of hydraulic complexity from As-Built topographic survey

Anecdotal fisheries reports

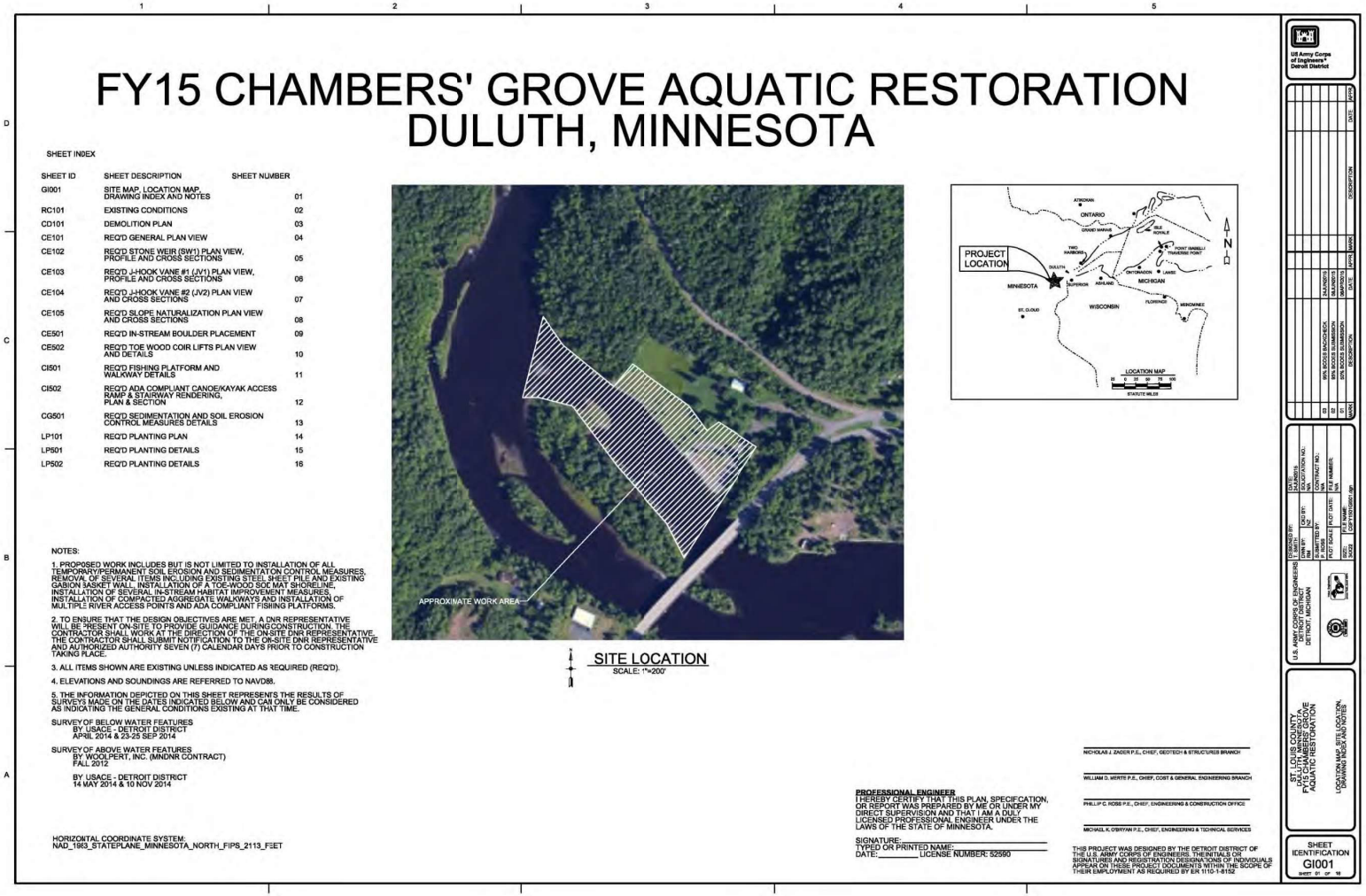
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    The project, as designed and executed, is well-positioned to meet the aquatic habitat, water quality and recreational goals.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No warranted corrections/modifications apparent at this phase.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    No foreseeable issues with the core project.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    There are no detractions known to the evaluators that were not mitigated for
17. ***Are follow-up assessments needed? Explain.***
    A follow up within the 5-year time frame (assess site conditions and review fisheries surveys) will provide a valuable perspective of outcome and lessons learned.
18. ***Additional comments on the restoration project.***
    Project is an excellent example of partnership (MN Land Trust, City of Duluth, MN DNR & USACE) and pairing partner needs and benefits. The individual projects may not have been feasible independently, but through partnership, greater outcomes were likely achieved at a lower probable cost.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    It is not known to the evaluators whether the stated amount of high quality spawning habitat (1.5 acres / 20% increase below dam) has been realized, but based on professional judgement one can reasonably assume that hydraulic complexity has been improved within the vicinity of the instream structures.
    The Toe Wood installation, which has been in place for over a year, appears stable and vegetation is establishing well. Based on numerous Toe Wood precedents throughout the region, the installation should foster stability and yield greater habitat value.
    Lastly, ample opportunity for accessible shore fishing has been provided in this desirable shore fishing location.
21. ***Site Assessor(s) Conducting Review:***
    Kevin Biehn - EOR

Appendix 14A: Site maps, Project plans or Vegetation tables



FY15 CHAMBERS' GROVE AQUATIC RESTORATION
DULUTH, MINNESOTA

SHEET INDEX

SHEET ID	SHEET DESCRIPTION	SHEET NUMBER
GI001	SITE MAP, LOCATION MAP, DRAWING INDEX AND NOTES	01
RC101	EXISTING CONDITIONS	02
CD101	DEMOLITION PLAN	03
CE101	REQ'D GENERAL PLAN VIEW	04
CE102	REQ'D STONE WEIR (SW1) PLAN VIEW, PROFILE AND CROSS SECTIONS	05
CE103	REQ'D J-HOOK VANE #1 (JV1) PLAN VIEW, PROFILE AND CROSS SECTIONS	06
CE104	REQ'D J-HOOK VANE #2 (JV2) PLAN VIEW AND CROSS SECTIONS	07
CE105	REQ'D SLOPE NATURALIZATION PLAN VIEW AND CROSS SECTIONS	08
CE501	REQ'D IN-STREAM BOULDER PLACEMENT	09
CE502	REQ'D TOE WOOD COIR LIFTS PLAN VIEW AND DETAILS	10
CI501	REQ'D FISHING PLATFORM AND WALKWAY DETAILS	11
CI502	REQ'D ADA COMPLIANT CANOE/KAYAK ACCESS RAMP & STAIRWAY RENDERING, PLAN & SECTION	12
CG501	REQ'D SEDIMENTATION AND SOIL EROSION CONTROL MEASURES DETAILS	13
LP101	REQ'D PLANTING PLAN	14
LP501	REQ'D PLANTING DETAILS	15
LP502	REQ'D PLANTING DETAILS	16

NOTES:

1. PROPOSED WORK INCLUDES BUT IS NOT LIMITED TO INSTALLATION OF ALL TEMPORARY/PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES, REMOVAL OF SEVERAL ITEMS INCLUDING EXISTING STEEL SHEET PILE AND EXISTING GABION BASKET WALL, INSTALLATION OF A TOE-WOOD SOC MAT SHORELINE, INSTALLATION OF SEVERAL IN-STREAM HABITAT IMPROVEMENT MEASURES, INSTALLATION OF COMPACTED AGGREGATE WALKWAYS AND INSTALLATION OF MULTIPLE RIVER ACCESS POINTS AND ADA COMPLIANT FISHING PLATFORMS.
2. TO ENSURE THAT THE DESIGN OBJECTIVES ARE MET, A DNR REPRESENTATIVE WILL BE PRESENT ON-SITE TO PROVIDE GUIDANCE DURING CONSTRUCTION. THE CONTRACTOR SHALL WORK AT THE DIRECTION OF THE ON-SITE DNR REPRESENTATIVE. THE CONTRACTOR SHALL SUBMIT NOTIFICATION TO THE ON-SITE DNR REPRESENTATIVE AND AUTHORIZED AUTHORITY SEVEN (7) CALENDAR DAYS PRIOR TO CONSTRUCTION TAKING PLACE.
3. ALL ITEMS SHOWN ARE EXISTING UNLESS INDICATED AS REQUIRED (REQ'D).
4. ELEVATIONS AND SOUNDINGS ARE REFERRED TO NAVD88.
5. THE INFORMATION DEPICTED ON THIS SHEET REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED BELOW AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.

SURVEY OF BELOW WATER FEATURES
BY USACE - DETROIT DISTRICT
APRIL 2014 & 23-25 SEP 2014

SURVEY OF ABOVE WATER FEATURES
BY WOOLPERT, INC. (MNDNR CONTRACT)
FALL 2012
BY USACE - DETROIT DISTRICT
14 MAY 2014 & 10 NOV 2014

HORIZONTAL COORDINATE SYSTEM:
NAD_1983_STATEPLANE_MINNESOTA_NORTH_FIPS_2113_FEET

APPROXIMATE WORK AREA

SITE LOCATION
SCALE: 1"=200'

PROJECT LOCATION

LOCATION MAP
STATUTE MILES

PROFESSIONAL ENGINEER
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE:
TYPED OR PRINTED NAME:
DATE: LICENSE NUMBER: 52590

NICHOLAS J. ZADER P.E., CHIEF, GEOTECH & STRUCTURES BRANCH
WILLIAM D. MERTE P.E., CHIEF, COST & GENERAL ENGINEERING BRANCH
PHILLIP C. ROSS P.E., CHIEF, ENGINEERING & CONSTRUCTION OFFICE
MICHAEL K. O'BRYAN P.E., CHIEF, ENGINEERING & TECHNICAL SERVICES

THIS PROJECT WAS DESIGNED BY THE DETROIT DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND REGISTRATION DESIGNATIONS OF INDIVIDUALS APPEAR ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER 1110-1-8152

US Army Corps of Engineers® Detroit District

U.S. ARMY CORPS OF ENGINEERS DETROIT DISTRICT, MICHIGAN

ST. LOUIS COUNTY DULUTH, MINNESOTA FY15 CHAMBERS' GROVE AQUATIC RESTORATION

LOCATION MAP, SITE LOCATION, DRAWING INDEX AND NOTES

SHEET IDENTIFICATION
GI001
SHEET 01 OF 16

Figure 14-1 - 6/24/2015 Construction Plan Set: SITE MAP, LOCATION MAP, DRAWING INDEX AND NOTES.

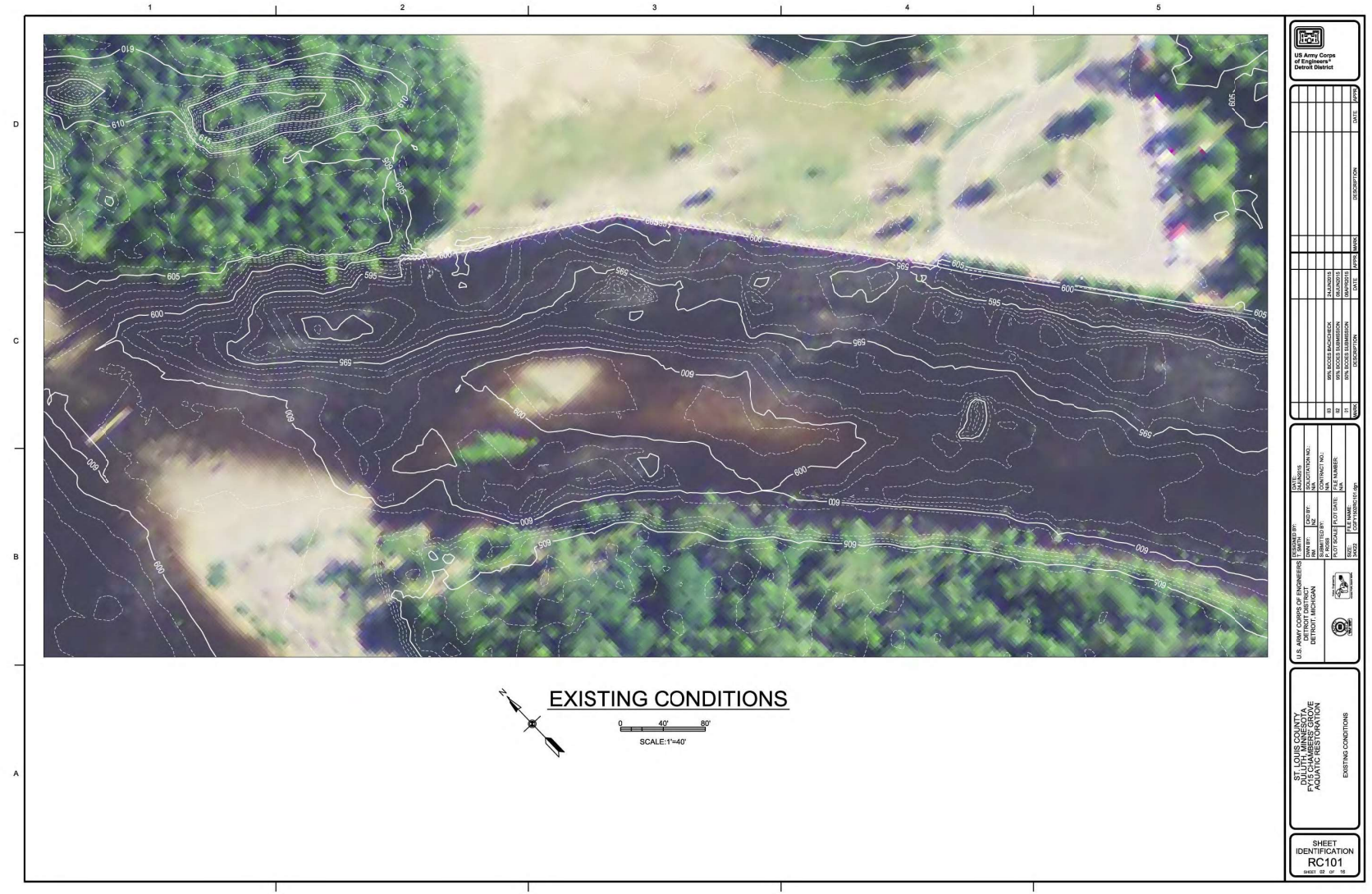
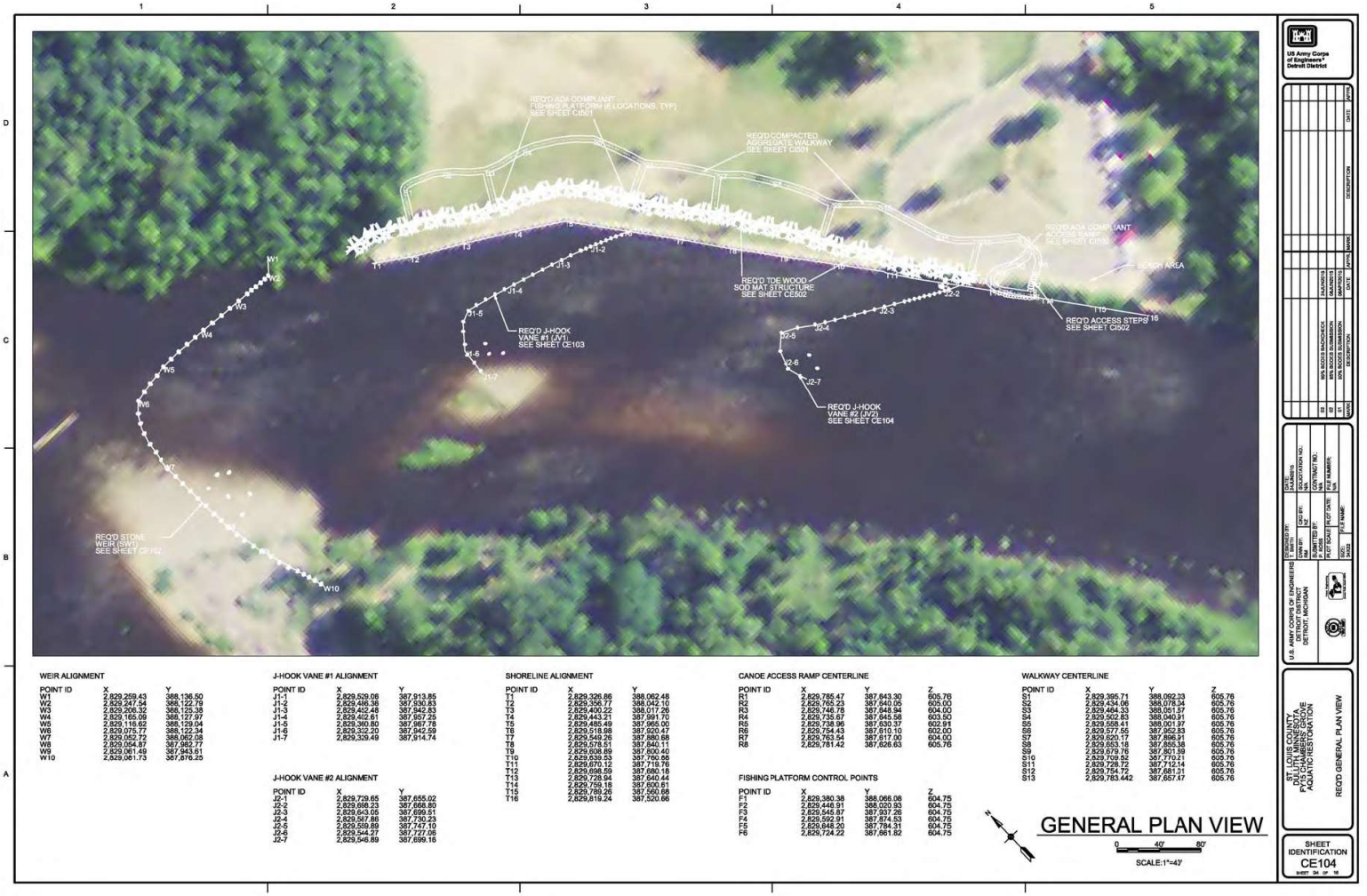


Figure 14-2 - 6/24/2015 Construction Plan Set: EXISTING CONDITIONS.



WEIR ALIGNMENT

POINT ID	X	Y
W1	2,829,259.43	388,136.50
W2	2,829,247.54	388,122.79
W3	2,829,206.32	388,125.38
W4	2,829,165.09	388,127.97
W5	2,829,119.62	388,129.54
W6	2,829,075.77	388,122.34
W7	2,829,052.72	388,062.08
W8	2,829,054.87	387,982.77
W9	2,829,061.49	387,943.61
W10	2,829,061.73	387,876.25

J-HOOK VANE #1 ALIGNMENT

POINT ID	X	Y
J1-1	2,829,529.06	387,913.85
J1-2	2,829,466.36	387,930.83
J1-3	2,829,462.48	387,942.83
J1-4	2,829,462.61	387,957.25
J1-5	2,829,360.80	387,987.78
J1-6	2,829,352.20	387,942.59
J1-7	2,829,329.49	387,914.74

J-HOOK VANE #2 ALIGNMENT

POINT ID	X	Y
J2-1	2,829,729.65	387,655.02
J2-2	2,829,698.23	387,668.80
J2-3	2,829,643.05	387,699.51
J2-4	2,829,587.86	387,730.23
J2-5	2,829,569.89	387,747.10
J2-6	2,829,544.27	387,727.05
J2-7	2,829,546.89	387,699.16

SHORELINE ALIGNMENT

POINT ID	X	Y
T1	2,829,326.86	388,062.48
T2	2,829,356.77	388,042.10
T3	2,829,406.22	388,017.26
T4	2,829,443.21	387,991.70
T5	2,829,486.49	387,965.00
T6	2,829,518.98	387,920.47
T7	2,829,549.26	387,880.88
T8	2,829,578.51	387,840.11
T9	2,829,608.89	387,800.40
T10	2,829,639.53	387,760.68
T11	2,829,670.12	387,719.76
T12	2,829,698.59	387,680.18
T13	2,829,728.94	387,640.44
T14	2,829,759.18	387,600.61
T15	2,829,789.26	387,560.68
T16	2,829,819.24	387,520.66

CANOE ACCESS RAMP CENTERLINE

POINT ID	X	Y	Z
R1	2,829,785.47	387,843.30	605.76
R2	2,829,765.23	387,840.05	605.00
R3	2,829,746.78	387,848.94	604.00
R4	2,829,735.67	387,845.58	603.50
R5	2,829,738.96	387,830.37	602.91
R6	2,829,754.43	387,810.10	602.00
R7	2,829,763.54	387,817.00	604.00
R8	2,829,781.42	387,826.63	605.76

FISHING PLATFORM CONTROL POINTS

POINT ID	X	Y	Z
F1	2,829,380.38	388,068.08	604.75
F2	2,829,446.91	388,020.93	604.75
F3	2,829,545.87	387,937.26	604.75
F4	2,829,592.91	387,874.53	604.75
F5	2,829,648.20	387,784.31	604.75
F6	2,829,724.22	387,661.82	604.75

WALKWAY CENTERLINE

POINT ID	X	Y	Z
S1	2,829,395.71	388,092.33	605.76
S2	2,829,434.06	388,078.24	605.76
S3	2,829,464.33	388,051.37	605.76
S4	2,829,502.83	388,040.91	605.76
S5	2,829,539.41	387,991.37	605.76
S6	2,829,577.55	387,952.53	605.76
S7	2,829,620.17	387,896.91	605.76
S8	2,829,653.18	387,856.36	605.76
S9	2,829,679.76	387,801.39	605.76
S10	2,829,709.82	387,770.21	605.76
S11	2,829,728.72	387,712.14	605.76
S12	2,829,754.72	387,681.31	605.76
S13	2,829,783.442	387,657.47	605.76

Figure 14-3 - 6/24/2015 Construction Plan Set: GENERAL PLAN OVERVIEW.

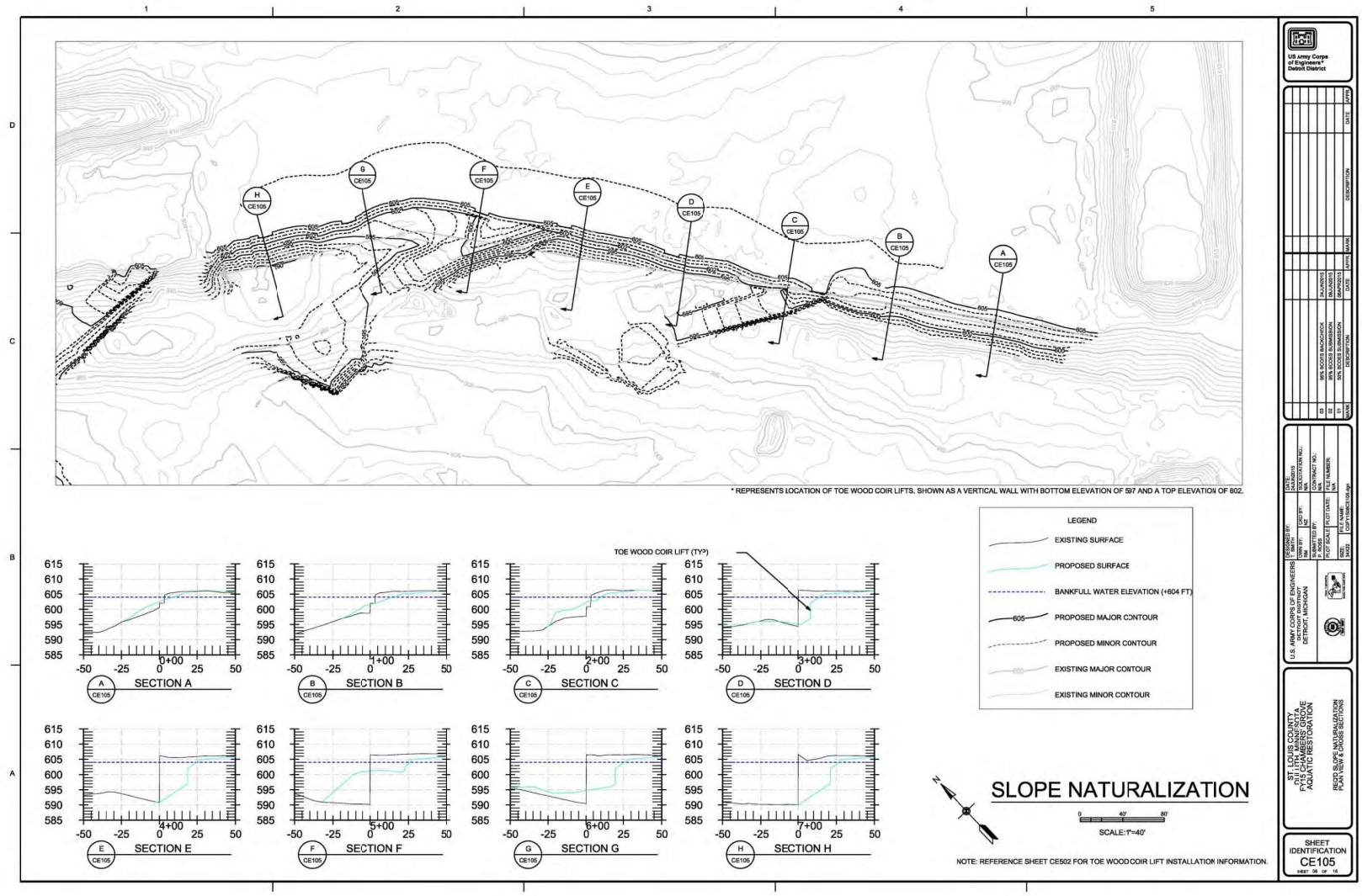


Figure 14-4 -6/24/2015 Construction Plan Set: SLOPE NATURALIZATION PLAN VIEW AND CROSS SECTIONS.

Appendix 14B: Site Photographs

Photo 14-1 – 11/14/2017 photograph of Toe Wood installation (right) and j-hook protruding upstream (left). Note – river was ~2.0' above normal river stage at time of photograph.

Figure 14-5 – 11/14/2017 photograph of J-Hook structure with integrated shoreline fishing access.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

15 - OHF St. Louis River Estuary, Radio Tower Bay

Legacy Fund Restoration Evaluations

Project Background

Project Name: Radio Tower Bay (RTB) Wetland Restoration Project

Project Location: Duluth, St. Louis County, MN

Township/Range Section: Township 48N Range 15W Section Sections 10 and 11

Project Manager / Affiliated Organization: MN DNR / John Lindgren

Fund: OHF ***Fiscal Year Funds:*** 2011

Project Start Date: July 2014

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Wetland , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Radio Tower Bay, known historically as Cedar Yard Bay, was the site of two sawmills in the late 1800s. A railroad line also once crossed the river here on pilings, and concrete foundations from an abandoned array of radio towers can be found in the bay. The sawmills dumped waste slab wood and sawdust directly into

the water, greatly reducing the quality of underwater habitat for fish and rendering the bay nearly inaccessible for recreation. Environmental conditions, such as low water temperature, low dissolved oxygen, and lack of currents within the bay, combined with the high volume of wood waste, limited the effectiveness of processes that would break down or disperse the wood naturally (Figure 5 & Figure 8). The layer of wood waste adversely impacted fish and wildlife habitat

Phase I of the project involved removing the wooden pilings that supported the railroad line. Phase II, which is the focus of this evaluation, included Mobilization and Site Preparation, Excavation and Restoration, and Demobilization. Individual components were as follows:

- Construct the dewatering facility and associated erosion and sediment controls (Figure 6)
- Install the slurry pipe and associated pump system between RTB and the dewatering facility
- Prior to initiating the proposed excavation, copper sulfate will be applied to the waters in the bay to stimulate aquatic animals to exit RTB into the river.
- After aquatic animals are sufficiently evacuated from the bay, a silt curtain to contain turbidity within RTB will be placed across the mouth of the bay
- Use a hydraulic dredge to excavate the wood waste/muck from RTB, pulverize it into a slurry and transport through a pipeline to a dewatering facility (Figure 7)
- The slurry will be pumped into permeable holding containers called geotubes arranged and stacked at the dewatering facility to drain off water and settle its organic solids. The decanted carriage water will be monitored for quality and drained back into Mud Lake.
- The excavated material that has been processed through the cutting head, mixed with organic sediments, and allowed to dewater will remain at the dewatering facility location until it is cleared for beneficial use as compost or, if necessary, disposed in a licensed landfill.
- After the excavation is completed, the MDNR will monitor the reestablishment of marsh vegetation and use by fish and wildlife species in RTB (Figure 9).

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

The following documents were made available and were reviewed as a part of this evaluation:

Minnesota Department of Administration (MN DA). 2014. Project Manual for the St. Louis River restoration Radio Tower Bay. MN DA, St. Paul, MN. Prepared for Minnesota Department of Natural Resources (MN DNR).

MN DA Environmental Quality Board. 2014. Environmental Assessment Worksheet: Radio Tower Bay Wetland Restoration Project. MN DA, St. Paul, MN. Prepared for MN DNR.

Cardno. April 2014. Attachment A: Construction Plan Set for St. Louis River Restoration – Radio Tower Bay. Cardno, Fitchburg, Wisconsin. Prepared for Minnesota Land Trust.

The follow documents are likely relevant, but not reviewed as a part of this evaluation:

Bay West. 2008. Sediment Sampling Letter Report for Mud Lake and Radio Tower Bay. Bay West, Inc., St. Paul. Prepared for Minnesota Pollution Control Agency, St. Paul. 5 pp. + fig, data.

Brady Valerie, Josh Dumke, and Dan Breneman. 2011. Pre-restoration Assessment of Biological Condition for Radio Tower Bay in the St. Louis River Estuary. Natural Resources Research Institute (NRRI), University of Minnesota Duluth. Report to Minnesota Land Trust, Duluth, MN. 32 pp. + app.

Cardno JFNew. 2012. Radio Tower Bay Fish Community Sampling, St. Louis River Estuary. Prepared for Minnesota Land Trust, Duluth, MN. 31 pp. + fig.

Cardno JFNew. 2013. Radio Tower Bay Wetland Restoration Material Properties. St. Louis County, MN. Prepared for Minnesota Land Trust, Duluth. 13 pp. + fig.

Mulholland, Susan C., Lawrence J. Sommer, Julie Kloss and Randolph Beebe. 2011. Archaeological Reconnaissance and Evaluation for Marine Debris Removal/Habitat Restoration Project, Radio Tower Bay, St. Louis River, Minnesota. Duluth Archaeology Center Report No. 11-40. Prepared for Minnesota Land Trust, Duluth. 49 pp. + appendix.

Minnesota Land Trust. 2011. St. Louis River Radio Tower Bay Marine Debris Removal and Habitat Restoration Project: Phase I Construction. MLT, 7 pp. + attach, fig.

Mulholland, Susan C., Lawrence J. Sommer and Julie Kloss. 2012. Historic Context Study of AM Radio Broadcasting in the Duluth Area for Evaluation of WREX Radio Tower Complex (21SL1126), Radio Tower Bay, Duluth, MN. Duluth Archaeology Center Report No. 12-19. 19 pp.

3. What are the stated goals of the project?

Project intends to restore RTB wetlands to healthy functional estuarine wetland habitat and improve spawning, nursery, foraging, and overwintering habitat for fish as well as improve wildlife habitat and recreational use within the St. Louis River estuary. The MDNR proposed to remove approximately 114,300 cubic yards (CY) of logging-era wood waste and sediment within a 29 acre area of RTB. On-average, 2.5 feet of wood waste/muck sediments was to be removed from the area, with some areas deepened to six feet below mean annual water level (AMSL) to create a channel for recreational boat access and a "deep water hole" for a suitable refugia for fish during heat waves of summer and thick icing periods of winter.

4. Were measures of restoration success identified in plans? Yes
If yes, list specific measurements.

With the removal of the wood waste/muck sediments, the water basin in RTB will have a reconfigured shoreline and deeper bathymetry

Aquatic plant colonization and establishment is expected to occur within one to two years following project completion

The final restoration outcome for the site will include the enhancement or creation of approximately 28.8 acres of productive shallow/deep estuarine marsh.

This includes creation of 8 acres of shallow marsh for wild rice establishment.

5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
If yes, provide in Appendix A and list Maps provided:

Construction Plan Set (select noted sheets are included in Appendix A):
Sheet G-1: Cover Sheet (Figure 1)
Sheet G-2: Erosion Control Notes & Details
Sheet G-3: General Notes
Sheet C-1: Dewater Details
Sheet C-2: Grading Plan (Figure 2)
Sheet C-3: Dewater Tube Layout
Sheet C-4: Dewatering Piping Plan
Sheet C-5: Off-Site Plan
Sheet C-6: Access Plan
Sheet D-1: Project Overview Map (Figure 3)
Sheet D-2: Existing Conditions Plan View
Sheet D-3: Proposed Conditions Plan View (Figure 4)
Sheet D-4: Cross Sections A-C
Sheet D-5: Cross Sections D-F

6. Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?

Design BMPs:

- The restoration approach is identified as Monitored Natural Recovery (MNR).
- Baseline studies were conducted to determine project feasibility, alternative treatment methods for removing the wood waste; and options available for managing wood waste disposal

Erosion Control BMPs (partial list includes most meaningful BMPs stated to have been employed):

- Preparation of a SWPPP.
- Shore/bottom contact points to minimize erosion and resuspension of sediments.
- An impermeable membrane will be embedded between clean gravel and surface stone to prevent additional water percolating into the slag materials along the drainageway. The stone layer placed above the membrane will reduce water velocity, eliminate erosion, and reduce the resuspension of colloidal materials.
- The drainageway will also have an impermeable layer and an 18-inch layer of mostly cobble- and stone-sized riprap greater than six inches in diameter to help dissipate energy. The rock weir and apron/splash pad structures will be installed, respectively, at the beginning and end of the drainageway to dissipate energy before the water enters Mud Lake. Additional filter treatments will be placed at the rock weir if necessary.
- Seeding/mulching and erosion control blanket installation will occur within 7 days following construction disturbance.
- Dewatering platform and drainageway will be configured to the existing land contour to limit grading requirements and downslope erosion control will be appropriately placed and functioning properly.
- Spill Plan will be prepared.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   The implemented dewatering approach did not use geotubes as stated.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   The alternate dewatering approach is not known to have negatively affected the project outcome.

Site Assessment

Field Review Date: **11/14/2017**

9. ***Surrounding Landscape Characteristics:***

   The project area consisted of a degraded estuarine marsh. Project area is located on the site of two historic lumber mills. These mills have not been operational for over 100 years however, remnants and foundations of the builds were still located adjacent to the western edge of the bay.

   The St. Louis River Water Trail passes near the project area. The project is also near to the River Place Campground and Dockage and the St. Louis Bay National Estuarine Research Reserve is across the thalweg of the river from the project. The dewatering facility associated with the project was located on vacant land owned by US steel slated for remediation. A railroad grade owned by the City of Duluth defines the north project limit of the bay.

   The project is located in the Glacial Lake Superior Plain Subsection. This subsection occupies a glacial lake bed. The area is dominated by northern hardwood forest, lowland hardwoods, lowland conifer forest, wetland, riparian areas, and well-developed drainage networks that have cut deep valleys. The site is encompassed by a Site of High Biodiversity Significance. This designation is based primarily on the occurrence of rare features, native plant communities, and the only estuarine habitat in Minnesota. However, the MBS site is heavily disturbed and degraded due to impacts of adjacent industrial contamination and disturbance due to industrial, commercial, residential, and transportation development.

10. ***Site Characteristics:***
    a. ***Soils:***
    The Natural Resources Conservation Service (NRCS) indicates the RTB excavation area falls within the “open water” mapping unit (MU). Bowstring and Fluvaquents (1020A) soil units (loamy with zero to two percent slopes and frequently flooded) essentially circumscribe the sedge meadow community found within the bay. The dewatering facility occupied disturbed soils within the “urban land” component of the urban land – Cuttre – rock outcropping complex MU (18A) that has zero to three percent slopes. Depth to bedrock is generally shallow; less than 7 feet.
    b. ***Topography:***

Topography of project area is flat and/or within and below OHWL.

c. Hydrology:

75-acre shallow estuarine wetland bay is directly connected to St. Louis River; partially separated from the St. Louis River (pre project) by a lowland peninsula around the southwest corner of the bay. The project is located within the St. Louis River watershed.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

- Estuarine Marsh (Lake Superior) (MRu94a Marsh System);
- Sedge Meadow (WMn82b) (recently classified as Northern Rich Fen (OPn92))
- Willow-Dogwood Shrub Swamp (WMn82a Northern Wet Meadow/Carr)
- Black Ash – Silver Maple Terrace Forest (FFn57a Northern Floodplain Forest)

e. Vegetation B: Meander Search Species List (as appropriate for site)

The restoration approach applied is identified as Monitored Natural Recovery (MNR), which entails periodically monitoring the condition of the habitat and the trend toward the recovery of aquatic plant and animal communities. If the monitoring reveals that the recovery progress will not meet expectations, the stakeholder would seek ways to remedy the restoration process, outside of the scope of this project, through interventions, such as re-seeding, or other applicable restoration techniques.

Separate from this project, stakeholders are in the process of establishing Wild Rice (*Zizania palustris*) over select portions of the dredged bay.

No other known vegetation inputs or management have been executed thus far.

11. ***Is the plan based on current science?*** Yes

The principal waste removal and dewatering approaches employed are within current industry standards and included innovative details that likely lessened the duration of construction as well as the probable impacts from construction.

The vegetation approach (Monitored Natural Recovery), is commonly employed with dredging projects, but does require monitoring and intervention if expectations are not met.

12. List indicators of project outcomes at this stage of project:

Removal of the wood waste/muck sediments

As-built bathymetry

Vegetation establishment

13. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

The design and executed project can reasonably restore a healthy functional estuarine wetland habitat and improve spawning, nursery, foraging, and overwintering habitat for fish as well as improve wildlife habitat and recreational use within the St. Louis River estuary.

To fully realize habitat potential vegetation establishment will require monitoring and intervention if a native seed bank is not viable and/or invasives outcompete desire vegetation. EPA funding has been secured to monitor for ecological outcomes, vegetation and fish, two and four years post completion. Project managers are working with the EPA now to design monitoring protocols.

14. Are corrections or modifications needed to meet proposed outcomes?

Aside from continued vegetation monitoring no warranted corrections/modifications apparent at this establishment phase.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    No foreseeable issues with the core project

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    The restoration process likely caused a temporary and localized disturbance to fish and wildlife resources in RTB during construction.
17. ***Are follow-up assessments needed? Explain.***
    Future assessment(s) after the planned post-project monitoring results are compiled is highly encourage and will likely yield information that can be directly applied to similar forthcoming projects within the St. Louis Estuary. As monitoring for ecological outcomes is planned, follow-up assessment during or after that data collection, including a review of the monitoring results, would be particularly informative.
18. ***Additional comments on the restoration project.***
    The potential value of dredged material (as compost) should be taken into account with future projects. Contingency planning and funding allocation for remedying the restoration process should be articulated to ensure proper response should natural recovery not meet expectations.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    Confidence of outcome is conservative at this stage of maturity, but based on professional judgment of early indicators, the project is expected to restore a healthy functional estuarine wetland habitat and improve spawning, nursery, foraging, and overwintering habitat for fish as well as improve wildlife habitat and recreational use within the St. Louis River estuary.
21. ***Site Assessor(s) Conducting Review:***
    Kevin Biehn - EOR

Appendix 15A: Site maps, Project plans or Vegetation tables

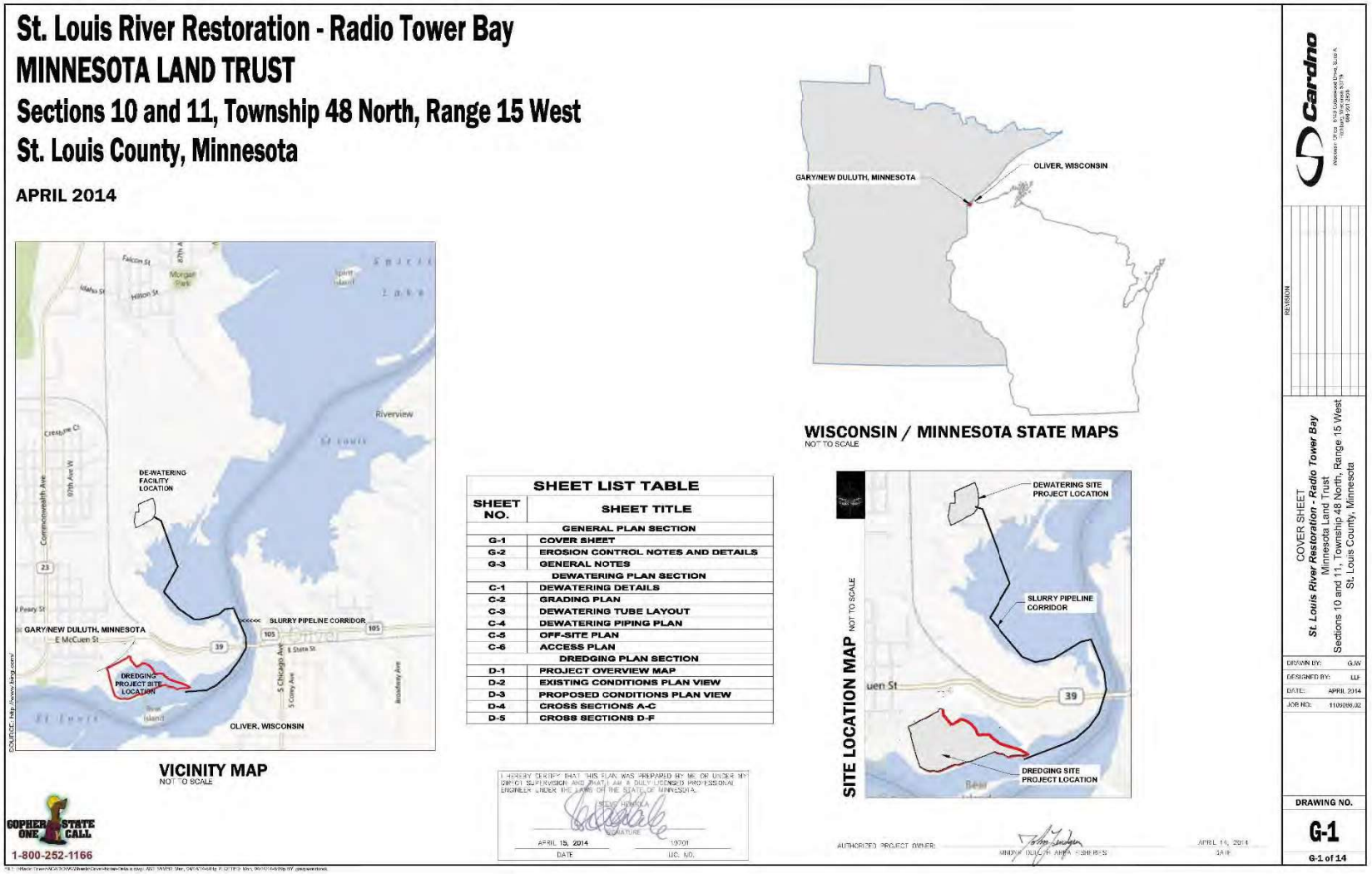


Figure 15-1 – Construction Plan Sheet G-1: Cover Sheet.

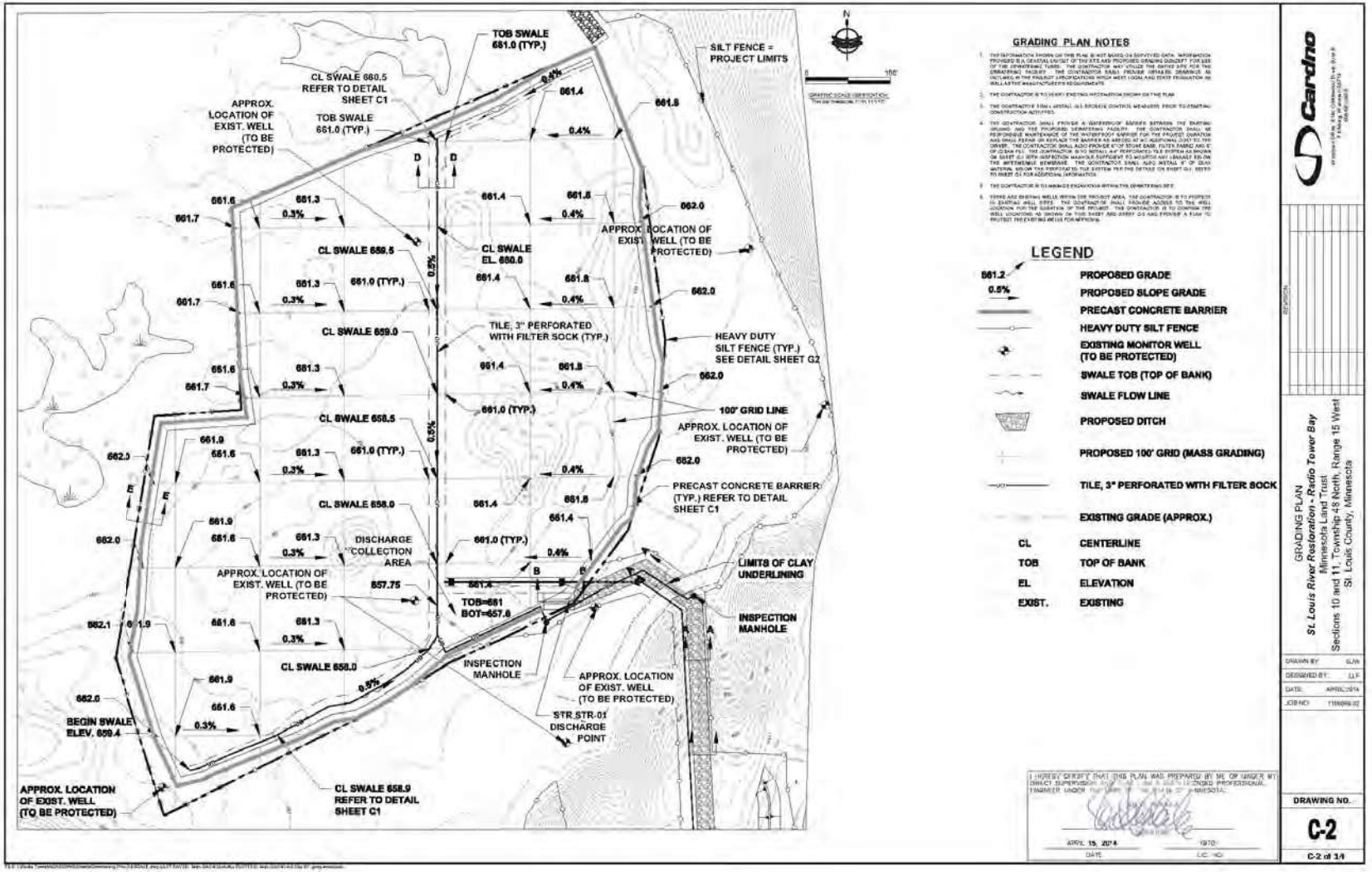


Figure 15-2 – Construction Plan Sheet C-2: Grading Plan.

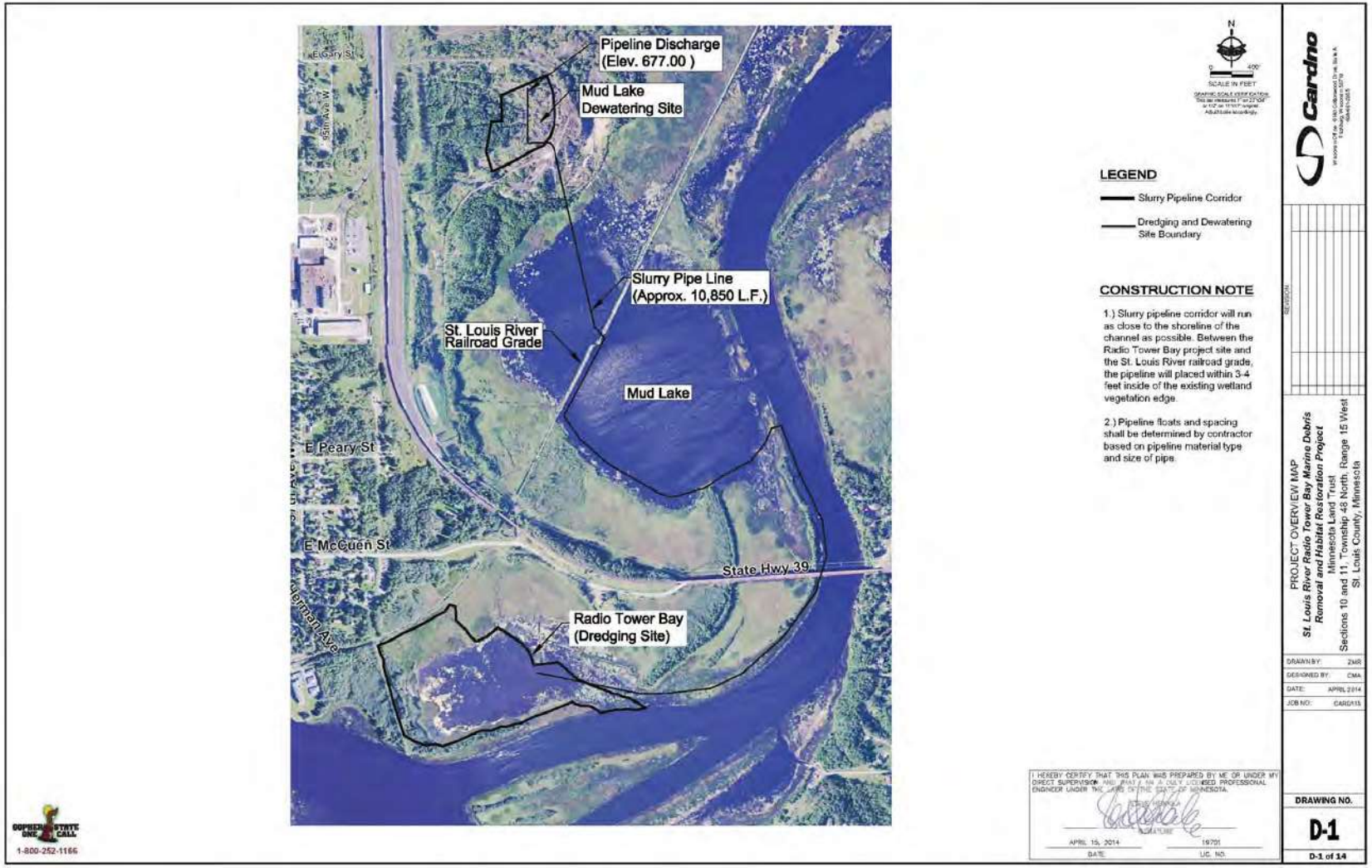


Figure 15-3 – Construction Plan Sheet D-1: Project Overview Map.

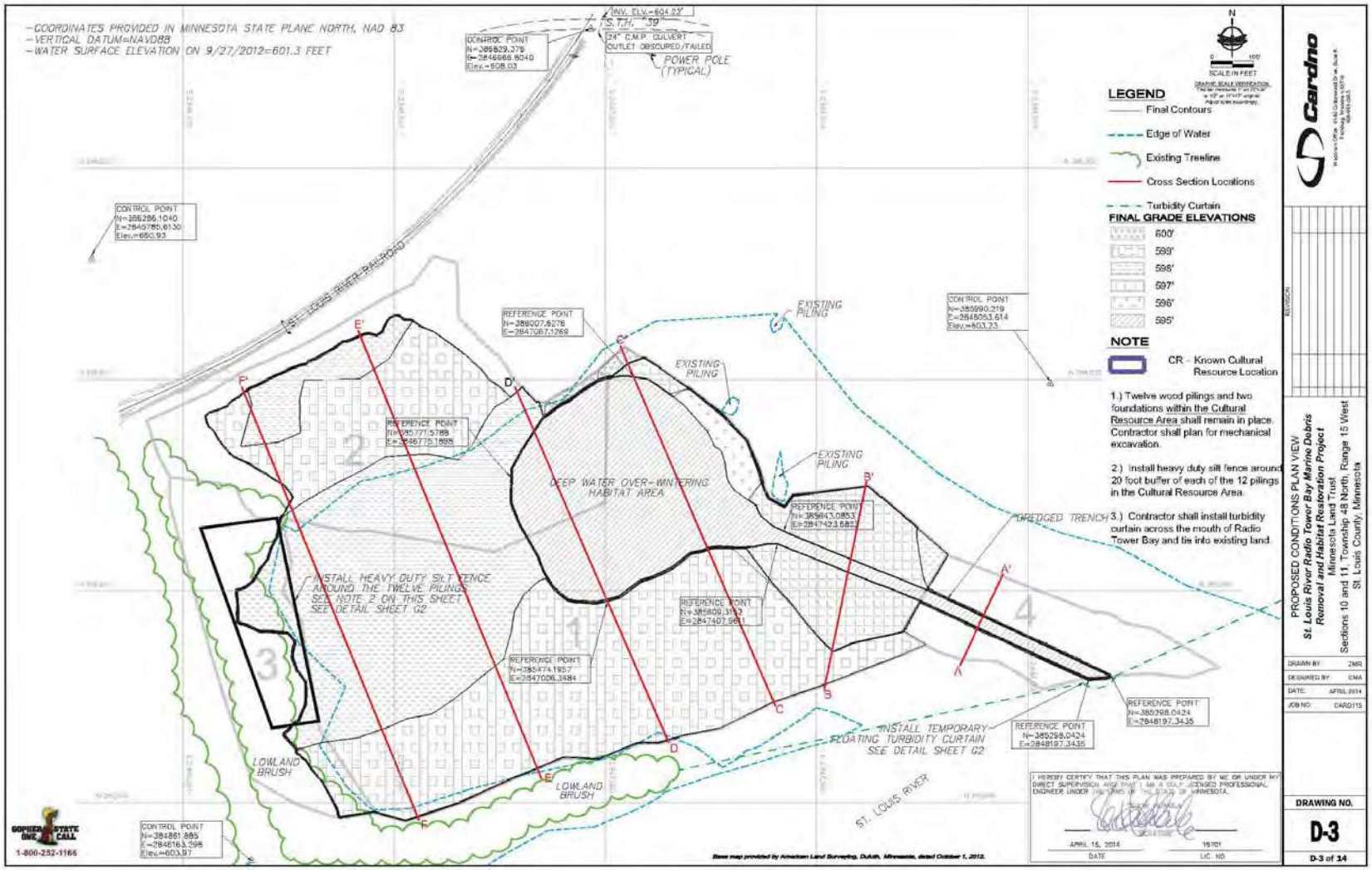


Figure 15-4 – Construction Plan Sheet D-3: Proposed Conditions Plan View.

Appendix 15B: Site Photographs

Photo 15-1 - Pre project wood waste example on shoreline. Photograph (date unknown) courtesy of MN Land Trust.

Photo 15-2 - Dewatering facility. Photograph (date unknown) courtesy of MN Land Trust.

Photo 15-3 - Excavation and grinding of wood waste. Photograph (date unknown) courtesy of MN Land Trust.

Photo 15-4 - Radio Tower Bay pre project. Photograph (date unknown) courtesy of MN Land Trust.

Photo 15-5 - 9/15/2015 post project photograph of Radio Tower Bay. Image courtesy of MN Land Trust.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

16 - OHF St. Louis River Estuary, Knowlton Creek

Legacy Fund Restoration Evaluations

Project Background

Project Name: Knowlton Creek Stream Restoration Project

Project Location: Duluth, St. Louis County, MN

Township/Range Section: Township 49N Range 15W Section Sections 14 and 23

Project Manager / Affiliated Organization: John Lindgren / MN DNR

Fund: OHF ***Fiscal Year Funds:*** 2011

Project Start Date: 2016

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Forest, Wetland

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   - Approximately 2,757 feet along the main stem from just below the Spirit Mountain Ski Area to the St. Louis River estuary (constructed riffles and incorporation of significant amounts of wood to enhance brook trout habitat);

- Approximately 257 feet along the lower reaches of the main tributary from the point of its confluence with the main stem and up to the Cloquet Water Pumping Station (step-pool construction to stabilize steep channels by reducing the potential for bed degradation and bank erosion);
- Approximately 2,285 feet along three reaches in the upper portion of the tributaries to the main stem (step-pool construction to stabilize steep channels by reducing the potential for bed degradation and bank erosion);
- Construction of boulder jam steps to stabilize major bed degradation contributing significant sediment to Knowlton Creek in two upland areas.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Environmental Assessment Worksheet (7/2013) and Construction Plan Set (4/10/2015)
3. ***What are the stated goals of the project?***
   The MNDNR, Division of Fish and Wildlife, proposed to restore and improve habitat for all life stages of brook trout and associated cold-water organisms along 6,491 feet of Knowlton Creek and tributaries, which is a designated trout stream (#S-002-003.5) located in the City of Duluth, St. Louis County, Minnesota. In general, the project aims to (1) adjust the stream channel size, location and shape; (2) establish a hydraulic connection between the channel and floodplain; (3) stabilize streambanks; and (4) enhance vegetation in the riparian corridor in order to create a self-sustaining, stable, and ecologically functional stream that supports native fish and aquatic life by mimicking the appropriate geomorphological structure. This project supports the Lower St. Louis River Area of Concern (AOC) Remedial Action Plan.
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   - Increase the availability of high quality habitat for fish and wildlife
   - Increased fish and wildlife populations
   - Reduction of other anthropogenic impacts
   - Reduction of sediment transport to St. Louis River Estuary
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:

EAW Figures

- Project Location
- Project Overview
- Knowlton Creek Overview
- UT Knowlton Creek Overview
- Upland Area Overview
- Root wad Revetment Example – Log J-Hook w/ Root wad
- Rock Vane Example – Boulder J-Hook
- CV/Riffle Example – Boulder Constructed Riffle

Construction Plan Set Sheets (select noted sheets are included in Appendix A):

- Sheet 1: Cover (Figure 1)
- Sheet 2: Sheet Index (Figure 2)

- Sheets 3 & 4: Design Narratives
- Sheets 5 & 6: Plans and Profiles
- Sheet 7: Plan and Profile – Reach 5 and Reach 6 (Figure 3)
- Sheet 8: Plan and Profile – Reach 6 continued (Figure 4)
- Sheet 9: Plan and Profile – Reach 6 continued (Figure 5)
- Sheets 10-13: Plans and Profiles
- Sheet 14: Plan & Profile - Unnamed Tributary Reach 6 Continued and Reach 7 (Figure 6)
- Sheet 15: Plan & Profile - Unnamed Tributary Reach 9 (Figure 7)
- Sheets 15-23: Plans and Profiles
- Sheets 24-27: Typical Cross-Sections
- Sheets 28-46: Details
- Sheets 47-51: Structure Tables
- Sheet 52: Erosion and Sediment Control
- Sheet 53: Planting Plan and Tables (1) (Figure 8)
    - Sheet 54: Planting Plan and Tables (2) (Figure 9)

6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***

Design BMPs

- Natural Channel Design (NCD) methodology was reportedly implemented to inform analysis and design. NCD is a standard industry methodology for stream restoration, most associated with Wildland Hydrology Consultants and Dave Rosgen.
- The primary practices employed are common practices used in stream restoration and stabilization in Minnesota and suitable to “North Shore” streams.

Erosion Control BMPs (partial list includes most meaningful BMPs stated to have been employed):

- Preparation of a SWPPP
- Work will be administered during a periods of low flow and low precipitation
- Monitoring of river flow and downstream conditions, stopping work if river flows exceed suitable conditions for in-water work.
- Phasing of excavation, fill, and demolition will minimize duration and extent of soil disturbance.
- Minimize movement of heavy equipment in and adjacent to the river.
- Immediate seeding/mulching and erosion control blanket installation following construction of individual segments of stream restoration.
- Once all construction activities are completed, the site will be seeded with a native forb mixture and an annual cover crop (oats and winter wheat) to minimize erosion while streambank plants become established

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes

With available resources cages were added around a subset of the tree plantings focusing on species most often subject to deer browsing.

8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Cages may increase likelihood of tree establishment along the creek.

Site Assessment

Field Review Date: **11/14/2017**

9. ***Surrounding Landscape Characteristics:***

The current land use is primarily public, undeveloped and forested. The public land adjoins several parcels of residential property on the east side of the Unnamed Tributary. The project site is adjacent to the Spirit Mountain Recreation Area (SMRA), which is owned and operated by the City of Duluth and the SMRA. There are several trails that pass through or near the project site. These include the Munger Trail (a paved bike trail); the Superior Hiking Trail; and the Cross City Trail (a future paved multi-use trail). Knowlton Creek is a MNDNR designated trout stream. The project site is within part of the Bardon's Peak Forest Park, which is included in the Duluth Natural Areas Program.

The project is located in the North Shore Highlands Subsection. The area is dominated by northern hardwood forest, lowland hardwoods, lowland conifer forest, wetland, riparian areas, and well-developed drainage networks that have cut deep valleys. The mouth of Knowlton Creek is also within an area that the Minnesota Biological Survey (MBS) has identified as a site of moderate Biodiversity Significance, indicating the area contains occurrences of rare species, and/or moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery.

The following contextual information was taken from project design narrative: Historic air photos of the St. Louis Estuary indicated that the onset of sediment deposition at the mouth of Knowlton Creek coincided with the opening of Sprit Mountain Ski Ara and the establishment of a pumping station on the Cloquet water line. Snowmaking activities associated with the ski area have increased snowpack on the bill by approximately 20% above natural conditions, which greatly increases the flow and associated erosion and steam channel degradation during spring snowmelt/ runoff. Impairments have also been documented in association with heavy rain events. In addition, maintenance activities associated with the ski slopes have created dirt roads and trials on the ski slopes that are the source of the sediment to the system. The City of Cloquet water pumping station, which is located on a tributary to Knowlton Creek, infrequently discharges substantial amounts of water directly to the tributary due to power outages. This occurs on average twice a year and has resulted in the serve degradation of the stream channel and sediment to the St. Louis River AOC. A significant (<1% probability of exceedance) flood occurred in the watershed in June 2012. This flood caused the failure of an already deteriorating railroad at the upstream end of the assessed area on the main steam of Knowlton Creek. Large amounts of sediment moved downstream and settled throughout the proposed restoration area.

10. ***Site Characteristics:***
    a. ***Soils:***

NRCS Soil types for the Knowlton Creek project area are classed as Finland-Hermantown-Twig (MN251) – 40% of site, in the upper reaches of the stream. The USDA soil type is Ahmeek-Toivola-Mooselake complex. This soil type is sandy-loam till over bedrock. Bedrock and clayey subsoil horizons perch snowmelt. Soils are moderately well drained. NRCS Soil types in the lower reaches are classified as Ontonagon-Bergland-Rudyard (MN475) – 60% of site. The USDA soil type is Ontonagon-Bergland-Campia complex. This soil type is very-fine to fine-silty, Red lacustrine clays. Depth to bedrock is generally shallow.

b. Topography:

In the upper reaches, the topography is moderate to steep slopes on rugged terrain. Topography is level to undulating in the lower reaches.

c. Hydrology:

Knowlton Creek is a 1st and 2nd order stream with a drainage area of roughly 1500 acres. Total length of streams in watershed is ~1.8 miles.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Birch Native Plant Community is considered a federally imperiled plant community.

e. Vegetation B: Meander Search Species List (as appropriate for site)

See Figure 8 & Figure 9 for specified vegetation inputs.

11. ***Is the plan based on current science?*** Yes

    The restoration methodology applied is a geomorphologic approach appropriate for the setting and follows Natural Channel Design (NCD) principals. NCD is an industry standard most associated with Wildland Hydrology Consultants and its founder Dave Rosgen.

12. ***List indicators of project outcomes at this stage of project:***

    Stream stability (horizontal, profile and cross-section)
    Desirable establishing vegetation
    Instream habitat quality and quantity

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    The design and executed project can reasonably address the core hydrology, geomorphology, connectivity, water quality and biology criteria.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    See response to question #18 - unsecured erosion control matting should be monitored and addressed if stability is threatened and off-channel pools should be evaluated for threats and improvements. Initially tree survival was poor throughout the reach but was under warranty. At the time of evaluation new plantings and live stakes had been installed throughout the reach.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    No foreseeable issues with the core project

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    There are no detractions known to the evaluators that were not mitigated for and/or improved upon by the project.

17. ***Are follow-up assessments needed? Explain.***

    A follow up within the 5-year time frame (assess site conditions and review fisheries surveys) will provide a valuable perspective of outcome and lessons learned.

18. ***Additional comments on the restoration project.*** Clarification of funding - Clean Water Funding was utilized for planning and Outdoor Heritage Funding was utilized for implementation.

It is worth noting that this project is part of a broader initiative to address issues in the Knowlton Creek Watershed and the St. Louis Estuary Area of Concern (AOC). The following, but not limited to the following, initiatives are collectively intended to restore watershed health:

- Rate control and diversion structures were built to lessen the anthropogenic impacts of snow making and water treatment identified in response to question #9.
- Stream crossings are being replaced/amended to improve stream health and enhance wildlife and recreational connectivity.

The following complications were observed during the 11/14/2017 site visit:

- At least one of the constructed off-channel pools has an unfavorable elevation relative to the constructed stream channel. Vertical separation can lesson habitat returns and in severe scenarios threaten bank stability and/or channel reroute (Figure 10).
- Portions of the coir erosion control matting utilized were not secured properly, and as a result, providing diminished protection.
- Habitat and stability structures within Reach 9 were not readily apparent in the quantities/locations stated. Signs of aggradation, which may have resulted in the partial covering of structures, may have occurred.
- Poor tree and shrub planting survival was noted across the project. A small portion of the losses can be attributed to recreational vehicle use. The project manager is well aware of the issue and enforcing plant warranties.

A substantial portion of the project is built with continuous structures, which is an assumed contradiction to the noted Natural Channel Design methodology employed, but the steep gradient of particular reaches likely warrants such horizontal and vertical confinement. The rock installation is exemplarily from both aesthetic and structural perspectives (Figure 11).

The construction plan set was very thorough and the inclusion of the Design Narrative is exemplarily. The table-heavy plan set may be challenging for some contractors to interpret and execute, but based on a conversation with the project manager, this was not a problem on this project.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    The implemented project coupled with the critical companion projects both completed and proposed set the project up to meet proposed outcomes. Confidence of outcome is conservative at this stage of

maturity, but based on professional judgment of early indicators, the project is expected to reasonably address the core hydrology, geomorphology, connectivity, water quality and biology criteria.

21. ***Site Assessor(s) Conducting Review:***
    Kevin Biehn – EOR & Gina Quiram – DNR

Appendix 16A: Site maps, Project plans or Vegetation tables

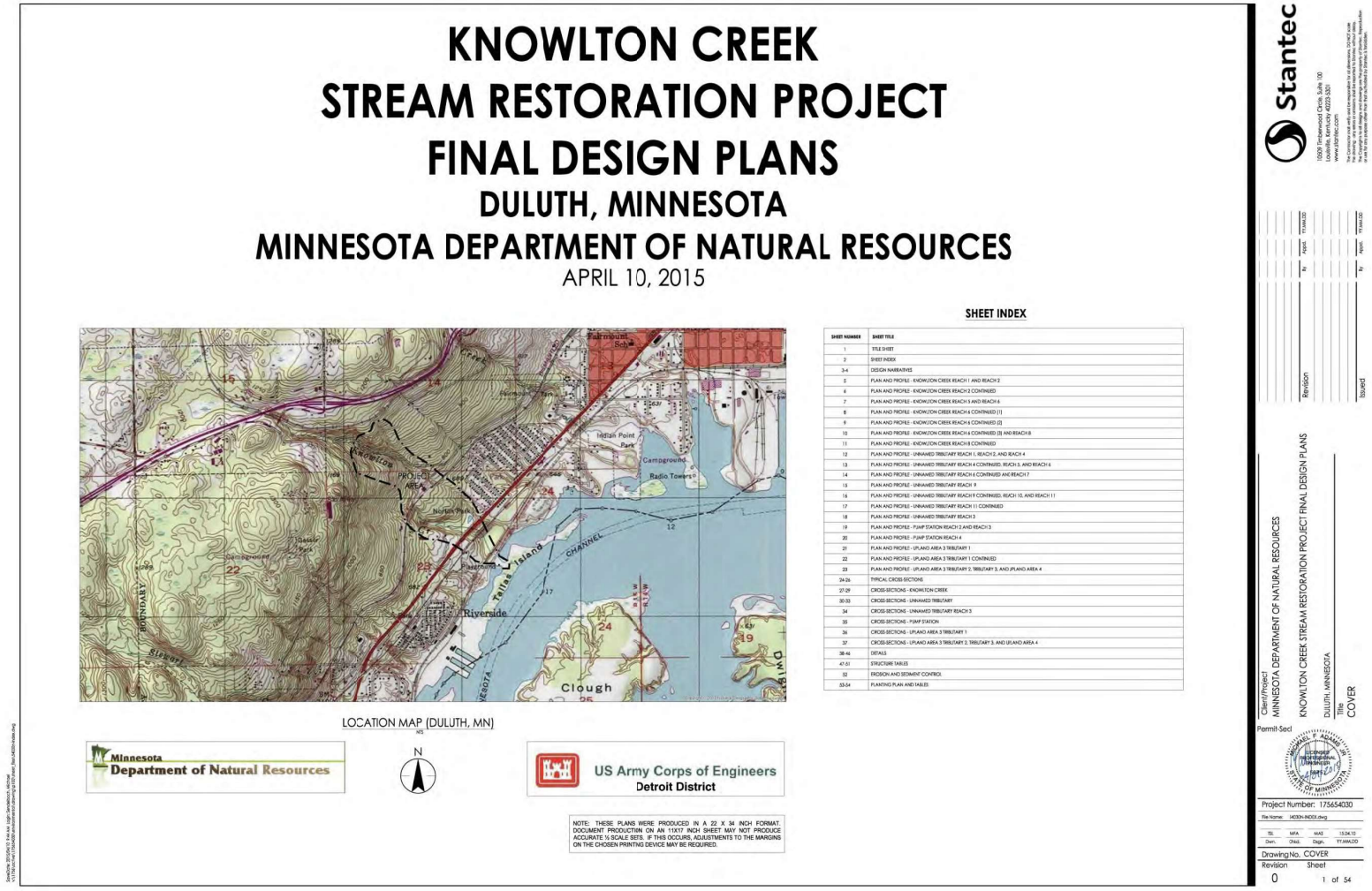
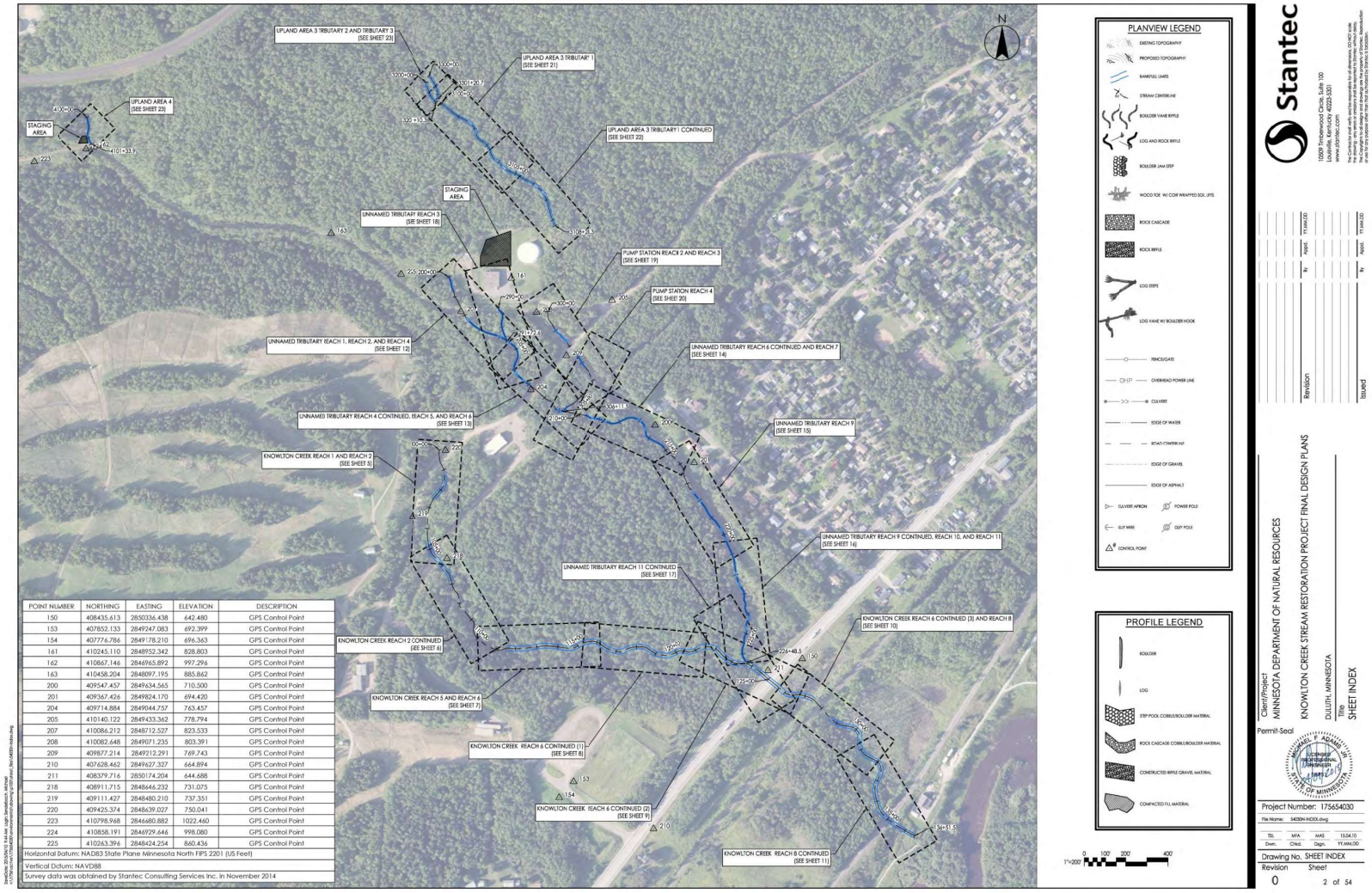


Figure 16-1 – Construction Plan Set: COVER.



POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
150	408435.613	2850336.438	642.480	GPS Control Point
153	407852.133	2849247.083	692.399	GPS Control Point
154	407776.786	2849178.210	696.363	GPS Control Point
161	410245.110	2848952.342	828.803	GPS Control Point
162	410867.146	2846965.892	997.296	GPS Control Point
163	410458.204	2848097.195	885.862	GPS Control Point
200	409547.457	2849634.565	710.500	GPS Control Point
201	409367.426	2849824.170	694.420	GPS Control Point
204	409714.884	2849044.757	763.457	GPS Control Point
205	410140.122	2849433.362	778.794	GPS Control Point
207	410086.212	2848712.527	823.533	GPS Control Point
208	410082.648	2849071.235	803.391	GPS Control Point
209	409877.214	2849212.291	769.743	GPS Control Point
210	407628.462	2849627.327	664.894	GPS Control Point
211	408379.716	2850174.204	644.688	GPS Control Point
218	408911.715	2848646.232	731.075	GPS Control Point
219	409111.427	2848480.210	737.351	GPS Control Point
220	409425.374	2848639.027	750.041	GPS Control Point
223	410798.968	2846680.882	1022.460	GPS Control Point
224	410858.191	2846929.646	998.080	GPS Control Point
225	410263.396	2848424.254	860.436	GPS Control Point
Horizontal Datum: NAD83 State Plane Minnesota North FIPS 2201 (US Feet)				
Vertical Datum: NAVD88				
Survey data was obtained by Stantec Consulting Services Inc. in November 2014				

Figure 16-2 – Construction Plan Set: SHEET INDEX.

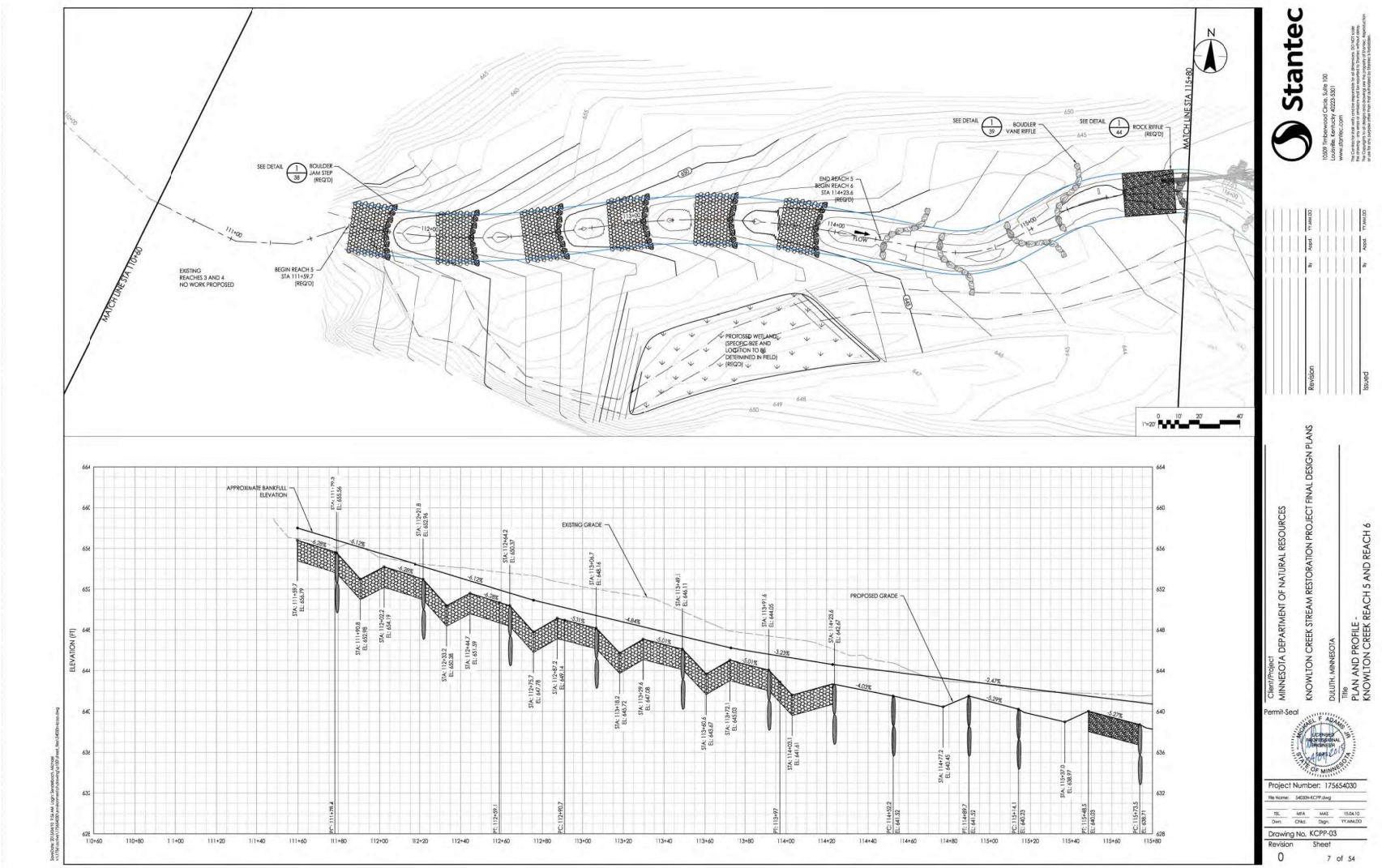


Figure 16-3 – Construction Plan Set: PLAN & PROFILE REACH 5 AND REACH 6.

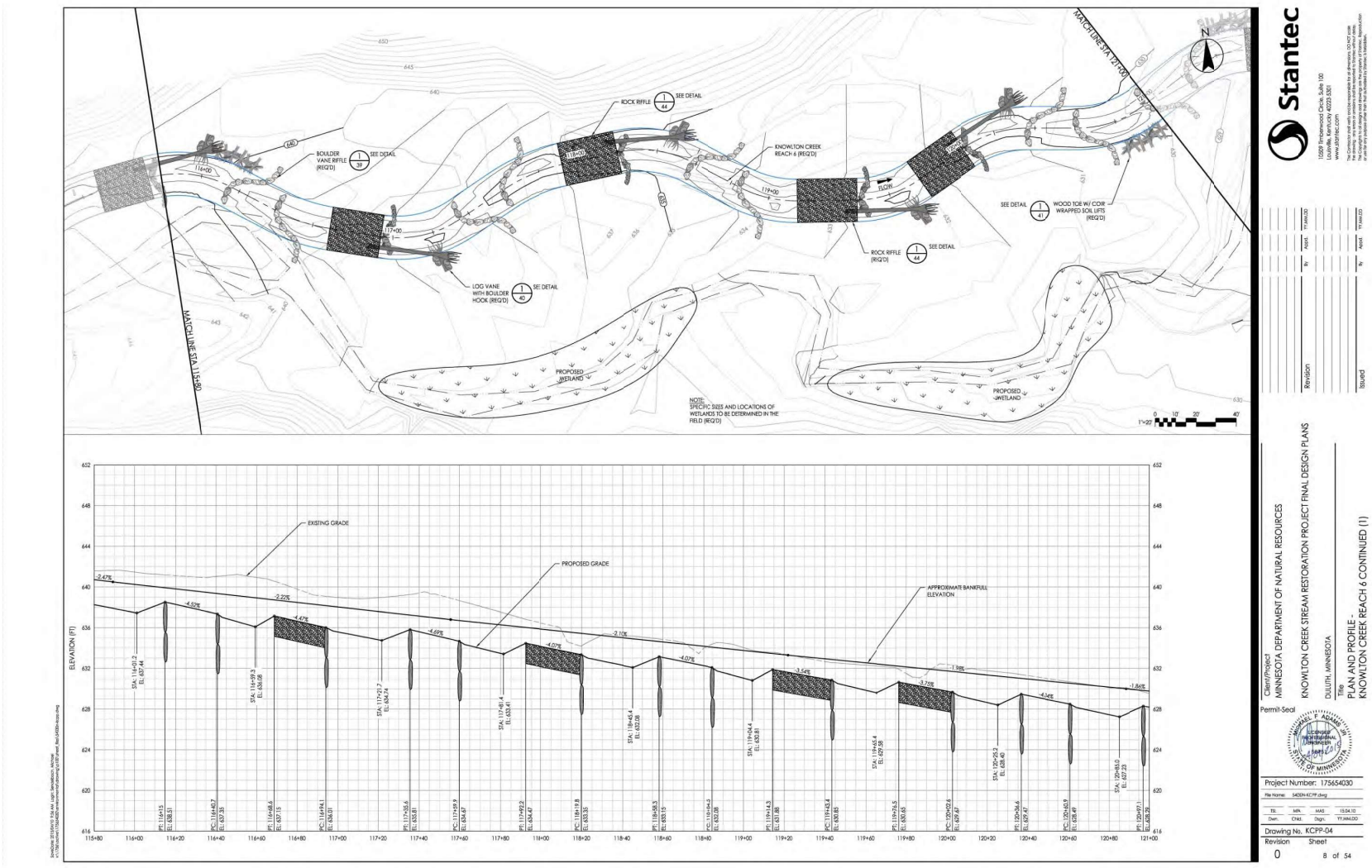


Figure 16-4 – Construction Plan Set: PLAN AND PROFILE REACH 6 CONTINUED.

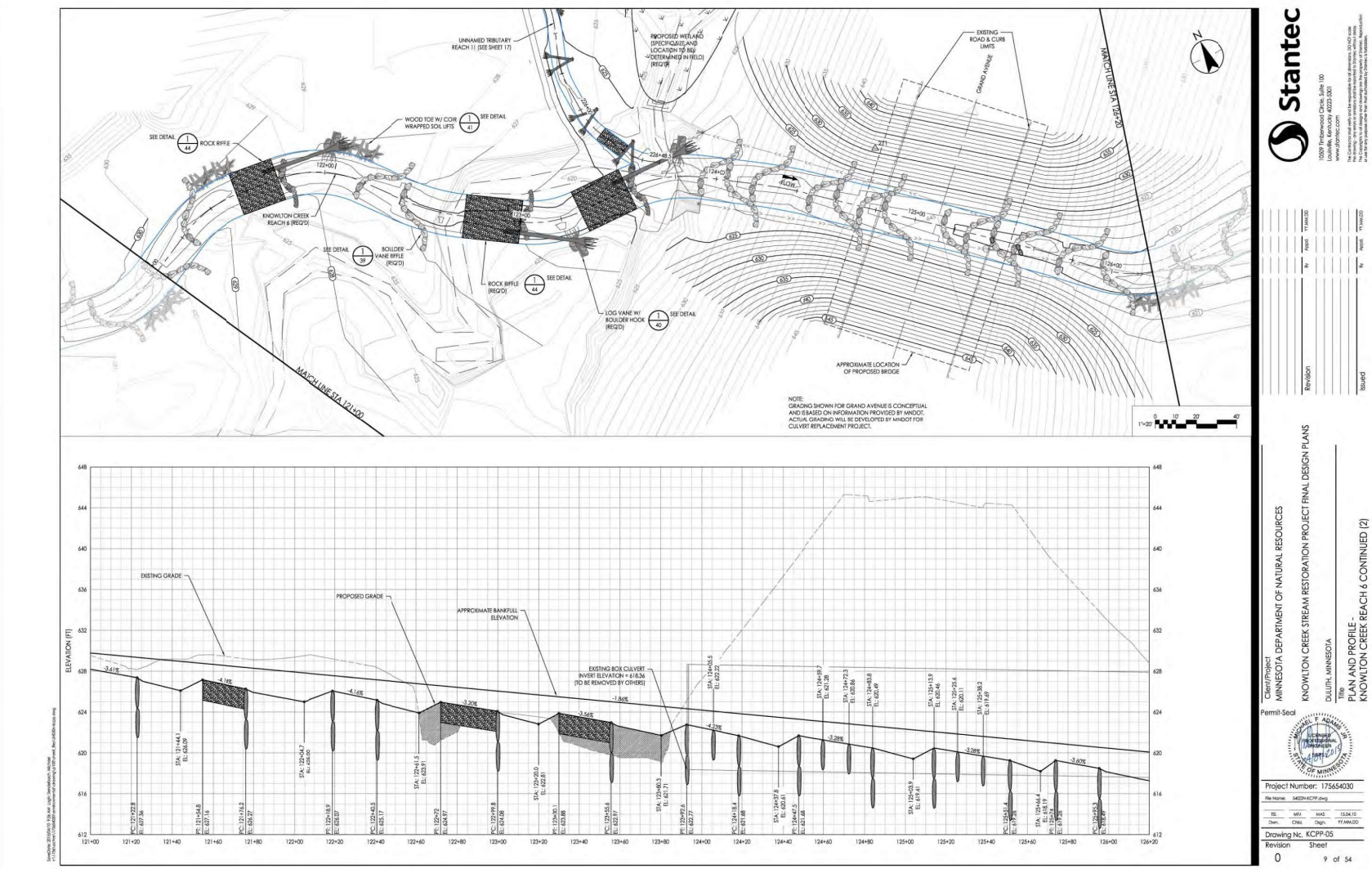


Figure 16-5 – Construction Plan Set: PLAN AND PROFILE REACH 6 CONTINUED.

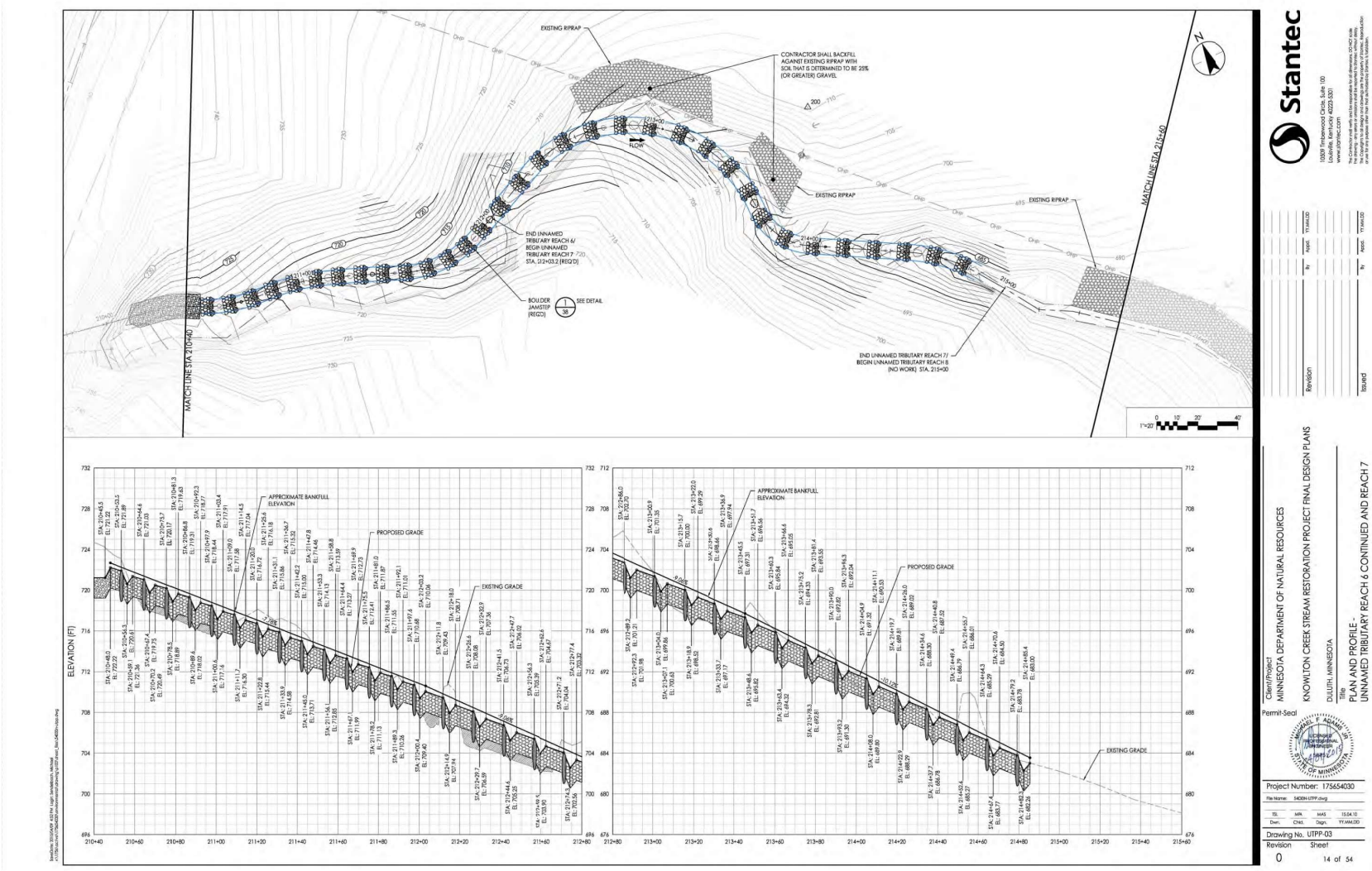


Figure 16-6 – Construction Plan Set: PLAN AND PROFILE UNNAMED TRIBUTARY REACH 6 CONTINUED AND REACH 7.

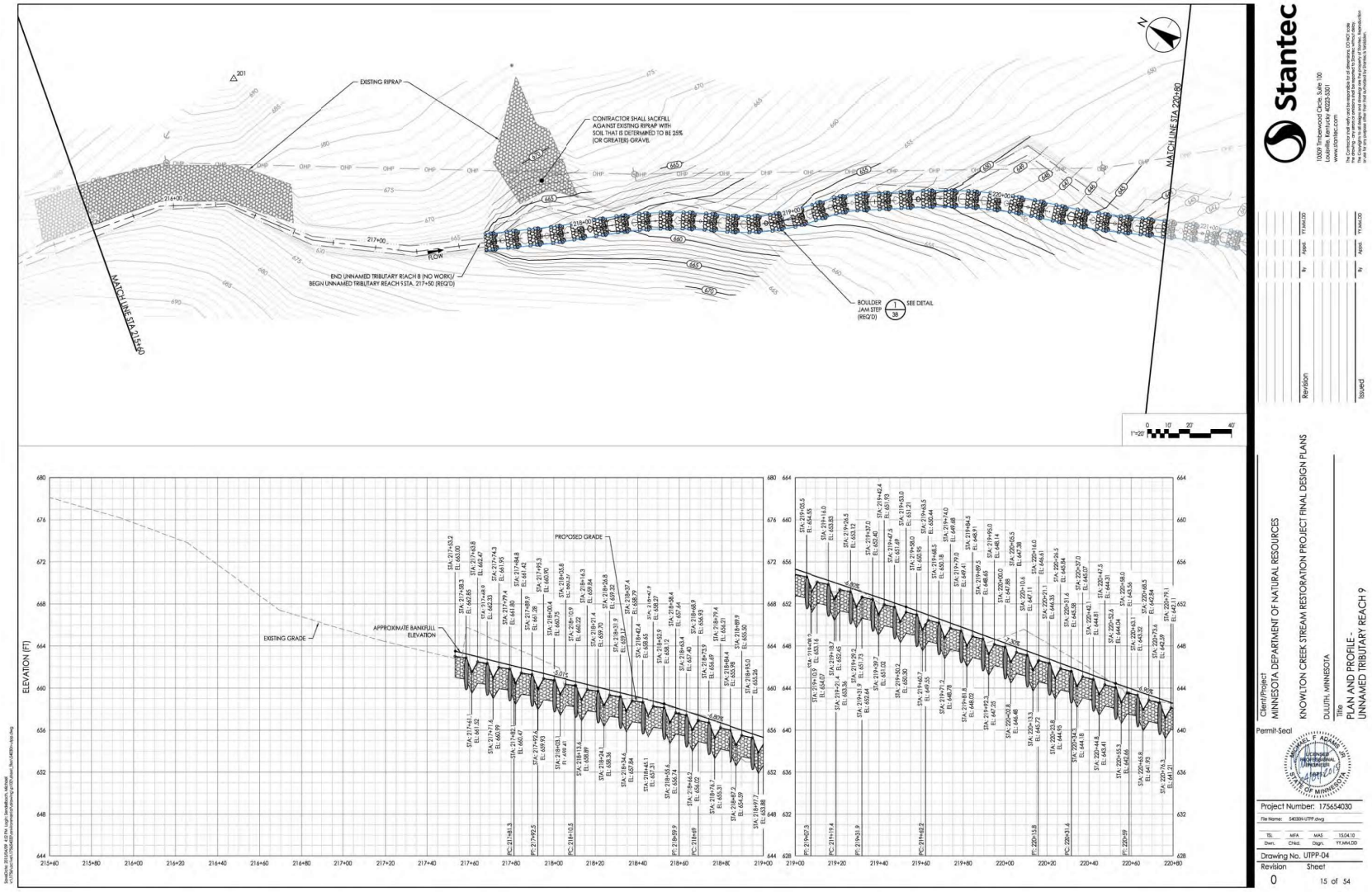
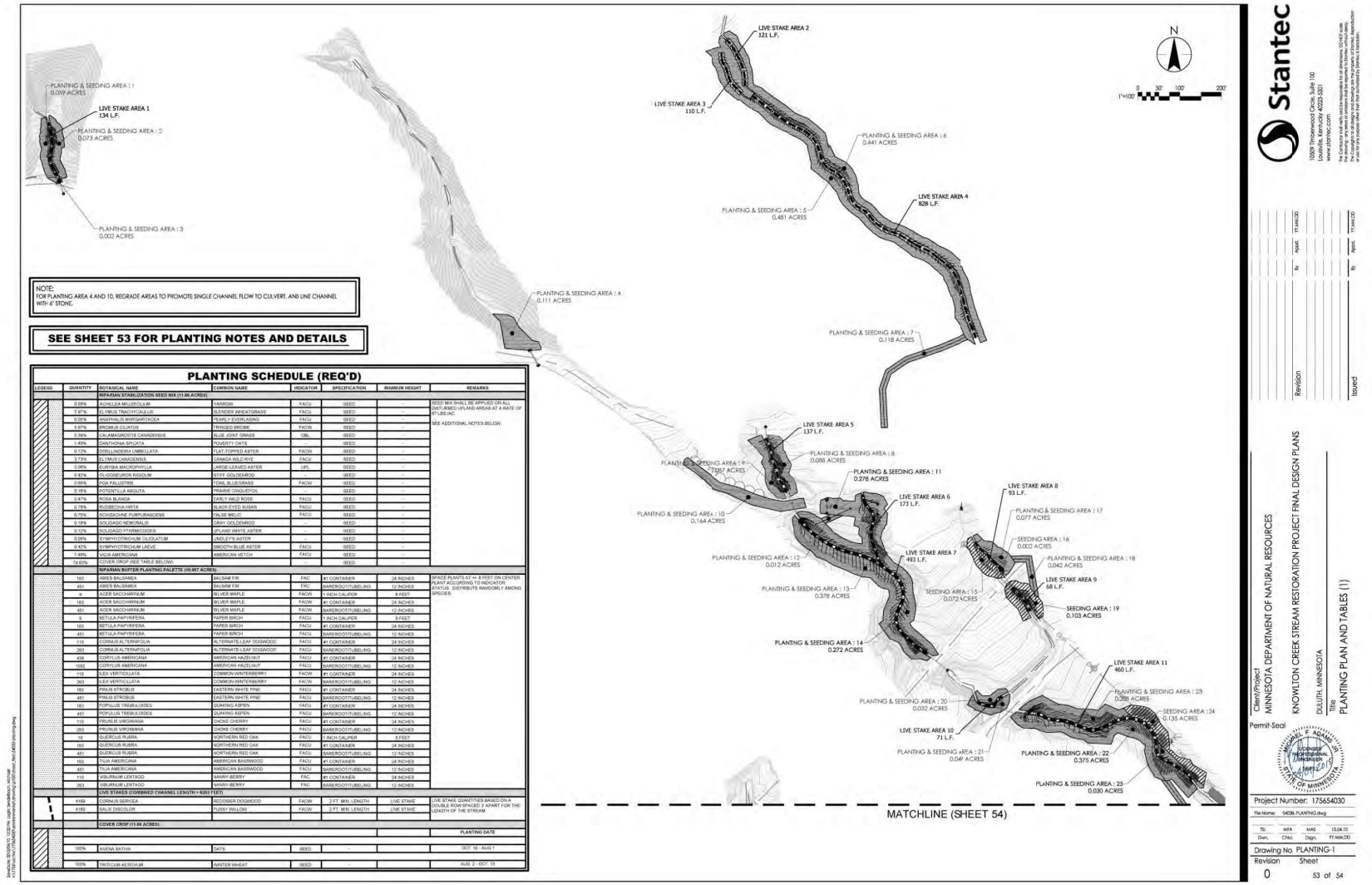


Figure 16-7 – Construction Plan Set: PLAN & PROFILE UNNAMED TRIBUTARY REACH 9.



PLANTING SCHEDULE (REQ'D)

LEGEND	QUANTITY	BOTANICAL NAME	COMMON NAME	INDICATOR	SPECIFICATION	MINIMUM HEIGHT	REMARKS
		RIPARIAN STABILIZATION SEED MIX (11.66 ACRES)					
	0.59%	ACHILLEA MILLEFOLIUM	YARROW	FACU	SEED	-	SEED MIX SHALL BE APPLIED ON ALL DISTURBED UPLAND AREAS AT A RATE OF 47LBS./AC.
	1.97%	ELYMUS TRACHYCAULUS	SLENDER WHEATGRASS	FACU	SEED	-	
	0.05%	ANAPHALIS MARGARITACEA	PEARLY EVERLASTING	FACU	SEED	-	SEE ADDITIONAL NOTES BELOW.
	9.97%	BROMUS CILIATUS	FRINGED BROME	FACW	SEED	-	
	0.99%	CALAMAGROSTIS CANADENSIS	BLUE JOINT GRASS	OBL	SEED	-	
	1.49%	DANTHONIA SPICATA	POVERTY OATS	-	SEED	-	
	0.12%	DOELLINGERIA UMBELLATA	FLAT-TOPPED ASTER	FACW	SEED	-	
	3.73%	ELYMUS CANADENSIS	CANADA WILD RYE	FACU	SEED	-	
	0.06%	EURYBIA MACROPHYLLA	LARGE-LEAVED ASTER	UPL	SEED	-	
	0.42%	OLIGONEURON RIGIDUM	STIFF GOLDENROD	-	SEED	-	
	2.65%	POA PALUSTRIS	FOWL BLUEGRASS	FACW	SEED	-	
	0.18%	POTENTILLA ARGUTA	PRAIRIE CINQUEFOIL	-	SEED	-	
	0.47%	ROSA BLANDA	EARLY WILD ROSE	FACU	SEED	-	
	2.79%	RUDBECKIA HIRTA	BLACK-EYED SUSAN	FACU	SEED	-	
	0.75%	SCHIZACHNE PURPURASCENS	FALSE MELIC	FACU	SEED	-	
	0.18%	SOLIDAGO NEMORALIS	GRAY GOLDENROD	-	SEED	-	
	0.12%	SOLIDAGO PTARMICOIDES	UPLAND WHITE ASTER	-	SEED	-	
	0.05%	SYMPHYOTRICHUM OLIGOLATUM	HELEY'S ASTER	-	SEED	-	
	0.42%	SYMPHYOTRICHUM LAEVE	SMOOTH BLUE ASTER	FACU	SEED	-	
	1.49%	VICIA AMERICANA	AMERICAN VETCH	FACU	SEED	-	
	74.63%	COVER CROP (SEE TABLE BELOW)		-	SEED	-	
		RIPARIAN BUFFER PLANTING PALETTE (10.957 ACRES)					
	163	ABIES BALSAMEA	BALSAM FIR	FAC	#1 CONTAINER	24 INCHES	SPACE PLANTS AT 4- 8 FEET ON CENTER. PLANT ACCORDING TO INDICATOR STATUS. DISTRIBUTE RANDOMLY AMONG SPECIES.
	451	ABIES BALSAMEA	BALSAM FIR	FAC	BAREROOT/TUBELING	12 INCHES	
	9	ACER SACCHARINUM	SILVER MAPLE	FACW	1 INCH CALIPER	8 FEET	
	163	ACER SACCHARINUM	SILVER MAPLE	FACW	#1 CONTAINER	24 INCHES	
	451	ACER SACCHARINUM	SILVER MAPLE	FACW	BAREROOT/TUBELING	12 INCHES	
	9	BETULA PAPYRIFERA	PAPER BIRCH	FACU	1 INCH CALIPER	8 FEET	
	163	BETULA PAPYRIFERA	PAPER BIRCH	FACU	#1 CONTAINER	24 INCHES	
	451	BETULA PAPYRIFERA	PAPER BIRCH	FACU	BAREROOT/TUBELING	12 INCHES	
	110	CORNUS ALTERNIFOLIA	ALTERNATE-LEAF DOGWOOD	FACU	#1 CONTAINER	24 INCHES	
	283	CORNUS ALTERNIFOLIA	ALTERNATE-LEAF DOGWOOD	FACU	BAREROOT/TUBELING	12 INCHES	
	438	CORYLUS AMERICANA	AMERICAN HAZELNUT	FACU	#1 CONTAINER	24 INCHES	
	1092	CORYLUS AMERICANA	AMERICAN HAZELNUT	FACU	BAREROOT/TUBELING	12 INCHES	
	110	ILEX VERTICILLATA	COMMON WINTERBERRY	FACW	#1 CONTAINER	24 INCHES	
	283	ILEX VERTICILLATA	COMMON WINTERBERRY	FACW	BAREROOT/TUBELING	12 INCHES	
	163	PINUS STROBUS	EASTERN WHITE PINE	FACU	#1 CONTAINER	24 INCHES	
	451	PINUS STROBUS	EASTERN WHITE PINE	FACU	BAREROOT/TUBELING	12 INCHES	
	163	POPULUS TREMULOIDES	QUAKING ASPEN	FACU	#1 CONTAINER	24 INCHES	
	451	POPULUS TREMULOIDES	QUAKING ASPEN	FACU	BAREROOT/TUBELING	12 INCHES	
	110	PRUNUS VIRGINIANA	CHOKE CHERRY	FACU	#1 CONTAINER	24 INCHES	
	283	PRUNUS VIRGINIANA	CHOKE CHERRY	FACU	BAREROOT/TUBELING	12 INCHES	
	18	QUERCUS RUBRA	NORTHERN RED OAK	FACU	1 INCH CALIPER	8 FEET	
	163	QUERCUS RUBRA	NORTHERN RED OAK	FACU	#1 CONTAINER	24 INCHES	
	451	QUERCUS RUBRA	NORTHERN RED OAK	FACU	BAREROOT/TUBELING	12 INCHES	
	163	TILIA AMERICANA	AMERICAN BASSWOOD	FACU	#1 CONTAINER	24 INCHES	
	451	TILIA AMERICANA	AMERICAN BASSWOOD	FACU	BAREROOT/TUBELING	12 INCHES	
	110	VIBURNUM LENTAGO	NANNY-BERRY	FAC	#1 CONTAINER	24 INCHES	
	283	VIBURNUM LENTAGO	NANNY-BERRY	FAC	BAREROOT/TUBELING	12 INCHES	
		LIVE STAKES (COMBINED CHANNEL LENGTH = 6283 FEET)					
	4189	CORNUS SERICEA	REDOSIER DOGWOOD	FACW	2 FT. MIN. LENGTH	LIVE STAKE	LIVE STAKE QUANTITIES BASED ON A DOUBLE ROW SPACED 3' APART FOR THE LENGTH OF THE STREAM
	4189	SALIX DISCOLOR	PUSSY WILLOW	FACW	2 FT. MIN. LENGTH	LIVE STAKE	
		COVER CROP (11.66 ACRES)					
							PLANTING DATE
	100%	AVENA SATIVA	OATS	SEED			OCT 16 - AUG 1
	100%	TRITICUM AESTIVUM	WINTER WHEAT	SEED			AUG 2 - OCT 15

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Revision	No	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD

Client/Project
MINNESOTA DEPARTMENT OF NATURAL RESOURCES
KNOWLTON CREEK STREAM RESTORATION PROJECT FINAL DESIGN PLANS
DULUTH, MINNESOTA
Title
PLANTING PLAN AND TABLES (1)

Permit-Seal

Project Number: 175654030
File Name: 54036-PLANTING.dwg

TS:	MFA	MAS	10.04.19
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. PLANTING-1
Revision 0
Sheet 53 of 54

Figure 16-8 – Construction Plan Set: PLANTING PLAN AND TABLES (1).

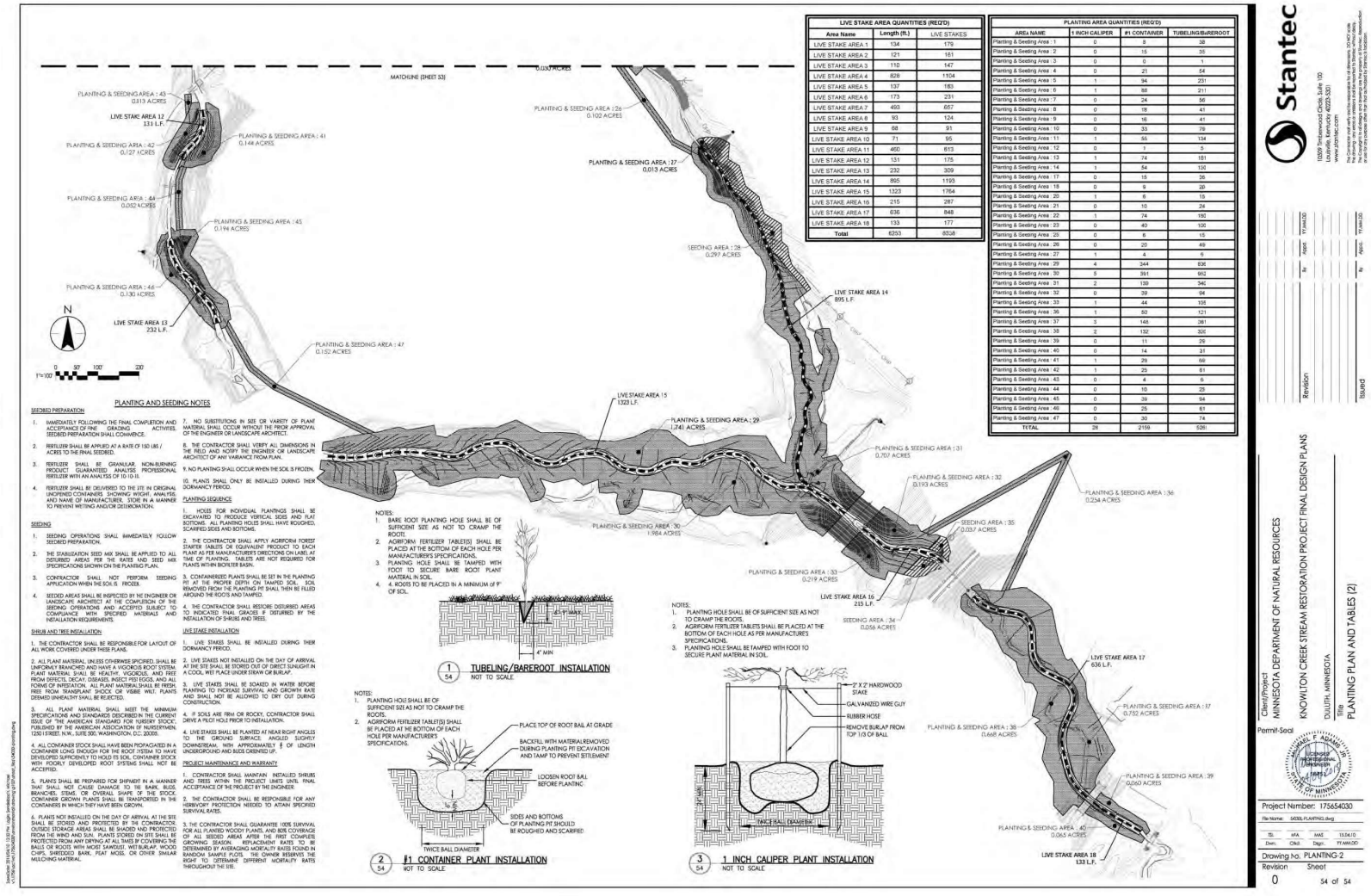

Figure 16-9 – Construction Plan Set: PLANTING PLAN AND TABLES (2).

Appendix 16B: Site Photographs

Photo 16-1 - 11/14/2017 photograph of off-line pool. The pool water surface is ~2' lower than the constructed stream (upper right).

Photo 16-2 - 11/14/2017 photograph of well-constructed rock structures.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

17 - OHF Swan Lake WMA, North Star Unit

Legacy Fund Restoration Evaluations

Project Background

Project Name: Nicollet Conservation Club/Swan Lake WMAs #1

Project Location: North Star Unit Nicollet County

Township/Range Section: Township 109N Range 28W Section 28

Project Manager / Affiliated Organization: Kristy Zajac, Nicollet Conservation Club

Fund: OHF ***Fiscal Year Funds:*** 2011

Project Start Date: 2011

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   North Star Unit: Conduct tree cutting on 35 acres of grassland habitat and conduct prescribed burn of 137 acres of same unit that tree cutting is conducted in.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

Information on project timing, tools, and methods on file with Joe Stangel, MN DNR Division of Wildlife. Seed mix table for Mackenzie unit provided to reviews.

3. ***What are the stated goals of the project?***
   From grant application: Prairie Enhancement Tree cutting – 35 acres Prairie burned – 137 acres Prairie Restoration Prairie planted – 2 acres; Total acres impacted 139 acres
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Tree cutting on 35 acres of grassland habitat and conduct prescribed burn of 137 acres (Figure 1).
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Yes, the project grant application work plan outlines the reasoning behind the tools, timing and methods employed, including reference to how the proposed work plan was consistent with known best management practices

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   North Star Unit Tree removal was been completed on 72.0 ac at North Star Unit (35 originally proposed). The prescribed burn was to be conducted by the Nicollet Wildlife office in the spring of 2013. The burn ws delayed and burns of the site were completed in May of 2014 and May of 2015.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Modifications to the proposed work plan do not appear to have negatively impacted the outcomes for this project.

Site Assessment

Field Review Date: **11/3/2017**

9. ***Surrounding Landscape Characteristics:***
   North Star Unit: prairie area that includes bluff line facing Minnesota Rive and rolling sand-gravel prairie hills.
10. ***Site Characteristics:***
    a. Soils:
    Udorthents-Pits, gravel complex
    b. Topography:
    moderately to steeply rolling
    c. Hydrology:

very well drained upland

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Dry to dry mesic prairie dominated by Indian grass, big bluestem, stiff goldenrod and others, with brush/tree cover totalling ~5-10%.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Work is primarily associated with cutting of trees (Siberian elm, cottonwood, willow). Prairie vegetation stimulated by burn is dominated by a combination of warm season native grasses (Indian grass and big bluestem) and forbs (stiff goldenrod and others).

11. ***Is the plan based on current science?*** Yes
    Based on proposed work plan and observable outcomes in field, the work plan was based on current acceptable restoration ecology practices/science.
12. ***List indicators of project outcomes at this stage of project:***
    North Star Unit: clear evidence of cut/treat tree stumps, burn piles for coarse woody debris and char on stumps throughout site as evidence for prairie (landscape) burn.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes – the implemented activities from the work plan contribute to the establishment and maintenance of prairie habitat.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No – the implemented activities have resulted in meeting the proposed outcomes.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes, based on our understanding of how the site is intended to be maintained in the future is consistent with maintaining prairie habitat.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    Activities completed as part of this grant-funded project are supportive of establishing and maintaining prairie habitat.
17. ***Are follow-up assessments needed? Explain.***
    No, outcomes from management activities are observable and consistent with proposed work plan.
18. ***Additional comments on the restoration project.***
    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Likely exceed proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***

North Star Unit: goal was to control large, invasive woody vegetation (trees) and conduct a prescribed burn on the broader landscape. Both objectives were accomplished.

21. Site Assessor(s) Conducting Review:

Paul Bockenstedt, Stantec Ecologist

Appendix 17A: Site maps, Project plans or Vegetation tables

Figure 17-1 – Map illustrating areas of the North Star Unit where invasive tree management and prescribed burn work was completed.

Appendix 17B: Site Photographs

Photo 17-1 – Slope invasive tree clearing area showing persistent brush seedlings following invasive tree clearing and prescribed burn. (North Star Unit, photo taken during site visit 11/03/2017).

Photo 17-2 – Landscape view looking west across burn unit. Invasive tree clearing area on left showing persistent brush and tree seedlings following invasive tree clearing and prescribed burn.

Photo 17-3 – Cut stumps showing burn scars.

Photo 17-4 – Looking north across burn unit. Siberian elm tree seedlings/saplings dominant in foreground.

Photo 17-5 – Residual coarse woody debris from cut tree burn pile.

Photo 17-6 – Looking north across burn unit. Cottonwood and Siberian elm tree seedlings/saplings dominant in foreground.

Photo 17-7 – Dormant quarry area inside burn unit. Large burn pile location evident in center of photo.

Photo 17-8 – Dormant quarry area inside burn unit. Large unburned tree pile evident in center of photo.

Photo 17-9 – Burn pile location evident in lower-left of photo. Brush patches in upper portion of photo are locations where large, invasive trees were cut/treated.

Photo 17-10 – View across burn unit to northwest.

Photo 17-11 – Residual invasive tree seedlings, saplings and brush in area where large trees were cut/treated.

Photo 17-12 – Cut tree with stump resprouts.

Photo 17-13 – Charcoal on residual coarse woody debris, after fire.

Photo 17-14 – Brush and tree resprouts in area where trees were cleared.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

18 - OHF Swan Lake WMA, Mackenzie Unit

Legacy Fund Restoration Evaluations

Project Background

Project Name: Nicollet Conservation Club/Swan Lake WMAs #1

Project Location: Mackenzie Unit Nicollet County

Township/Range Section: Township 110N Range 29W Section 22

Project Manager / Affiliated Organization: Kristy Zajac, Nicollet Conservation Club

Fund: OHF ***Fiscal Year Funds:*** 2011

Project Start Date: 2011

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Mackenzie Unit: Restore two acres of diverse prairie through fall glyphosate application, mowing and disking followed by spring 2012 seeding. RoundUp was applied to the site in August 2011, May 2012,

and September 2012. Site was disked in October 2011 then disked and mowed in September 2012. Seed was applied in November 2012 and the site was clipped in July 2013.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Information on project timing, tools and methods on file with Joe Stangel, MN DNR Division of Wildlife. Seed mix table for Mackenzie unit provided to reviewers.
3. ***What are the stated goals of the project?***
   Restore two acres of diverse prairie.
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Restore two acres of diverse prairie, but no mention about quantitative measures for plant cover/species diversity establishment from seed mix.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** No
   If yes, provide in Appendix A and list Maps provided:
   Click here to enter text.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Yes, the project grant application work plan outlines the reasoning behind the tools, timing and methods employed, including reference to how the proposed work plan was consistent with known best management practices.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Mackenzie Unit seeding was accomplished in the fall of 2012.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Modifications to proposed work plan does not appear to have negatively impacted the outcome for this project.

Site Assessment

Field Review Date: **11/3/2017**

9. ***Surrounding Landscape Characteristics:***
   Mackenzie Unit: small, one-acre area between gravel road and wetland edge. Air photo history indicates history of cropping.
10. ***Site Characteristics:***
    a. ***Soils:***
    Cordova clay loam, 0 to 2 percent slopes
    b. ***Topography:***

Shallow slopes to level

c. Hydrology:

Nearly level wet-mesic site

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Wet-mesic prairie with mix of seeded native grasses and forbs, with approximately 25% cover of nonnative grasses and forbs.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Please refer to attached seed mix schedule with notes regarding observed species of native grasses and forbs. A total of 17 species from the 50-species seed mix were evident, including three native grasses and 14 native forbs from the seed mix. Nonnative vegetation at Mackenzie Unit site comprises approximately 25% of total cover and primarily includes the nonnatives reed canary grass, sow thistle, and Kentucky bluegrass. Other nonnative, invasive species observed include Canada thistle, red clover, curly dock and timothy grass.

11. ***Is the plan based on current science?*** Yes
    Based on proposed work plan and observable outcomes in the field, the work plan was based on current acceptable restoration ecology practices/science.
12. ***List indicators of project outcomes at this stage of project:***
    Evidence of established plants from seed mix based on meander survey evaluation of overall character/quality of wildlife cover.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes – the implemented activities from the work plan contribute to the establishment and maintenance of prairie habitat.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    No – the implemented activities have resulted in meeting the proposed outcomes.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes, based on our understanding of how the site is intended to be maintained in the future is consistent with maintaining prairie habitat.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    Activities completed as part of this grant-funded project are supportive of establishing and maintaining prairie habitat.
17. ***Are follow-up assessments needed? Explain.***
    No, outcomes from management activities are observable and consistent with proposed work plan.
18. ***Additional comments on the restoration project.***
    This restoration meets the overall goal of developing grassland wildlife habitat. The area is small, has a history of row crop agriculture, is on the edge of a wetland area, and is a challenging area to manage. Given some of the challenges at this site, the overall vegetation composition is in line with what might be expected. The area has increased the amount of grassland wildlife habitat in the area and serves as a substantial improvement over crop ground as a water quality buffer to the adjacent wetland.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Minimally meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    Mackenzie Unit: about one third of species from prairie seed mix have established and the planting has been transitioned into a long-term maintenance phase.
21. ***Site Assessor(s) Conducting Review:***
    Paul Bockenstedt, Stantec Ecologist

Appendix 18A: Site maps, Project plans or Vegetation tables

SHOOTING STAR NATIVE SEEDS
20740 County Road 33 • Spring Grove, MN 55974

REDWO1201B

Nicollet Conservation Club Mixture

9.65 Total lb
12.47 Bulk lb
9.65 PLS lb

NOTE: Species underlined in red observed on site 11.3.17

Mix %	PLS lb	Bulk lb	Lot Number	Common Name	Scientific Name	Variety	Origin	Mix Purity	Species Purity	Germ	Hard or Dormant	TZ	Total Viable	PLS
10.36%	1.00	1.30	ANDGER012A	Big Bluestem	Andropogon gerardii	VNS	MN	8.72%	83.54%	8.00%	86.00%		92.00%	76.86%
13.58%	1.31	2.47	SCHSCO010K	Little Bluestem	Schizachyrium scoparium	VNS	MN	14.59%	73.79%	42.00%	30.00%		72.00%	53.13%
1.04%	0.10	0.11	BOUCUR012C	Sideoats Grama	Bouteloua curtipendula	VNS	MN	0.84%	96.77%			95.00%	95.00%	91.93%
0.52%	0.05	0.06	CARSTI282A	Fox Sedge	Carex stipata	VNS	MN	0.48%	99.77%	0.00%	83.00%		83.00%	82.81%
3.63%	0.35	0.43	CARVUL142C	Brown Fox Sedge	Carex vulpinoidea	VNS	MN	3.38%	99.21%			83.00%	83.00%	82.34%
3.63%	0.35	0.38	PANVIR461C	Switchgrass	Panicum virgatum	VNS	IA	3.02%	99.87%	86.00%	7.00%		93.00%	92.88%
5.18%	0.50	0.55	SCIACU201A	Hardstem Bulrush	Scirpus acutus	VNS	MN	4.27%	95.92%			94.00%	94.00%	90.16%
7.77%	0.75	0.95	SORNUT092A	Indiangrass	Sorghastrum nutans	VNS	MN	7.08%	92.02%	0.00%	85.00%		85.00%	78.73%
2.59%	0.25	0.28	SPOHET011A	Prairie Dropseed	Sporobolus heterolepsis	VNS	MN	2.13%	96.14%	7.00%	87.00%		94.00%	90.37%
1.04%	0.10	0.12	AGAFOE022A	Anise Hyssop	Agastache foeniculum	VNS	MN	0.89%	95.94%	38.00%	52.00%		90.00%	86.35%
0.52%	0.05	0.06	ALLSTE282A	Prairie Onion	Allium stellatum	VNS	MN	0.45%	99.91%	20.00%	69.00%		89.00%	88.92%
0.93%	0.09	0.12	ANECAN692A	Canada Anemone	Anemone canadensis	VNS	MN	0.91%	92.33%	0.00%	79.00%		79.00%	72.94%
1.55%	0.15	0.16	ASCINC462A	Swamp Milkweed	Asclepias incarnata	VNS	IA	1.25%	99.52%	61.00%	35.00%		96.00%	95.54%
2.59%	0.25	0.28	ASCSYR892A	Common Milkweed	Asclepias syriaca	VNS	MN	2.16%	97.69%	21.00%	72.00%		93.00%	90.85%
0.62%	0.06	0.06	ASCTUB672A	Butterfly Milkweed	Asclepias tuberosa	VNS	Midwest	0.50%	99.28%	93.00%	3.00%		96.00%	95.31%
0.83%	0.08	0.08	ASTCAN022A	Canada Milk Vetch	Astragalus canadensis	VNS	MN	0.67%	99.95%			96.00%	96.00%	95.95%
0.62%	0.06	0.07	CEAAME141A	New Jersey Tea	Ceanothus americanus	VNS	IA	0.53%	99.35%			91.00%	91.00%	90.41%
0.93%	0.09	0.13	CORPAL521A	Prairie Coreopsis	Coreopsis palmata	VNS	MN	0.80%	90.00%			90.00%	90.00%	72.00%
3.11%	0.30	0.36	DALCAN128BMN	White Prairie Clover	Dalea candidum	VNS	MN	2.90%	99.98%	38.00%	45.00%		83.00%	82.98%
3.11%	0.30	0.36	DALPUR201B	Purple Prairie Clover	Dalea purpurea	VNS	MN	2.90%	99.99%	54.00%	29.00%		83.00%	82.99%
2.38%	0.23	0.25	DESCAN281A	Showy Tick Trefoil	Desmodium canadense	VNS	MN	1.98%	99.62%	54.00%	39.00%		93.00%	92.65%
2.07%	0.20	0.21	ECHPAL702A	Pale Purple Coneflower	Echinacea pallida	VNS	IA	1.67%	98.46%	80.00%	36.00%		96.00%	94.52%
0.52%	0.05	0.06	EUPALT462A	Tall Boneset	Eupatorium altissimum	VNS	IA	0.44%	87.66%	9.00%	82.00%		91.00%	79.77%
0.52%	0.05	0.06	EUPPER462A	Boneset	Eupatorium perfoliatum	VNS	IA	0.42%	81.29%			95.00%	95.00%	77.23%
0.83%	0.08	0.09	EUPPUR462A	Sweet Joe Pye Weed	Eupatorium purpureum	VNS	IA	0.68%	94.93%	43.00%	52.00%		95.00%	90.18%
0.73%	0.07	0.09	HELAUT011A	Sneezeweed	Helenium autumnale	VNS	MN	0.65%	95.69%			86.00%	86.00%	82.29%
0.62%	0.06	0.13	HELGRO952A	Sawtooth Sunflower	Helianthus grosseserratus	VNS	MN	0.76%	75.76%	12.00%	51.00%		63.00%	47.73%
2.07%	0.20	0.21	HELHEL022A	Ox-eye Sunflower	Heliopsis helianthoides	VNS	MN	1.67%	96.92%			96.00%	96.00%	93.04%
0.52%	0.05	0.05	HEURIC022B	Prairie Alumroot	Heuchera richardsonii	VNS	IA	0.42%	98.28%	31.00%	65.00%		96.00%	94.35%
1.55%	0.15	0.17	LESCAP692A	Round-headed Bush Clover	Lespedeza capitata	VNS	MN	1.35%	97.27%	36.00%	53.00%		89.00%	86.57%
1.66%	0.16	0.18	LIALIG011A	Meadow Blazingstar	Liatris ligulistylis	VNS	IA	1.38%	93.25%	13.00%	81.00%		94.00%	87.66%
2.28%	0.22	0.36	LIAPYC022C	Prairie Blazingstar	Liatris pycnostachya	VNS	MN	1.94%	67.09%			91.00%	91.00%	61.05%
0.83%	0.08	0.08	LOBSIP951A	Great Blue Lobelia	Lobelia siphilitica	VNS	MN	0.66%	97.44%	3.00%	94.00%		97.00%	94.52%
0.21%	0.02	0.03	MONFIS012B	Wild Bergamot	Monarda fistulosa	VNS	MN	0.22%	87.39%			73.00%	73.00%	63.79%
0.31%	0.03	0.03	PYCVIR462A	Mountain Mint	Pycnanthemum virginianum	VNS	IA	0.26%	92.86%			93.00%	93.00%	86.36%
1.04%	0.10	0.12	RATCOL201A	Long-headed Coneflower	Ratibida columnifera	VNS	MN	0.86%	89.18%			93.00%	93.00%	82.94%
1.55%	0.15	0.16	RATPIN462A	Yellow Coneflower	Ratibida pinnata	VNS	IA	1.25%	99.33%	95.00%	0.00%		95.00%	95.36%
5.18%	0.50	0.57	RUDHIR702A	Black-eyed Susan	Rudbeckia hirta	VNS	IA	4.56%	99.62%	84.00%	4.00%		88.00%	87.67%
2.07%	0.20	0.23	SILLAC462A	Compass Plant	Silphium laciniatum	VNS	IA	1.67%	91.13%	1.00%	95.00%		96.00%	87.48%
1.04%	0.10	0.15	SILPER952A	Cup Plant	Silphium perfoliatum	VNS	MN	1.02%	83.02%			79.00%	79.00%	65.59%
0.10%	0.01	0.01	SOLSPE462A	Showy Goldenrod	Solidago speciosa	VNS	IA	0.08%	95.82%	20.00%	75.00%		95.00%	91.03%
0.52%	0.05	0.06	ASTAZU462A	Sky Blue Aster	Aster azureus	VNS	IA	0.44%	92.90%	84.00%	7.00%		91.00%	84.54%
0.62%	0.06	0.07	ASTNOV702A	New England Aster	Aster novae-angliae	VNS	MN	0.53%	96.84%	87.00%	4.00%		91.00%	88.12%
0.52%	0.05	0.12	ASTUMB282A	Flat-topped Aster	Aster umbellatus	VNS	MN	0.87%	93.85%	15.00%	31.00%		46.00%	43.17%
1.55%	0.15	0.17	TRAOHI142B	Ohio Spiderwort	Tradescantia ohiensis	VNS	IA	1.32%	96.29%			91.00%	91.00%	87.62%
1.04%	0.10	0.10	VERHAS491A	Blue Vervain	Verbena hastata	VNS	WI	0.82%	99.21%			98.00%	98.00%	97.23%
1.55%	0.15	0.17	VERFAS022A	Common Ironweed	Vernonia fasciculata	VNS	MN	1.32%	95.17%			91.00%	91.00%	86.60%
0.31%	0.03	0.04	VERVIR022A	Culver's Root	Veronicastrum virginicum	VNS	MN	0.26%	86.81%			92.00%	92.00%	79.87%
0.62%	0.06	0.07	ZIZAPT022B	Heartleaf Alexanders	Zizia aptera	VNS	MN	0.52%	97.81%			92.00%	92.00%	89.99%
1.04%	0.10	0.10	ZIZAUR142A	Golden Alexanders	Zizia aurea	VNS	MN	0.84%	99.90%			96.00%	96.00%	95.90%
100.00%	9.65	12.47												

Purity 89.32%, Inert Matter 9.96%, Other Crop 0.7%, Weed Seed 0.02%
Noxious Weeds/lb: 6 Giant Foxtail, 2 Quackgrass, 1 White Cockle
Test Date: 02/2012

Figure 18-1 – Seed mix with notations on species establishment. Species were observed on 11/3/17.

Appendix 18B: Site Photographs

Photo 18-1 - View looking east-northeast. Prairie seeding located between gravel road on right and wetland edge (roughly the two trees) on the left of the photo. (Photo taken during site visit 11/03/2017).

Photo 18-2 Looking north from gravel road. Prairie seeding extends to the row of trees at the top of the photo. Reed canary grass, Kentucky bluegrass, smooth brome and Canada goldenrod comprise a relatively high proportion of vegetation in this area.

Photo 18-3 Looking east, along wetland edge (left edge of photo). Prairie seeding native grasses are common in this area along with nonnative cool season grasses (especially Kentucky bluegrass).

Photo 18-4 Looking west to west edge of prairie seeding (WMA sign). Prairie seeding native grasses are common in this area along with forbs like cupplant and compass plant, as well as nonnative cool season grasses (e.g. smooth brome, reed canary grass, and Kentucky bluegrass).

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

19 - OHF Swan Lake WMA, Peterson Lake Unit

Legacy Fund Restoration Evaluations

Project Background

Project Name: Swan Lake WMA - Peterson Lake Unit

Project Location: Nicollet

Township/Range Section: Township 110N Range 29W Section 11

Project Manager / Affiliated Organization: Eran Sandquist, Pheasants Forever

Fund: OHF ***Fiscal Year Funds:*** 2012

Project Start Date: 2015

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Install live plant plugs in pre-existing, native grass-dominated prairie restoration.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

Grant work plan/agreement, CPL Grant Program Annual Accomplishment Form (Final 2015), maps of planting areas, list of plants (summary from Ramsey county Correctional Facility). Records with Joe Stangel, MN DNR Wildlife and provided to reviewers.

3. ***What are the stated goals of the project?***
   Restore pollinator (wildlife) habitat at Peterson Lake Unit of Swan Lake WMA in Nicollet County. Plantings of approximately 3,860 life plant plugs of 35+ species in 2, 2-acres patches of warm season native grass-dominated prairie restoration.
4. ***Were measures of restoration success identified in plans? No***
   If yes, list specific measurements.
   Although number of plants to install was listed, no goal for longer-term results (e.g. % or number of surviving plants) was listed.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Maps provided by MN DNR Wildlife regarding planting location.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Concentrating planting of plugs is more beneficial to pollinators (rather than scattering forbs widely/evenly across a large area). Plan set consisted of plant plug list (both design and as-installed). A total of 12 of the 37 plant species on the planting list are not well suited for these sites. Additionally, one plant plug species is not native to Minnesota (blue wild indigo (*Baptisia australis*)). Seeding of native form (rather than plug instillation) would likely have resulted in outcomes of greater species richness and higher total native form cover, particularly at the Nicollet Bay Unit where plug survival was very poor.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   Paperwork provided indicates the plant plug list was modified based on availability of plants from the Ramsey County Correctional Facility greenhouse. As well, the plug planting was delayed until 2015 due to the weather.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Alterations did not appear to result in significant change in outcomes compared to original design.

Site Assessment

Field Review Date: **11/3/2017**

9. ***Surrounding Landscape Characteristics:***
   Peterson Lake Unit: Project area is bordered by restored prairie, with a cattail marsh to the north. Site is bordered on south by County Highway 5

10. ***Site Characteristics:***

    a. Soils:

    Peterson Lake Unit: Lester Loam, 2-10 percent slopes

    b. Topography:

    Peterson Lake Unit: gently sloped to north

    c. Hydrology:

    Upland, well-drained soils

    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

    Peterson Lake Unit: dry-mesic to mesic restored prairie dominated by Indian grass, big bluestem, and patches of flowers from the planted plugs.

    e. Vegetation B: Meander Search Species List (as appropriate for site)

    Please refer to attached summary.

11. ***Is the plan based on current science?*** Portions

    Planting forbs in relatively compact patches rather than as widely scattered individuals provides greater benefit to pollinators. However, 12 of the 37 plant species on the planting list are not well suited for these sites. Additionally, one plant plug species is not native to Minnesota (blue wild indigo (Baptisia australis)). Seeding of native forbs (rather than plug installation) would likely have resulted in outcomes of greater species richness and higher total native forb cover, particularly at the Nicollet Bay Unit where plug survival was very poor.

12. ***List indicators of project outcomes at this stage of project:***

    Peterson Lake Unit: There was evidence of fair plug survival at this site for species that were well-suited to the location. A total of 17 of the 37 planted species were observed. Planted plugs for some species appeared to be surviving well, and in some instances expanding - especially for golden Alexanders, stiff goldenrod, bergamot, and oxeye false sunflower.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Generally, yes. Some plant species selected for plug installation and the use of live plant plugs rather than seeds likely contributed to the lack of survival/persistence for some plant species. It is not clear if weather and/or timing of plant installation was a factor in differences in survival between the two sites. Please refer to the attached summary of on-site transect survey for additional detail.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    Corrections/modifications will not be necessary.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Yes – areas to be maintained with same tools, methods, timing as surrounding prairie restoration areas.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Project activities are supportive of the grant activities and desired long-term outcomes for the habitat.

17. ***Are follow-up assessments needed? Explain.***

    No additional assessments will be necessary. Plant plugs that survived the initial establishment period were adequately observable at the time of the evaluation field visit.

18. ***Additional comments on the restoration project.***
    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Minimally meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Plant plugs that survived the initial establishment period were adequately observable at the time of the evaluation field visit.
21. ***Site Assessor(s) Conducting Review:***
    Paul Bockenstedt, Stantec Ecologist

Appendix 19A: Site maps, Project plans or Vegetation tables

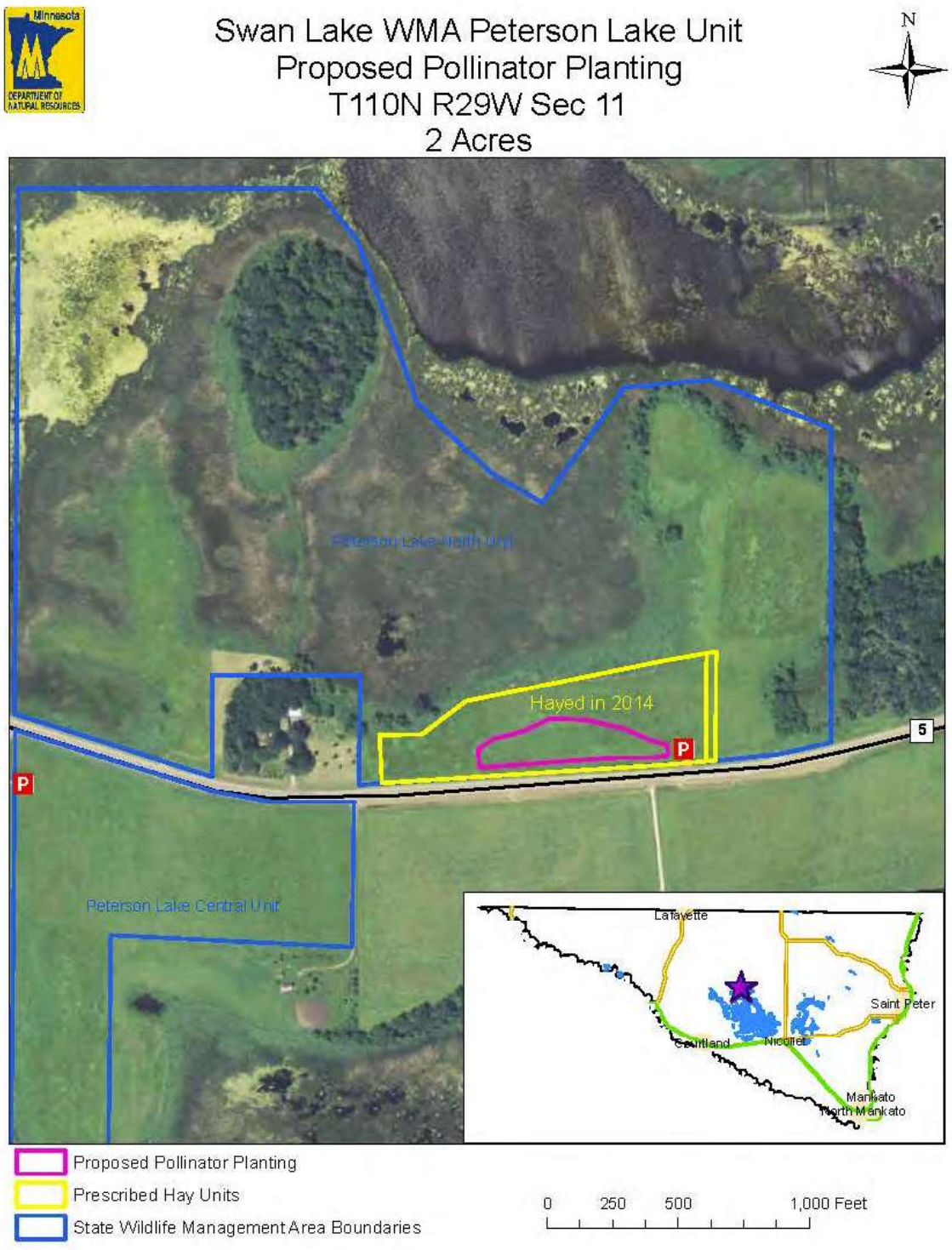

Figure 19-1 – Site planting location map Nicollet Bay Unit, Swan Lake WMA.

Table 19-1 – Proposed pollinator plant plug list (From Ramsey County Correctional Facility Master Plant list). The Quantity of plugs listed was proposed for both the Peterson Lake and Nicollet Bay Unit plantings on Swan Lake.

Scientific Name	Common Name	Quantity plugs
Amorpha canescens	lead plant	192
Amorpha fruiticosa	False Indigo	192
Anemone canadensis	Canada Anemone	192
Aquilegia canadensis	Columbine	192
Artemisia ludoviciana	Prairie sage	192
Asclepeis tuberosa	Butterfly milkweed	192
Asclesis verticillata	Whorled milkweed	192
Aster ericoides	Heath Aster	192
Aster novae-angliae	New England aster	192
Astragalus canadensis	Canada Milk Vetch	192
Baptisia australis	Wild Blue Indigo	192
Coreopsis palmata	Prairie coreopsis	192
Desmodium canadense	Showy tick trefoil	192
Eryngium yuccifolium	Rattlesnake Master	192
Eupatorium macualatum	Joe Pye weed	192
Eupatorium perfoliatum	Boneset	192
Gentiana andrewsii	Bottle gentian	192

Scientific Name	Common Name	Quantity plugs
Geum triflorum	Prairie Smoke	192
Heliopsis helianthoides	Early sunflower	192
Lespedeza capitata	R.H. Bush Clover	192
Liatris Ligustylis	Meadow Blazing star	192
Lobelia siphilitica	Blue lobelia	192
Monarda fistulosa	Bergamot	192
Penstemon sp.	Slender beardtongue	192
Petalostemum purpurea	Purple Prairie Clover	192
Phlox pilosa	Prairie Phlox	192
Pycanthemum virginiana	Mountain Mint	192
Ratibida pinnata	Yellow coneflower	192
Silphium perfoliatum	Cup plant	192
Silphium terebinthinaceum	Prairie dock	192
Solidago rigida	Stiff goldenrod	192
Solidago speciosa	Showy goldenrod	192
Tradescantia ohioensis	Ohio Spiderwort	192
Verbena Hastata	Blue vervain	192
Zizia aurea	Golden Alexanders	192

2006 RCCF Master Inventory/Price List

FORBS	2015 inventory species	Qty plugs		
Amorpha canescens	lead plant	192		
Amorpha fruticosa	False Indigo	192		
Anemone canadensis	Canada Anemone	192		
Aquileg a canadensis	Columbine	192		
Artemisia ludoviciana	Prairie sage	192		
Asclepeis tuberosa	Butterfly milkweed	192		
Asclesis verticillata	Whorled milkweed	192		
Aster ericoides	Heath Aster	192		
Aster novae-angliae	New England aster	192		
Astragalus canadensis	Canada Milk Vetch	192		
Baptisia australis	Wild Blue Indigo	192		
Coreopsis palmata	Prairie coreopsis	192		
Desmodium canadense	Showy tick trefoil	192		
Eryng um yuccifolium	Rattlesnake Master	192		
Eupatorium macualatum	Joe Pye weed	192		
Eupatorium perfoliatum	Boneset	192		
Gentiana andrewsii	Bottle gentian	192		
Geum triflorum	Prairie Smoke	192		
Heliopsis helianthoides	Early sunflower	192		
Lespeceza capitata	R.H. Bush Clover	192		
Liatris Ligustylis	Meadow Blazing star	192		
Lobelia siphilitica	Blue lobelia	192		
Mona da fistulosa	>Bergamot	192		
Penstemon sp.	Slender beardstongue	192		
Petalostemum purpurea	Purple Prairie Clover	192		
Phlox pilosa	Prairie Phlox	192		
Pycanthemum virginiana	Mountain Mint	192		
Ratibida pinnata	Yellow coneflower	192		
Silphium perfoliatum	Cup plant	192		
Silphium terebinthinaceum	Prairie dock	192		
Solidago rigida	Stiff goldenrod	192		
Solidago speciosa	Showy goldenrod	192		
Tradescantia ohioensis	Ohio Spiderwort	192		
Verbena Hastata	Blue vervain	192		
Zizia aurea	Golden Alexanders	192		
		6720		0.75

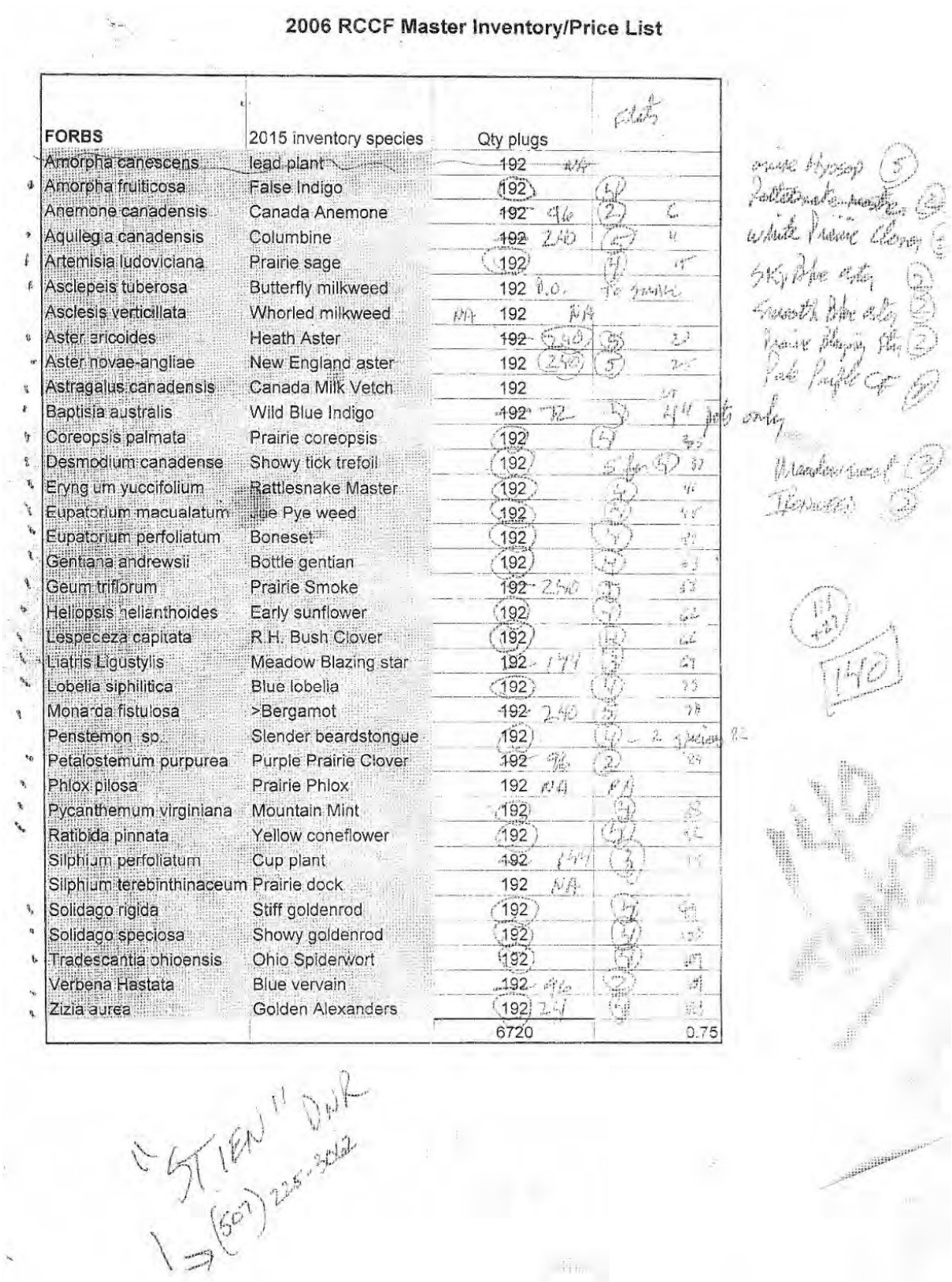

Figure 19-2 – Installed pollinator plant plug list.

Table 19-2 – Observed plants during detailed survey of the planting area on 11/03/2017. C-common; O-occasional; R-rare; P-present; n-not observed. *Zizia aptera* observed as a few plants rather than *Zizia aurea.*

Scientific Name	Common Name	Observed Abundance
Amorpha fruiticosa	False Indigo	P
Anemone canadensis	Canada Anemone	P
Aquilegia canadensis	Columbine	n
Artemisia ludoviciana	Prairie sage	O
Asclepeis tuberosa	Butterfly milkweed	n
Symphyotrichum ericoides	Heath Aster	P
Symphyotrichum novae-angliae	New England aster	P
Astragalus canadensis	Canada Milk Vetch	n
Baptisia australis	Wild Blue Indigo	O
Coreopsis palmata	Prairie coreopsis	P
Desmodium canadense	Showy tick trefoil	n
Eryngium yuccifolium	Rattlesnake Master	n
Eupatorium maculatum	Joe Pye weed	P
Eupatorium perfoliatum	Boneset	n
Gentiana andrewsii	Bottle gentian	n
Geum triflorum	Prairie Smoke	n
Heliopsis helianthoides	Early sunflower	O

Scientific Name	Common Name	Observed Abundance
Lespedeza capitata	Roundheaded Bushclover	R
Liatris Ligustylis	Meadow Blazing star	n
Lobelia siphilitica	Blue lobelia	n
Monarda fistulosa	Bergamot	C
Penstemon sp. [digitalis]	Slender beardstongue	n
Petalostemum purpureum	Purple Prairie Clover	n
Pycanthemum virginianum	Virginia mountain mint	P
Ratibida pinnata	Yellow coneflower	O
Silphium perfoliatum	Cup plant	P
Solidago rigida	Stiff goldenrod	O
Solidago speciosa	Showy goldenrod	O
Tradescantia ohioensis	Ohio Spiderwort	n
Verbena hastata	Blue vervain	P
*Zizia aurea**	Golden Alexanders	C
Agastache foeniculum	Anise hyssop	n
Dalea candida	White prairie clover	n
Symphyotrichum oolentangiense	Sky blue aster	n
Symphyotrichum laeve	Smooth blue aster	O

Scientific Name	Common Name	Observed Abundance
Liatris pycnostachya	Prairie blazingstar	n
Echinacea ?pallida	Pale purple coneflower	P
Spiraea alba	Meadowsweet	n
Vernonia fasciculata	Ironweed	n

Appendix 19B: Site Photographs

Photo 19-1 – Looking west from WMA parking area, across pollinator plug planting area (photo taken during site visit 11/03/2017).

Photo 19-2 – Looking east toward WMA parking area, on south edge of pollinator plug planting area (photo taken during site visit 11/03/2017).

Photo 19-3 – Example of area demonstrating very good plug survival (in this case, bergamot plant plugs have matured and are a significant portion of the total plant cover in the immediate area; photo taken during site visit 11/03/2017).

Photo 19-4 – Looking southwest toward County Highway 5, round-headed bush clover plants from pollinator plug planting are evident in this area (taller spike in center of photo; photo taken during site visit 11/03/2017).

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

20 - OHF Swan Lake WMA, Nicollet Bay Unit

Legacy Fund Restoration Evaluations

Project Background

Project Name: Swan Lake WMA - Nicollet Bay Unit

Project Location: Nicollet

Township/Range Section: Township 109N Range 28W Section 6

Project Manager / Affiliated Organization: Eran Sandquist, Pheasants Forever

Fund: OHF ***Fiscal Year Funds:*** 2012

Project Start Date: 2015

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Install live plant plugs in pre-existing, native grass-dominated prairie restoration.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

Grant work plan/agreement, CPL Grant Program Annual Accomplishment Form (Final 2015), maps of planting areas, list of plants (summary from Ramsey county Correctional Facility). Records with Joe Stangel, MN DNR Wildlife and provided to reviewers.

3. ***What are the stated goals of the project?***
   Restore pollinator (wildlife) habitat at Peterson Lake Unit of Swan Lake WMA in Nicollet County. Plantings of approximately 3,860 life plant plugs of 35+ species in 2, 2-acres patches of warm season native grass-dominated prairie restoration.
4. ***Were measures of restoration success identified in plans?*** *Yes*
   If yes, list specific measurements.
   Although number of plants to install was listed, no goal for longer-term results (e.g. % or number of surviving plants) was listed.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Maps provided by MN DNR Wildlife regarding planting location.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Concentrating planting of plugs is more beneficial to pollinators (rather than scattering forbs widely/evenly across a large area). Plan set consisted of plant plug list (both design and as-installed). A total of 12 of the 37 plant species on the planting list are not well suited for these sites. Additionally, one plant plug species is not native to Minnesota (blue wild indigo (*Baptisia australis*)). Seeding of native form (rather than plug instillation) would likely have resulted in outcomes of greater species richness and higher total native form cover, particularly at the Nicollet Bay Unit where plug survival was very poor.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   Paperwork provided indicates the plant plug list was modified based on availability of plants from the Ramsey County Correctional Facility greenhouse. As well, the plug planting was delayed until 2015 due to the weather.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Alterations did not appear to result in significant change in outcomes compared to original design.

Site Assessment

Field Review Date: **11/3/2017**

9. ***Surrounding Landscape Characteristics:***
   Nicollet Bay Unit – Restored prairie to south, cattail wetland to north, and crop ground to the northwest.
10. ***Site Characteristics:***

a. Soils:

Nicollet Bay Unit: Canisteo clay loam, 0 to 2 percent slopes

b. Topography:

Nicollet Bay Unit nearly level

c. Hydrology:

Well drained, upland

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Nicollet Bay Unit: mesic restored prairie with wet-mesic inclusions; forbs are infrequent to rare.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Please refer to attached summary.

11. ***Is the plan based on current science?*** Portions

Planting forbs in relatively compact patches rather than as widely scattered individuals provides greater benefit to pollinators. However, 12 of the 37 plant species on the planting list are not well suited for the site characteristics (e.g. the plant list included species better suited for wetter or drier sites than this one). Additionally, one plant plug species that was installed is not native to Minnesota (blue wild indigo (Baptisia australis)). It is my professional opinion that seeding of native forbs (rather than plug installation) would likely have resulted in greater species richness and higher total native forb cover, particularly at the Nicollet Bay Unit where plug survival appeared to be very poor.

12. ***List indicators of project outcomes at this stage of project:***

    Plug survival was very poor with only 12 of the 37 planted plug species observed with the total cover of native forbs being very low. Overall survival of plant plugs appears to have been very low at this particular site.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Generally, yes. Some plant species selected for plug instillation and the use of live plant plugs rather than seeds likely contributed to the lack of survival/persistence for some plant species. It is not clear if weather and/or timing of plant instillation was a factor in overall poor survival.

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    Corrections/modifications will not be necessary.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Yes – areas to be maintained with same tools, methods, timing as surrounding prairie restoration areas.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    Project activities are supportive of the grant activities and desired long-term outcomes for habitat.

17. ***Are follow-up assessments needed? Explain.***

    No additional assessments will be necessary. Plant plugs that survived the initial establishment period were adequately observable at the time of the evaluation field visit.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Minimally meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Plat plugs that survived the initial establishment period were adequately observable at the time of the evaluation field visit.
21. ***Site Assessor(s) Conducting Review:***
    Paul Bockenstedt, Stantec Ecologist

Appendix 20A: Site maps, Project plans or Vegetation tables

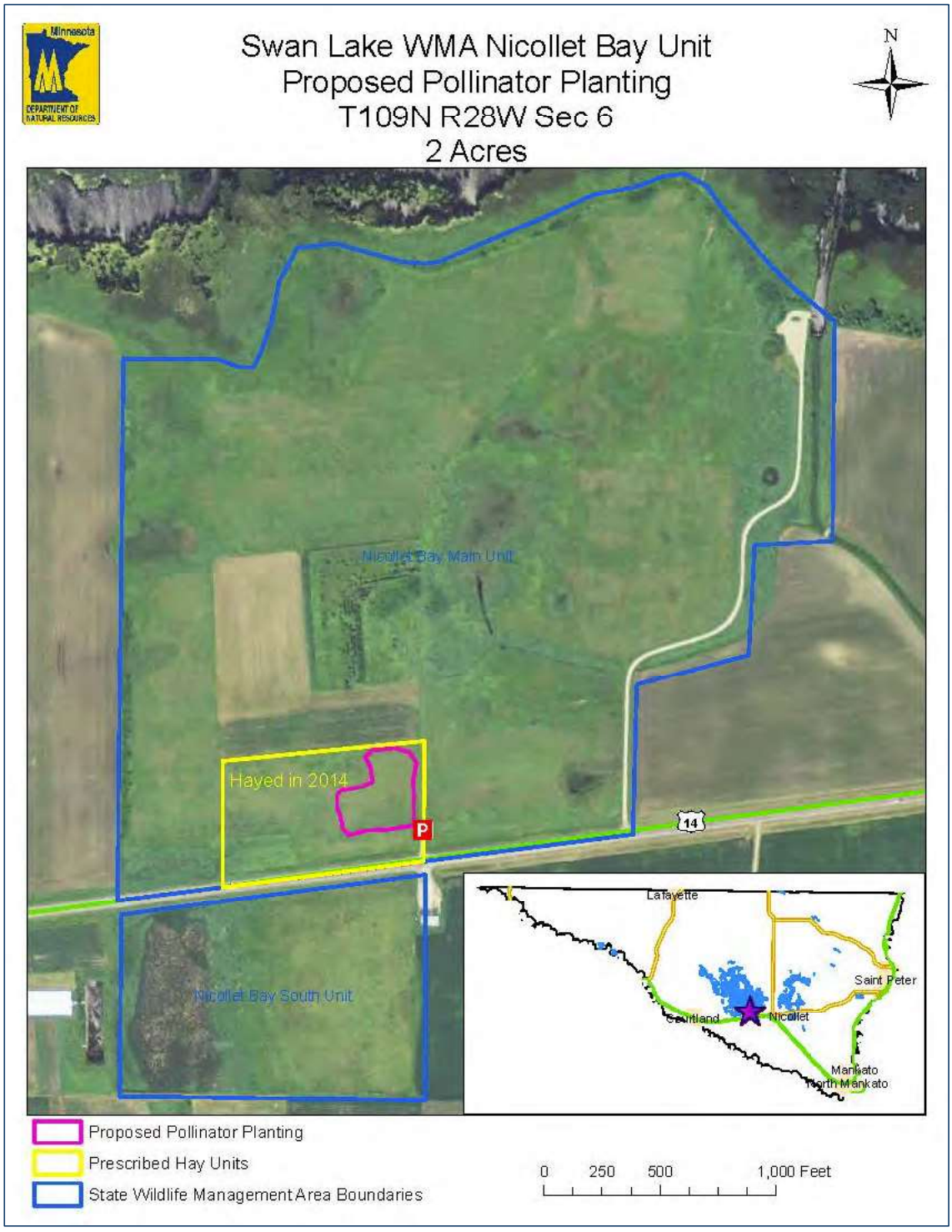

Figure 20-1 – Site planting location map Nicollet Bay Unit, Swan Lake WMA.

Table 20-1 – Proposed pollinator plant plug list (From Ramsey County Correctional Facility Master Plant list). The Quantity of plugs listed was proposed for both the Peterson Lake and Nicollet Bay Unit plantings on Swan Lake.

Scientific Name	Common Name	Quantity plugs
Amorpha canescens	lead plant	192
Amorpha fruiticosa	False Indigo	192
Anemone canadensis	Canada Anemone	192
Aquilegia canadensis	Columbine	192
Artemisia ludoviciana	Prairie sage	192
Asclepeis tuberosa	Butterfly milkweed	192
Asclesis verticillata	Whorled milkweed	192
Aster ericoides	Heath Aster	192
Aster novae-angliae	New England aster	192
Astragalus canadensis	Canada Milk Vetch	192
Baptisia australis	Wild Blue Indigo	192
Coreopsis palmata	Prairie coreopsis	192
Desmodium canadense	Showy tick trefoil	192
Eryngium yuccifolium	Rattlesnake Master	192
Eupatorium macualatum	Joe Pye weed	192
Eupatorium perfoliatum	Boneset	192
Gentiana andrewsii	Bottle gentian	192

Scientific Name	Common Name	Quantity plugs
Geum triflorum	Prairie Smoke	192
Heliopsis helianthoides	Early sunflower	192
Lespedeza capitata	R.H. Bush Clover	192
Liatris Ligustylis	Meadow Blazing star	192
Lobelia siphilitica	Blue lobelia	192
Monarda fistulosa	Bergamot	192
Penstemon sp.	Slender beardtongue	192
Petalostemum purpurea	Purple Prairie Clover	192
Phlox pilosa	Prairie Phlox	192
Pycanthemum virginiana	Mountain Mint	192
Ratibida pinnata	Yellow coneflower	192
Silphium perfoliatum	Cup plant	192
Silphium terebinthinaceum	Prairie dock	192
Solidago rigida	Stiff goldenrod	192
Solidago speciosa	Showy goldenrod	192
Tradescantia ohioensis	Ohio Spiderwort	192
Verbena Hastata	Blue vervain	192
Zizia aurea	Golden Alexanders	192

2006 RCCF Master Inventory/Price List

FORBS	2015 inventory species	Qty plugs
Amorpha canescens	lead plant	192
Amorpha fruticosa	False Indigo	192
Anemone canadensis	Canada Anemone	192
Aquilegia canadensis	Columbine	192
Artemisia ludoviciana	Prairie sage	192
Asclepeis tuberosa	Butterfly milkweed	192
Asclesis verticillata	Whorled milkweed	192
Aster ericoides	Heath Aster	192
Aster novae-angliae	New England aster	192
Astragalus canadensis	Canada Milk Vetch	192
Baptisia australis	Wild Blue Indigo	192
Coreopsis palmata	Prairie coreopsis	192
Desmodium canadense	Showy tick trefoil	192
Eryng um yuccifolium	Rattlesnake Master	192
Eupatorium macualatum	Joe Pye weed	192
Eupatorium perfoliatum	Boneset	192
Gentiana andrewsii	Bottle gentian	192
Geum triflorum	Prairie Smoke	192
Heliopsis helianthoides	Early sunflower	192
Lespeceza capitata	R.H. Bush Clover	192
Liatris Ligustylis	Meadow Blazing star	192
Lobelia siphilitica	Blue lobelia	192
Monarda fistulosa	>Bergamot	192
Penstemon sp.	Slender beardstongue	192
Petalostemum purpurea	Purple Prairie Clover	192
Phlox pilosa	Prairie Phlox	192
Pycanthemum virginiana	Mountain Mint	192
Ratibida pinnata	Yellow coneflower	192
Silphium perfoliatum	Cup plant	192
Silphium terebinthinaceum	Prairie dock	192
Solidago rigida	Stiff goldenrod	192
Solidago speciosa	Showy goldenrod	192
Tradescantia ohioensis	Ohio Spiderwort	192
Verbena Hastata	Blue vervain	192
Zizia aurea	Golden Alexanders	192
		6720

Figure 20-2 – Installed pollinator plant plug list.

Figure 20-3 – Observed plants during detailed survey of the planting area on 11/03/2017. C-common; O-occasional; R-rare; P-present; n-not observed. *Zizia aptera* observed as a few plants rather than *Zizia aurea.*

Scientific name	Common name	Observed Abundance
Amorpha fruiticosa	False Indigo	n
Anemone canadensis	Canada Anemone	n
Aquilegia canadensis	Columbine	n
Artemisia ludoviciana	Prairie sage	n
Asclepeis tuberosa	Butterfly milkweed	n
Symphyotrichum ericoides	Heath Aster	P
Symphyotrichum novae-angliae	New England aster	O
Astragalus canadensis	Canada Milk Vetch	P
Baptisia australis	Wild Blue Indigo	P
Coreopsis palmata	Prairie coreopsis	n
Desmodium canadense	Showy tick trefoil	n
Eryngium yuccifolium	Rattlesnake Master	n
Eupatorium maculatum	Spotted Joe-pye weed	n
Eupatorium perfoliatum	Boneset	n
Gentiana andrewsii	Bottle gentian	O
Geum triflorum	Prairie Smoke	n
Heliopsis helianthoides	Early sunflower	O

Scientific name	Common name	Observed Abundance
Lespedeza capitata	Roundheaded bushclover	R
Liatris ligustylis	Meadow blazingstar	n
Lobelia siphilitica	Blue lobelia	n
Monarda fistulosa	Bergamot	P
Penstemon sp. [digitalis]	Slender beardtongue	P
Petalostemum purpurea	Purple Prairie Clover	n
Pycanthemum virginiana	Virginia mountain mint	P
Ratibida pinnata	Yellow coneflower	P
Silphium perfoliatum	Cup plant	n
Solidago rigida	Stiff goldenrod	P
Solidago speciosa	Showy goldenrod	n
Tradescantia ohioensis	Ohio Spiderwort	n
Verbena hastata	Blue vervain	n
*Zizia aurea**	Golden Alexanders	n
Agastache foeniculum	Anise hyssop	n
Dalea candida	White prairie clover	n
Symphyotrichum oolentangiensis	Sky blue aster	n
Symphyotrichum laeve	Smooth blue aster	n
Liatris pycnostachya	Prairie blazingstar	n

Scientific name	Common name	Observed Abundance
Echinacea pallida	Pale purple coneflower	n
Spiraea alba	Meadowsweet	n
Vernonia fasciculata	Ironweed	n

Appendix 20B: Site Photographs

Photo 20-1 – Forb seedling (green plant in center of photo) amid warm season native grasses (photo taken during site visit 11/03/2017).

Photo 20-2 – Bottle gentian (*Gentiana andrewsii*) rusty-brown plant in center of photo was one of the forb plugs that showed fair survival at the Swan Lake Unit forb enrichment pollinator planting (photo taken during site visit 11/03/2017).

Photo 20-3 – Oxeye false sunflower (*Heliopsis helianthoides*) was also encountered occasionally during the transect survey (photo taken during site visit 11/03/2017).

Photo 20-4 – New England Aster (*Symphyotrichum novae-angliae*) forb plug. New England aster was one of the plug species that showed fair survival at this site (photo taken during site visit 11/03/2017).

Photo 20-5 – Looking north within the pollinator planting area. Taller forb stems in the foreground are Canada goldenrod (*Solidago canadensis*), a common volunteer native forb within the native grass planting (photo taken during site visit 11/03/2017).

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

21 - PTF Dakota County Parks, Spring Lake Park and Mississippi River Flyway

Legacy Fund Restoration Evaluations

Project Background

Project Name: Spring Lake Park

Project Location: Archery Trail

Township/Range Section: Township 115N Range 18W Section 21-22

Project Manager / Affiliated Organization: Dakota County Parks, Natural Resources Manager, Tom Lewanski

Fund: PTF and OHF (CPL Grant) ***Fiscal Year Funds:*** 2012, 2013, and 2014

Project Start Date: 2012

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Woody species control as initial phase of restoring Savanna and Prairie.
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

Spring Lake Park South Archery Trail – Ecological Restoration Plan, from Dakota Co Parks Nat Resources. Specific actions for woody removal were guided by *Project Schedule on pg 34* of Plan.

3. ***What are the stated goals of the project?***
   Create open prairie and savanna structure through woody removal and thinning. Create structure and conditions to facilitate restoration of *Southern Dry-Mesic Oak Forest MHs37*. And *Southern Dry Prairie Ups13.*
4. ***Were measures of restoration success identified in plans?*** *Choose an item.*
   If yes, list specific measurements.
   All shrubs and trees cut and stumps treated except selected Oak, Hazelnut and Black Walnut (Black Walnut to be phased out overtime).
5. ***Are plan Sets available?*** Choose an item. ***Have new GIS maps been created?*** Choose an item.
   If yes, provide in Appendix A and list Maps provided:
   Management Plant *Spring Lake Park Archery Trail - Ecological Restoration Plan* directs management actions. Specific plan sets for implemented actions were not provided.
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Plan sets were not provided, however from the Management Plan and communication by Dakota County Parks personnel, cutting was followed by stump treatment with Garlon 4 and 3A, and slash was removed or piled and burned on site.

Additional funding sources were utilized to accomplish forestry mowing, disking, broadcast and drilled seeding as well as follow up prescribed burning.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   No
   Click here to enter text.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   No

Site Assessment

Field Review Date: **11/29/2017**

9. ***Surrounding Landscape Characteristics:***
   Mississippi river to the north (Spring Lake), west is forested/woodland private property, gravel road to the south, and forested/woodland section of Spring Lake Park to the east.
10. ***Site Characteristics:***
    a. ***Soils:***
    Sand/loam throughout site including 27A Dickinson sandy loam, 7b Hubbard loamy sand, and 8b Sparta loamy fine sand

b. Topography:

Nearly level

c. Hydrology:

Well drained sandy soils, dry upland

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Overall vegetation quality was determined to be relatively high with minimal presence of invasive species.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Vegetation monitoring completed in 2017 in Archery Trail units one and three as a part of the LCCMR Restoration Evaluation Monitoring 2017 for MeCC7 (Jul 2013 – Jun 2016). Report provided by Friends of the Mississippi River project manager Karen Schik. Fifty seven seeded forb and small shrub, 13 seeded graminoid, 18 native not seeded and eight non-native species were observed on site.

11. ***Is the plan based on current science?*** Yes

    The sequencing of restoration activities is consistent with current restoration science. Initial brush clearing prepares the site for subsequent restoration activities.

12. ***List indicators of project outcomes at this stage of project:***

    The absence of most of the undesirable woody species in the project area created opportunity for subsequent seeding. At the time of this project evaluation, well established dry and mesic prairie species dominate the east side of the archery trail area. Control of undesirable woody species managed to date appears successful throughout the site. Ongoing thinning of black walnuts was identified as a goal in portions of the site.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    No, with ongoing planned management there is an opportunity for success in current and future restoration efforts.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Yes, there is committed support for the site form Dakota County Parks and other interested parties for ongoing management. Funding is a potential challenge as the site will require continued management of woody and invasive species to maintain replicated native plant communities.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    No

17. ***Are follow-up assessments needed? Explain.***

    Yes, there is committed support for the site form Dakota County Parks and other interested parties for ongoing management. Funding is a potential challenge as the site will require continued management of woody and invasive species to maintain replicated native plant communities.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    High
20. ***Provide explanation of reason(s) for determination.***
    Woody control and treatment was well implemented setting the stage for ongoing prairie and savanna management.
21. ***Site Assessor(s) Conducting Review:***
    Mark Cleveland, MN DNR

Appendix 21A: Site maps, Project plans or Vegetation tables

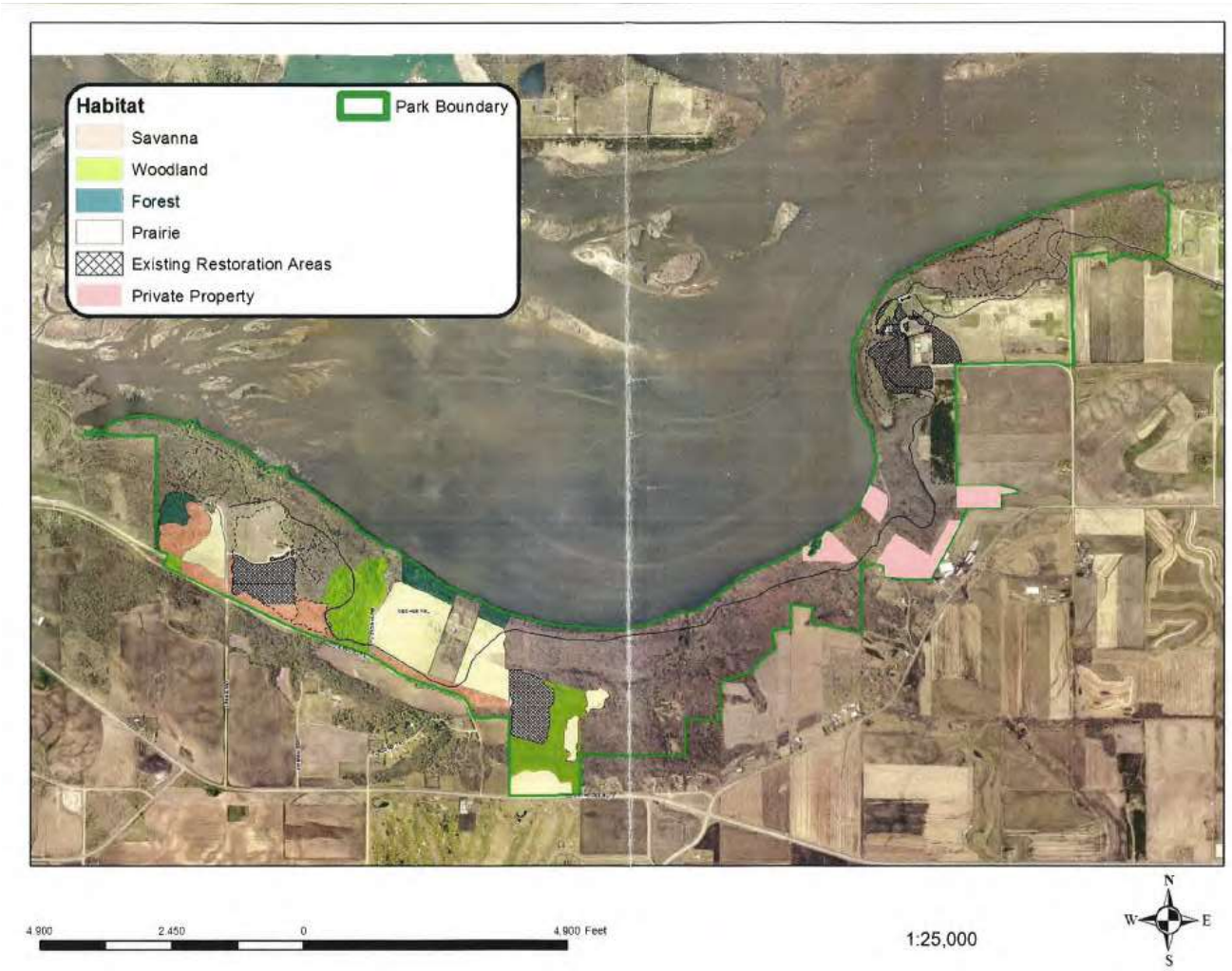

Figure 21-1 – Spring Lake Park habitat types for restoration target areas. Woody vegetation removal/clearing activities completed as a part of PTF grant activates occurred, and were evaluated, in the Savanna and Prairie habitats on the eastern edge of the property. Prairie habitat south and east of the forested habitat near the center of the property were not included in the evaluation. Map provided by Dakota County Parks Natural Resource staff.

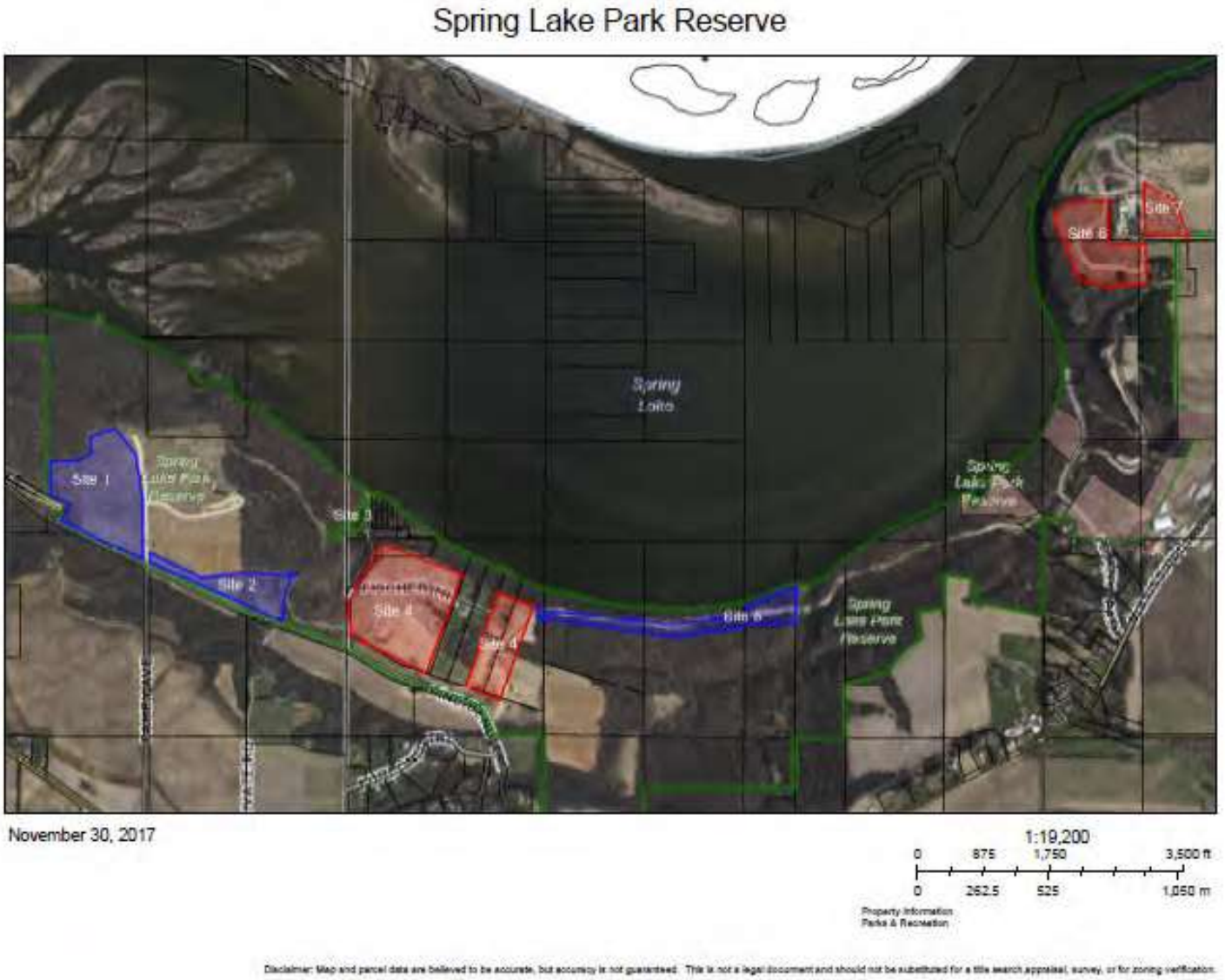

Figure 21-2 – Spring Lake Park work sites for activities funded with Parks and Trails Funding. Woody vegetation clearing/thinning activities occurred in Sites 1, 2, 4, and 5. Information about activities completed in each site can be found in Table 2. Map provided by Dakota County Parks Natural Resource staff.

Figure 21-3 – Existing land cover for Archery Trail prior to implementation of restoration plan from the Spring Lake Park Reserve Ecological Restoration Plan for South Archery Trail. Archery Trail is located on the east side of the parcel where woody vegetation was cleared/thinned as a part of the project.

Figure 21-4 – Restoration goal communities for Archery Trail prior to implementation of restoration plan from the Spring Lake Park Reserve Ecological Restoration Plan for South Archery Trail. Archery Trail is located on the east side of the parcel where woody vegetation was cleared/thinned as a part of the project.

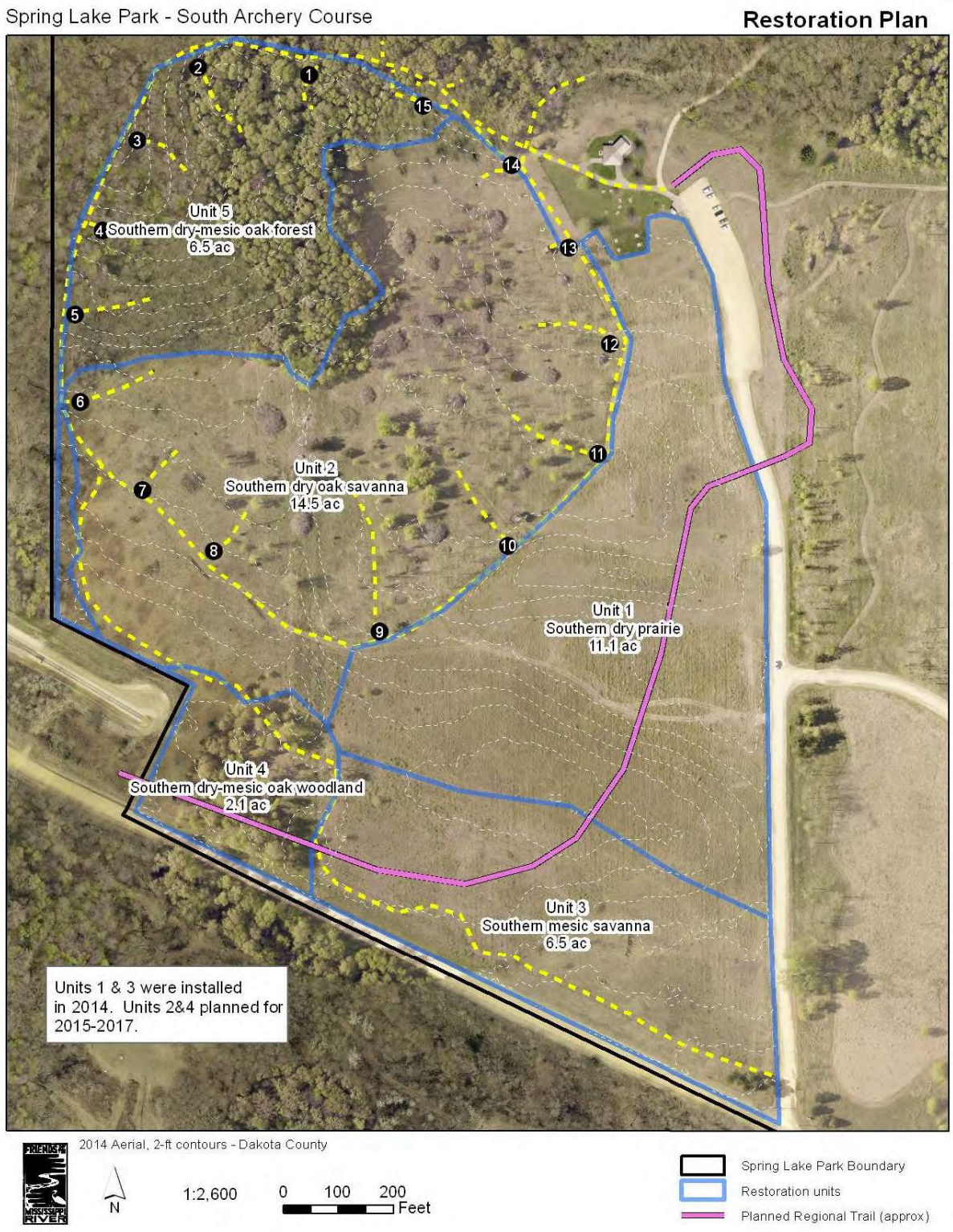

Figure 21-5 – Updated restoration plan for Archery Trail prior to implementation of restoration plan. Map from the LCCMR Restoration Evaluation Monitoring 2017 Report by Friends of the Mississippi River. Archery Trail is located on the east side of the parcel where woody vegetation was cleared/thinned as a part of the project.

Table 21-1 – Proposed project schedule for woody removal from the *Spring Lake Park Reserve Ecological Restoration Plan for South Archery Trail*. Archery Trail is located on the east side of the parcel where woody vegetation was cleared/thinned as a part of the project. Woody removal activities outlined in this table represent the range of woody vegetation removal/clearing activities implemented across the project.

Year	Season	Unit	Activity	Acres
1	Fall/Wtr	I	Cut & stump-treat all trees & shrubs except oaks. Chip wood. Brush-cut sumac (do not treat)	10.4
1	Fall/Wtr	II	Cut & stump-treat all trees except oak, hazelnut, selected black walnut and selected shrubs. Chip wood. Brush-cut sumac (do not treat)	15.1
1	Fall/Wtr	III	Cut & stump-treat all trees except oak, hazelnut, selected black walnut, selected shrubs, and pines at entry. Chip wood. Brush-cut sumac (do not treat)	6.5
1	Fall/Wtr	IV	Cut & stump-treat non-native trees and shrubs. Chip wood.	2.1
1	Fall/Wtr	V	Cut & stump-treat non-native trees and shrubs. (primarily buckthorn and honeysuckle). Chip wood.	6.5
2 & 3	Fall	IV, V	Follow-up treatment of resprouts	8.6

Table 21-2 – Work completed in Dakota County Parks – Spring Lake Park (SLPR) funded by Parks and Trails Funding. Tasks performed at a park-wide or county-wide level are not included here but may have occurred at SLPR. Data provided by Dakota County Parks Natural Resource staff.

Fiscal Year	Activity
2012	SLPR -Clearing trees and brush prior to MRFR Grant - Site 2
2013	SLPR - Clearing BT and HS for archaeological digs prior to trail construction - Site 5
2013	SLPR - brush and tree removal - Sites 1 and 2
2014	Honeysuckle Removal SLPR 11 days - Site 1 and 2
2014	SLPR Fence Removal 9 days - Site 4

Appendix 21B: Site Photographs

Photo 21-1 – Archery trail prairie/savanna restoration looking east from center of site Archery Trail (7/18/2012, prior to completion of woody removal and restoration activities; photo courtesy of Karen Schik).

Photo 21-2 – Archery trail prairie/savanna restoration looking east from center of site Archery Trail (summer 2017, following completion of woody removal, disking, planting, 2 years of mowing, and burning; photo courtesy of Karen Schik).

Photo 21-3 – Archery trail prairie/savanna restoration looking east from the parking lot at Archery Trail (11/29/17, photo taken during field evaluation).

Photo 21-4 – Ongoing prairie habitat restoration project looking west from Fischer Ave (11/29/17, photo taken during field evaluation).

Photo 21-5 – Charred stump in ongoing prairie habitat restoration project west of Fischer Ave (11/29/17, photo taken during field evaluation).

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

22 - PTF Dakota County Parks, Lebanon Hills Visitors Center

Legacy Fund Restoration Evaluations

Project Background

Project Name: Lebanon Hills

Project Location: McDonough Lake / Visitor Center Site

Township/Range Section: Township 27N Range 23W Section 35-36

Project Manager / Affiliated Organization: Dakota County Parks, Natural Resources Manager, Tom Lewanski

Fund: OHF ***Fiscal Year Funds:*** 2012, 2013, And 2014

Project Start Date: 2012

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***
   Non-native woody species (including Buckthorn and honeysuckle species) control in mesic hardwood and fire dependent woodland plant communities
2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***

Lebanon Hills Regional Park Master Plan, 2015 from Dakota Co Parks Nat Resources.

3. ***What are the stated goals of the project?***
   Buckthorn management is the first stage of larger long term natural communities restoration activities.
4. ***Were measures of restoration success identified in plans?*** *No*
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** No ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   See appendix A
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Control methods were consistent with current Best Management Practices. These include cut stump herbicide treatments, woody material removal, and planned follow up woody seedling control utilizing mechanical methods as well as prescribed fire.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   The density of smaller woody stems was significantly greater after the removal of larger seed bearing scrubs. The best treatment option was to plan for additional herbicide treatments and use of prescribed fire to control new seedlings and any re-sprouted buckthorn. These treatments are ongoing.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   Click here to enter text.

Site Assessment

Field Review Date: **11/29/2017**

9. ***Surrounding Landscape Characteristics:***
   Partially restored former agricultural field and pastured lands including remnant oak savanna and mesic woodlands.
10. ***Site Characteristics:***
    a. Soils:
    Kingsley-Mahtomedi-Spencer Complex and Kingsley sandy loam which are all found on hill slopes
    b. Topography:
    Hilly with slopes from 8 to 40 percent
    c. Hydrology:
    Dry to mesic uplands above wetland basins
    d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:
    Mesic woodland and restored prairie

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes

    Current best management practice were utilized including minimizing soil disturbance and avoidance of impacts to non-target species.

12. ***List indicators of project outcomes at this stage of project:***
    Mature seed bearing buckthorn is now absent from the site. There is minimal basal re-sprouting of controlled deciduous species that were cut and stump treated. There are areas within the project areas that show significant buckthorn seedling growth in response to removal of larger buckthorn.
13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***
    Yes.
14. ***Are corrections or modifications needed to meet proposed outcomes?***
    Clearer management plan including restoration sequence steps.
15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***
    Yes. As with any invasive control and restoration plan, the long term goal needs to be management of the non-native species. Managing the existing seed bank and seedlings will require regular management efforts including the use of prescribed fire. There are also herbaceous non-native and invasive species which are on or near the project site that will require management efforts in the future.
16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***
    None have been identified.
17. ***Are follow-up assessments needed? Explain.***
    Yes, monitoring and follow up buckthorn control efforts will be necessary.
18. ***Additional comments on the restoration project.***
    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***
    The methods used in the mesic woodland and oak savanna portions of this project have been found to be successful in similar setting. Current project oversight is good and there is awareness of the future management needs and identification of anticipated methods to continue to move to the next stages of

invasive species control and native plant community restoration. The understory in the mesic woodland has good composition. However, there are numerous nonnative herbaceous (including Japanese hedge parsley and garlic mustard) and woody species which are anticipated to pose future management challenges. These will require ongoing maintenance and management so the site does not revert to low quality and lower diversity mesic woodland and oak savanna communities.

21. Site Assessor(s) Conducting Review:

Mark Cleveland, MN DNR

Appendix 22A: Site maps, Project plans or Vegetation tables

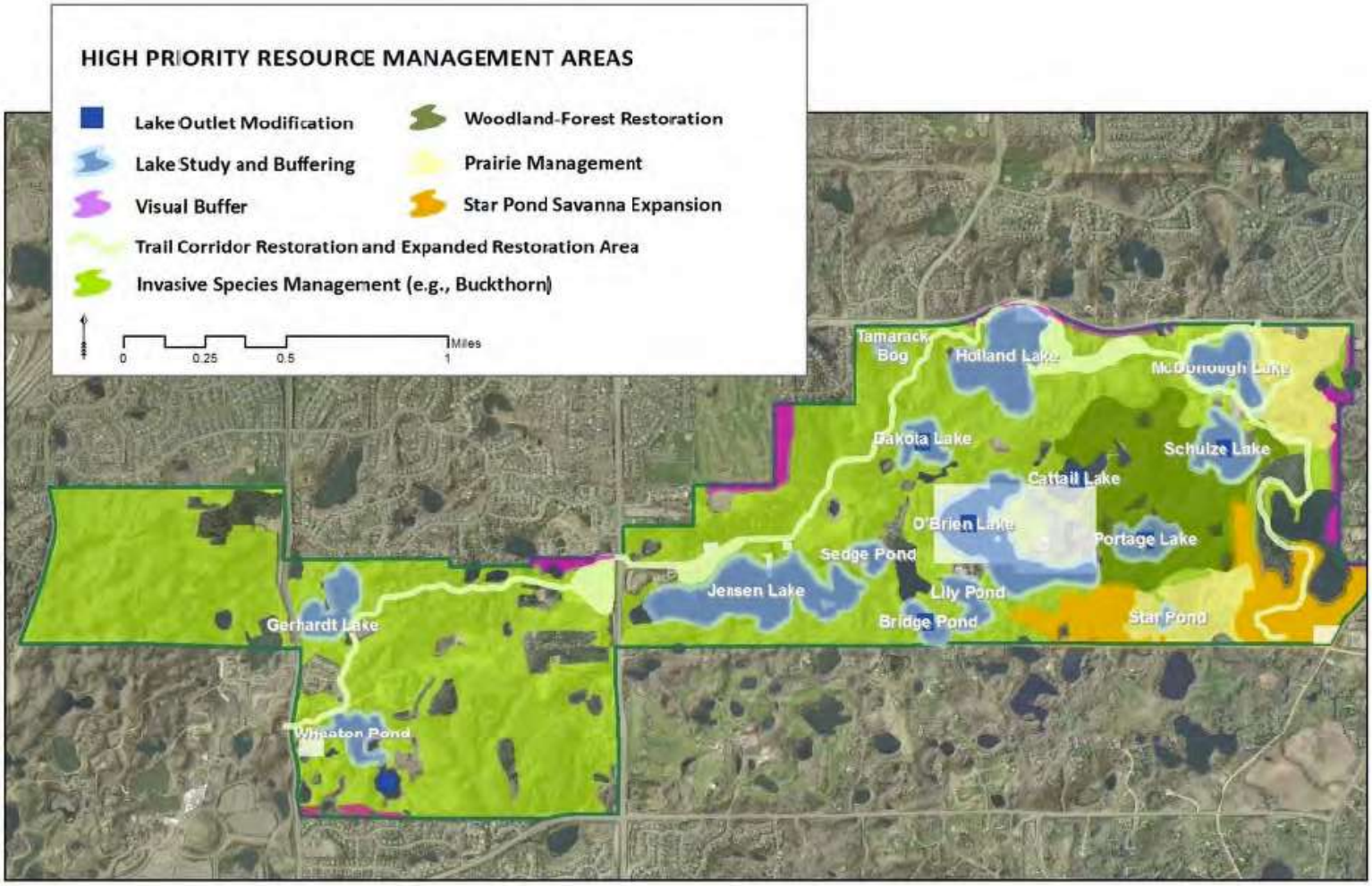

Figure 22-1 – High priority resource management areas identified in the Lebanon Hills Regional Park Master Plan, 2015. Woody vegetation removal/clearing activities completed as a part of the PTF grant activities occurred, and were evaluated, in the North East corner of the property in the vicinity of McDonough Lake and the park Visitor Center. Current management priorities in the area focus on restoration and management activities, as well as ongoing invasive species management.

Figure 22-2 – Lebanon Hills Regional Park work sites for activities funded with Parks and Trails Funding. Woody vegetation clearing/thinning activities for the McDonough Lake / Visitor Center area occurred in Sites 9 and 10. Information about activities completed in each site can be found in Table 2. Map provided by Dakota County Parks Natural Resource staff.

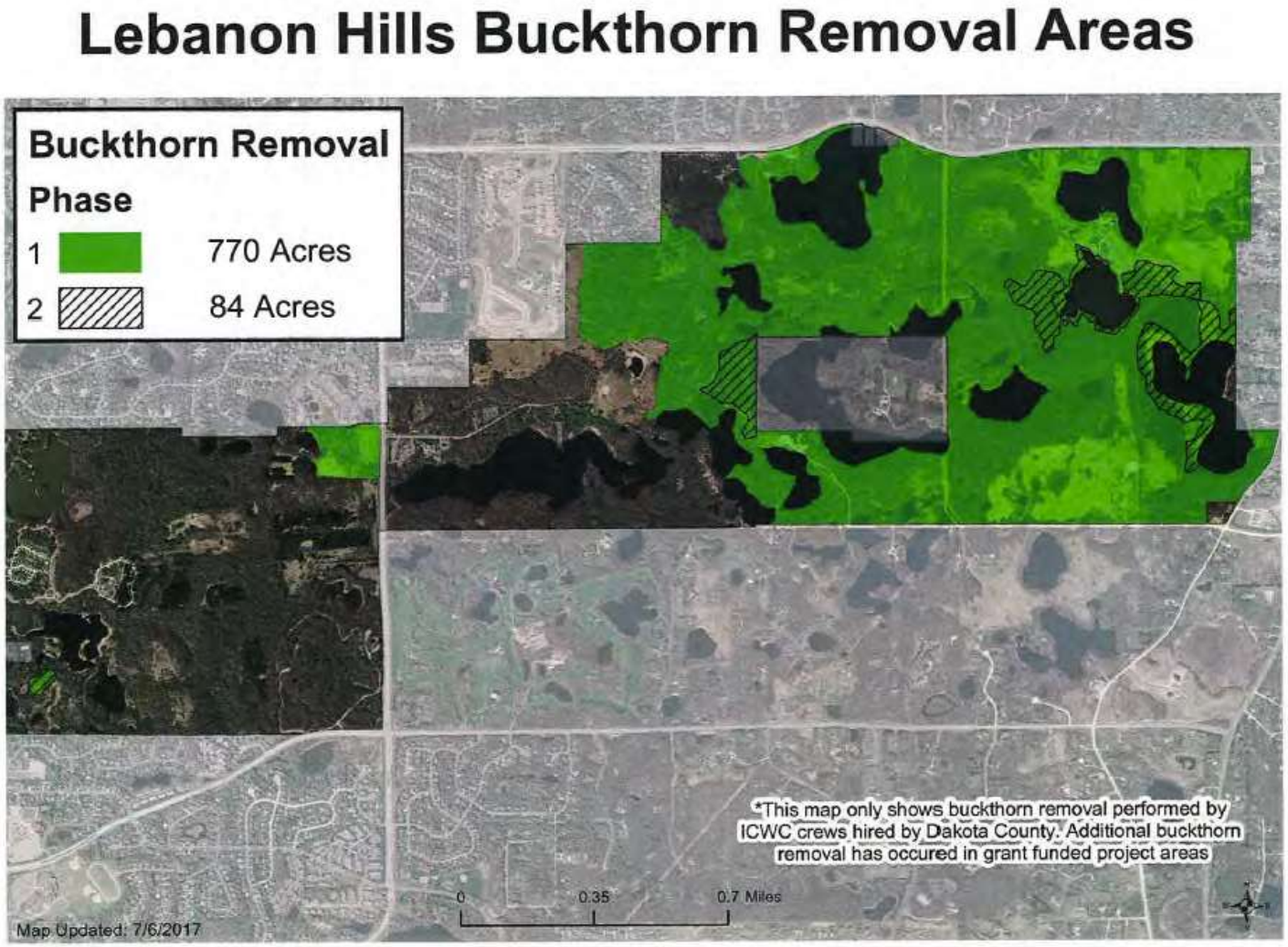

Figure 22-3 – Buckthorn removal completed by ICWC crews hired by Dakota County in and around the McDonough Lake / Visitor Center site. Throughout the site buckthorn removal was staged with activities targeted to be most effective for a given infestation level including cutting, treatment with Garlon, forestry mowing, and foliar spray. Removal or reduction of buckthorn in the project area has allowed Dakota County to focus on grants/activities making progress on some of the other restoration and enhancement priorities in the Lebanon Hills Regional Park Master Plan, 2015. Map provided by Dakota County Parks Natural Resources staff.

Figure 22-4 – USDA NRCS soil Map for the McDonough Lake / Visitor Center site in Lebanon Hills Regional Park.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 13, Oct 4, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure 22-4 – Continued

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
279B	Otterholt silt loam, 1 to 6 percent slopes	4.6	1.8%
342B	Kingsley sandy loam, 3 to 8 percent slopes	20.4	7.9%
342C	Kingsley sandy loam, 8 to 15 percent slopes	85.9	33.4%
342E	Kingsley sandy loam, 15 to 25 percent slopes	4.9	1.9%
344	Quam silt loam	5.8	2.2%
895B	Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes	9.9	3.8%
895C	Kingsley-Mahtomedi-Spencer complex, 8 to 15 percent slopes	30.3	11.8%
896E	Kingsley-Mahtomedi complex, 15 to 25 percent slopes	37.7	14.7%
896F	Kingsley-Mahtomedi complex, 25 to 40 percent slopes	13.7	5.3%
1824	Quam silt loam, ponded	5.5	2.1%
1902B	Jewett silt loam, 1 to 6 percent slopes	4.5	1.7%
W	Water	34.3	13.3%
Totals for Area of Interest		**257.4**	**100.0%**

Figure 22-4 – Continued

Table 22-1 – Work completed in Dakota County Parks – Lebanon Hills Regional Park (LHRP) at the Visitor Center site funded by Parks and Trails Funding. Tasks performed at a park-wide or county-wide level are not included here but may have occurred at LHRP. Data provided by Dakota County Parks Natural Resource staff.

Fiscal Year	Activity
2012	LHRP - Brush removal at Maple Bottom - Site 9
2012	LHRP - Brush removal at NE Savanna - Site 10
2013	LHRP - BT removal throughout the park
2013	LBRP - Prairie maintenance and Siberian elm removal
2014	LHRP Buckthorn Blitz 35 days
2014	LHRP Buckthorn Blitz 19 days
2014	LHRP Buckthorn Blitz 44 days
2014	LHRP Buckthorn Blitz 54 days
2014	LHRP Buckthorn Blitz 48 days
2014	LHRP Buckthorn Blitz 65 days

Appendix 22B: Site Photographs

Photo 22-1 – Recently cut buckthorn stump. Initial woody vegetation removal efforts focused on larger diameter stems (1 ½ in +) which may have the ability to produce seeds. Stumps were treated with Garlon following cutting and rarely showed any signs of reporting. Photo taken during site visit 11/29/2017.

Photo 22-2 – Older cut buckthorn stumps. Like newly cut stems on site, older cuttings showed very little evidence of reporting. Photo taken during site visit 11/29/2017.

Photo 22-3 – DNR and Dakota County Parks staff inspecting new young buckthorn stems in an area where larger diameter stems had been eliminated. Some areas of the park have a higher density of young stems that have come back and ongoing management is planned for those areas including cutting, stump treatment, forestry mowing, fire, and or foliar spray. Photo taken during site visit 11/29/2017.

Photo 22-4 – Garlic mustard growing in the understory of an area targeted for woody invasive removal. Ongoing invasive species management in the park will include woody and herbaceous invasives. Photo taken during site visit 11/29/2017.

Photo 22-5 – Oak Savanna on a sandy hillside west of McDonough Lake and north of the Visitor Center. This was an area targeted for woody vegetation removal/thinning to facilitate ongoing regeneration of desirable species such as Bur Oak. Photo taken during site visit 11/29/2017.

Minnesota Department of Natural Resources
Minnesota Board of Water and Soil Resources

23 - PTF Dakota County Parks, Lebanon Hills Buck Pond

Legacy Fund Restoration Evaluations

Project Background

Project Name: Lebanon Hills

Project Location: Buck Pond Site

Township/Range Section: Township 27N Range 23W Section 34

Project Manager / Affiliated Organization: Dakota County Parks, Natural Resources Manager, Tom Lewanski

Fund: PTF ***Fiscal Year Funds:*** 2012, 2013, 2014

Project Start Date: 2012

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Aquatic

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. ***What are the specific project components and treatments?***

Non-native woody species (including Buckthorn and honeysuckle species) control in mesic hardwood and fire dependent woodland plant communities. Cut stump, brush saw, and post cutting herbicide treatments to prevent re-sprouting of deciduous plants.

2. ***What plans / record of project decisions / prescription worksheets are available? Provide location for the data?***
   Lebanon Hills Regional Park Master Plan, 2015 from Dakota Co Parks Nat Resources.
3. ***What are the stated goals of the project?***
   Restoration of mesic woodland and prairie communities. Another part of the project area has been part of a wetland restoration project, which has been completed using other funding sources.
4. ***Were measures of restoration success identified in plans?*** *No*
   If yes, list specific measurements.
   Click here to enter text.
5. ***Are plan Sets available?*** Yes ***Have new GIS maps been created?*** Yes
   If yes, provide in Appendix A and list Maps provided:
   Pre-project planning maps are attached
6. ***Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?***
   Buckthorn and honeysuckle plants were cut and removed from the site. Initial focus was on seed bearing plants. Stumps were treated using an appropriate herbicide mixture. Follow up treatments include additional treatments on any re-sprouting plants, control of smaller seedlings including herbicide treatments and prescribed fire.
   Public communication to visitors was also part of the project.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

7. ***Were alterations made to the original plan during construction?***
   Yes
   The density of smaller woody stems was significantly greater after the removal of larger seed bearing scrubs. The best treatment option was to plan for additional herbicide treatments and use of prescribed fire to control new seedling and any re-sprouted buckthorn.
8. ***In what ways did alterations to the plan or implementation change the proposed project outcome? Did this change derive from a desire to change outcomes?***
   The changes addressed issues and will increase the project success.

Site Assessment

Field Review Date: **11/29/2017**

9. ***Surrounding Landscape Characteristics:***
   Mesic woodland and Upland restored prairie on level and gently rolling slopes.
10. ***Site Characteristics:***
    a. ***Soils:***
    Gotham loamy fine sand and Kingsley sandy loam and Kingsley-Mahtomedi complex.
    b. ***Topography:***

Site includes area that are nearly level (0 to 2 percent slopes to wooded hills (with 8 to 40 percent slopes).

c. Hydrology:

Project activities were limited to upland areas which have well drained soils. There are no hydric features in the woody vegetation management areas of this project. The larger project area identified the 2015 Management Plan does feature the Buck Pond wetland restoration site.

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Click here to enter text.

e. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

11. ***Is the plan based on current science?*** Yes

    Current best management practices were utilized including minimizing soil disturbance and avoidance of impacts to non-target species.

12. ***List indicators of project outcomes at this stage of project:***

    Mature seed bearing buckthorn is now absent from the site. There is minimal basal re-sprouting of controlled deciduous species that were cut and stump treated. There are areas within the project areas that show significant buckthorn seedling growth in response to removal of larger buckthorn. Buckthorn stumps have been treated with an appropriate herbicide mixture.

13. ***Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?***

    Yes

14. ***Are corrections or modifications needed to meet proposed outcomes?***

    Yes. Some of the woody stems that were cut were shattered. This does increases the potential for re-sprouting to occur. Re-sprouts will require new cutting and stump treatments, basal bark treatments or foliar herbicide applications or a combination of these methods.

15. ***Do proposed or planned future steps, including long term management, appear practical and reasonable? What are the potential challenges or limitations?***

    Yes. The project location is likely to have a significant non-native species seed bank which means that future control efforts are anticipated and are ongoing.

16. ***Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.***

    No

17. ***Are follow-up assessments needed? Explain.***

    Yes, monitoring and follow up buckthorn control efforts will be necessary.

18. ***Additional comments on the restoration project.***

    Click here to enter text.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

19. ***The project will:***
    Meet proposed outcomes
    Confidence of outcome determination:
    Medium
20. ***Provide explanation of reason(s) for determination.***

The methods used in the mesic woodland and prairie portions of this project have been found to be successful in similar setting. Current project oversight is good and there is awareness of the future management needs and identification of anticipated methods to continue to move to the next stages of invasive species control and native plant community restoration. The understory in the mesic woodland has good composition. However, there are numerous nonnative herbaceous and woody species which are anticipated to future management challenges. These will require ongoing maintenance and management so the site does not revert to a low quality and lower diversity woodland and prairie site.

21. ***Site Assessor(s) Conducting Review:***
    Mark Cleveland, MN DNR

Appendix 23A: Site maps, Project plans or Vegetation tables

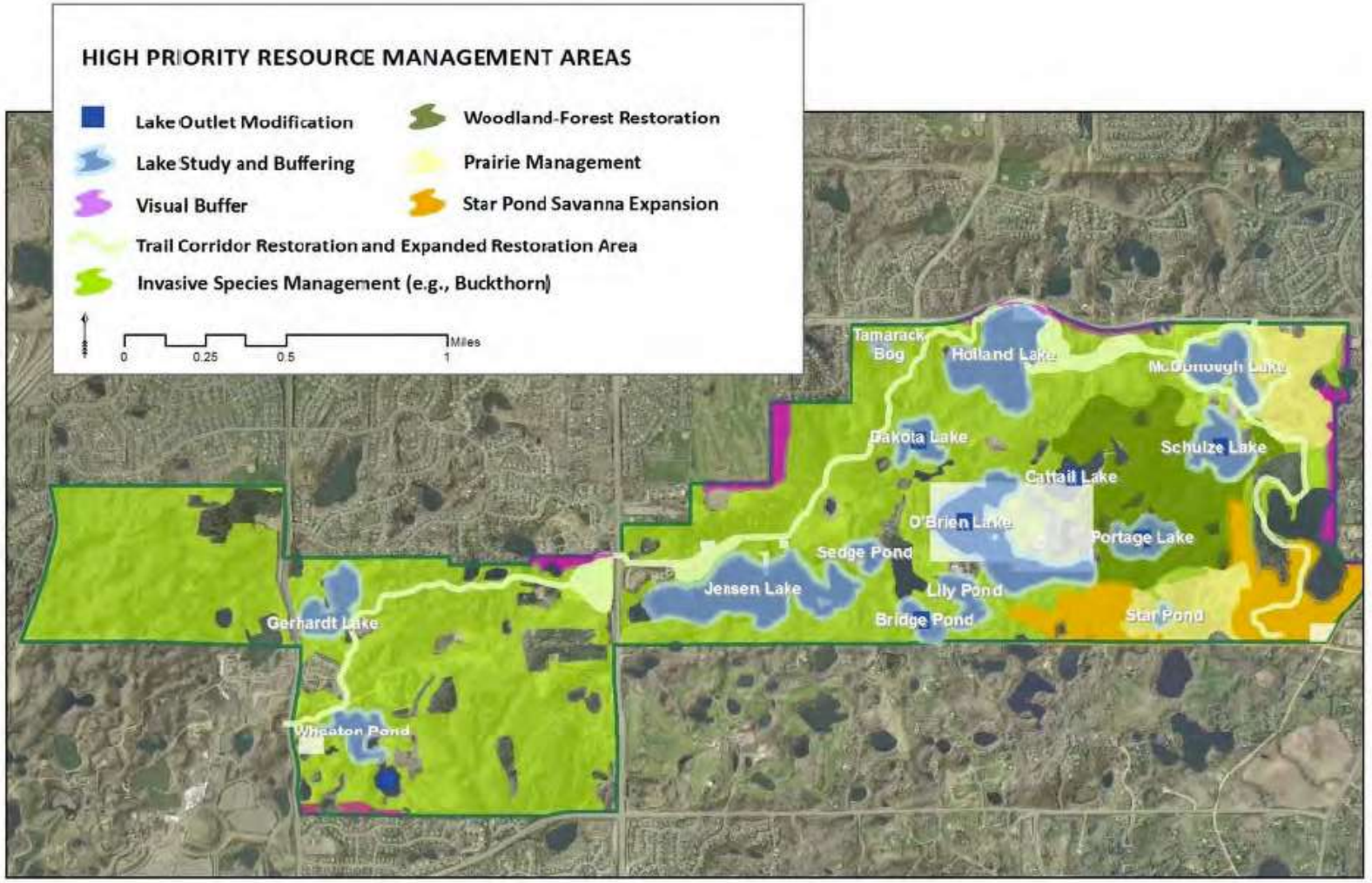

Figure 23-1 – High priority resource management areas identified in the Lebanon Hills Regional Park Master Plan, 2015. Woody vegetation removal/clearing activities completed as a part of the PTF grant activities occurred, and were evaluated, around Buck Pond (unlabeled water body North West of Sedge Pond).

Figure 23-2 – Lebanon Hills Regional Park work sites for activities funded with Parks and Trails Funding. Woody vegetation clearing/thinning activities for the Buck Pond area occurred in site 8. Information about activities completed in site 8 can be found in Table 1. Map provided by Dakota County Parks Natural Resource staff.

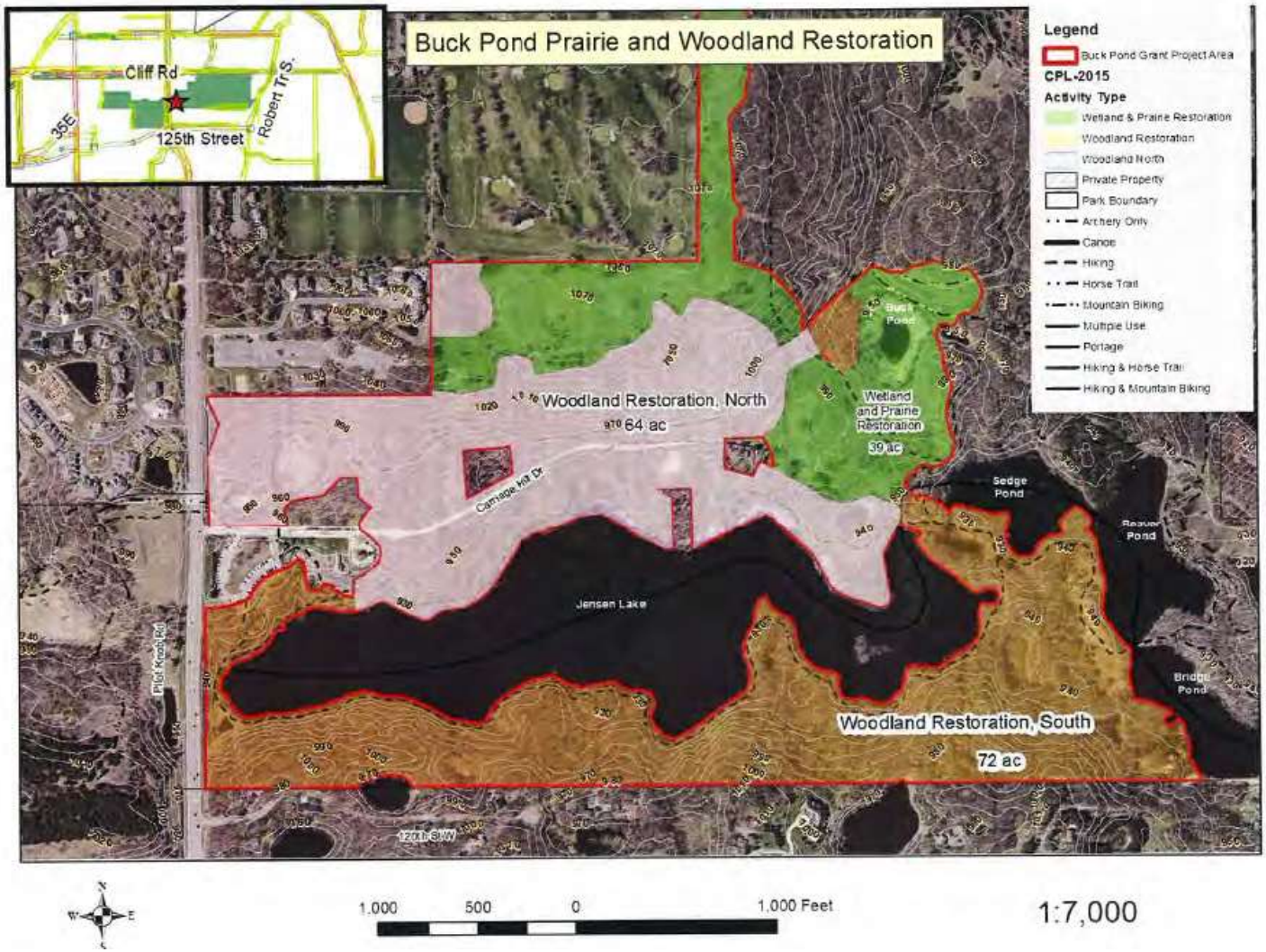

Figure 23-3 – Woody removal has been done and is ongoing in the Buck Pond Prairie and Woodland Restoration Area. Throughout the site buckthorn removal is being staged with activities targeted to be most effective for a given infestation level including cutting, treatment with Garlon, forestry mowing, and foliar spray. Removal or reduction of buckthorn in the project area has allowed Dakota County to focus on grants/activities making progress on some of the other restoration and enhancement priorities in the Lebanon Hills Regional Park Master Plan, 2015. At the time of review Map provided by Dakota County Parks Natural Resources Staff.

Figure 23-4 – USDA NRCS soil Map for the McDonough Lake / Visitor Center site in Lebanon Hills Regional Park.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure 23-4 – Continued

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
177A	Gotham loamy fine sand, 0 to 2 percent slopes	4.8	2.0%
177B	Gotham loamy fine sand, 2 to 6 percent slopes	24.9	10.4%
177C	Gotham loamy fine sand, 6 to 12 percent slopes	10.3	4.3%
279C	Otterholt silt loam, 6 to 15 percent slopes	13.6	5.7%
283D	Plainfield loamy sand, 6 to 18 percent slopes	8.7	3.6%
342B	Kingsley sandy loam, 3 to 8 percent slopes	2.8	1.2%
342C	Kingsley sandy loam, 8 to 15 percent slopes	2.3	0.9%
342F	Kingsley sandy loam, 25 to 40 percent slopes	7.5	3.1%
344	Quam silt loam	3.4	1.4%
454C	Mahtomedi loamy sand, 8 to 15 percent slopes	4.0	1.7%
454E	Mahtomedi loamy sand, 15 to 25 percent slopes	8.7	3.6%
611F	Hawick loamy sand, 20 to 40 percent slopes	11.2	4.7%
895B	Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes	18.4	7.7%
895C	Kingsley-Mahtomedi-Spencer complex, 8 to 15 percent slopes	35.4	14.9%
896E	Kingsley-Mahtomedi complex, 15 to 25 percent slopes	26.6	11.2%
1816	Kennebec variant silt loam	2.8	1.2%
1824	Quam silt loam, ponded	2.1	0.9%
W	Water	50.8	21.3%
Totals for Area of Interest		**238.2**	**100.0%**

Figure 23-4 – Continued

Table 23-1 – Work completed in Dakota County Parks – Lebanon Hills Regional Park (LHRP) at the Buck Pond site funded by Parks and Trails Funding. Tasks performed at a park-wide or county-wide level are not included here but may have occurred at LHRP. Data provided by Dakota County Parks Natural Resource staff.

Fiscal Year	**Activity**
2012	LHRP - Brush removal at Buck Pond - Site 8
2013	LHRP - Tree and brush removal in rattlebox prairie - Site 8
2013	LHRP - BT removal throughout the park
2014	LHRP Buckthorn Blitz 35 days
2014	LHRP Buckthorn Blitz 19 days
2014	LHRP Buckthorn Blitz 44 days
2014	LHRP Buckthorn Blitz 54 days
2014	LHRP Buckthorn Blitz 48 days
2014	LHRP Buckthorn Blitz 65 days
Fiscal Year	Activity

Appendix 23B: Site Photographs

Photo 23-1 – Forested hillside after recent forestry mowing and stump treatment with Garlon. Mowing and stump treatment had occurred just prior to site visit as a part of ongoing management efforts. Photo taken during site visit 11/29/2017.

Photo 23-2 – Resprouts from a cut buckthorn stem. Throughout the site there was evidence of effective woody vegetation removal/thinning activities with limited resprouting. Photo taken during site visit 11/29/2017.

Photo 23-3 – Small diameter buckthorn stem treated with Garlon following forestry mowing. This stem is an example of the precise and through hand application of the herbicide. Photo taken during site visit 11/29/2017.

Photo 23-4 **–** Buck Pond, an area of active restoration and enhancement activities in Lebanon Hills Regional Park. Following confirmation of active native seed bank, the perimeter of the pond was scraped to remove reed canary grass. Photo taken during site visit 11/29/2017.

Photo 23-5 – DNR and Dakota County Parks staff inspecting upland area used to hold reed canary grass scraped off of Buck Pond. Following woody vegetation management around Buck Pond, resource managers were able to focus on restoration and enhancement activities including scraping and restoration of Buck Pond. Photo taken during site visit 11/29/2017.