Ford Brook, Pickerel Lake, and East Twin Lake Subwatershed Analysis

Prepared by

ANOKA CONSERVATION DISTRICT

Ford Brook, Pickerel Lake, and East Twin Lake Subwatershed Analysis: 2024

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Project Profile

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Disclaimer: At the time of printing, this report identifies and ranks potential Best Management Practices (BMPs) for selected subwatersheds in the cities of Nowthen, Ramsey, and Oak Grove that drain to Ford Brook. This list of practices is not all-inclusive and does not preclude adding additional priority BMPs in the future. An updated copy of the report shall be housed at Anoka Conservation District.

Abstract

The Anoka Conservation District (ACD) completed a subwatershed analysis (SWA) for the purpose of identifying and ranking water quality improvement projects in priority drainage areas of the Ford Brook watershed (HUC 070102070705). This watershed encompasses approximately 24,000 acres throughout the northwestern corner of Anoka County and portions of Sherburne and Isanti Counties. Land use in this region is characterized by scattered agricultural operations and increasing residential and commercial development. Ford Brook was identified as a priority waterbody in local watershed plans due to the elevated nutrient loads it contains and ultimately delivers to Trott Brook and the Rum River; therefore, total phosphorus (TP) was the target pollutant for this analysis. Although a TMDL with defined annual reduction goals does not exist for Ford Brook, a total TP reduction of approximately 5% is sought for the Rum River and project implementation within the Ford Brook watershed is intended to support this reduction effort. Pickerel and East Twin lakes, both of which are located within the headwaters region of the Ford Brook watershed, are also priority waterbodies in local watershed plans and thus were assessed individually for water quality protection opportunities as part of this SWA.

This subwatershed analysis is primarily intended to identify Best Management Practices (BMPs) and Conservation Practices (CPs) with the greatest potential to improve water quality in Ford Brook and, by extension, the Rum River. Land use and water quality monitoring data suggest that agricultural runoff from fields within the stream's direct drainage subwatershed is likely contributing most to elevated TP concentrations reaching the Ford Brook outlet. Therefore, agricultural BMPs are the primary project type explored in this analysis. The Prioritize, Target and Measure Application (PTMApp) – a watershed planning tool designed for rural landscapes and informed by a collection of refined watershed-specific datasets - was used to identify drainage areas likely contributing most to nutrient and sediment loads in Ford Brook, generate a list of candidate water quality improvement projects within those priority drainage areas, and estimate costs, pollutant reductions, and cost effectiveness associated with each candidate project.

Project cost estimates are based on annualized Useful Life Total Costs (ULTC) generated by PTMApp, which accounts for the anticipated costs of planning, design, permitting, construction, inspection, operation, and maintenance. Candidate projects were then ranked based on cost effectiveness for Total Phosphorus removal ($ per pound of TP reduced, per year) as estimated at the priority waterbody (Pickerel Lake, East Twin Lake, or the Ford Brook outlet). Altogether, the top ~250 most cost-effective water quality improvement projects identified as part of these analyses are summarized in this report.

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Executive Summary

The Anoka Conservation District (ACD) completed a Subwatershed Assessment (SWA) for the Ford Brook watershed in Northwestern Anoka County to identify conservation projects that would protect and improve water quality in Ford Brook, Pickerel Lake, and East Twin Lake. These waterbodies are identified as priorities in local watershed management plans, including the Rum River One Watershed One Plan (1W1P) and Watershed Restoration and Protection Strategy (WRAPS) reports. The Ford Brook watershed, which also encompasses the Pickerel and East Twin Lake subwatersheds, lies almost entirely within the city of Nowthen and contains a mosaic of agricultural lands and rural residential development.

This analysis is primarily intended to identify potential conservation projects within the Ford Brook watershed that would produce the greatest total phosphorus (TP) reductions at the Ford Brook outlet, and the greatest water quality protection benefits for East Twin and Pickerel Lakes. TP concentrations in Ford Brook regularly exceed the state standard (100 µg/L) and thus contribute to elevated nutrient loads in Trott Brook and the Rum River downstream. Land use characteristics and water quality monitoring data indicate that agricultural land uses are likely the primary source of TP in the watershed's runoff. Because of this, the projects considered in this analysis were generally agricultural best management practices (BMPs) that facilitate source reduction, infiltration/ filtration, storage, and/or protection. Although total phosphorus (TP) was the target pollutant, co-occurring benefits for total suspended solids (TSS), Total Nitrogen (TN), and water volume reductions are also documented and discussed in this report. Similarly, other project types such as shoreline stabilizations are also considered, particularly within the East Twin and Pickerel Lake subwatersheds which contain little to no agriculture.

The Prioritize, Target, and Manage Application (PTMApp) was the primary tool used to identify suitable BMPs in priority watersheds and, subsequently, estimate their costs and the water quality benefits they would produce. PTMApp is a Geographic Information System (GIS)-based watershed planning tool that uses information from peer-reviewed literature and local datasets (e.g. soils, hydrology, elevation, and precipitation) to 1) model pollutant loading and transport throughout the watershed, 2) generate candidate rural BMPs, 3) estimate the water quality benefits produced by candidate BMPs at priority surface waters downstream, and 4) estimate the cost to plan, design, install, and maintain candidate BMPs.

A variety of rural best management practices were identified, including source reduction (reduced/ no till, cover crops, nutrient management, perennial crops, forage/ biomass planting, and prescribed grazing), filtration/ infiltration (riparian buffer, filtration strip, infiltration trench/ basin), protection (critical area planting, grassed waterway), and storage (water and sediment control basin and wetland creation/ restoration). Areas containing low-density (primarily residential) development were investigated for stormwater treatment opportunities typical of urban/suburban areas (e.g. rain gardens, stormwater treatment ponds, subsurface treatment structures, etc.). However, these areas currently lack curb, gutter, and storm sewer infrastructure; instead, stormwater is managed with roadside ditch networks which generally

contain sandy soils and are far-removed from Ford Brook. Although not sited as part of this analysis, urban/ suburban stormwater BMPs should be considered and pursued alongside increasing development in this region.

If all of the practices identified during this analysis were installed, substantial pollutant reductions could be accomplished. However, funding limitations and landowner interest make this goal unlikely. Furthermore, while a single field may be suitable for multiple types of BMPs, it would often be impractical and unnecessary to install all of them. Rather, it is recommended that projects be installed in order of cost-effectiveness (pounds of pollution reduced per dollar spent) with consideration of treatment train effects from upstream projects if two or more are pursued within a single drainage area. In this report, candidate BMPs were ranked based on their annual cost effectiveness for TP reduction ($/ lb TP reduced) as estimated at the priority waterbodies. Other factors, including a project's educational value/visibility, anticipated treatment train effects from nearby projects, construction timing, total cost, or non-target pollutant reduction also affect project installation decisions and should be considered by resource managers when pursuing projects.

In summary, 244 candidate projects were identified throughout priority drainage areas in the Ford Brook watershed. Project types generally consisted of source reduction (102, 41% of total), filtration/infiltration (28, 11% of total), protection (56, 23% of total), and storage (58, 24% of total).

Overall, cost-effectiveness for TP removal ranged from $70/lb-TP to greater than $4,000/lb-TP, with most projects falling into the ~$200 – $2,000/ lb TP removed range. Cost-effectiveness for TSS removal ranged from ~$60/1,000 lbs-TSS to greater than $5,000/1,000 lbs-TSS. The most cost-effective projects for both TP and TSS removal were source reduction practices such as no-till, reduced till, and cover crops.

Installation of projects in series will result in lower total treatment than the simple sum of treatment achieved by the individual projects due to treatment train effects. Reported treatment levels are dependent upon optimal site selection and sizing. More detail about each project is available in the project profile pages of this report. Projects deemed infeasible due to prohibitive size, number, or expense were not included in this report.

In total, 18 different types of practices were considered. Drainage areas within the 24,000-acre study watershed were consolidated into 557 catchments and 12 subwatersheds (collections of catchments draining to a common waterbody), which allowed for a finer-scale analysis of load and load reduction estimates at priority points throughout the watershed.

The PTMApp model was not calibrated and was only used as an estimation tool to identify and prioritize projects within the priority subwatershed. In no case should the pollutant loading, pollutant reduction, project cost, or project cost effectiveness data included in this report be used to represent actual values, nor does this report serve as a TMDL for the study area.

Similarly, the positioning of candidate practices on the landscape was automated by the PTMApp model. The outputs were manually reviewed, refined, and added to as needed based on staff knowledge of the local landscape. Even so, project outlines mapped in this report should only be used as a starting point for the development of more refined designs if and when projects are pursued.

Document Organization

This document is organized into five primary sections, plus references and appendices. Each section is briefly described below.

Background

The background section provides a brief description of landscape characteristics and water quality information for the target watershed(s).

Methodology

The methodology section overviews the procedures that were followed when analyzing the target watersheds. It explains the processes of drainage area prioritization, BMP scoping, desktop analysis, modeling, and cost/treatment analysis.

Project Ranking and Selection

The project ranking and selection section describes the methods and rationale for how projects were ranked for this report. Local resource management professionals will be responsible to select and pursue projects, taking into consideration the many possible ways to prioritize projects. Several considerations in addition to project cost-effectiveness for prioritizing installation are discussed. Project funding opportunities may play a large role in project selection, design, and installation.

BMP Descriptions

For each type of project included in this report, there is an associated NRCS practice standard overview sheet provided in Appendix D detailing practice purpose and application. Theory and documentation for PTMApp calculations driving cost and pollutant reduction estimates can be found on the MN Board of Water and Soil Resources designated PTMApp webpage.

Project Profiles

Maps and tables detailing candidate projects in the East Twin and Pickerel Lake watersheds are provided in their respective sections in the body of the report. Individual project profile sheets for all other candidate BMPs targeting pollutant reductions in Ford Brook are provided in Appendices F-N. These profile sheets correspond with ranked cost effectiveness tables provided in the body of the report. In these profiles, individual project details such as drainage area, anticipated pollutant and water volume reductions, and cost estimates are provided.

References

This section identifies various sources of information synthesized to produce the protocol used in this analysis.

Appendices

This section provides additional candidate project details, supplemental information on the targeted watershed, and/or data used during the analysis.

Background

Study Areas

Ford Brook is a stream tributary to the Rum River which is located almost entirely within the City of Nowthen in northwestern Anoka County. It originates from a chain of three lakes (Goose, Pinnaker, and Eckstrom) and then flows south until merging with Trott Brook immediately upstream of the Rum River. In its entirety, the Ford Brook watershed encompasses 24,400 acres comprised of small-scale agricultural land uses, increasing residential development, generally flat topography, a shallow water table, and abundant wetlands.

Pickerel and East Twin Lakes are located within the headwaters region of the Ford Brook watershed; as a result, they are hydrologically far removed from the stream's outlet. Both have good water quality and small watersheds containing scattered low-density residential areas, undeveloped open spaces, and few to no extant cultivated fields.

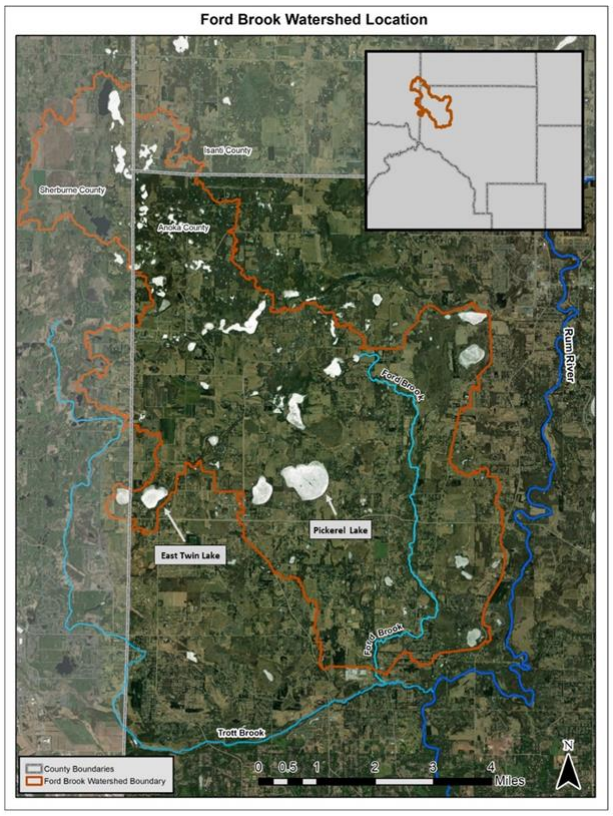


Figure 1: Ford Brook watershed location

Hydrology

Over 50% of the Ford Brook watershed area (~14,000 acres) lies within its headwaters region upstream of the chain of lakes from which the stream's main channel originates. This region contains several lakes, particularly within the northwestern-most extent of the watershed. Wetlands are abundant throughout both the headwaters and direct drainage areas, but many have been impacted by a history of drainage, filling, and other modifications to increase useable land for agriculture and rural development. Many private and public drainage ditches are present to manage runoff (Appendix A). Given the high water table in this region it is likely that subsurface tile drainage is prevalent in throughout the watershed, but field-specific data for these features were not available at the time of this analysis.

Soils

The majority of the Ford Brook watershed contains group A (sand, loamy sand, or sandy loam) or group B (silty loam or loam) soils with moderate to high infiltration rates. Group C soils (sandy clay loam) are also present but less common. However, a shallow water table (<10 ft) is prevalent throughout much of the watershed, which has led to widespread soil drainage networks and correspondingly group A/D and B/D soils (Appendix A).

Land Use and Land Cover

Agriculture historically dominated land use in this region, but residential development has steadily increased in recent years. Even so, many crop, pasture, and hay fields remain, but few to none of them

contain known BMPs. Corn, soybeans, and hay/ alfalfa are the primary crops grown and harvested. Sod farms are also abundant in the region upstream of Goose, Pinnaker, and Eckstrom Lakes. Natural land in the watershed is primarily composed of deciduous woodland and herbaceous wetlands. See *Appendix A* for a map of land cover in the watershed, which is derived from the National Landover Dataset (NLCD) and manually updated as needed to reflect local knowledge of land use changes.

Water Quality

Ford Brook

Ford Brook is identified by the Rum River One Watershed One Plan (1W1P) report and Watershed Restoration and Protection Strategies (WRAPS) report as a contributor of polluted runoff to the Rum River. Water quality monitoring at the Ford Brook outlet has occurred periodically since 1998, but has not previously been conducted elsewhere throughout the watershed. Therefore, four additional sites were monitored in 2022 to gain a better understanding of contaminant transport within the watershed: two within the Ford Brook channel (one at its starting point at the Eckstrom Lake outlet and another approximately halfway to the Ford Brook outlet), one at the outlet of the Ford Brook headwaters region, and one at the outlet of a large ditch network entering Ford Brook immediately prior to its convergence with Trott Brook (see *Figure 2* for monitoring locations). Drought during much of the 2022 growing season impacted monitoring efforts in locations where streambeds ran dry, resulting in fewer samples than planned at some sites.

Overall, water quality monitoring confirmed that Total Phosphorus (TP) continues to be present at high concentrations in Ford Brook (*Figure 3*). In 2022, average TP concentrations across all monitoring locations regularly exceeded the state standard for impairment (100 µg/ L) and median for Anoka County streams (91 µg/ L) during both baseflow conditions and following storm events. Furthermore, historical monitoring data at the Ford Brook outlet also indicate that this threshold has been exceeded regularly across time. Farther upstream in the watershed, TP concentrations were often elevated prior to entering the chain of lakes from which the Ford Brook channel flows, but were reduced by the time water exits Eckstrom Lake and enters the Ford Brook main channel. This indicates that Goose, Pinnaker, and/or Eckstrom lakes likely capture some phosphorus through naturally occurring processes such as the settling of particulate material and consumption of dissolved phosphorus by aquatic plants. Total phosphorous concentrations then increase again as Ford Brook flows south, and remain constant from the midway point to the outlet; this indicates that phosphorus sources are likely scattered throughout the watershed downstream of the headwaters region.

Both Total Suspended Solids (TSS) and turbidity were generally low throughout the Ford Brook watershed and at its outlet in 2022, remaining below state water quality standards for both baseflow conditions and storm events. The same is true for historical trends, for which only a few sampling events have exceeded the state standards for TSS. Like TP concentrations, elevated TSS and turbidity were reduced as water passes through the Goose, Pinnaker, and Eckstron chain of lakes. However, unlike

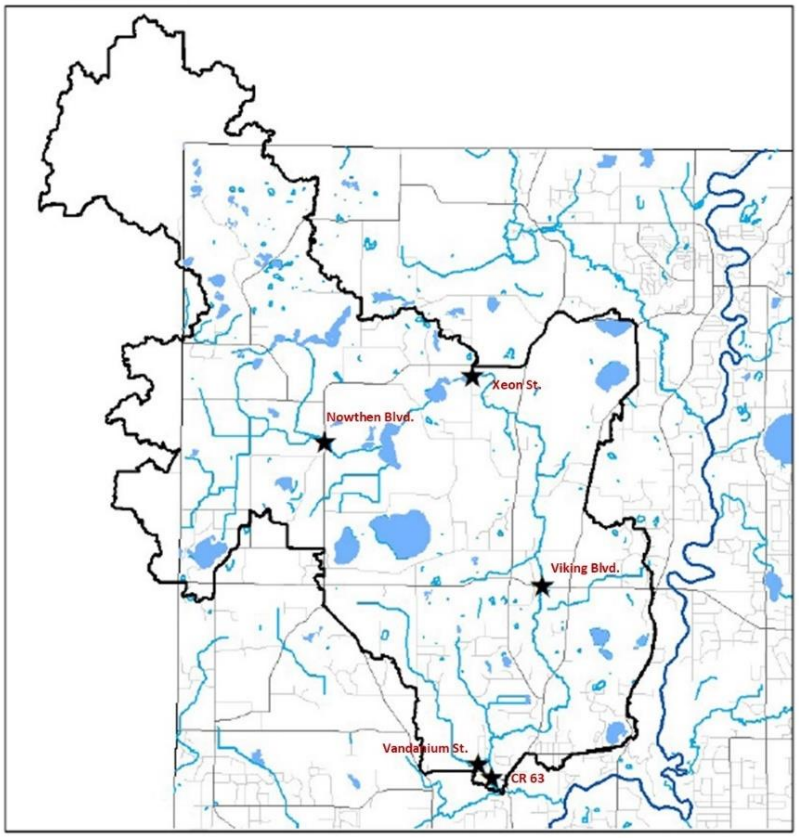


Figure 2. Ford Brook water quality sampling locations.

phosphorus, these metrics generally did not increase again as Ford Brook flowed south. Given this, it's likely that a large portion of the phosphorus present in Ford Brook has been transported in a dissolved form.

Because Total Phosphorus is the primary contaminant of concern in Ford Brook and the Rum River downstream, candidate conservation projects were selected and ranked based on their anticipated phosphorus reductions to Ford Brook (as measured at the Ford Brook outlet). Although phosphorus reductions were prioritized, most candidate BMPs would also provide nitrate, sediment, and water volume reduction benefits.

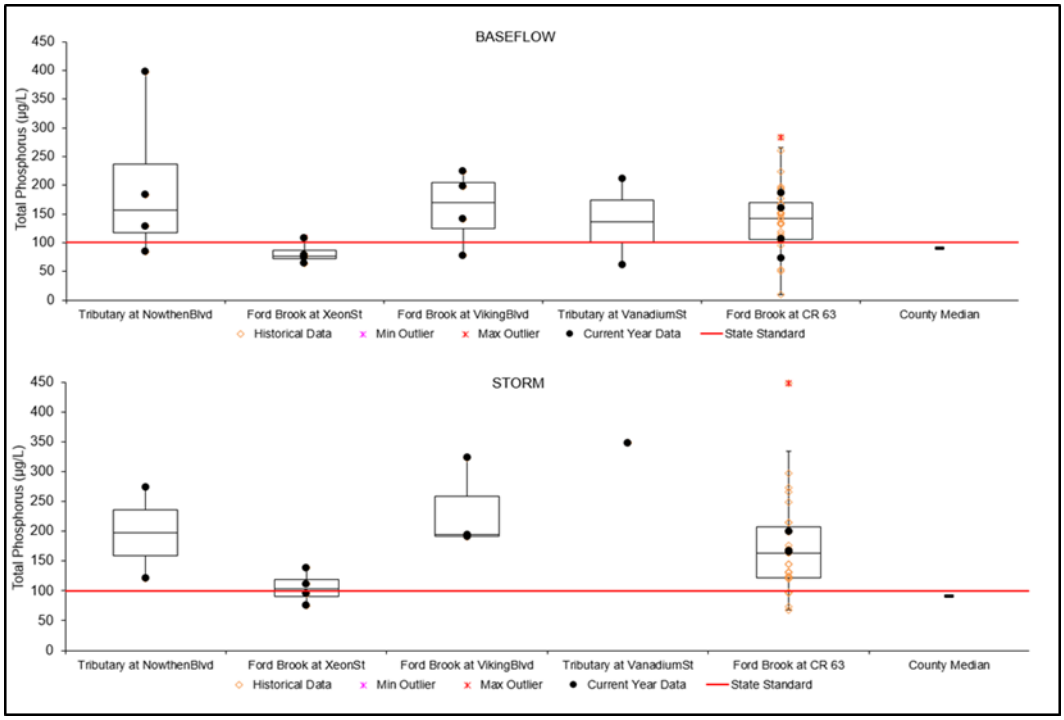


Figure 3. Total phosphorus concentrations at targeted water quality monitoring locations in the Ford Brook watershed.

Pickerel Lake

Ambient surface water monitoring data collected by the Minnesota Pollution Control Agency from 1980 to 2019 indicate that Pickerel Lake has contained consistently good water quality over time. Total phosphorus (*Figure 4*), total suspended solids, and secchi depth measurements were typically well within state water quality standards for shallow lakes in the region. Due to its small, mostly undeveloped watershed and existing high water quality, Pickerel Lake is predominantly a high priority for protection efforts.

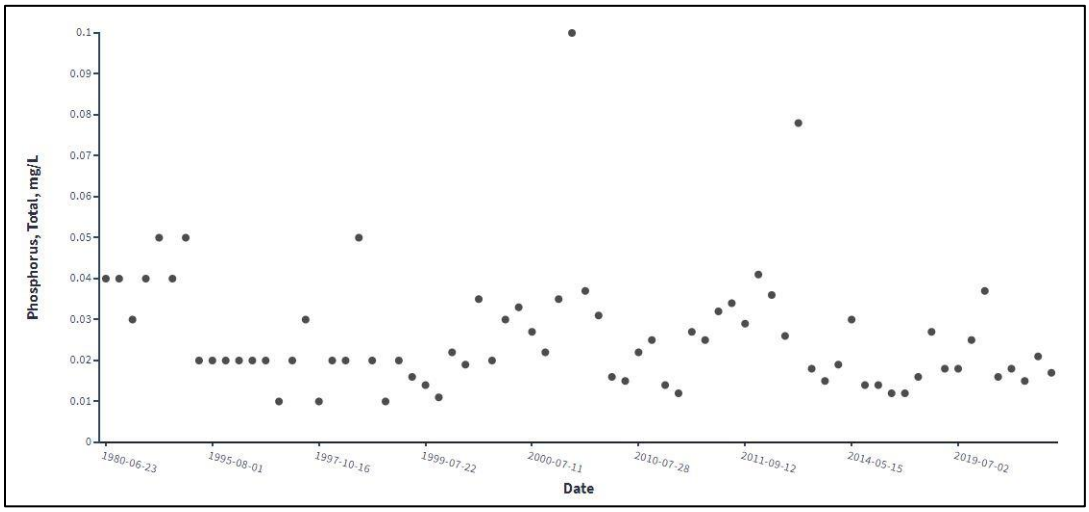


Figure 4. Pickerel Lake phosphorus concentrations, 1980 – 2019. The median concentration across all years in 0.02mg/L. Source: Minnesota Pollution Control Agency – Ambient Surface Water Monitoring.

East Twin Lake

Water quality data for East Twin Lake has been collected intermittently by the Anoka Conservation District, Metropolitan Council, and Anoka Conservation District from 1980-2021. Total phosphorus, total suspended solids, and secchi depth indicate excellent water quality across this time period (*Figure 5*). This is likely due in large part to the lake's depth (maximum of 68 ft.). The watershed is relatively small and is largely undeveloped with some agriculture, another lake (Twin Lake) upstream, and low-density residential development. Given the existing high water quality, East Twin Lake is primarily a priority for protection efforts.

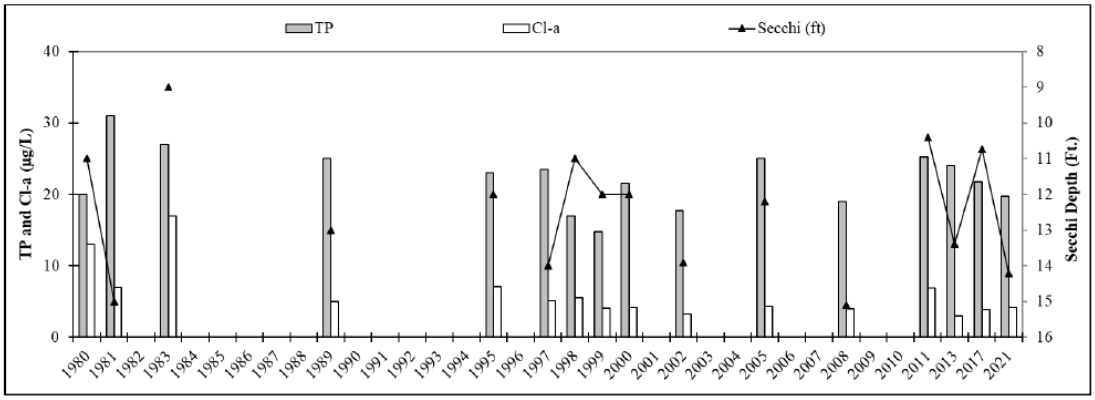


Figure 5. East Twin Lake annual averages for total phosphorus, chlorophyll a, and secchi depth, 1980 – 2021. Graph source: Anoka Conservation District Water Almanac, 2021.

Methodology

PTMApp Modeling for Rural BMPs

The Prioritize, Target, and Measure Application (PTMApp) was the primary tool used to estimate pollutant loading and identify project opportunities throughout the Ford Brook watershed. PTMApp was chosen for this analysis for the following reasons:

- Designed for rural areas
- Developed for Local Government Unit staff in the context of Minnesota landscapes
- Identifies drainage areas likely contributing most to nutrient and sediment loading in priority waterbodies
- Generates candidate conservation projects and estimates of their water quality benefits at priority waterbodies
- Affordable (the toolbar is free and requires only a Basic ArcGIS license)
- Recommended by the MN Board of Water and Soil Resources (BWSR) for use in local watershed planning efforts

The Agricultural Conservation Planning Framework (ACPF) toolbox was considered and compared alongside PTMApp in the early stages of watershed modeling and project identification, but due to ArcGIS licensing restrictions, strong similarities in BMP placement, and the PTMApp benefits listed above, all final outputs were sourced from the PTMApp toolbar.

Preparing Input Datasets

Multiple datasets are required to run the PTMApp toolbar. Some are provided in a downloadable "base" geodatabase, which is regularly updated and available on the PTMApp webpage. Other datasets need to be prepared by the user and compiled in a processing geodatabase. All datasets were prepared following methodology detailed in the PTMApp desktop user guides, with updates and modifications incorporated as needed to reflect project goals and local knowledge of the landscape.

Base Geodatabase

A full list of all datasets provided in the downloadable base geodatabase is detailed in the PTMApp desktop data catalog. Some of these datasets are required inputs for the PTMApp toolbar, while others are provided to reference as needed during planning processes. Brief descriptions of the primary datasets are provided below:

- **Rainfall**: NOAA Atlas 14 precipitation information for 2 year, 24 hour and 10 year, 24 hour rainfall events.
- **Soils:** NRCS Soil Survey Geographic Database (SSURGO), including RUSLE Kw (soil erodibility) factors. This dataset was used, occasionally in conjunction with others such as land use, to generate several separate SSURGO and RUSLE processing datasets.
- **Wetlands:** USFWS National Wetland Inventory.
- **Hydrography:** USGS National Hydrography Dataset flowline and waterbodies data.
- **Watershed boundaries:** USDA huc10 and huc12 watershed boundaries.
- **Supplemental Datasets:** Many other datasets were provided to reference during planning processes, but are not used directly for modeling within the PTMApp toolbar. These include

public land and municipal information, impaired waterbodies, flow monitoring gauges, and water quality sampling stations.

Land Use

Anoka County is one of the most rapidly developing regions in Minnesota. Because of this, existing land use datasets quickly become outdated as remaining rural landscapes bordering the metropolitan area often transition rapidly to industrial, commercial, or residential land uses. Land use impacts the movement of water, the pollutants it carries, and the placement of appropriate conservation practices, making an updated land use dataset essential to producing accurate outputs through PTMApp.

The 2019 National Land Cover Dataset (NLCD) was used as the base reference for land use information, and the USDA 2021 Cropland Data Layer, high-resolution aerial imagery, and field boundary datasets were referenced to manually update and enhance the base NLCD dataset (particularly cultivated cropland designations within it) to the greatest extent possible.

Digital Elevation Model (DEM) and Hydrology Products

- **Digital Elevation Model (DEM)**
  A high-resolution, hydrologically conditioned DEM is needed to accurately represent topography and flowpaths throughout the watershed. From this information, conservation practices are placed and metrics such as hydraulic travel time and load/ load reduction estimates are calculated. Features like bridges or roadways with underlying culverts can create "artificial dams" blocking water movement captured by the DEM, reducing the accuracy of the datasets derived from it.

  A 1-m resolution DEM derived from Light Detection and Ranging (LiDAR) was used as the base elevation product. Desktop analyses and field surveys were completed to identify areas containing culverts, bridges, and ditch networks poorly captured by the original DEM were "burned" into the DEM, producing a final hydroconditioned product used for PTMApp processing.

- **Flow Direction, Flow Accumulation and Hydraulic Travel Time**
  The hydrologically conditioned DEM (hDEM) was used to generate high resolution flow direction and flow accumulation rasters. Once created, these products were used to further refine the hDEM by identifying remaining discrepancies in the watershed's flow networks.

  The hDEM and corresponding flow direction/ flow accumulation rasters were used as inputs in the MNDNR Travel Time Toolbox (v2.0) to create a raster output simulating water travel time throughout the watershed, and thus the amount of time it takes runoff to reach the receiving waterbody.

Existing Best Management Practices

Known existing BMPs present in the study area can be incorporated into the PTMApp model to account for their water quality benefits and avoid siting projects where they already exist. ACD has not previously installed or managed agricultural BMPs in the Ford Brook watershed, and the Natural Resource Conservation Service (NRCS) also does not have any records of involvement with projects in this region.

The Minnesota buffer law requires the establishment of perennial vegetation buffers 50 feet wide along rivers, lakes, and streams, and 16.5 feet wide along ditches. The Ford Brook channel itself is surrounded by a generally wide buffer and floodplain which regularly exceeds 50 ft and rarely borders cultivated fields directly. However, many of its tributaries are composed of private ditch networks draining cropped fields, which fall under the 16.5 ft. buffer requirement. Buffers of this width are moderately effective at reducing sediment loading (~70% removal efficiency) and less effective at reducing dissolved nutrient loading (~50% removal efficiency for TP and TN) (Zhang et al. 2010). Because all waterways in the study area are currently compliant with the buffer law, estimated load reductions produced by existing buffers were applied to all model outputs as existing conservation practices, where applicable. Riparian buffers enhancements (strategically expanding existing buffers to widths of approximately 100 ft.) were still sited as candidate projects in in this SWA.

Lakes

Lake routing is a process in PTMApp which simulates the influences of biogeochemical lacustrine processes on the fate and transport of sediment and nutrients. These processes (e.g. burial and bio-assimilation) often result in the capture and/or reduction of sediment and nutrients entering the lake, and thus should be accounted for to improve loading estimates to priority resource points. A technical memorandum describing the theory and technical approach for lake routing is provided on the PTMApp webpage.

11 lakes were selected for inclusion in lake routing processes for the Ford Brook watershed. Information for each lake is provided in *Appendix B*.

All runoff from the Ford Book headwaters region passes through a chain of lakes (Goose, Pinnaker, and Eckstrom) before entering the Ford Brook main channel. For this reason, priority resource points were placed at the outlet of each to estimate the sediment and nutrient reductions they

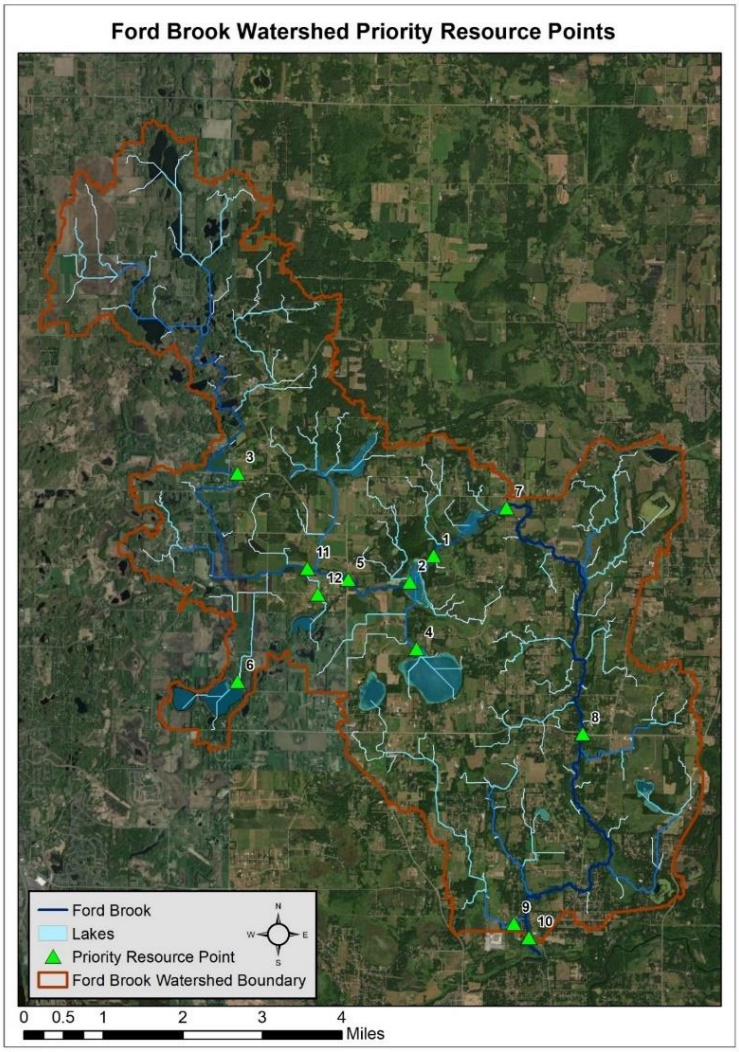


Figure 6. Priority Resource Points (PRPs) selected for water quality and pollutant loading estimates with PTMApp.

may be providing. The same was done for Pickerel and East Twin lakes, which are also priority waterbodies.

Priority Resource Points

Priority resource points (hereafter referred to as "PRP(s)") were selected in locations where estimates of pollutant loading and BMP-produced water quality benefits were sought. They were placed in the following locations:

- Intermittently along the Ford Brook main channel
- Outlets of major tributaries to Ford Brook
- Outlets of heavily cultivated subwatersheds
- Locations where water quality data was/ is being collected

A total of 12 PRPs were selected throughout the watershed. Details for each PRP are provided in *Table 1*, and the location of each is mapped in *Figure 6*.

*Table 1: Nutrient and sediment loading estimates generated by PTMApp at priority resource points (PRPs). Points of primary interest are denoted with **

Point ID	Location	Drainage Area	TP Loading Estimate (lbs/yr)	TSS Loading Estimate (tons/yr)	TN Loading Estimate (lbs/yr)
1	Goose Lake outlet		1,019	739	18,858
2	Primary Goose Lake inlet (several other smaller inlets present)		886	554	15,669
3	Outlet of entire northwestern subcatchment of the Ford Brook watershed		523.6	360	9,116
4	Pickerel Lake Outlet		1.2	0.25	82
5	Outlet of entire western portion of the Ford Brook watershed, prior to draining into Goose Lake		903	618	15,955
6	East Twin Lake outlet		4.2	0.45	130
7*	Pinnaker/ Eckstrom Lake outlet; drainage point for the entire Ford Brook headwaters subcatchment		1,040	681	19,635
8	Ford Brook main channel at Viking Blvd.; water quality sampling point		1,342	772	25,539
9	Outlet of large tributary entering Ford Brook immediately before its confluence with Trott Brook.		190	383	3,041
10*	Ford Brook main channel at Green Valley Rd.; outlet for entire Ford Brook watershed		1,892	191.5	33,217

11	Outlet of a large ditch system draining multiple cultivated crop and sod fields in the Ford Brook headwaters subcatchment		820	556	14,229
12	Outlet of Bear Lake and surrounding wetlands, through which runoff from multiple cultivated fields flows		18.9	22	391

PTMApp Processing

The PTMApp desktop toolbar (Version 3.1.0289) was used following recommended protocols to estimate pollutant loading, generate candidate projects, and predict their associated benefits and costs. A substantial amount of processing occurs during PTMApp modeling, the details of which are too extensive to cover in this report. Technical memoranda, user guides, theory and documentation, and other materials detailing PTMApp mechanics are housed on the BWSR webpage dedicated to this toolbar. Brief descriptions of the toolbar's primary functions are provided below.

Catchment Delineations and Loading Estimates

After all input datasets were organized into a processing geodatabase, they were ingested into the PTMApp toolbar and clipped to the study area boundary. The clipped study area encompassed the entire Ford Brook watershed plus a 0.75-mile buffer around its delineated boundaries to ensure all hydrologic connections around the edges were captured during processing.

Next, the hydro conditioned DEM was used to delineate finer-scale drainage areas within the watershed, which produced over 500 catchments averaging 40 acres in size. At the same time, subwatersheds (collections of catchments draining to priority resources points) were also delineated. Subsequent PTMApp tools were then used to calculate water volumes and pollutant (TP, TN, and TSS) loads leaving the landscape and being delivered downstream to each catchment outlet and priority resource point. Factors influencing pollutant loads in runoff and concentrated water flow (e.g. soil type, in-channel and in-lake processes, land cover, precipitation, etc.) were accounted for through literature-based values that are incorporated into the PTMApp model's loading calculations.

BMP Suitability

Once the boundaries and pollutant loading estimates for catchments and subwatersheds were completed, candidate best management practices (BMPs) were generated. The PTMApp BMP Suitability tool automated the placement of candidate BMPs throughout the watershed based on topography, soils, hydrology, land use, and typical design criteria for each BMP type. PTMApp is capable of generating potential locations for 24 types of NRCS conservation practices, each of which are broadly categorized under one of six treatment methods. See *Appendix C* for a list of these BMPs. All BMP types were generated and considered, however only some were ultimately recommended or explored further in planning analyses. The reasoning behind such decisions is described in the *Project Selection and Ranking* section below.

Restorable Wetlands Identification

Due to the complex nature of wetland restorations and thus the many elements that must be considered when siting potentially suitable sites, candidate locations for these projects were identified manually rather than being automated through the PTMApp toolbar. This process was completed entirely through desktop analyses of the watershed using several relevant datasets such as the following:

- National Wetlands Inventory (NWI), especially focusing on wetland areas with the "d" drainage modifier in the wetland code
- Statewide Restorable Wetlands Inventory (RWI), produced by the University of Minnesota
- Soils survey data, especially focusing on areas with hydric soils
- Anoka County ditches (private and public)
- Current and historic aerial imagery
- Depth grid and flow accumulation rasters (both generated in earlier steps from the hydro conditioned DEM)
- Land use/ land cover

Proximity to critical features such as county ditches, houses, and roads were also considered to avoid siting projects in locations where flooding risks could negatively impact property. Only wetlands which showed signs of hydrologic impacts were selected as candidate restoration sites because water quality improvement is the primary benefit sought through this analysis. The approximate outlines of each candidate project were drawn and compiled into a single feature layer, which was then ingested into PTMApp alongside the other PTMApp- generated candidate projects for subsequent steps.

Benefit and Cost Analyses

Once candidate BMPs and pollutant loading estimates under existing conditions were generated, the reduction efficiencies and corresponding water quality benefits associated with each candidate BMP were estimated by the model. Anticipated pollutant reductions were calculated for both the 2-yr, 24-hr and 10-yr, 24-hr runoff events at the outlet of the catchment containing the BMP and at all downstream PRPs. Median reduction efficiency was assumed for all candidate BMPs, and treatment train effects were not applied due to the variety of options that could be applied to most cultivated fields.

By default, the PTMApp cost analysis model generates two different cost estimates for each BMP: one ("Total Cost") which is based on the Minnesota Environmental Quality Incentive Programs (EQIP) payment schedule, and the other ("Useful Life Total Cost" (ULTC)), which represents a more comprehensive estimate that incorporates costs outside of construction alone, such as those for planning, designing, permitting, operating, and maintaining the projects. Both estimates are then annualized based on the associated BMP's effective life. Given its comprehensiveness, annualized useful life total cost (ULTC) estimates were used for all cost effectiveness calculations described in this report.

Cost effectiveness was calculated for each project ($/ lb reduced/ yr for Total Phosphorus and Total Nitrogen, $/ ton reduced/ yr for sediment) based on annualized useful life cost effectiveness for total phosphorus, the 2-year, 24 hour storm event scenario, and median BMP reduction efficiency in order to rank and prioritize candidate BMPs; see more details below in the *Project Selection and Ranking* section.

Other Project Types Considered

Shoreline Stabilizations

Eroding lakeshores and streambanks contribute to the internal loading of sediment and nutrients in surface waters. Elevated internal loading from erosion is generally most common in streams experiencing increased flow (often as a result of robust manmade drainage networks and/or expanding development in the watershed) and in lakes with unprotected shorelines and frequent wave/ ice action.

All three priority waterbodies (East Twin Lake, Pickerel Lake, and Ford Brook) were considered for shoreline erosion analyses, but an erosion inventory and identification of candidate stabilization projects were ultimately only completed for East Twin Lake. Justification for these decisions is as follows:

- **East Twin Lake:** Most residential development in the East Twin Lake watershed is lakefront property, so a shoreline erosion inventory was completed to identify stabilization needs. This process involved mounting a 360° camera in a boat and navigating the perimeter of the lake to collect continuous photos of the lakeshore. A desktop analysis of these photos was then completed to identify areas experiencing erosion, and subsequently estimate the costs and water quality benefits of installing erosion control projects at these locations.
- **Pickerel Lake:** Unlike East Twin Lake, Pickerel Lake contains little residential development on its shoreline. High-resolution oblique aerial images were examined to further assess the potential need for shoreline stabilization projects, but little erosion was obvious on the shoreline as the lake's low-lying banks are generally well vegetated and often protected by dense emergent vegetation. As a result, an erosion inventory for Pickerel Lake was deemed unnecessary at this time.
- **Ford Brook:** the Ford Brook channel is low-lying and bordered by a relatively intact floodplain of herbaceous wetlands throughout the majority of its course downstream. These riparian wetlands act as a "buffer" between the flowing water in the channel and the steeper banks beyond, minimizing the potential for severe erosion. Furthermore, water quality data collected throughout Ford Brook indicates relatively low levels of suspended solids, suggesting that most TP entering the stream is dissolved and not particulate phosphorus being released through erosion. The stream's shallow water and intermittent passage through culverts would also make it difficult to navigate with the equipment needed for erosion photo collection. For these reasons, an erosion inventory for Ford Brook was deemed unnecessary and infeasible at this time.

Urban Stormwater BMPs

Urban and suburban areas with high impervious surface coverage (roads, driveways, rooftops, etc.) typically contain stormwater conveyance networks composed of curbs, catch basins, and subsurface pipes to manage stormwater and prevent flooding. Stormwater treatment features such as wet ponds are required in areas undergoing new development, while many areas developed before stormwater regulations were enacted still route stormwater directly to the nearest lake, stream, or wetland, untreated. Such areas can be retrofitted with stormwater best management practices (BMPs) like rain gardens, detention ponds, and subsurface treatment structures to improve water quality.

The Ford Brook, East Twin Lake, and Pickerel Lake watersheds contain few commercial or industrial properties, and established residential developments are low-density with most lots exceeding 2 acres.

These areas and paved roads throughout the Ford Brook watershed were inspected through field visits and desktop analyses to determine the types of stormwater conveyance features present. All areas inspected contain generally sandy soils, minimal impervious surfaces, and lack curb and gutter infrastructure, even within denser residential development in the southern portions of the watershed. Instead, stormwater flows to shallow vegetated ditches, culverts, open spaces, and/or wetlands, which cumulatively results in stormwater treatment and retention through natural processes and therefore few to no direct stormwater inputs into Ford Brook. New development is ongoing in the watershed, but required to install stormwater treatment features coincident with local regulations. Therefore, candidate urban BMPs were not sited as part of this SRA.

Project Selection and Ranking

The intent of this subwatershed analysis is to provide local natural resource managers with the information needed to achieve water quality goals by pursuing the most cost-effective projects. Given the watershed's large size and variety of options for BMPs within and between fields, this analysis ranks candidate projects by cost effectiveness for total phosphorus reductions (the primary contaminant of concern for this watershed) at priority waterbodies to facilitate project selection. Several filters were applied to the original output list of candidate project prior to cost-effectiveness based rankings, as described below.

Filters

The PTMApp model initially produced over 3,000 candidate conservation projects. However, the placement of many of these were impractical and/or would provide little benefit to the target waterbodies. Furthermore, the implementation of these practices is limited by factors such as funding and landowner interest, thus requiring a manageable list of priority projects to pursue for implementation. Therefore, a series of filters were applied to the initial project outputs to remove impractical projects and condense the list of candidates to those which have the greatest potential for water quality benefits.

- **Headwaters Region:** Candidate projects located in the far northwestern region of the Ford Brook watershed were removed from further consideration entirely (Appendix E). Much of this area lies outside of the Anoka County boundary, resulting in a lack of local knowledge needed to perform QA/QC on model inputs and candidate BMP outputs. Furthermore, this region is hydrologically far-removed from Ford Brook itself and the majority of it is undeveloped with minimal agriculture and abundant wetlands, ultimately contributing very little to estimated pollutant loads at the Ford Brook outlet.

  All other candidate projects sited upstream of the chain of lakes from which the Ford Brook main channel originates were still analyzed and considered in initial cost effectiveness rankings; however, they ranked out poorly as both the model and water quality monitoring data indicate that many pollutants stemming from this region are likely removed through in-lake processes prior to reaching Ford Brook itself. Other than candidate projects benefitting Pickerel and East Twin Lakes, which are still included in this report, all projects detailed herein are located in the priority areas draining directly to the Ford Brook channel or its immediate ditch tributaries (*Figure 7*)**.**

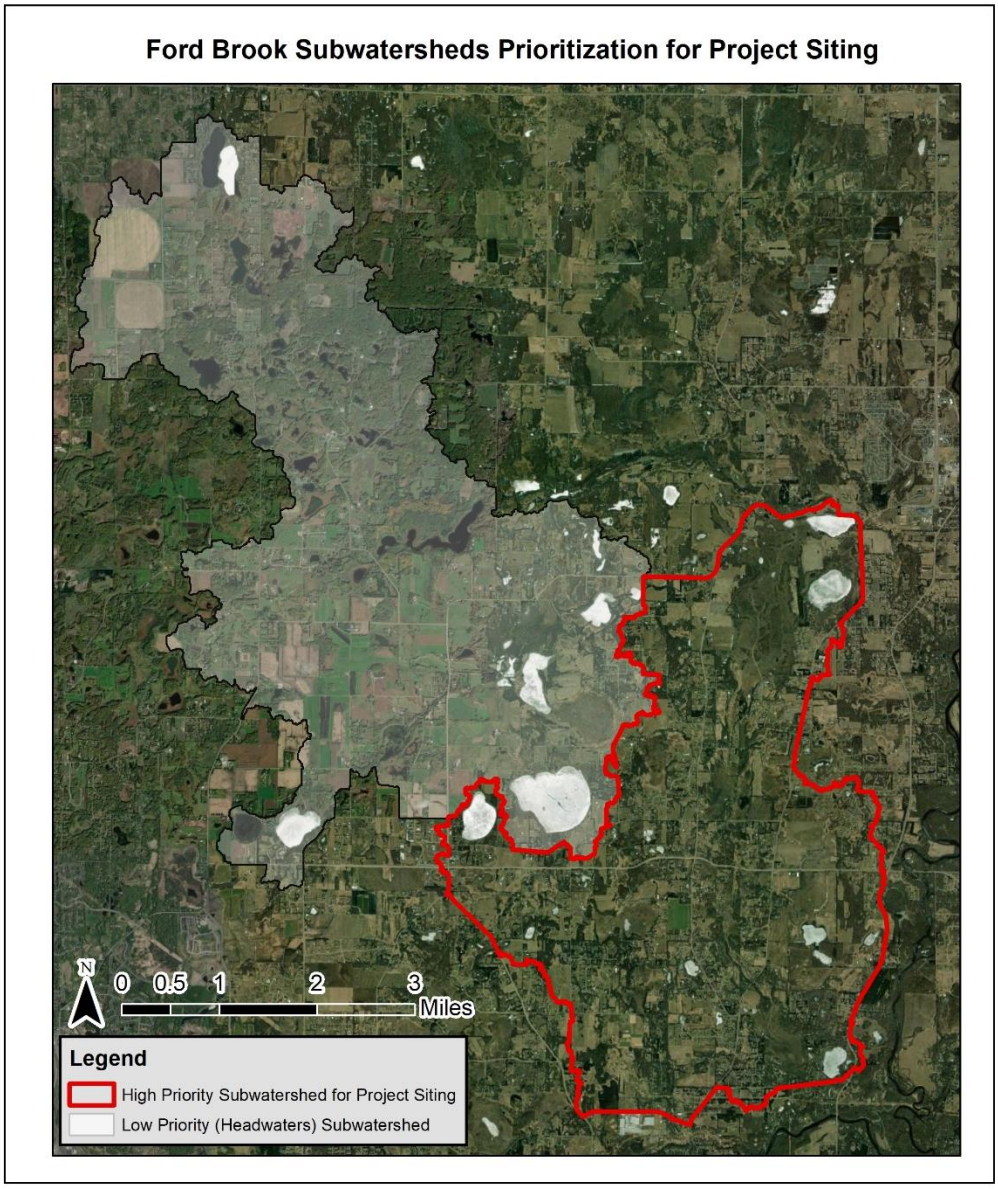


Figure 7. Prioritization for Ford Brook subwatersheds. This report focuses on candidate projects identified in the red direct drainage subwatershed area, which is suspected to contribute most to nutrient pollution in Ford Brook.

- **Cost Effectiveness:** Projects with an estimated load reduction less than 0.1 lbs TP/yr and cost effectiveness exceeding $7,000/ lb TP/ yr (as measured at the Ford Brook outlet or Pickerel and East Twin Lake inlets) were removed from further consideration.

- **Project Type:** Several types of BMPS were removed from further consideration – some intentionally based on staff knowledge and local goals, while others were removed as an artifact of cost effectiveness filters. Because phosphorus in surface water is the target pollutant for this analysis, nutrient management practices for nitrogen and groundwater, including denitrifying bioreactors, were removed from further consideration. PTMApp-generated lake and wetland shoreline restorations were also filtered out due to their poor placement on the landscape by

the PTMApp toolbar, and because opportunities for these projects were already assessed in other ways for this watershed.

- **Project Placement:** The above filters removed the majority of infeasible or impractical projects generated by the PTMApp toolbar. However, some projects with poor placement on the landscape remained. These were manually removed from the list of candidate projects as needed based on professional judgement.

East Twin Lake

BMP opportunities in the East Twin Lake watershed are limited by the low quantities of agriculture and hydrologically impacted wetlands, presence of only low-density residential development, and the watershed's small size overall. Even so, East Twin Lake's excellent water quality makes it a priority for protection. Therefore, candidate agricultural and shoreline stabilization projects were explored and ranked for anticipated water quality benefits as described below.

Shoreline Stabilization

The shoreline erosion inventory for East Twin Lake identified seven stretches of shoreline (totaling approximately 435 linear feet) with slight to moderate erosion (*Figure 8*). The Wisconsin NRCS erosion calculator was used to estimate annual soil losses resulting from erosion on each of these shorelines using the following calculation:

$$\left(\text{Lakeshore Soil Loss } \left[\frac{\text{lbs}}{\text{yr}}\right]\right) = \left\{\left(\begin{matrix}\text{Eroding}\\ \text{Face[ft]}\end{matrix}\right) * \left(\begin{matrix}\text{Recession}\\ \text{Rate } \left[\frac{\text{ft}}{\text{yr}}\right]\end{matrix}\right) * \left(\begin{matrix}\text{Shoreline}\\ \text{Length [ft]}\end{matrix}\right) * \left(\begin{matrix}\text{Soil Bulk}\\ \text{Density } \left[\frac{\text{lbs}}{\text{ft}^3}\right]\end{matrix}\right)\right\}$$

A ratio of 1 lb TP for every 2,000 lbs of sediment was used to approximate nutrient losses from the eroding soils. Then, a cost estimate was generated for each candidate project based on average bioengineered shoreline expenses encountered by the Anoka Conservation District. Bioengineering (in this case, likely coir logs placed along the base of the shoreline paired with a native buffer planting) is the recommended approach for all sites because erosion is relatively minor and appears to be strongly associated with areas where riparian vegetation has been cleared such as near docks, beaches, and turf grass lawns. Cost estimates include expenses for construction materials and labor associated with project planning and installation. Ultimately, projects were ranked based on estimated annualized useful life cost effectiveness ($ per pound of TP and sediment reduced, per year), as summarized in *Table 2*, which corresponds with shoreline IDS in *Figure 8*.

Table 2. Water quality benefits and cost/ cost effectiveness estimates for candidate shoreline stabilization projects on East Twin Lake. Cost estimates are derived from expenses typically associated with bioengineering practices. True costs will likely vary.

Shoreline ID	Erosion Severity (estimated shoreline recession, ft/yr)	Shoreline Length	Estimated Soil Losses (lbs/yr)	Estimated Contribution to TP Loading (lbs/ yr)	Estimated Project Cost ($)	TP Annualized Useful Life Effectiveness ($/ lbs TP reduced/ year)
ET-LS-03	0.23	115	5290	2.6	4,600	173
ET-LS-04	0.2	100	4000	2	4,000	200
ET-LS-05	0.1	100	1500	0.75	4,000	533
ET-LS-07	0.05	60	300	0.15	2,400	1,600
ET-LS-01	0.03	15	45	0.03	600	2,000
ET-LS-02	0.03	25	75	0.04	1,000	2,500
ET-LS-06	0.03	20	60	0.03	800	2,667
TOTAL	--	435	11,270	5.6	17,400	--

Figure 8. Locations and severity of eroding shorelines on East Twin Lake in Nowthen

Agricultural BMPs

There is one 50-acre cultivated field present in the East Twin Lake watershed, which is located entirely beyond the Anoka County boundary in Sherburne County (*Figure 9*). Runoff from the majority of this field enters Twin Lake (West), which is located immediately upstream of East Twin Lake. An estimated 23 pounds of Total Phosphorus, 36 tons of sediment, and 538 pounds of Total Nitrogen enters Twin Lake (West) as part of this runoff each year. However, much of this pollutant load is likely captured through in-lake processes such as settling and plant uptake before reaching East Twin Lake; PTMApp-derived lake routing calculations estimate a 98% reduction in both TSS and TP from Twin Lake (West). However, water quality data for this lake is unavailable so true reductions are unknown.

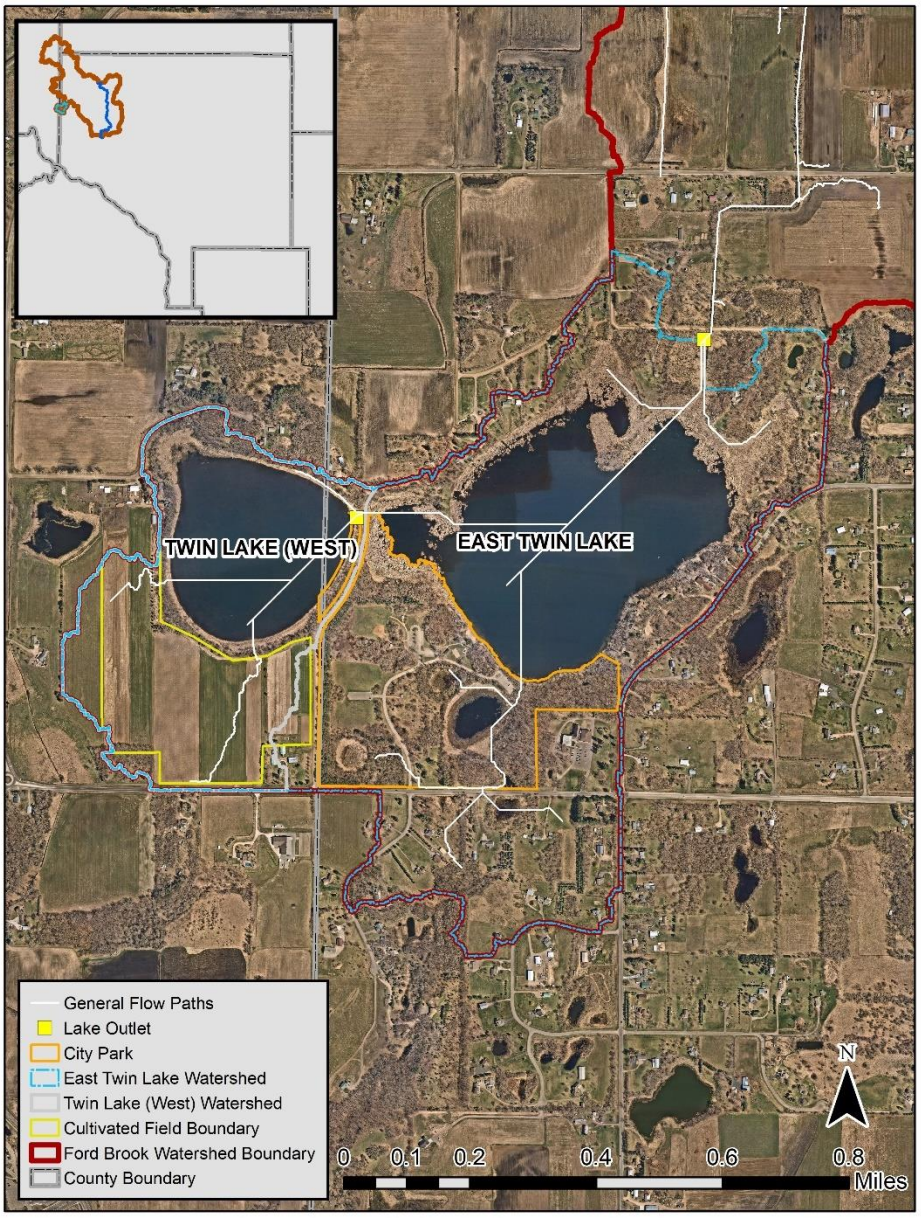


Figure 9. Twin Lakes watershed extent and characteristics, including cropped field boundaries within which candidate agricultural BMPs are site.

Pollutant reduction efforts in the Twin Lake (West) drainage area may still be warranted given its direct connection to East Twin Lake and the otherwise limited potential for water quality protection projects in the watershed. Therefore, several candidate agricultural BMPs were generated for this field. Source reduction practices such as no/ reduced till or cover crops are the most cost - effective approaches to reducing nutrient loads in runoff. More targeted filtration/ infiltration practices such as grassed waterways and infiltration basins are also cost- effective ways to reduce loading. These candidate practices are listed in *Table 3* below and mapped in *Figure 10*.

Land Protection

The remaining 50-acre cultivated field adjacent to Twin Lake (West) makes up approximately 10% of the East Twin Lake's upland watershed, and is the only large undeveloped parcel remaining in this drainage area minus the City Park immediately to its east. The protection of this land, either through a permanent conservation easement or stormwater regulation requirements if/ when development does arrive, would help support water quality in both lakes long-term.

Table 3. Summary information for the top 10 most cost-effective candidate agricultural BMPs in the East Twin Lake subwatershed. Projects are listed from the most to least cost effective for TP reductions. Pollutant values are derived from reduction estimates at the catchment outlet, which in this case is Twin Lake (West), as estimated by the PTMApp toolbar. Treatment train effects are NOT accounted for in this table but should be approximated if the installation of more than one project is considered.

Practice Type	Project ID (s)	TP Reduction (lbs/ yr)	TSS Reduction (tons/ yr)	TN Reduction (lbs/ yr)	Useful Life (yr)	Useful Life Total Cost Estimate	Cost effectiveness ($/ lb TP removed/ yr)	Notes
No- Till	ET-NT-01	8.10	13.02	152.92	1	1,624	200.49	No-till proposed for entire cultivated field
Reduced Till	ET-RT-01	5.94	10.07	119.68	1	1,246	209.76	Reduced- till proposed for entire cultivated field, if the more cost-effective no-till isn't pursued
Riparian Buffer	ET-RB-01	1.90	0.65	25.86	10	7,116	374.53	Extension of existing lake riparian buffer into low-lying zone where much of the field's runoff concentrates prior to entering the lake
Drainage Water Management	ET-DW-01	1.46	2.24	26.02	20	13,094	448.42	The presence of subsurface drainage tile in this field is unknown, but given the high water table in this region it is possible. The actual placement of water management structures will be dependent on the location of tiles, if present.
Drainage Water Management	ET-DW-02	1.32	1.95	14.78	20	13,017	493.07	The presence of subsurface drainage tile in this field is unknown, but given the high water table in this region it is possible. The actual placement of water management structures will be dependent on the location of tiles, if present.
Cover Crops	ET-CC-01	7.21	11.52	146.28	1	3,802	527.32	Cover crops proposed for entire cultivated field; could be paired with no-till or reduced-till, but cost effectiveness would be reduced given treatment train effects.
Infiltration Trench/ Small Infiltration Basin	ET-IT-01	2.41	3.26	43.40	20	29,725	616.70	A basin with an engineered outlet near the outfall of tile drainage or concentrated overland flow.

Practice Type	Project ID (s)	TP Reduction (lbs/ yr)	TSS Reduction (tons/ yr)	TN Reduction (lbs/ yr)	Useful Life (yr)	Useful Life Total Cost Estimate	Cost effectiveness ($/ lb TP removed/ yr)	Notes
Grassed Waterway	ET-GW-01	0.85	1.49	16.28	20	11,275	663.24	Grassed waterway along the path where overland flow is most likely concentrating
Grassed Waterway	ET-GW-02	0.44	0.52	9.31	20	6,859	779.43	Grassed waterway along the path where overland flow is most likely concentrating
Perennial Crops/ Conservation Cover	ET-PC-01	9.06	11.54	72.86	10	108,180	1,194.03	Permanent vegetative cover applied to the whole field; also commonly referred to as conservation cover

Figure 10. Candidate structural projects sited in the East Twin Lake watershed. Source reduction practices were also generated here and could be applied to the entire cropped field. See details for each project in Table 3.

Pickerel Lake

The need for BMPs in the Pickerel Lake watershed is minimal due to the lake's generally good water quality, lack of agriculture and urban development, and the watershed's small size. Shoreline development is also minimal and a thick ring of emergent vegetation borders the majority of the lake, so a shoreline erosion inventory was deemed unnecessary and this time and was not pursued. However, several remaining open spaces and potentially restorable wetlands were identified as opportunities for restoration and/or protection efforts, which would help maintain watershed health as this region continues to develop.

Wetland Restoration and Land Protection

Five wetlands in the Pickerel Lake watershed were identified as potential candidates for restoration efforts. See *Figure 11* for a map of their locations and *Table 4* for their estimated water quality benefits and cost estimates. Because the watershed is minimally developed and cropped fields are absent, the estimated base load of sediment and nutrients entering Pickerel Lake is low (as further indicated by the lake's good water quality). Thus, estimated pollutant reductions provided by these candidate projects are minimal and cost effectiveness is low. However, these wetlands and the generally undeveloped land that surrounds them would be good candidates for protection as the region continues to develop.

Table 4: Information for candidate wetland restoration sites in the Pickerel Lake subwatershed. Cells with no values ("—") indicate negligible phosphorus reduction estimates.

Wetland Project ID	Maximum volume of water treated (cu-ft)	TP Reduction (lbs/ yr)	TSS Reduction (tons/yr)	Useful Life Total Cost Estimate ($)	Estimated cost effectiveness ($/ lb TP removed/ yr)	Proposed Approach
P-WR-01	897	-	0.31	30, 410	--	Scraping/ Excavation and Vegetative Restoration
P-WR-02	62,973	1.52	12.12	40, 902	2,582	Scraping/ Excavation and Vegetative Restoration
P-WR-03	258,833	1.04	4.51	32,273	3,524	Ditch Plug or Earthen Embankment and Excavation/ Scraping as Needed
P-WR-04	9,424	--	8.92	16,622	--	Scraping to reduce non-native plant coverage; use material as fill to create a ditch plug.
P-WR-05	21	--	0.08	9,820	--	Primarily vegetation restoration, which may require some minor scraping

Figure 11. Candidate wetland restoration locations in the Pickerel Lake subwatershed. See Table 5 for a summary of each project's estimated benefits.

Ford Brook

Practices providing pollutant reductions at the Ford Brook outlet make up the majority of candidate projects described in this report. These projects are generally ranked according to their anticipated cost effectiveness for nutrient (TP) reductions, but other anticipated benefits (such as total suspended solids reductions) are also provided as part of the project summaries.

Source Reduction

Source reduction practices generally ranked as the most cost-effective agricultural BMP for reducing nutrient loads reaching the Ford Brook outlet. Source reduction practices can also reduce the need for additional (often more costly) BMPs elsewhere in the cultivated field they're applied to. In addition to being effective and affordable, implementing agricultural BMPs on an annual basis is ideal for this region because cropland is being increasingly converted to development, which often makes a more expensive structural project with a longer effective life unattractive to a landowner or not worth the long-term investment.

There are multiple options for the type of source reduction practice that can be applied to agricultural fields. Four (cover crops, no-till, reduced till, and nutrient management) are typically applied to the entire field, and others (perennial crops, forage/biomass planting, and prescribed grazing) involve a more targeted application within a field. The practice type which is most cost effective should be pursued first, and if more than one source reduction practice is being considered for a field, treatment train effects should be evaluated to ensure all are worth pursuing. Table 5 provides an overview of average cost effectiveness and TP reductions for each type of source reduction practice modeled in the Ford Brook watershed. Of the four whole-field practices, no-till consistently ranked as the most cost effective approach, followed closely by reduced till and then cover crops. Nutrient management for phosphorus generally exhibited poor cost effectiveness.

Table 5. Summary information for candidate source reduction practices. Reduction values represent estimated Total Phosphorus reductions at the Ford Brook outlet, and project costs are based on annualized useful life cost estimates. All cost, pollutant reduction, and cost effectiveness estimates are derived from PTMApp toolbar calculations. True values may vary.

Source Reduction Type	NRCS Practice Code	AverageTP Reductions (lb/acre practice applied/year)	Average Project Cost ($/ acre applied/year)	Median Cost Effectiveness ($/lb reduced/year)	Total Candidate Area (acres)	Total # Remaining after Filters Applied
Whole-Field Application						
No-Till	329	0.13	$41.86	$322.91	1,970	116
Reduced Till	345	0.09	$33.29	$369.88	1,970	116
Cover Crops	340	0.11	$105.91	$962.82	1,970	116
Nutrient Management for Phosphorus	590	0.04	$291.62	$7,290.05	1,970	61

Source Reduction Type	NRCS Practice Code	AverageTP Reductions (lb/acre practice applied/year)	Average Project Cost ($/ acre applied/year)	Median Cost Effectiveness ($/lb reduced/year)	Total Candidate Area (acres)	Total # Remaining after Filters Applied
Targeted Application						
Forage/ Biomass Planting	512	0.13	$173.30	$1,333.08	203	42
Perennial Crops/ Conservation Cover	327	0.13	$288.41	$2,218.54	806	59
Prescribed Grazing	528	0.03	$76.74	$2,558.43	34	1

Figure 12. Catchment boundaries and flow paths for a cultivated field adjacent to Ford Brook. Portions of the field draining directly to ditch networks contribute the greatest pollutant loads to Ford Brook through these direct hydrologic connections, whereas runoff passing through other features, such as this shallow lake, likely loses much of its pollutant load prior to entering the Ford Brook channel.

While source reduction efforts would be beneficial throughout the watershed, they can be further prioritized based on their estimated pollutant reductions to the Ford Brook outlet. As a result, targeting fields within Ford Brook's direct drainage area will generally yield the greatest benefits, while efforts upstream of its headwater lakes would ultimately produce fewer water quality benefits at the Ford Brook outlet per dollar spent (*Figure 13*). Candidate source reduction projects produced by the PTMApp toolbar conformed to catchment boundaries rather than field boundaries This resulted in several instances where a single catchment spanned across two or more fields or, more commonly, a single field contained two or more catchments; see *Figure 12* for an example of this. Because, in reality, source reduction efforts typically conform to field boundaries rather than drainage area boundaries, the original values generated by the PTMApp toolbar were re-worked to represent pollutant reduction and cost estimates at the field scale rather than the catchment scale.

Priority areas for whole-field source reduction projects were ranked based on the cost-effectiveness of no-till in reducing TP loading at the Ford Brook outlet (Table 6). Profile sheets for each of these sites is provided in Appendix F. If a different source reduction approach is sought (reduced till, cover crops, or nutrient management), Table 5 can be used to approximate relative differences from no-till derived values for pollutant reductions, cost, and cost effectiveness.

Though less cost-effective and with fewer candidate locations, some targeted source reduction practices (perennial crops/ conservation cover) were also sited within the priority direct drainage watershed. These are listed in Table 7 and mapped in their respective profile sheets in Appendix G.

Table 6: Candidate source reduction sites ranked according to cost-effectiveness for total phosphorus reductions at the Ford Brook outlet, from no-till practices. No-till values were used to rank sites for source reduction because it consistently ranked as the most cost-effective TP source reduction approach in this analysis. All water quality improvement and cost estimates are derived from the PTMApp toolbar; true reductions and costs will likely vary.

Site ID	Field/ Practice Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/ yr
FB-NT-01	24.4	3.87	8.94	73.17	838	216.18
FB-NT-02	24.7	3.66	7.51	69.17	821	224.23
FB-NT-03	42.0	7.03	17.83	132.70	1,611	229.25
FB-NT-04	19.4	2.79	6.65	52.75	643	230.04
FB-NT-05	19.2	2.77	6.59	52.24	636	230.04
FB-NT-06	26.5	4.59	8.64	86.71	1,102	239.96
FB-NT-07	38.3	5.52	12.25	104.23	1,343	243.25
FB-NT-08	13.5	2.28	6.52	43.00	561	246.52
FB-NT-09	21.9	3.69	13.09	69.73	933	252.60
FB-NT-10	30.2	4.66	3.82	88.05	1,186	254.45
FB-NT-11	46.9	7.22	24.89	136.03	1,866	258.48
FB-NT-12	37.9	6.05	3.28	114.33	1,573	259.75
FB-NT-13	141.1	20.91	44.36	393.81	5,521	264.07
FB-NT-14	6.6	1.14	4.45	21.51	302	264.72
FB-NT-15	97.5	14.35	32.14	274.75	3,848	268.03
FB-NT-16	21.7	3.36	11.62	63.49	914	271.88
FB-NT-17	5.2	0.87	1.06	16.43	242	278.01
FB-NT-18	28.4	4.18	10.10	78.95	1,179	282.12
FB-NT-19	25.1	3.39	6.39	63.93	961	283.94
FB-NT-20	7.8	1.06	2.22	20.03	306	288.02
FB-NT-21	7.9	1.15	1.55	21.72	343	297.93
FB-NT-22	9.2	1.32	5.13	24.99	400	302.55
FB-NT-23	6.6	0.95	1.78	18.01	294	307.76
FB-NT-24	14.6	1.99	2.69	37.60	613	307.98
FB-NT-25	17.3	2.53	7.80	47.80	784	309.79
FB-NT-26	14.3	1.93	4.07	36.51	599	309.88
FB-NT-27	24.3	3.27	1.52	61.82	1,019	311.34
FB-NT-28	11.8	1.57	0.78	29.61	488	311.45
FB-NT-29	7.8	1.08	1.92	20.43	347	320.68
FB-NT-30	15.5	2.05	2.46	38.68	684	333.93
FB-NT-31	13.7	1.71	1.27	33.11	604	353.26
FB-NT-32	156.2	15.65	30.42	312.10	5,741	366.76

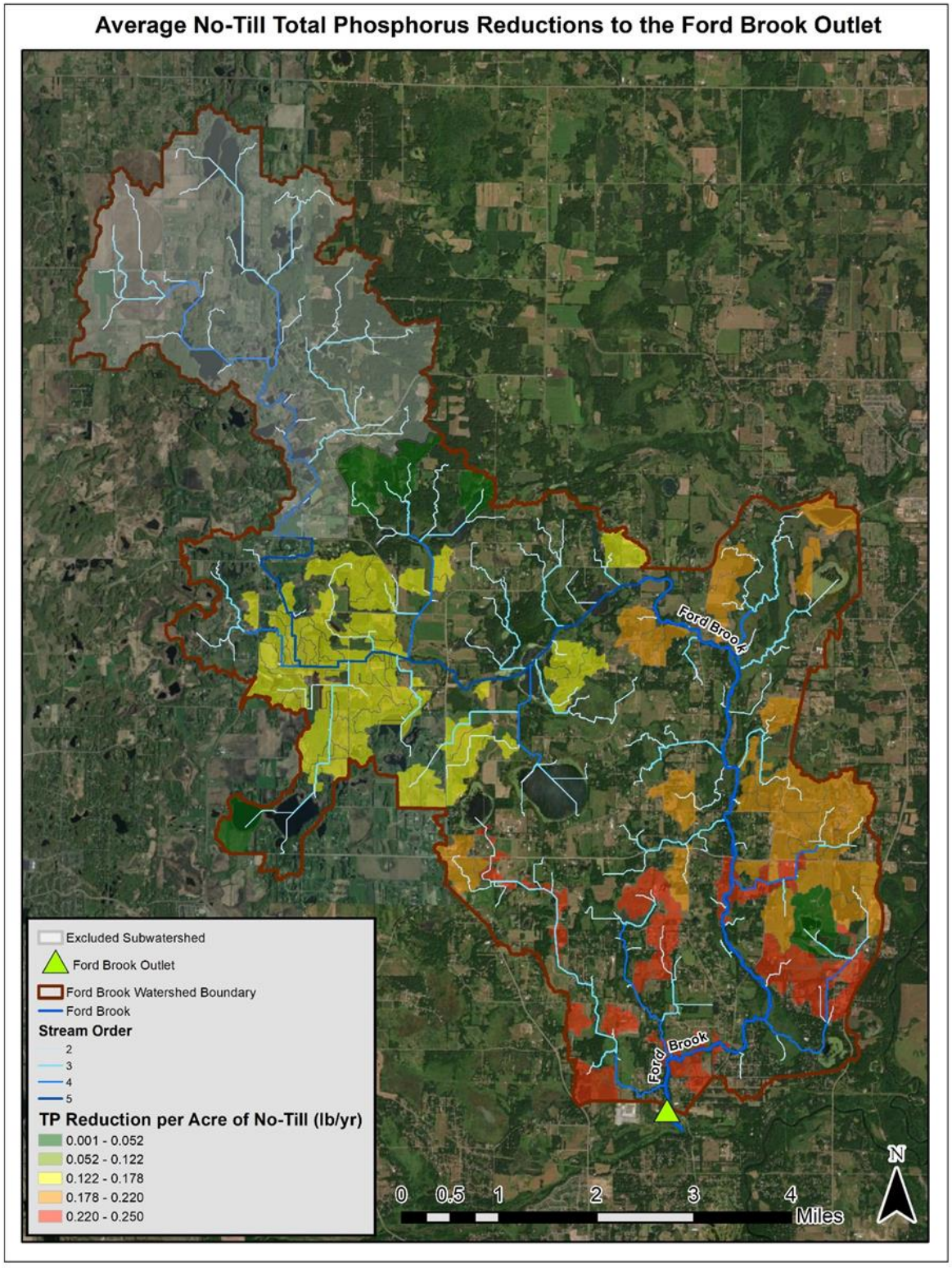


Figure 13. Estimated per-acre TP reductions from no-till candidate sites in the Ford Brook watershed. Values are derived from anticipated TP reductions at the Ford Brook outlet.

Though less cost-effective and with fewer candidate locations, some targeted source reduction practices (perennial crops/ conservation cover) were also sited within the priority direct drainage watershed. These are listed in Table 7 and mapped in their respective profile sheets in Appendix G.

Table 7. Candidate perennial crop/ conservation cover sites ranked according to cost effectiveness for TP load reduction at the Ford Brook outlet. All water quality improvement and cost estimates are derived from the PTMApp toolbar for relative site rankings; true reductions and costs will likely vary.

Site ID	Practice Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Useful Life (10 years) Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/ yr
FB-PC-01	22.32	4.33	5.38	34.89	64,112	1,482.02
FB-PC-02	7.41	1.41	4.27	11.33	22,605	1,608.76
FB-PC-03	14.73	2.54	7.47	20.45	40,810	1,609.17
FB-PC-04	24.25	4.22	0.72	34.05	68,489	1,622.59
FB-PC-05	22.50	3.96	4.80	31.97	68,459	1,726.68
FB-PC-06	8.92	1.49	2.42	12.02	26,506	1,777.89
FB-PC-07	11.37	1.83	6.65	14.76	32,654	1,784.55
FB-PC-08	9.56	1.56	1.66	12.58	28,129	1,802.85
FB-PC-09	5.54	0.91	1.89	7.35	17,594	1,930.78

Wetland Restoration

Over 130 locations with signs of current (degraded) or former wetland conditions were sited as candidate wetland restoration projects throughout the Ford Brook watershed (Figure 14). Many are located along private ditches and would likely be good candidates for hydrologic restoration through approaches such as ditch plugs or water diversion. Others are composed of depressions that are currently cropped or grazed but show signs of being frequently inundated with water; these sites may be od candidates for approaches such as excavation and drainage tile removal (if present).

Because TP reductions at the Ford Brook outlet are sought through this SRA, only the most cost-effective wetland projects for achieving these water quality improvements are included in this report (~50 sites total, outlined broadly in Table 8 below and described in more detail in their respective profile pages (Appendix H). However, if other objectives such as habitat restoration or water volume control are sought, information for all other candidate wetland restoration sites not detailed in this report can be provided upon request.

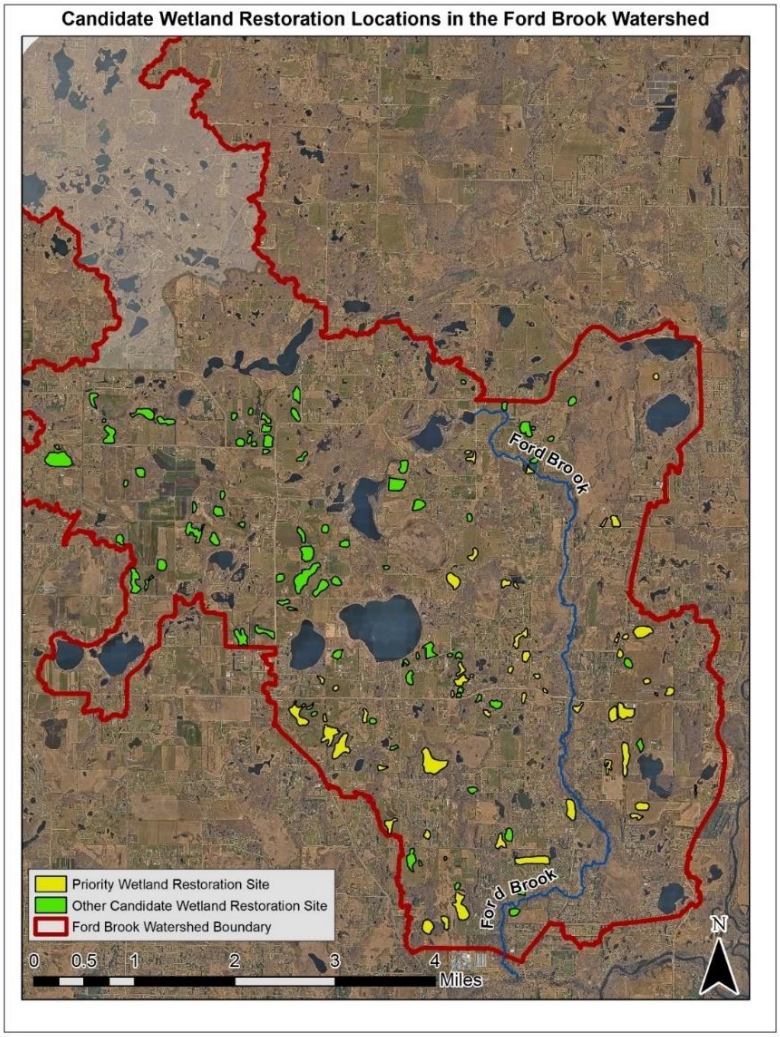


Figure 14. All candidate wetland restoration sites sited as part of this watershed analysis.

Table 8: Ford Brook candidate wetland restoration sites ranked from highest to lowest cost-effectiveness for total phosphorus reductions at the Ford Brook outlet. All water quality improvement and cost estimates are derived from the PTMApp toolbar; true reductions and costs will likely vary based on the restoration approach(es) taken.

Site ID	Wetland Watershed Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	Estimated Useful Life Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/ yr
FB-WR-01	321	18.09	20.22	27,853	102.64
FB-WR-02	206	9.45	4.90	23,186	163.53
FB-WR-03	89	7.14	2.35	18,615	173.82
FB-WR-04	54	6.49	27.04	21,441	220.22
FB-WR-05	52	3.77	6.83	16,307	288.54
FB-WR-06	66	5.08	3.69	22,949	301.30
FB-WR-07	61	8.00	9.32	37,218	310.33
FB-WR-08	79	10.13	42.29	49,039	322.63
FB-WR-09	86	3.39	3.96	19,163	376.52

FB-WR-10	80	2.58	1.93	14,563	376.92
FB-WR-11	60	4.47	4.24	28,874	430.79
FB-WR-12	73	4.85	4.31	36,004	494.80
FB-WR-13	73	6.17	2.40	45,954	496.87
FB-WR-14	231	2.50	11.12	21,305	568.40
FB-WR-15	96	5.83	8.64	51,321	586.53
FB-WR-16	50	5.41	19.42	47,774	588.70
FB-WR-17	20	2.03	0.51	17,983	590.02
FB-WR-18	26	2.97	21.87	26,485	594.01
FB-WR-19	16	2.10	1.66	18,933	601.20
FB-WR-20	1208	2.35	127.64	24,919	705.62
FB-WR-21	43	3.61	3.34	44,120	815.26
FB-WR-22	20	2.82	13.99	35,752	844.86
FB-WR-23	99	3.80	29.02	51,652	906.52
FB-WR-24	84	4.12	8.51	56,838	919.68
FB-WR-25	35	3.92	1.67	56,054	953.98
FB-WR-26	8	0.96	1.11	14,987	1037.55
FB-WR-27	30	1.67	1.17	26,749	1064.79
FB-WR-28	73	0.66	3.27	11,405	1152.60
FB-WR-29	13	1.37	2.51	24,159	1172.45
FB-WR-30	13	2.14	0.16	37,860	1180.51
FB-WR-31	51	2.65	0.53	55,677	1399.69
FB-WR-32	19	0.95	0.90	20,788	1457.70
FB-WR-33	20	1.40	1.10	30,806	1467.64
FB-WR-34	18	0.74	0.61	16,504	1482.57
FB-WR-35	20	1.21	7.89	30,683	1689.83
FB-WR-36	24	1.61	14.60	41,472	1713.15
FB-WR-37	8	0.99	4.86	26,408	1770.67
FB-WR-38	79	2.47	15.68	67,671	1824.60
FB-WR-39	112	0.96	3.77	27,388	1903.10
FB-WR-40	13	0.95	2.56	28,483	2005.82
FB-WR-41	7	1.58	0.07	49,105	2069.90
FB-WR-42	13	1.12	4.83	35,019	2084.16
FB-WR-43	2	0.34	1.04	10,700	2088.20
FB-WR-44	3	0.60	0.82	19,255	2138.42
FB-WR-45	8	0.87	5.50	29,857	2289.42
FB-WR-46	22	0.91	0.15	33,064	2422.65
FB-WR-47	5	0.55	0.60	20,436	2461.27
FB-WR-48	6	0.93	0.15	35,848	2562.16
FB-WR-49	7	0.45	3.33	18,800	2774.08
FB-WR-50	5	0.43	4.67	17,891	2779.71
FB-WR-51	11	0.53	0.87	22,216	2816.52
FB-WR-52	7	0.71	5.70	31,058	2896.39
FB-WR-53	16	0.50	0.63	22,510	3007.91

Targeted and Structural BMPs

Targeted biofiltration/ infiltration, protection, and storage BMPs are typically constructed in areas where overland flow and the contaminants it contains are concentrating within an agricultural field. As a result of related placement criteria, many BMPs in these treatment groups were sited in overlapping locations. However, because the benefits and cost of each approach varies even with identical placement, all 110 of these candidate projects sited within the priority areas are included in cost effectiveness ranking tables and described in this report. If and when projects are implemented, those with matching field boundary IDs should be compared to select the most cost-effective option and ensure treatment train effects are accounted for.

Overall, riparian buffer enhancements generally exhibited the greatest cost effectiveness across their effective lives for total phosphorus reductions at the Ford Brook outlet, followed by grassed waterways, filtration strips, critical area plantings, water and sediment control basins, and infiltration trenches/ basins. *Table 9* provides water quality, cost, and cost effectiveness data for the top targeted and structural agricultural BMPs sites as part of this watershed analysis. Maps for each of these practices is provided in Appendices I - N. In both locations, projects are organized by BMP type and then ranked from highest to lowest cost effectiveness for TP removal at the Ford Brook outlet.

Field- Scale Prioritization

Practices identified in this report are likely to be prioritized for implementation at the watershed scale based on their cost effectiveness for pollutant reductions at the Ford Brook outlet. Even so, the consideration of conservation opportunities at the field scale can lead to additional efficiency in targeted pollutant reductions and opportunity to pursue holistic conservation plans addressing multiple areas of concern. The application of multiple practices to one field should account for treatment train effects.

Appendix O provides a summary table of all agricultural BMPs identified in this report, organized by identification numbers unique to each cropped field.

Table 9. Summary water quality benefit and cost data for all targeted/ structural candidate BMPs sited in the Ford Brook direct drainage subwatershed. See Appendices I-N for profile sheets of each project, which contain additional details and show the project's position within the field and watershed.

Project Type	Site ID	Practice Watershed Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Useful Life Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/yr
Critical Area Planting	FB-CP-01	42.8	1.78	8.20	36.92	17,887	1,002.39
	FB-CP-02	79.1	2.23	10.03	45.81	23,612	1,059.73
	FB-CP-03	39.6	1.26	5.99	22.94	13,362	1,064.56
	FB-CP-04	36.3	0.61	3.10	11.09	6,558	1,083.08
	FB-CP-05	39.7	1.09	3.94	22.31	11,975	1,097.50
	FB-CP-06	48.3	1.18	3.98	24.24	13,718	1,158.72
	FB-CP-07	19.1	0.72	2.41	14.65	8,366	1,168.65
	FB-CP-08	55.7	0.96	7.01	19.87	11,936	1,237.56
	FB-CP-09	14.7	0.45	0.17	9.27	5,657	1,245.23
	FB-CP-10	6.8	0.38	1.75	7.65	4,733	1,261.29
	FB-CP-11	14.0	0.53	0.96	10.91	6,943	1,304.44
	FB-CP-12	17.8	0.48	1.19	9.56	6,476	1,337.98
	FB-CP-13	25.7	0.56	2.88	11.51	7,592	1,363.20
	FB-CP-14	8.7	0.21	1.35	4.31	2,882	1,380.98
	FB-CP-15	8.5	0.21	0.34	4.23	2,950	1,412.22
	FB-CP-16	22.2	0.65	2.62	13.04	9,342	1,431.44
	FB-CP-17	15.0	0.29	0.88	5.90	4,118	1,433.81
	FB-CP-18	53.3	0.64	3.81	12.93	9,180	1,440.68
	FB-CP-19	13.2	0.43	0.21	8.94	6,449	1,493.55
	FB-CP-20	8.5	0.26	0.03	5.50	4,044	1,552.57
	FB-CP-21	14.4	0.30	0.74	6.17	4,771	1,566.27
	FB-CP-22	11.9	0.32	0.25	6.68	5,150	1,598.88
	FB-CP-23	8.6	0.12	0.78	2.38	1,849	1,608.14
	FB-CP-24	10.7	0.16	0.34	3.22	2,602	1,633.72
	FB-CP-25	13.4	0.19	0.72	4.00	3,118	1,643.47
	FB-CP-26	119.5	0.20	0.82	4.27	3,301	1,667.06
	FB-CP-27	13.0	0.23	0.06	4.74	3,867	1,682.09
	FB-CP-28	7.0	0.16	0.35	3.57	2,802	1,726.08
	FB-CP-29	9.4	0.17	0.28	3.79	2,920	1,768.67
	FB-CP-30	6.4	0.12	0.29	2.43	2,180	1,788.76

Project Type	Site ID	Practice Watershed Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Useful Life Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/yr
	FB-CP-31	5.9	0.14	0.38	2.81	2,490	1,789.89
	FB-CP-32	6.6	0.13	0.52	2.80	2,344	1,813.60
	FB-CP-33	6.9	0.12	0.24	2.41	2,242	1,879.26
	FB-CP-34	12.9	0.15	0.89	3.20	2,773	1,885.58
AVERAGE			*0.51*	*1.99*	*10.41*	*6,476*	*1,458.27*
Filtration Strip	FB-FS-01	4.0	0.90	2.93	11.05	2,560	283.71
	FB-FS-02	5.5	0.91	3.96	19.55	2,611	285.48
	FB-FS-03	12.7	0.81	0.00	6.93	2,746	339.66
	FB-FS-04	3.4	0.46	1.48	9.68	2,538	551.25
	FB-FS-05	3.7	0.43	0.78	6.32	2,548	588.80
	FB-FS-06	3.1	0.39	0.94	7.20	2,521	645.32
	FB-FS-07	4.0	0.33	0.15	4.67	2,561	765.86
	FB-FS-08	1.9	0.29	1.22	6.42	2,450	854.32
	FB-FS-09	1.1	0.17	0.77	3.71	2,368	1,404.05
AVERAGE			*0.52*	*1.36*	*8.39*	*2,545*	*635.38*
Grassed Waterway	FB-GW-01	37.0	0.89	3.87	15.81	6,916	386.48
	FB-GW-02	42.9	2.31	9.69	47.93	20,389	442.11
	FB-GW-03	79.1	3.00	12.29	61.72	27,546	459.32
	FB-GW-04	20.8	0.83	3.40	17.08	7,997	480.63
	FB-GW-05	39.6	1.38	6.62	25.28	13,586	490.90
	FB-GW-06	48.3	0.96	3.66	19.76	9,542	495.34
	FB-GW-07	15.9	0.61	0.23	12.37	6,239	512.53
	FB-GW-08	8.4	0.26	1.68	5.32	2,827	545.02
	FB-GW-09	19.1	0.80	2.87	16.28	8,782	549.56
	FB-GW-10	6.8	0.47	2.11	9.53	5,190	554.11
	FB-GW-11	17.9	0.67	1.47	12.98	7,791	582.35
	FB-GW-12	14.7	0.43	0.98	8.58	5,236	614.58
	FB-GW-13	14.0	0.65	1.14	13.37	8,235	631.43
	FB-GW-14	22.2	0.95	3.23	18.47	12,546	659.09
	FB-GW-15	8.7	0.14	0.97	2.90	1,977	719.21
	FB-GW-16	6.6	0.19	0.65	4.13	2,683	724.54
	FB-GW-17	55.7	1.97	9.88	41.06	28,749	729.91

Project Type	Site ID	Practice Watershed Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Useful Life Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/yr
	FB-GW-18	11.9	0.39	0.30	8.22	5,735	730.09
	FB-GW-19	6.9	0.17	0.32	3.41	2,486	734.39
	FB-GW-20	13.9	0.21	1.57	4.65	3,302	786.16
	FB-GW-21	8.5	0.18	0.01	3.97	3,064	861.56
	FB-GW-22	6.4	0.14	0.36	2.82	2,821	973.32
	FB-GW-23	6.7	0.27	0.96	5.83	5,426	997.90
AVERAGE			*0.78*	*2.97*	*15.72*	*8,655*	*637.42*
Infiltration Trench/ Basin	FB-IT-01	11.9	2.53	1.59	48.90	25,963	513.99
	FB-IT-02	11.1	2.32	1.87	44.52	25,147	541.26
	FB-IT-03	13.8	2.16	2.92	40.66	27,966	648.59
	FB-IT-04	33.7	1.75	4.36	19.13	43,761	1,251.97
	FB-IT-05	7.1	0.62	1.89	11.81	20,076	1,621.44
	FB-IT-06	10.1	0.48	1.18	8.95	23,992	2,517.25
	FB-IT-07	14.4	0.54	1.14	10.46	28,641	2,634.56
	FB-IT-08	6.7	0.36	0.62	6.03	19,536	2,692.28
	FB-IT-09	1.3	0.14	0.20	1.92	8,504	2,970.40
	FB-IT-10	5.8	0.27	2.04	4.49	18,162	3,310.00
	FB-IT-11	6.8	0.29	1.80	5.60	19,616	3,382.09
	FB-IT-12	21.1	0.48	5.73	8.46	34,663	3,586.70
	FB-IT-13	10.7	0.32	2.23	6.12	24,670	3,873.01
	FB-IT-14	6.8	0.23	0.52	4.50	19,723	4,212.25
	FB-IT-15	5.9	0.19	1.42	3.53	18,318	4,925.41
	FB-IT-16	10.8	0.18	2.38	3.43	24,819	6,933.90
AVERAGE			*0.80*	*1.99*	*14.28*	*23,972*	*2,850.94*
Riparian Buffer Enhancement	FB-RB-01	386.8	5.50	0.00	14.84	3,893	70.77
	FB-RB-02	640.9	8.08	0.00	23.08	16,034	198.49
	FB-RB-03	189.5	4.04	0.02	20.69	10,782	267.21
	FB-RB-04	300.5	2.08	0.00	7.33	15,783	757.30
	FB-RB-05	53.3	2.15	0.17	19.02	17,751	826.19
AVERAGE			*4.37*	*0.04*	*17.00*	*12,849*	*423.99*

Project Type	Site ID	Practice Watershed Area (acres)	TP Reduction (lbs/yr)	TSS Reduction (tons/yr)	TN Reduction (lbs/yr)	Estimated Useful Life Total Cost	Estimated Cost/ lb TP Reduced at the Ford Brook Outlet/yr
Water and Sediment Control Basin	FB-WB-01	11.5	2.01	4.29	21.60	11,397	567.16
	FB-WB-02	12.1	0.46	1.08	6.53	11,620	2,527.70
	AVERAGE			1.23	2.68	14.07	11,508

References

Deutschmann, Mark R. & Koep, Sarah. (2022). Improved Cost Estimates for Agricultural Conservation Practices. *American Society of Agricultural and Biological Engineers.* Vol. 38(3): 539-551

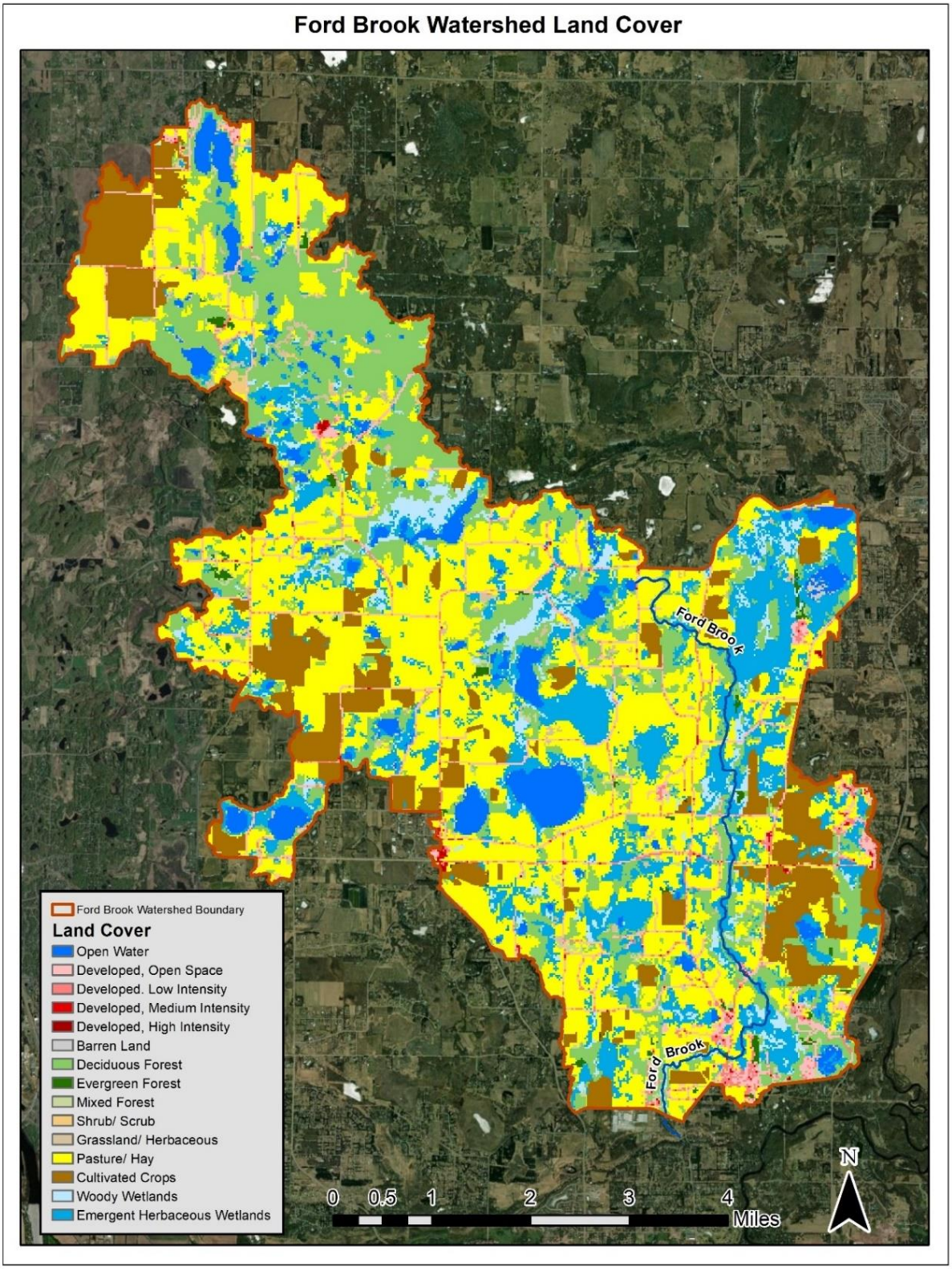
Zhang X., Liu X., Zhang M., Dahlgren RA., Eitzel M. (2009). A review of vegetated buffers and a meta-analysis of their mitigation efficacy in reducing nonpoint source pollution. Journal of Environmental Quality. 39(1):76-84.

Key Terms

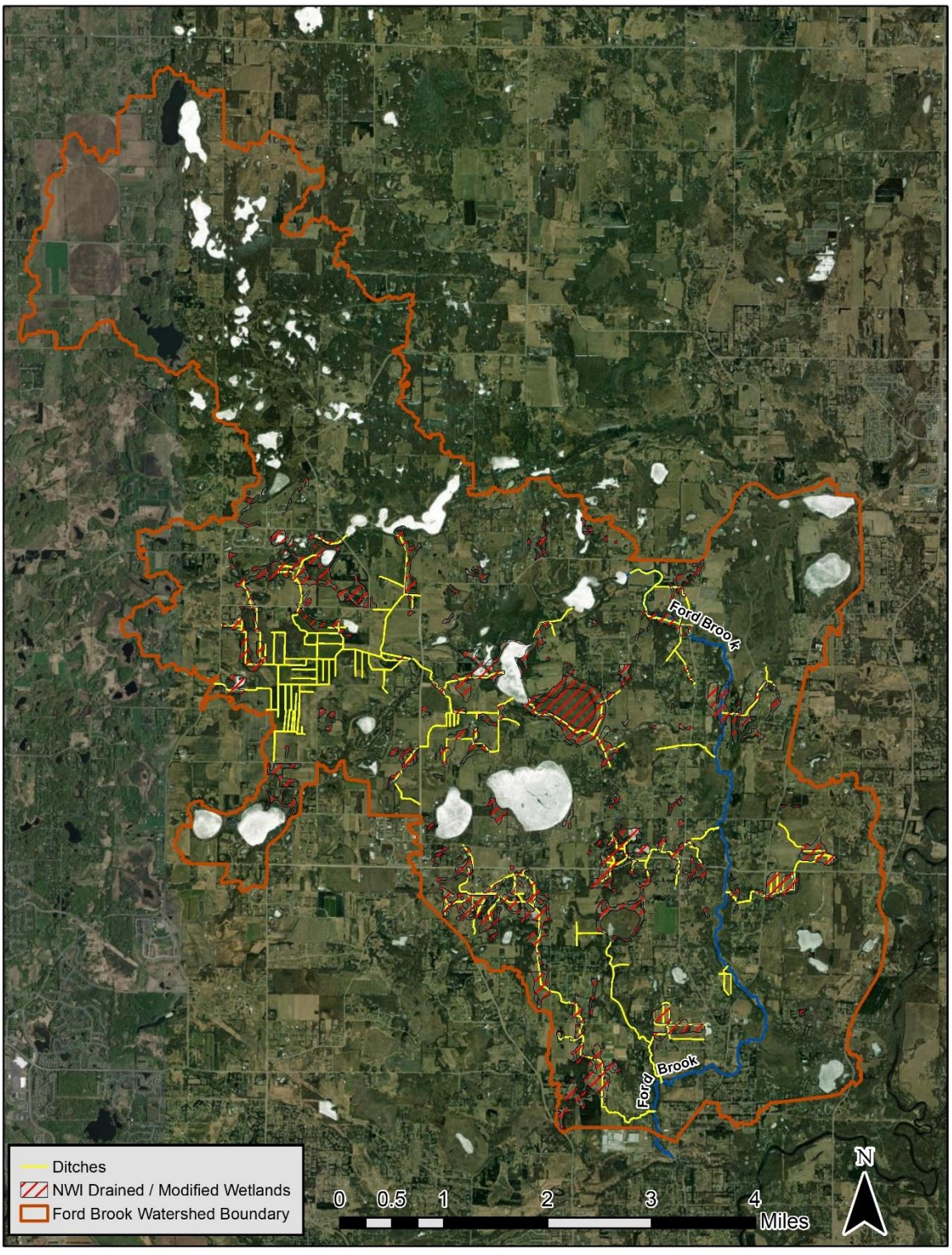
Best Management Practice (BMP) – A practice that is used to prevent or reduce the amount of pollutants entering surface and groundwater from nonpoint sources
Hydrologically Conditioned Digital Elevation Model (hDEM) – a LiDAR-derived digital elevation model manually modified to capture hidden or poorly represented water flow networks
Subwatershed – A collection of catchments draining to a common waterbody or priority resource point
Subwatershed Analysis (SWA) – technical report detailing candidate projects identified for water quality improvement in a priority watershed
Catchment – drainage areas
Priority Resource Point (PRP) – A point manually identified by the PTMApp user at which data for load and load reduction estimates are sought (typically at the outlet of the priority watershed and subwatersheds within it)
Prioritize, Target, and Measure Application (PTMApp) –a GIS-based application used to build a watershed model which estimates pollutant loading and generates candidate water quality improvement projects and their associated costs and benefits
Total Phosphorus (TP) – a combination of particulate phosphorus, which is bound to sediment and organic debris, and dissolved phosphorus, which is in solution and readily available for plant growth (active). Phosphorus is a nutrient essential to plant growth and is commonly the factor that limits the growth of plants in surface water bodies.
Total Suspended Solids (TSS) – Very small mineral and organic particles that can be dispersed into the water column due to turbulent mixing. TSS loading can create turbid and cloudy water conditions and carry particulate phosphorus.
Useful Life Total Cost (ULTC) – The total estimated cost of a project across its useful life, including costs associated with planning, design, construction, operations, and maintenance. ULTC was annualized through diving the total cost by the practice's useful life; annualized ULTC was used to calculate cost effectiveness values in this report.

Appendices

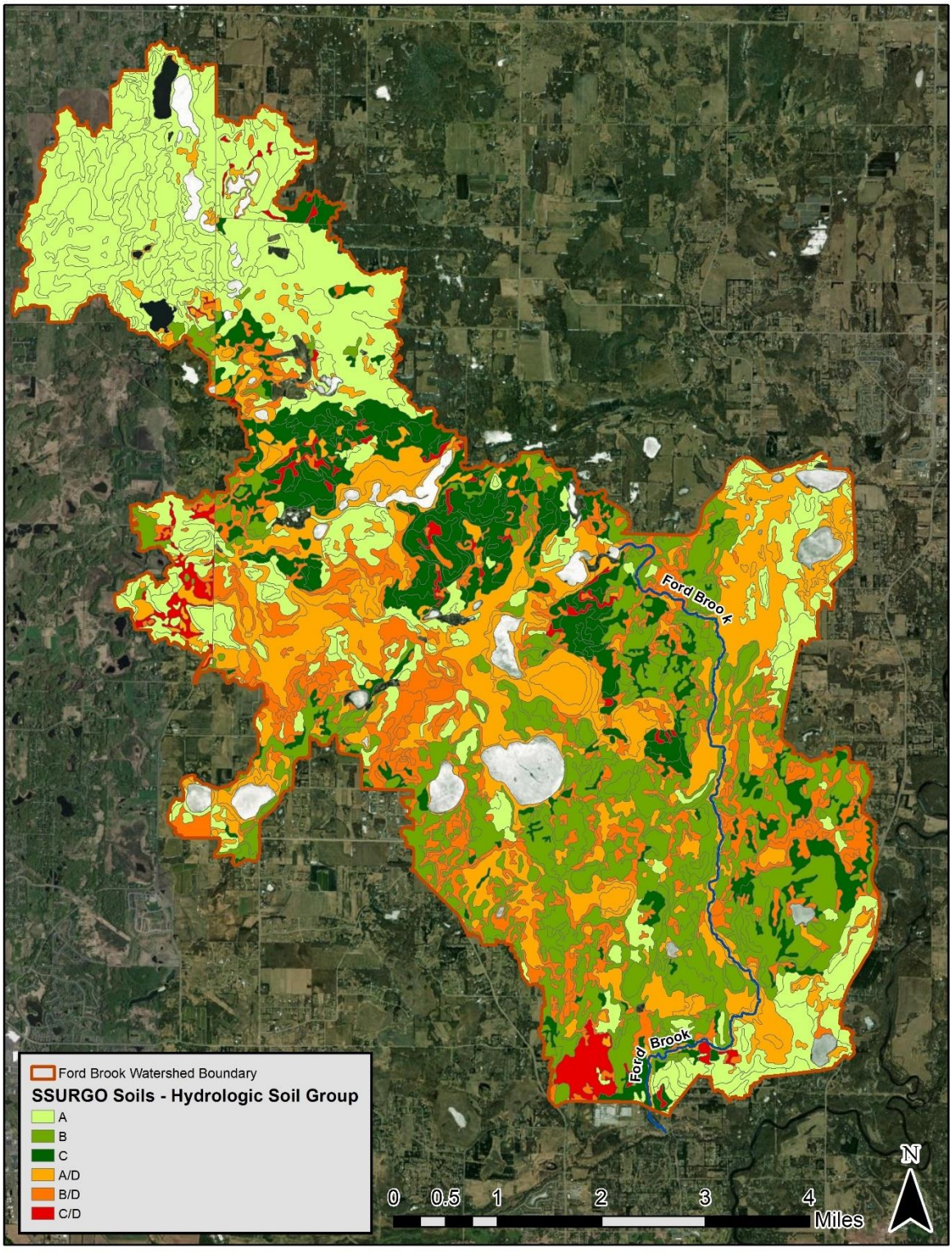
Appendix A: Ford Brook Watershed General Characteristics

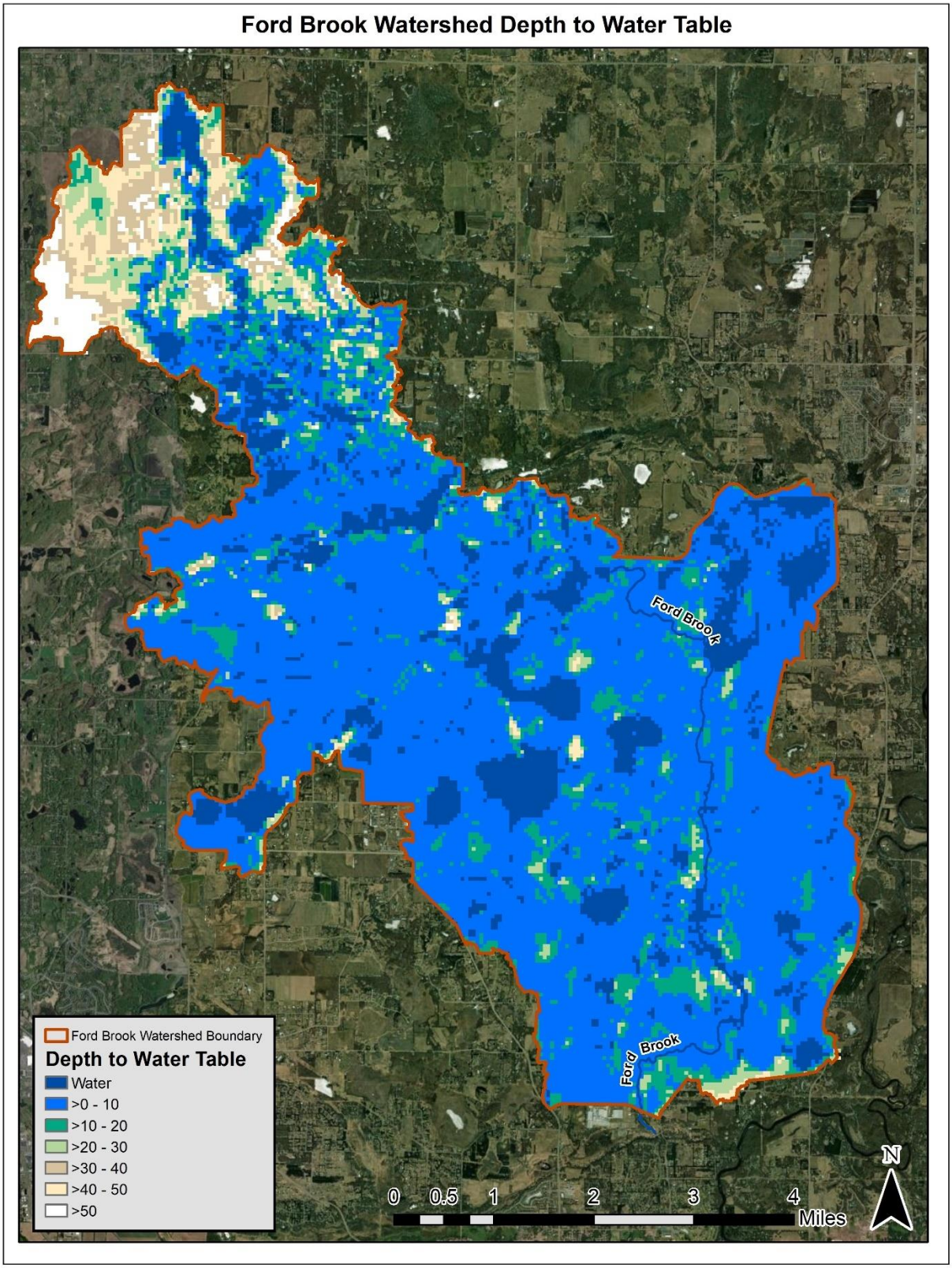


Ford Brook Watershed Ditches and Modified Wetlands

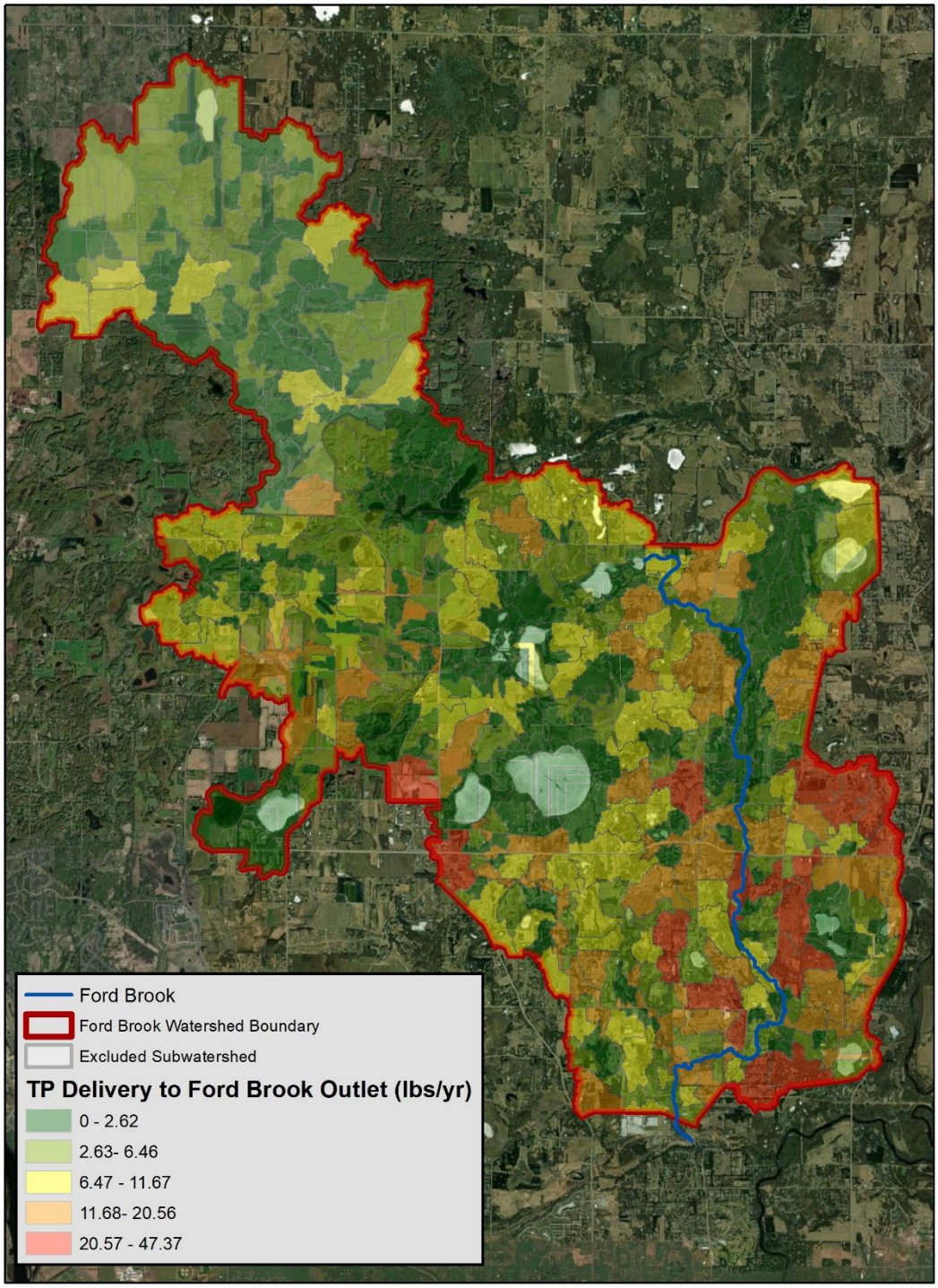


Ford Brook Watershed Hydrologic Soil Groups



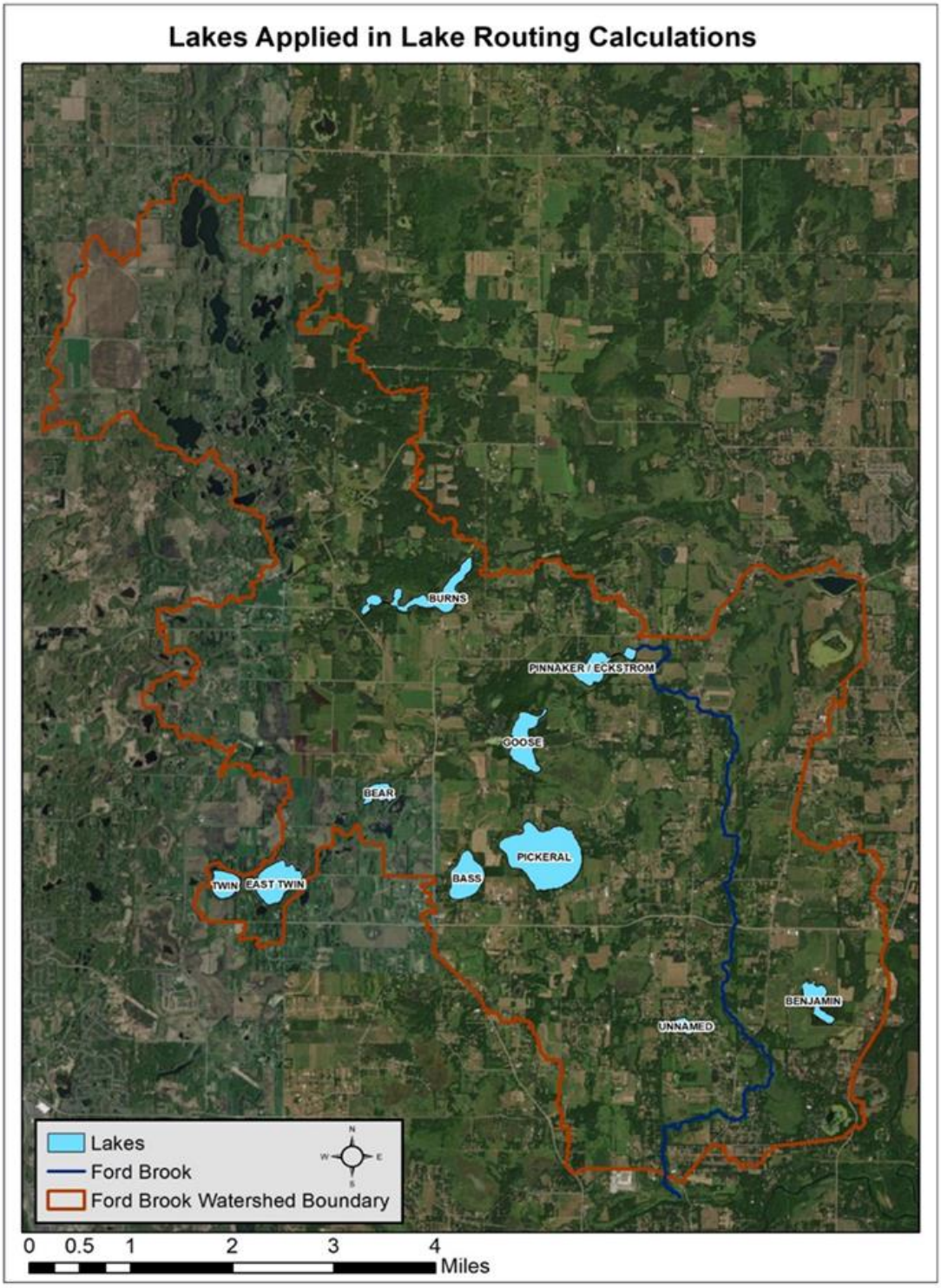

Ford Brook Watershed Depth to Water Table
Ford Brook Watershed Boundary
Depth to Water Table
Water
>0 - 10
>10 - 20
>20 - 30
>30 - 40
>40 - 50
>50
Ford Brook
Ford Brook
0 0.5 1 2 3 4
Miles
N

Estimated Catchment-Level Total Phosphorus Delivery to Ford Brook Outlet



Appendix B. Lakes Applied in Lake Routing Processes

Waterbody Name	Acres	Shore Miles	FW ID
Burns	95	4	3589
Pickerel	238	2.7	2896
Bear	21	0.9	13738
Goose	65	1.8	13699
Twin	40	0.9	2903
East Twin	92	2.2	2900
Bass	82	1.5	2899
Pinnaker	37	1.3	13667
Benjamin	39	1.6	15944
Eckstrom	6	0.4	13661
Unnamed	9	0.4	13864


Lakes Applied in Lake Routing Calculations
BURNS
PINNAKER / ECKSTROM
GOOSE
BEAR
PICKERAL
BASS
TWIN
EAST TWIN
BENJAMIN
UNNAMED
Lakes
Ford Brook
Ford Brook Watershed Boundary
N
W
E
S
0 0.5 1 2 3 4
Miles

Appendix C. Best Management Practice Types Produced by PTMApp

Conservation Practice Name	NRCS Practice Code	Treatment Method	Effective Life (Years)
Farm Pond/ Wetland	378	Storage	25
Drainage Water Management	554	Storage	20
Water and Sediment Control Basin	638	Storage	10
Regional Wetland/ Pond	656	Storage	15
Large Wetland Restoration	656	Storage	15
Riparian Buffer	390	Filtration	10
Filtration Strip	393	Filtration	10
Saturated Buffer	604	Biofiltration	15
Denitrifying Bioreactor	605	Biofiltration	10
Infiltration Trench/ Small Infiltration Basin	350	Infiltration	20
Multi-Stage Ditch (open channel)	582	Infiltration	15
Critical Area Planting	342	Protection	10
Grade Stabilization	410	Protection	15
Grassed Waterway	412	Protection	20
Lake and Wetland Shoreline Restoration	580	Protection	20
Perennial Crops	327	Source Reduction	10
No Till	329	Source Reduction	1
Cover Crops	340	Source Reduction	1
Reduced Till	345	Source Reduction	1
Forage / Biomass Planting	512	Source Reduction	10
Prescribed Grazing	528	Source Reduction	4

Nutrient Management of Groundwater	590	Source Reduction	1
Nutrient Management for Phosphorus	590	Source Reduction	1
Nutrient Management for Nitrogen	590	Source Reduction	1

Appendix D: NRCS Conservation Practice Standard Overview Sheets

USDA United States Department of Agriculture

Conservation Practice Standard Overview — September 2016

Residue and Tillage Management, No Till (Code 329)

The residue and tillage management, no till practice addresses the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round. Crops are planted and grown in narrow slots or tilled strips established in the untilled seedbed of the previous crop.

Practice Information

This practice includes maintaining most of the crop residue on the soil surface throughout the year, commonly referred to as no till. The common characteristic of this practice is that the only tillage performed is a very narrow strip prepared by coulters, sweeps, or similar devices attached to the front of the planter.

Benefits to soil include increasing organic matter, improving soil tilth, and increasing productivity as the constant supply of organic material left on the soil surface is decomposed by a healthy population of earthworms and other organisms.

Operations and maintenance for this practice includes evaluating the crop-residue cover and orientation for each crop to ensure the planned amounts, orientation, and benefits are being achieved. Weeds and other pests must be monitored to ensure pest populations do not exceed thresholds.

Common Associated Practices

Residue and Tillage Management, No Till (Code 329) is commonly applied with practices such as Conservation Crop Rotation (Code 328), Nutrient Management (Code 590), Integrated Pest Management (Code 595), and Irrigation Water Management (Code 449).

For further information, contact your local NRCS field office.

Natural Resources Conservation Service

Helping People Help the Land

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Conservation Practice Standard Overview

Cover Crop (340)

Cover crop is growing a crop of grass, small grain, or legumes primarily for seasonal protection and soil improvement.

Practice Information

Cover and green manure crops are grown on land where seasonal or long-term benefits of a cover crop are needed.

This practice is used to control erosion, add fertility and organic material to the soil, improve soil tilth, increase infiltration and aeration of the soil, and improve overall soil health. The practice is also used to increase populations of bees for pollination purposes. Cover and green manure crops have beneficial effects on water quantity and quality. Cover crops have a filtering effect on movement of sediment, pathogens, and dissolved and sediment-attached pollutants.

Operation and maintenance of cover crops include: controlling weeds by mowing or by using other pest management techniques, and managing for the efficient use of soil moisture by selecting water-efficient plant species and terminating the cover crop before excessive transpiration. Use of the cover crop as a green manure crop to cycle nutrients will impact when to terminate the cover to match release of nutrient with uptake by following cash crop.

Common Associated Practices

Cover Crop (340) is commonly applied with practices such as Conservation Crop Rotation (328); Residue and Tillage Management, No Till (329); Residue and Tillage Management, Reduced Till (345); Nutrient Management (590), and Integrated Pest Management (595).

For further information, contact your local NRCS field office.

USDA United States Department of Agriculture

Conservation Practice Standard Overview

September 2016

Critical Area Planting (Code 342)

Critical area planting establishes permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have conditions that prevent the establishment of vegetation with normal practices.

Practice Information

Erosion control is the primary consideration for plant material selection. However, a broad choice of grass, trees, shrubs, and vines are usually available and adapted for most sites. Wildlife and beautification are additional considerations that influence planning decisions on a site needing this practice.

Conservation benefits may include, but are not limited to—

- reduced sheet and rill erosion
- reduced transport of sediment
- stabilized slopes, road banks, stream banks, shorelines, sand dunes

The following decisions must be made when planning this practice:

- species of plants to establish
- methods and rates of planting
- fertilizer and soil amendments necessary for establishment and growth
- mulching requirements
- planting site preparation
- irrigation requirement
- site management following establishment of the vegetation

Common Associated Practices

Installation of practices such as Diversion (Code 362), Obstruction Removal (Code 500), Subsurface Drain (Code 606), or Underground Outlet (Code 620) may be necessary to prepare the area or ensure vegetative establishment.

Critical Area Planting (Code 342) is commonly applied with practices such as Mulching (Code 484), Nutrient Management (Code 590), and Herbaceous Weed Control (Code 315).

For further information, contact your local NRCS field office.

USDA United States Department of Agriculture

Conservation Practice Standard Overview September 2016

Residue and Tillage Management, Reduced Till (Code 345)

Residue and tillage management, reduced till practice manages the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting.

Practice Information

This practice includes tillage methods commonly referred to as mulch tillage where a majority of the soil surface is disturbed by noninversion tillage operations such as vertical tillage, chiseling, and disking, and also includes tillage/planting systems with relatively minimal soil disturbance.

Mulch tillage includes the uniform spreading of residue on the soil surface, planning the number, sequence, and timing of tillage operations to achieve the prescribed amount of surface residue needed and using planting equipment designed to operate in high residue situations.

This practice benefits soil by increasing organic matter, improving soil tilth, and increases productivity as the constant supply of organic material left on the soil surface is decomposed by a healthy population of earth worms and other organisms.

Operations and maintenance for this practice includes evaluating the crop residue cover and orientation for each crop to ensure the planned amounts, orientation, and benefits are being achieved.

Common Associated Practices

Residue and Tillage Management, Reduced Till (Code 345) is commonly applied with practices such as Conservation Crop Rotation (Code 328), Nutrient Management (Code 590), Integrated Pest Management (Code 595), and Irrigation Water Management (Code 449).

For further information, contact your local NRCS field office.

USDA United States Department of Agriculture

Conservation Practice Standard Overview May 2016

Sediment Basin (Code 350)

A sediment basin is a basin constructed with an engineered outlet, formed by constructing an embankment, excavating a dugout, or a combination of both.

Practice Information

Sediment basins capture and detain sediment-laden runoff or other debris for a sufficient length of time to allow it to settle out in the basin.

Sediment basins preserve the capacity of reservoirs, culverts, ditches, canals, diversions, waterways, and streams; prevent excessive down-slope deposition; trap sediment originating from construction sites; and reduce or abate damage to natural resources from pollution or deposition of sediment.

Many factors influence the efficiency of sediment removal in a basin. These include the detention time of runoff, the type of dewatering device, the presence of a permanent pool in the basin, a decrease in turbulence in the basin, and soil particle size.

Operation and maintenance requirements will include periodic inspections with prompt repair or replacement of damaged components, periodic removal of sediment, and periodic mowing of vegetation.

Common Associated Practices

Sediment Basin (Code 350) may be a component practice of a required storm water management plan and/or erosion and sediment control plan. Conservation practices commonly applied with Sediment Basin (Code 350) include Critical Area Planting (Code 342), Mulching (Code 484), and Structure for Water Control (Code 587).

For further information, contact your local NRCS field office.

United States Department of Agriculture

Conservation Practice Overview

November 2022

Riparian Herbaceous Cover (Code 390)

Riparian herbaceous cover is establishment and maintenance of grasses, grass-like plants, and forbs that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zone between terrestrial and aquatic habitats.

Practice Information

This practice is used on lands along water courses or at the boundary of water bodies or wetlands where the natural or desired plant community is dominated by herbaceous vegetation. ;The ecosystem has been disturbed and the natural plant community is missing, changed, or has been converted to agricultural crops, lawns, or other high maintenance vegetation; or invasive species dominate.

The purposes of this practice include:

- Provision of food, shelter, shading substrate, access to adjacent habitats.
- Nursery habitat and pathways for movement by resident and nonresident aquatic, semiaquatic, and terrestrial organisms.
- Improvement and protection of water quality.
- Stabilization of streambanks and shorelines. ,
- Increased net carbon storage in the biomass and soil.

Common Associated Practices

Riparian Herbaceous Cover (390) is commonly applied with conservation practices such as Fence (382), Use Exclusion (472), Wetland Wildlife Habitat Management (644), Prescribed Grazing (528), Streambank and Shoreline Protection (580), Stream Crossing (578), and Watering Facility (614).

For further information, contact your local NRCS field office.

USDA United States Department of Agriculture

Conservation Practice Standard Overview

September 2016

Filter Strip (Code 393)

A filter strip is an area of vegetation established for removing sediment, organic material, and other pollutants from runoff and wastewater.

Practice Information

Filter strips are generally located at the lower edge(s) of a field and are designed to serve as a buffer between a field and environmentally sensitive areas such as streams, lakes, wetlands, and other areas susceptible to damage by sediment and waterborne pollutants.

In addition to serving as a buffer, with proper plant selection and management, filter strips can provide additional benefits such as:

- improved fish and wildlife habitat
- improved field access
- increased livestock forage

Operate and maintain filter strips by mowing, fertilizing, controlling weeds, and reseeding (as needed) to promote dense vegetative growth. After storm events, inspect filter strips and if needed, fill in gullies and remove accumulated sediment to keep filter strips functioning effectively.

Exclude livestock and vehicular traffic from filter strips during wet periods of the year to reduce compaction that will limit infiltration.

Common Associated Practices

Filter Strips (Code 393) are commonly applied with conservation practices such as Nutrient Management (Code 590), Integrated Pest Management (Code 595), Waste Recycling (Code 633), and Residue and Tillage Management (Codes 329 and 345).

For further information, contact your local NRCS field office.

United States Department of Agriculture

Conservation Practice Overview

September 2020

Grassed Waterway (Code 412)

A shaped or graded channel that is established with suitable vegetation to convey surface water at a nonerosive velocity using a broad and shallow cross section to a stable outlet.

Practice Information

Waterways are constructed to convey runoff from concentrated-flow areas, terraces, or diversions where erosion control is needed. Waterways can be used to control gullies and/or improve the water quality of downstream water bodies by reducing the sediment carried by runoff water.

Grassed waterways are usually parabolic or trapezoidal in shape and are designed to allow farm equipment to cross without damaging the waterway or the equipment.

When possible, species of vegetation should be selected that can serve multiple purposes, such as benefiting wildlife, while still meeting the basic criteria needed for providing a stable conveyance for runoff. Tall bunch grasses and perennial forbs may also be planted along waterway margins to improve wildlife habitat. Including diverse legumes or other forbs that provide pollen and nectar will have the added benefit of providing habitat for native bees.

This practice has a minimum expected life of 10 years. Some maintenance will be needed to maintain the waterway capacity, vegetative cover, and outlet stability. This will include mowing (or controlled grazing), fertilizing, and sediment removal. Most of the damage that occurs to grassed waterways is caused by equipment or herbicides and can be avoided by careful management. Vegetation that is damaged by machinery, herbicides, or erosion must be repaired promptly.

Common Associated Practices

NRCS Conservation Practice Standard (CPS) Grassed Waterway (Code 412) is commonly applied with other conservation practices such as NRCS CPSs Terrace (Code 600), Diversion (Code 362), Critical Area Planting (Code 342), Grade Stabilization Structure (Code 410), and other erosion control practices.

For further information, contact your local NRCS field office.

United States Department of Agriculture

Conservation Practice Overview

August 2023

Water and Sediment Control Basin (Code 638)

A water and sediment control basin (WASCOB) is an earth embankment or a combination ridge and channel constructed across the slope of a minor drainageway.

Practice Information

The purpose of this practice is to reduce gully erosion, trap sediment, and reduce and manage runoff. WASCOBs are constructed across small drainageways where they intercept runoff. The basin detains runoff and slowly releases it allowing sediment to settle. WASCOBs generally use an underground outlet to control the release and carry the runoff in a pipe to a receiving stream or ditch.

This practice applies to sites where—

- The topography is generally irregular.
- Gully erosion is a problem.
- Other conservation practices control sheet and rill erosion.
- Runoff and sediment damages land and works of improvement.
- Stable outlets are available.

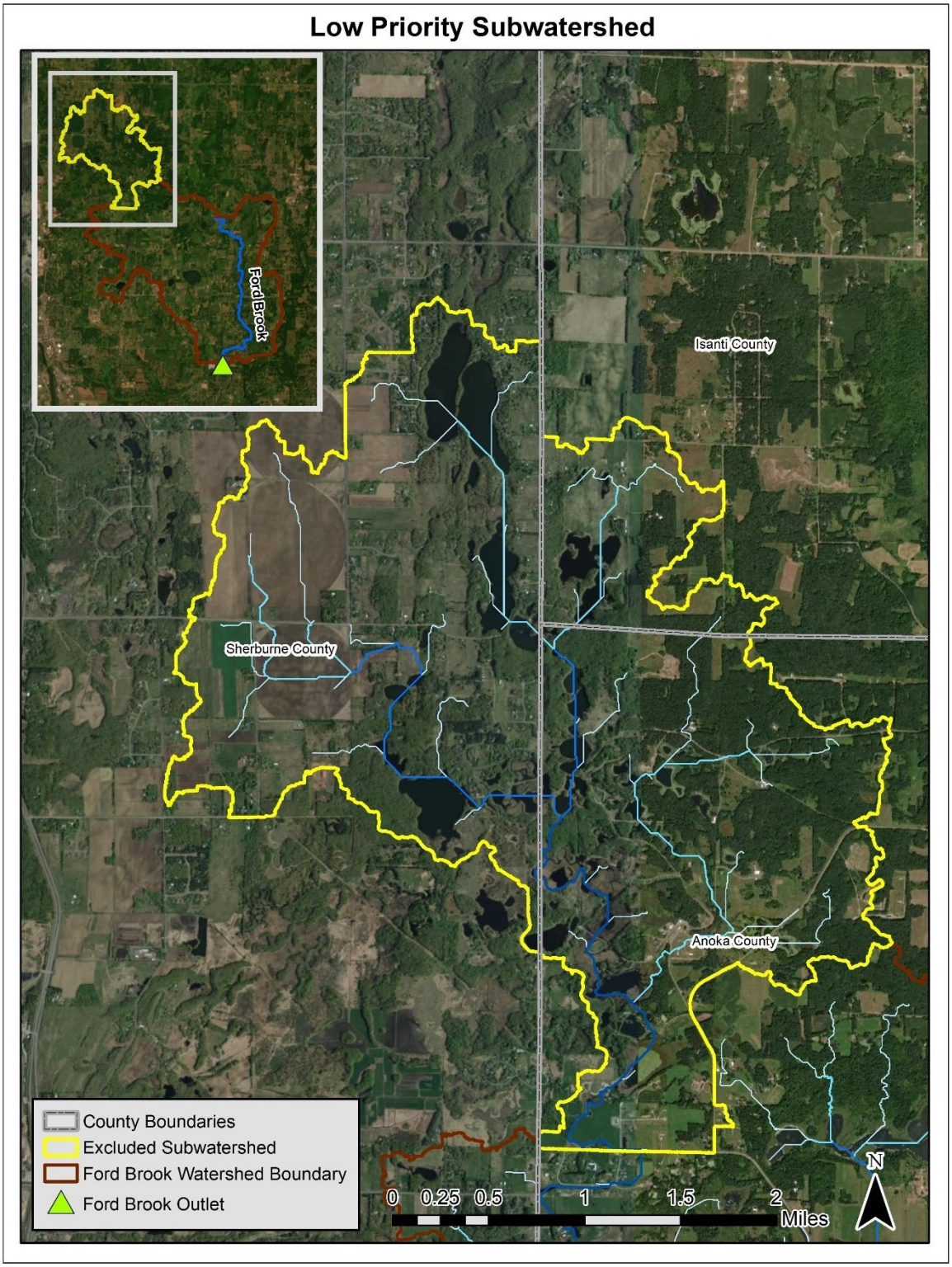
WASCOBs alone may not be sufficient to control sheet and rill erosion on sloping upland areas. In addition, outlets from water and sediment control basins can provide a direct conduit to receiving waters for contaminated runoff from cropland. For these reasons, additional practices may be needed to adequately protect sloping upland areas from erosion and to protect down-slope water quality.

Common Associated Practices

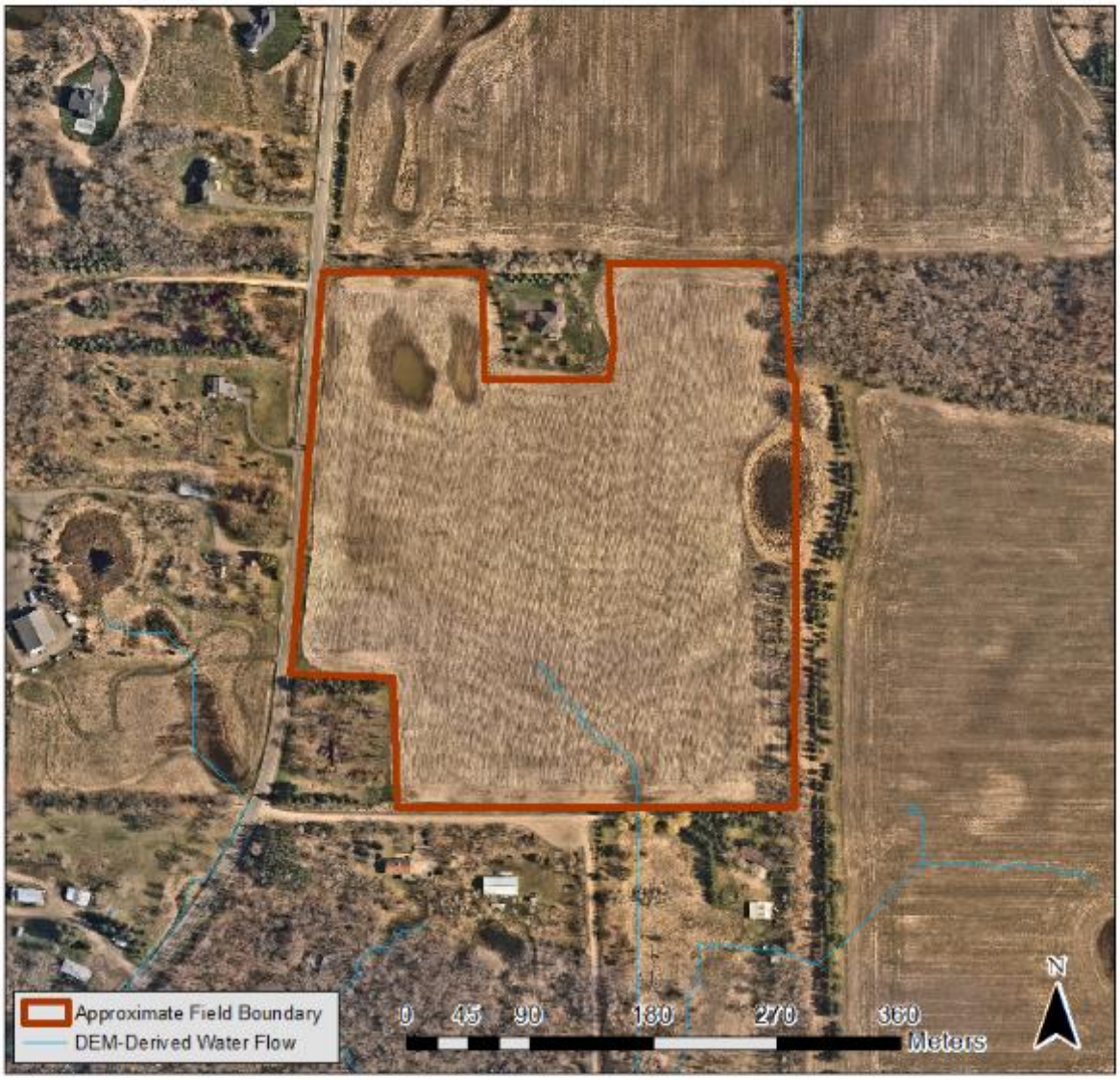
The Conservation Practice Standard (CPS) Water and Sediment Control Basin (Code 638) is frequently associated with CPSs Conservation Crop Rotation (Code 328); Residue and Tillage Management, No Till (Code 329); Residue and Tillage Management, Reduced Till (Code 345); Cover Crop (Code 430); Critical Area Planting (Code 342); Filter Strip (Code 393); and Nutrient Management (Code 590).

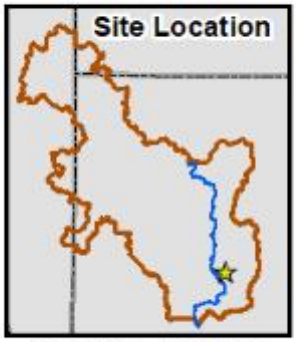
For further information, contact your local NRCS field office.

Appendix E: Subwatershed Removed from Further Consideration for BMPS



Appendix F: Project Profiles: Top Ford Brook Watershed No-Till Source Reduction Site

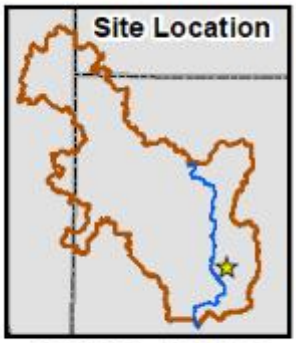




45.315043, -93.400949

Site ID: FB-NT-01 | Field ID: F070102070705_485	
Field Area (acres)	24.4
TP Reduction (lb/yr)	3.87
TSS Reduction (tons/yr)	8.94
TN Reduction (lb/yr)	73.17
Useful Life Total Cost Estimate	838
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**216.18**

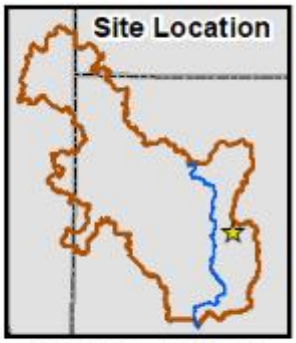
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.318642, -93.400504

Site ID: FB-NT-02 | Field ID: F070102070705_207	
Field Area (acres)	24.7
TP Reduction (lb/yr)	3.66
TSS Reduction (tons/yr)	7.51
TN Reduction (lb/yr)	69.17
Useful Life Total Cost Estimate	821
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**224.23**

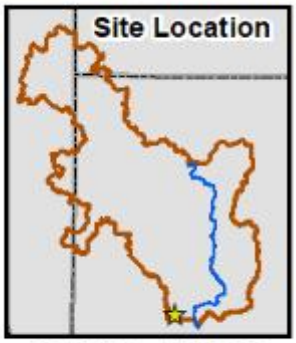
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.294065, -93.436696

Site ID: FB-NT-03 | Field ID: F070102070705_462	
Field Area (acres)	42
TP Reduction (lb/yr)	7.03
TSS Reduction (tons/yr)	17.83
TN Reduction (lb/yr)	132.70
Useful Life Total Cost Estimate	1,611
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**229.25**

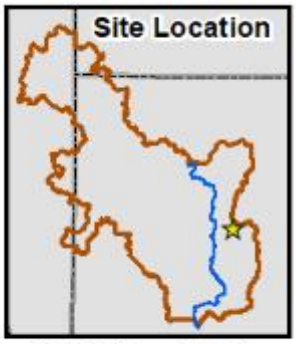
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.335808, -93.396206

Site ID: FB-NT-04 | Field ID: F070102070705_116	
Field Area (acres)	19.4
TP Reduction (lb/yr)	2.79
TSS Reduction (tons/yr)	6.65
TN Reduction (lb/yr)	52.75
Useful Life Total Cost Estimate	643
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**230.04**

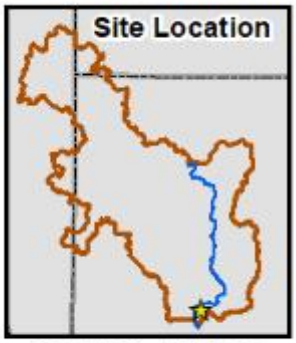
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.337496, -93.3962

Site ID: FB-NT-05 | Field ID: F070102070705_115	
Field Area (acres)	19.2
TP Reduction (lb/yr)	2.77
TSS Reduction (tons/yr)	6.59
TN Reduction (lb/yr)	52.24
Useful Life Total Cost Estimate	636
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**230.04**

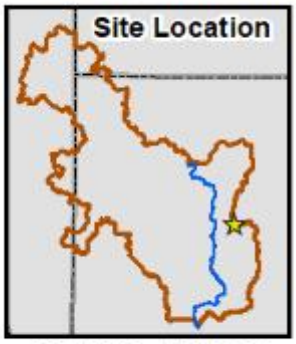
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.296484, -93.418932

Site ID: FB-NT-06 | Field ID: F070102070705_289	
Field Area (acres)	26.5
TP Reduction (lb/yr)	4.59
TSS Reduction (tons/yr)	8.64
TN Reduction (lb/yr)	86.71
Useful Life Total Cost Estimate	1,102
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**239.96**

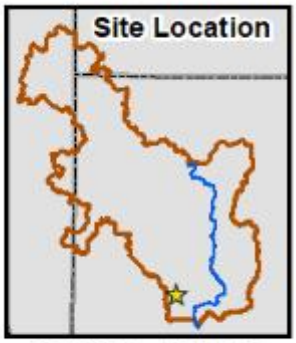
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.33988 , -93.394227

Site ID: FB-NT-07 | Field ID: F070102070705_92	
Field Area (acres)	38.3
TP Reduction (lb/yr)	5.52
TSS Reduction (tons/yr)	12.25
TN Reduction (lb/yr)	104.23
Useful Life Total Cost Estimate	1,343
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**243.25**

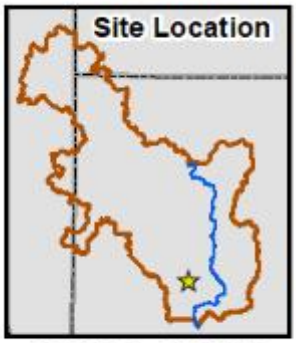
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.304408, -93.435592

Site ID: FB-NT-08 | Field ID: F070102070705_499	
Field Area (acres)	13.5
TP Reduction (lb/yr)	2.28
TSS Reduction (tons/yr)	6.52
TN Reduction (lb/yr)	43.00
Useful Life Total Cost Estimate	561
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**246.52**

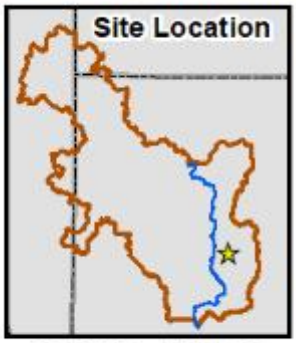
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.311482, -93.42702

Site ID: FB-NT-09 | Field ID: F070102070705_118	
Field Area (acres)	22
TP Reduction (lb/yr)	3.69
TSS Reduction (tons/yr)	13.09
TN Reduction (lb/yr)	69.73
Useful Life Total Cost Estimate	933
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**252.6**

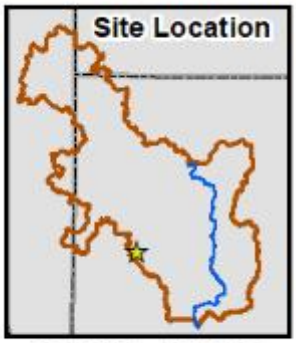
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.325536, -93.399262

Site ID: FB-NT-10 | Field ID: F070102070705_441	
Field Area (acres)	30.2
TP Reduction (lb/yr)	4.66
TSS Reduction (tons/yr)	3.82
TN Reduction (lb/yr)	88.05
Useful Life Total Cost Estimate	1,186
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**254.45**

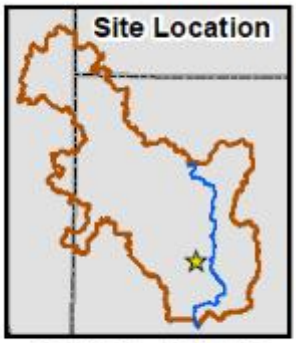
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.326121, -93.464852

Site ID: FB-NT-11 | Field ID: F070102070705_65	
Field Area (acres)	46.9
TP Reduction (lb/yr)	7.22
TSS Reduction (tons/yr)	24.89
TN Reduction (lb/yr)	136.03
Useful Life Total Cost Estimate	1,866
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**258.48**

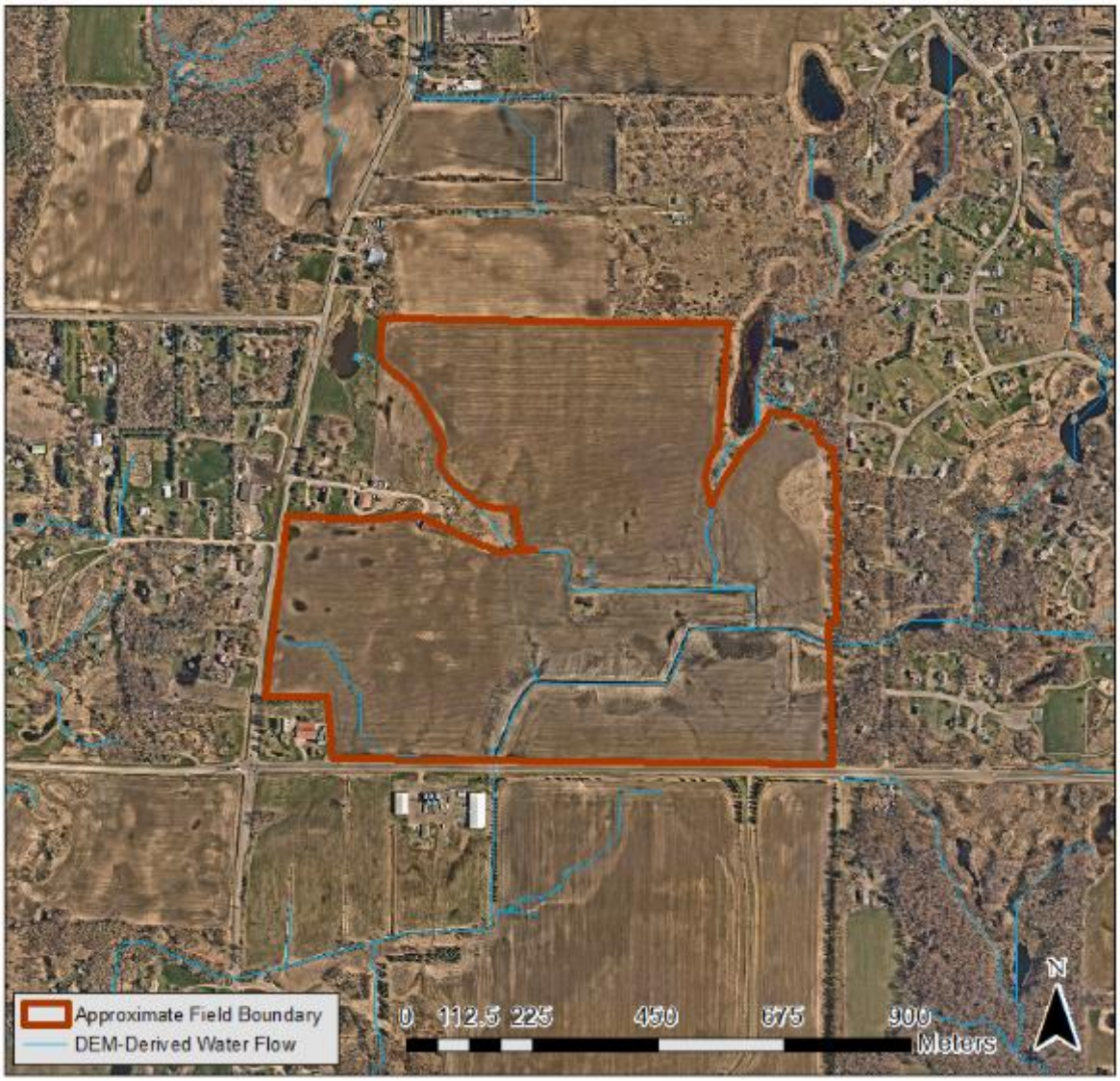
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

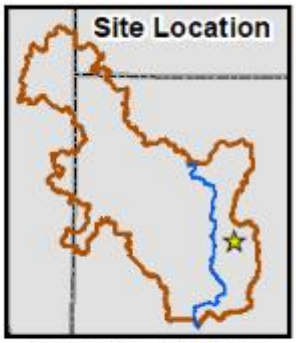


45.321071, -93.422014

Site ID: FB-NT-12 | Field ID: F070102070705_478	
Field Area (acres)	38
TP Reduction (lb/yr)	6.05
TSS Reduction (tons/yr)	3.28
TN Reduction (lb/yr)	114.33
Useful Life Total Cost Estimate	1,573
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**259.75**

Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

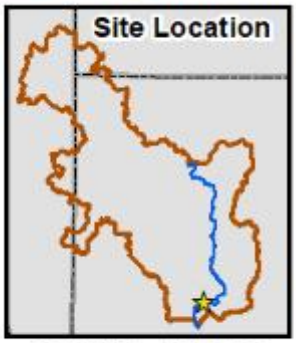




45.331247, -93.394774

Site ID: FB-NT-13 | Field ID: F070102070705_132	
Field Area (acres)	141.1
TP Reduction (lb/yr)	20.91
TSS Reduction (tons/yr)	44.35
TN Reduction (lb/yr)	393.81
Useful Life Total Cost Estimate	5,521
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**264.07**

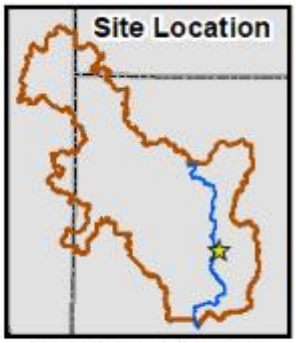
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.300791, -93.416636

Site ID: FB-NT-14 | Field ID: F070102070705_344	
Field Area (acres)	6.6
TP Reduction (lb/yr)	1.14
TSS Reduction (tons/yr)	4.45
TN Reduction (lb/yr)	21.51
Useful Life Total Cost Estimate	302
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**264.72**

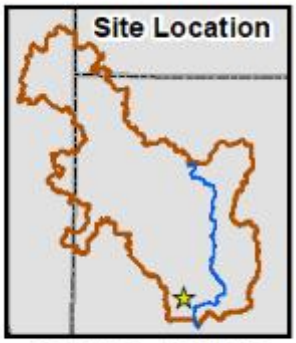
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.312479, -93.392438

Site ID: FB-NT-15 | Field ID: F070102070705_217	
Field Area (acres)	97.5
TP Reduction (lb/yr)	14.35
TSS Reduction (tons/yr)	32.14
TN Reduction (lb/yr)	274.75
Useful Life Total Cost Estimate	3,848
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**268.03**

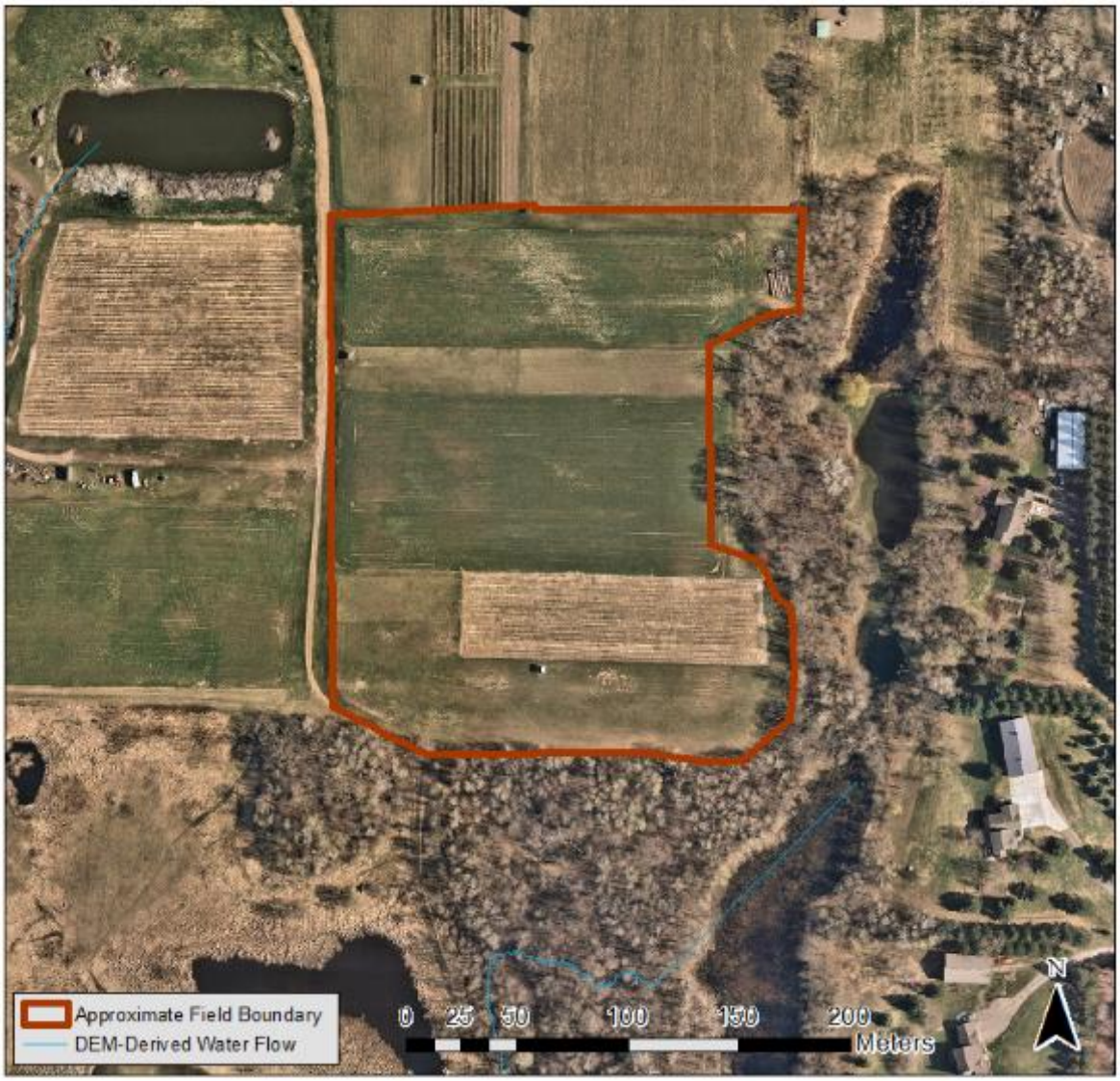
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.326402, -93.405114

Site ID: FB-NT-16 | Field ID: F070102070705_37	
Field Area (acres)	21.7
TP Reduction (lb/yr)	3.36
TSS Reduction (tons/yr)	11.62
TN Reduction (lb/yr)	63.49
Useful Life Total Cost Estimate	914
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**271.88**

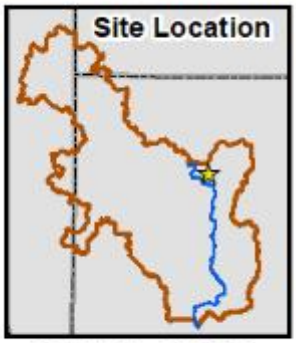
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.302851, -93.430696

Site ID: FB-NT-17 | Field ID: F070102070705_297	
Field Area (acres)	5.2
TP Reduction (lb/yr)	0.87
TSS Reduction (tons/yr)	1.06
TN Reduction (lb/yr)	16.43
Useful Life Total Cost Estimate	242
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**278.01**

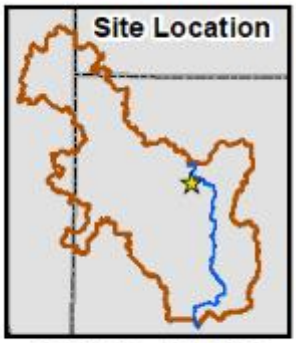
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.336567, -93.40471

Site ID: FB-NT-18 | Field ID: F070102070705_89	
Field Area (acres)	28.4
TP Reduction (lb/yr)	4.18
TSS Reduction (tons/yr)	10.1
TN Reduction (lb/yr)	78.95
Useful Life Total Cost Estimate	1,179
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**282.12**

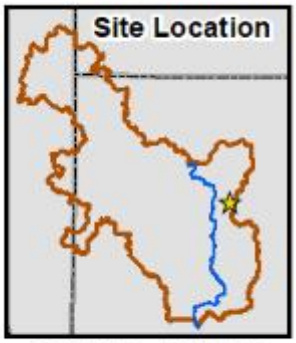
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.365363, -93.413456

Site ID: FB-NT-19 | Field ID: F070102070705_547	
Field Area (acres)	25.1
TP Reduction (lb/yr)	3.39
TSS Reduction (tons/yr)	6.39
TN Reduction (lb/yr)	63.93
Useful Life Total Cost Estimate	961
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**283.94**

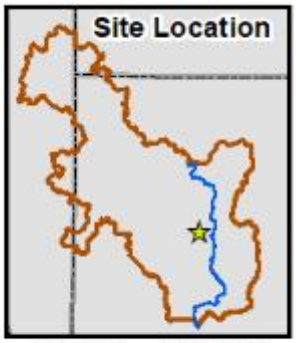
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.360909, -93.425943

Site ID: FB-NT-20 | Field ID: F070102070705_881	
Field Area (acres)	7.8
TP Reduction (lb/yr)	1.06
TSS Reduction (tons/yr)	2.22
TN Reduction (lb/yr)	20.03
Useful Life Total Cost Estimate	306
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**288.02**

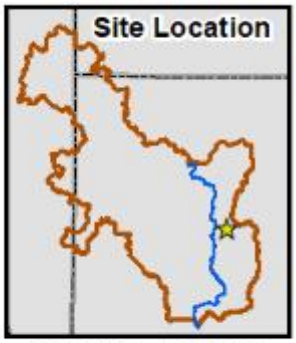
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.35071 , -93.398131

Site ID: FB-NT-21 | Field ID: F070102070705_888	
Field Area (acres)	7.9
TP Reduction (lb/yr)	1.15
TSS Reduction (tons/yr)	1.55
TN Reduction (lb/yr)	21.72
Useful Life Total Cost Estimate	343
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**297.93**

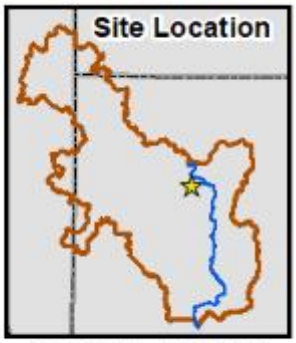
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.336186, -93.419536

Site ID: FB-NT-22 | Field ID: F070102070705_72	
Field Area (acres)	9.2
TP Reduction (lb/yr)	1.32
TSS Reduction (tons/yr)	5.13
TN Reduction (lb/yr)	24.99
Useful Life Total Cost Estimate	400
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**302.55**

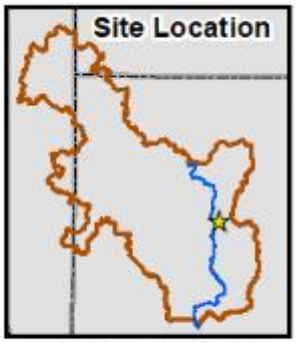
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.337451, -93.400481

Site ID: FB-NT-23 | Field ID: F070102070705_889	
Field Area (acres)	6.6
TP Reduction (lb/yr)	0.95
TSS Reduction (tons/yr)	1.78
TN Reduction (lb/yr)	18.01
Useful Life Total Cost Estimate	294
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**307.76**

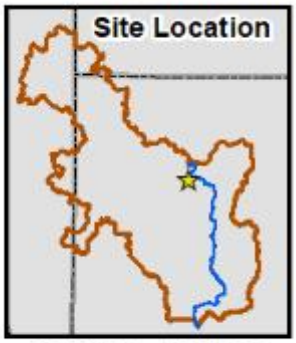
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.35895 , -93.425807

Site ID: FB-NT-24 | Field ID: F070102070705_81	
Field Area (acres)	14.6
TP Reduction (lb/yr)	1.99
TSS Reduction (tons/yr)	2.69
TN Reduction (lb/yr)	37.60
Useful Life Total Cost Estimate	613
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**307.98**

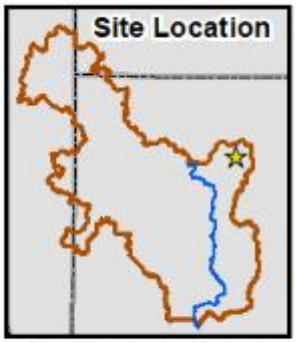
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.341208, -93.405293

Site ID: FB-NT-25 | Field ID: F070102070705_166	
Field Area (acres)	17.3
TP Reduction (lb/yr)	2.53
TSS Reduction (tons/yr)	7.8
TN Reduction (lb/yr)	47.80
Useful Life Total Cost Estimate	784
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**309.79**

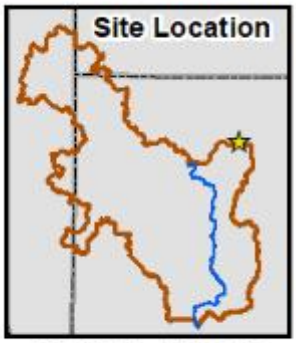
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.361827, -93.427461

Site ID: FB-NT-26 | Field ID: F070102070705_446	
Field Area (acres)	14.3
TP Reduction (lb/yr)	1.93
TSS Reduction (tons/yr)	4.07
TN Reduction (lb/yr)	36.51
Useful Life Total Cost Estimate	599
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**309.88**

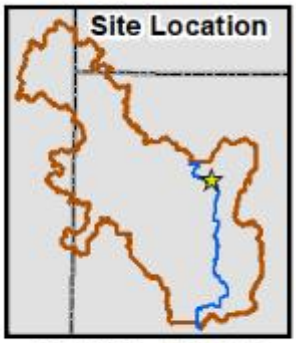
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.37367 , -93.393535

Site ID: FB-NT-27 | Field ID: F070102070705_261	
Field Area (acres)	24.3
TP Reduction (lb/yr)	3.27
TSS Reduction (tons/yr)	1.52
TN Reduction (lb/yr)	61.82
Useful Life Total Cost Estimate	1,019
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**311.34**

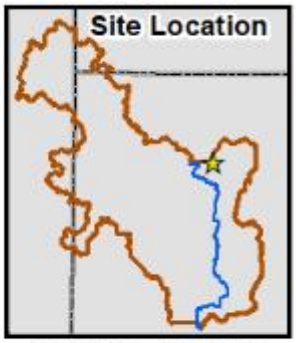
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



45.38127 , -93.391548

Site ID: FB-NT-28 | Field ID: F070102070703_725	
Field Area (acres)	11.8
TP Reduction (lb/yr)	1.57
TSS Reduction (tons/yr)	0.78
TN Reduction (lb/yr)	29.61
Useful Life Total Cost Estimate	488
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**311.45**

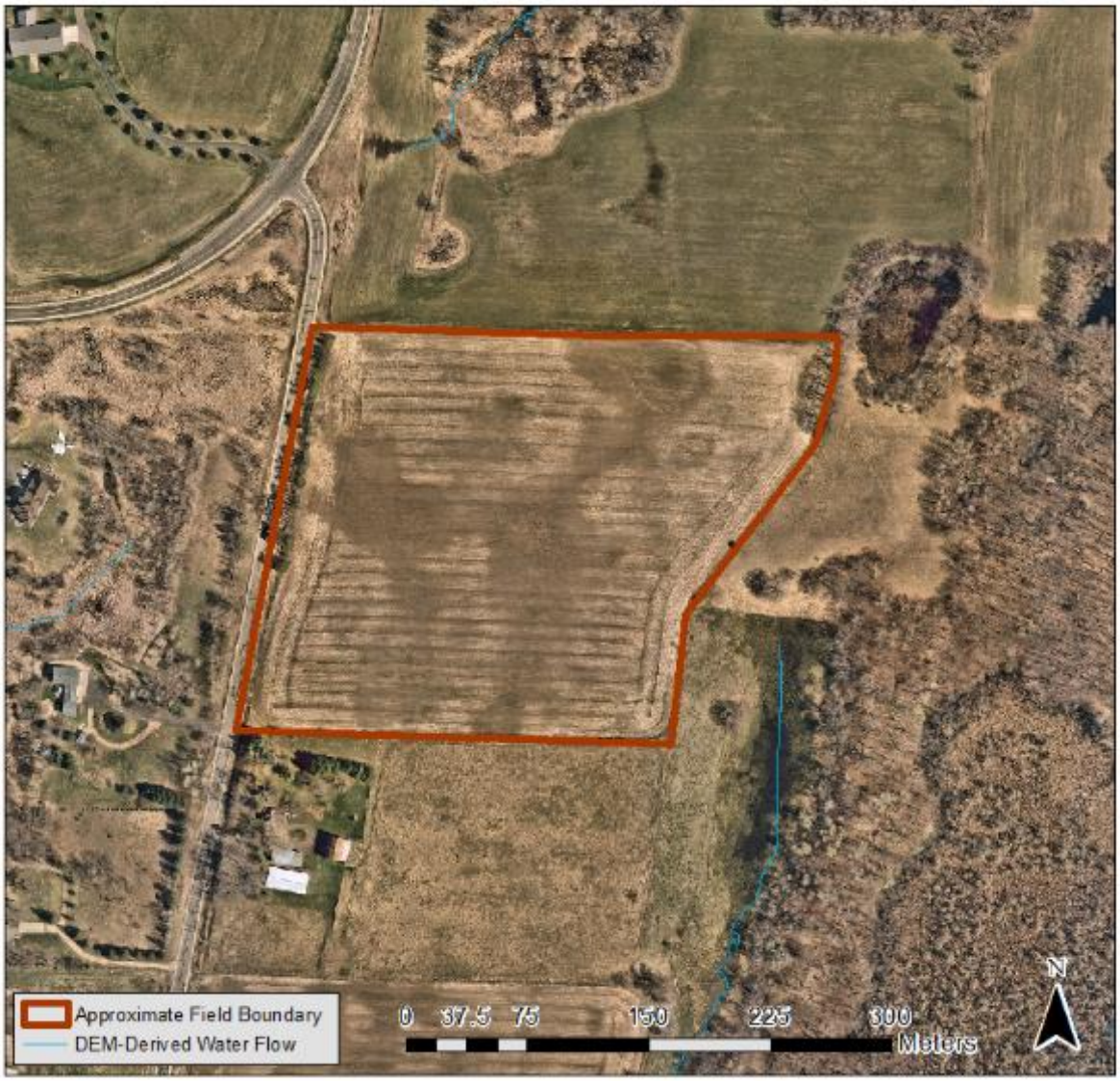
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

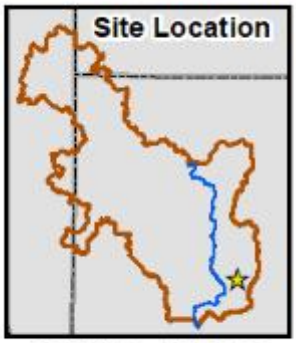


45.361642, -93.412644

Site ID: FB-NT-29 | Field ID: F070102070705_60	
Field Area (acres)	7.8
TP Reduction (lb/yr)	1.08
TSS Reduction (tons/yr)	1.92
TN Reduction (lb/yr)	20.43
Useful Life Total Cost Estimate	347
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**320.68**

Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

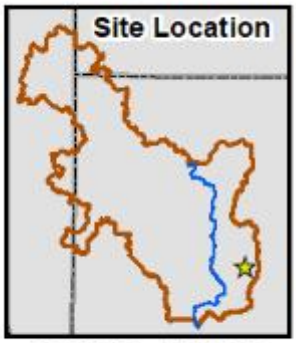




45.369739, -93.412594

Site ID: FB-NT-30 | Field ID: F070102070705_548	
Field Area (acres)	15.5
TP Reduction (lb/yr)	2.05
TSS Reduction (tons/yr)	2.46
TN Reduction (lb/yr)	38.68
Useful Life Total Cost Estimate	684
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**333.93**

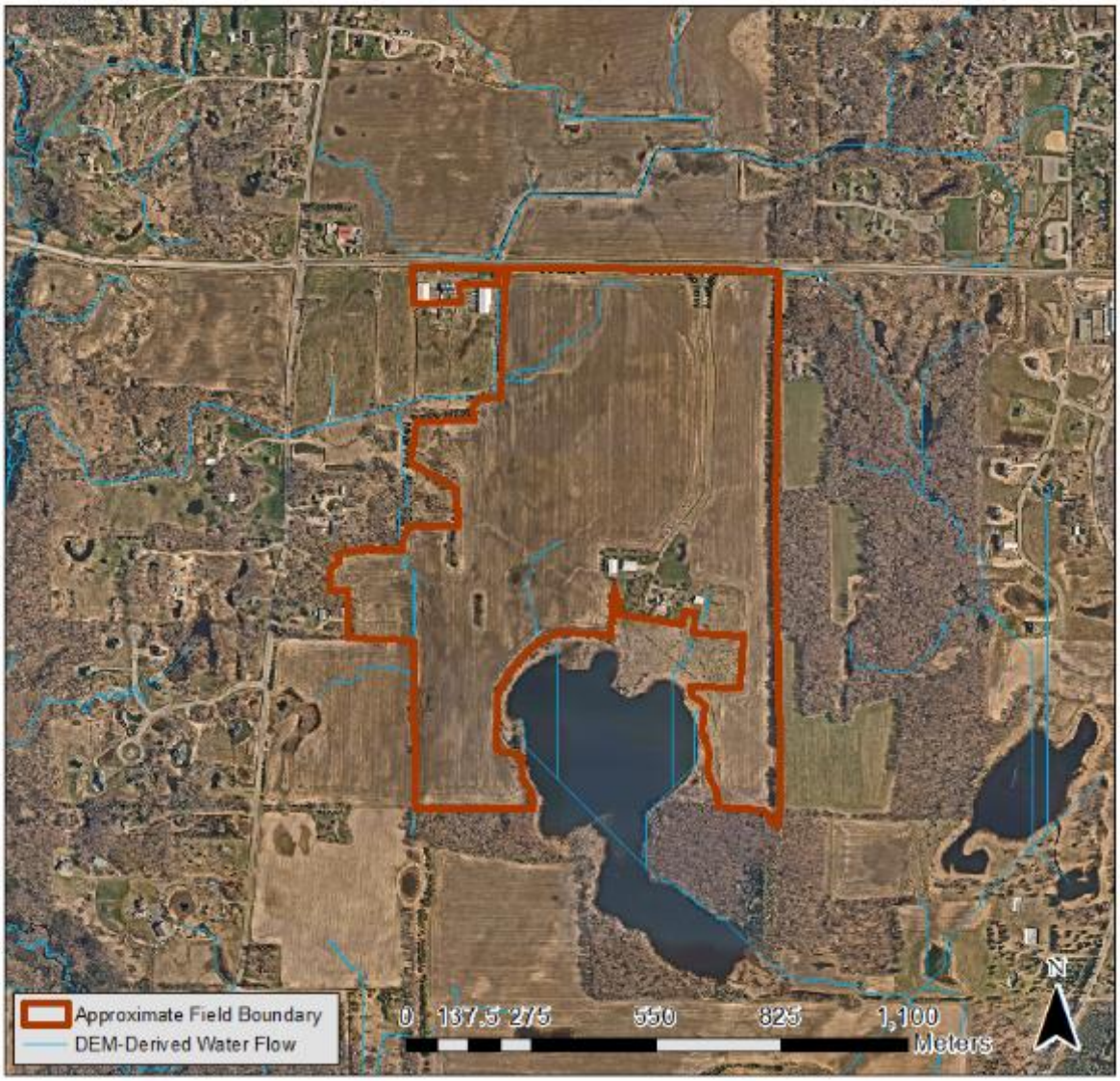
Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

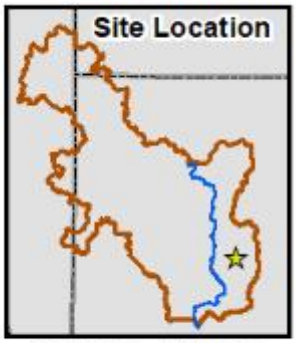


45.318152, -93.387145

Site ID: FB-NT-31 | Field ID: F070102070704_255	
Field Area (acres)	13.7
TP Reduction (lb/yr)	1.71
TSS Reduction (tons/yr)	1.27
TN Reduction (lb/yr)	33.11
Useful Life Total Cost Estimate	604
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**353.26**

Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.



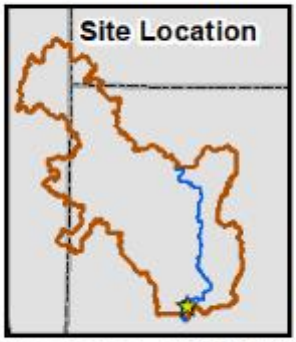


45.322802, -93.393902

Site ID: FB-NT-32 | Field ID: F070102070705_437	
Field Area (acres)	156.2
TP Reduction (lb/yr)	15.65
TSS Reduction (tons/yr)	30.42
TN Reduction (lb/yr)	312.10
Useful Life Total Cost Estimate	5,741
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**366.76**

Reminder: These values represent estimates for candidate no-till farming sites, which were used to rank the most cost-effective locations for source reduction efforts.

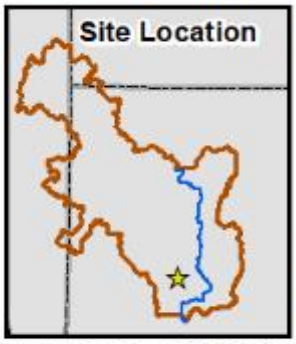
Appendix G: Project Profiles for Candidate Perennial Crop/ Conservation Cover Practices



45.296492, -93.418797

Site ID: FB-PC-01 | Field ID: F070102070705_289	
Field Area (acres)	22.3
TP Reduction (lb/yr)	4.33
TSS Reduction (tons/yr)	5.38
TN Reduction (lb/yr)	34.89
Useful Life Total Cost Estimate	64,112
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,482.02**

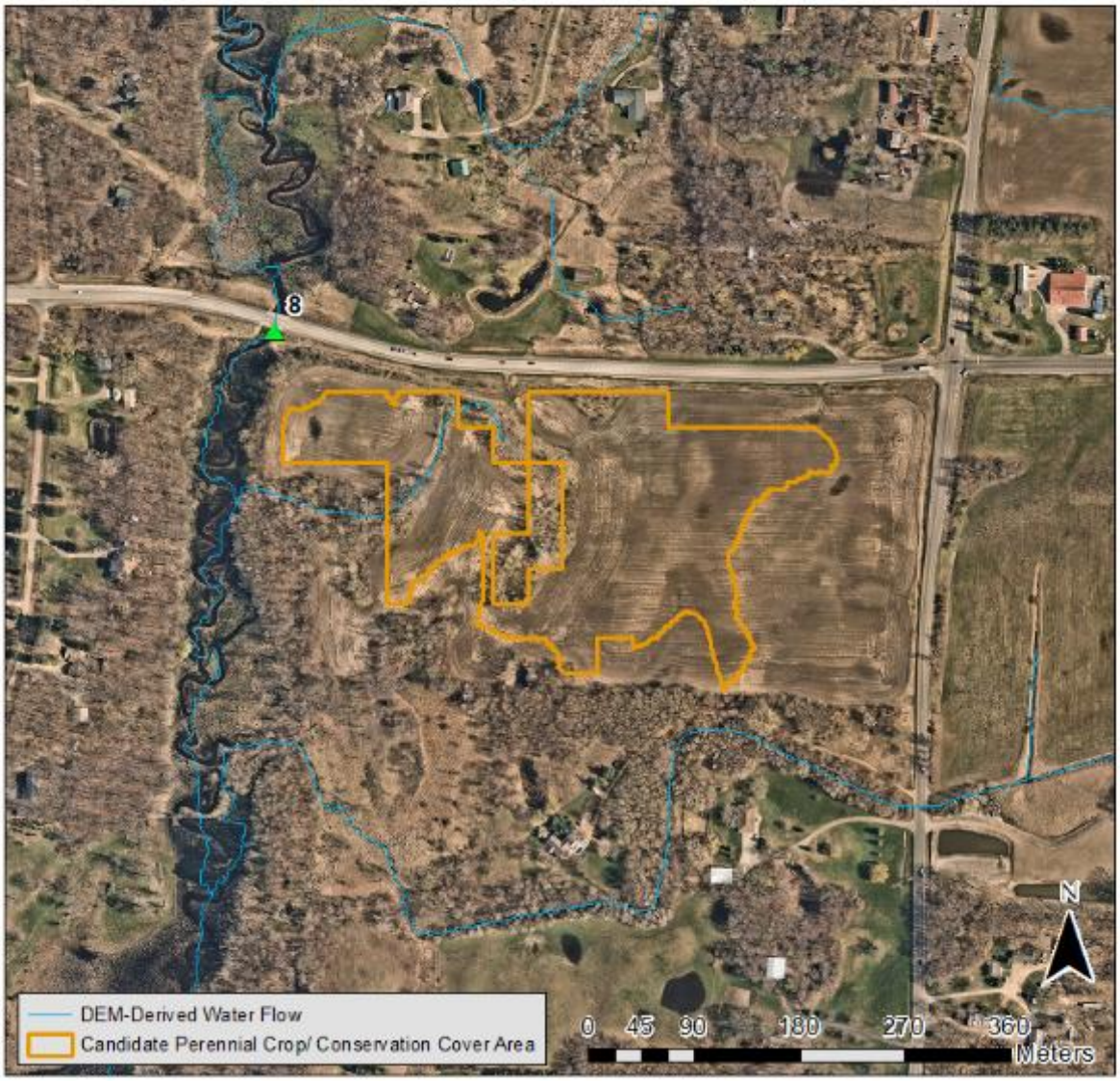
Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

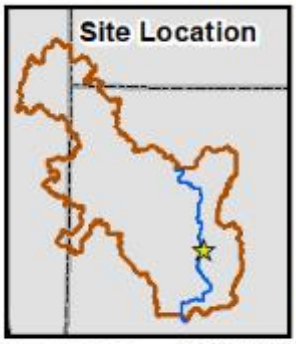


45.312101, -93.425946

Site ID: FB-PC-02 | Field ID: F070102070705_118	
Field Area (acres)	7.4
TP Reduction (lb/yr)	1.41
TSS Reduction (tons/yr)	4.27
TN Reduction (lb/yr)	11.33
Useful Life Total Cost Estimate	22,605
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,608.76**

Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

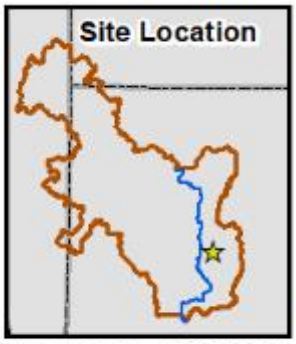




45.326637, -93.40614

Site ID: FB-PC-03 | Field ID: F070102070705_37	
Field Area (acres)	14.7
TP Reduction (lb/yr)	2.54
TSS Reduction (tons/yr)	7.47
TN Reduction (lb/yr)	20.45
Useful Life Total Cost Estimate	40,810
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,609.17**

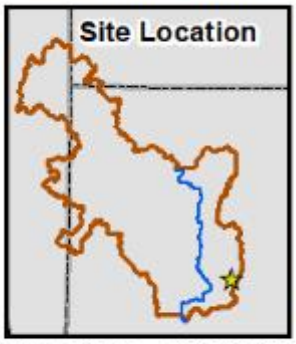
Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.



45.325989, -93.399363

Site ID: FB-PC-04 | Field ID: F070102070705_441	
Field Area (acres)	24.2
TP Reduction (lb/yr)	4.22
TSS Reduction (tons/yr)	0.71
TN Reduction (lb/yr)	34.05
Useful Life Total Cost Estimate	68,489
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,622.59**

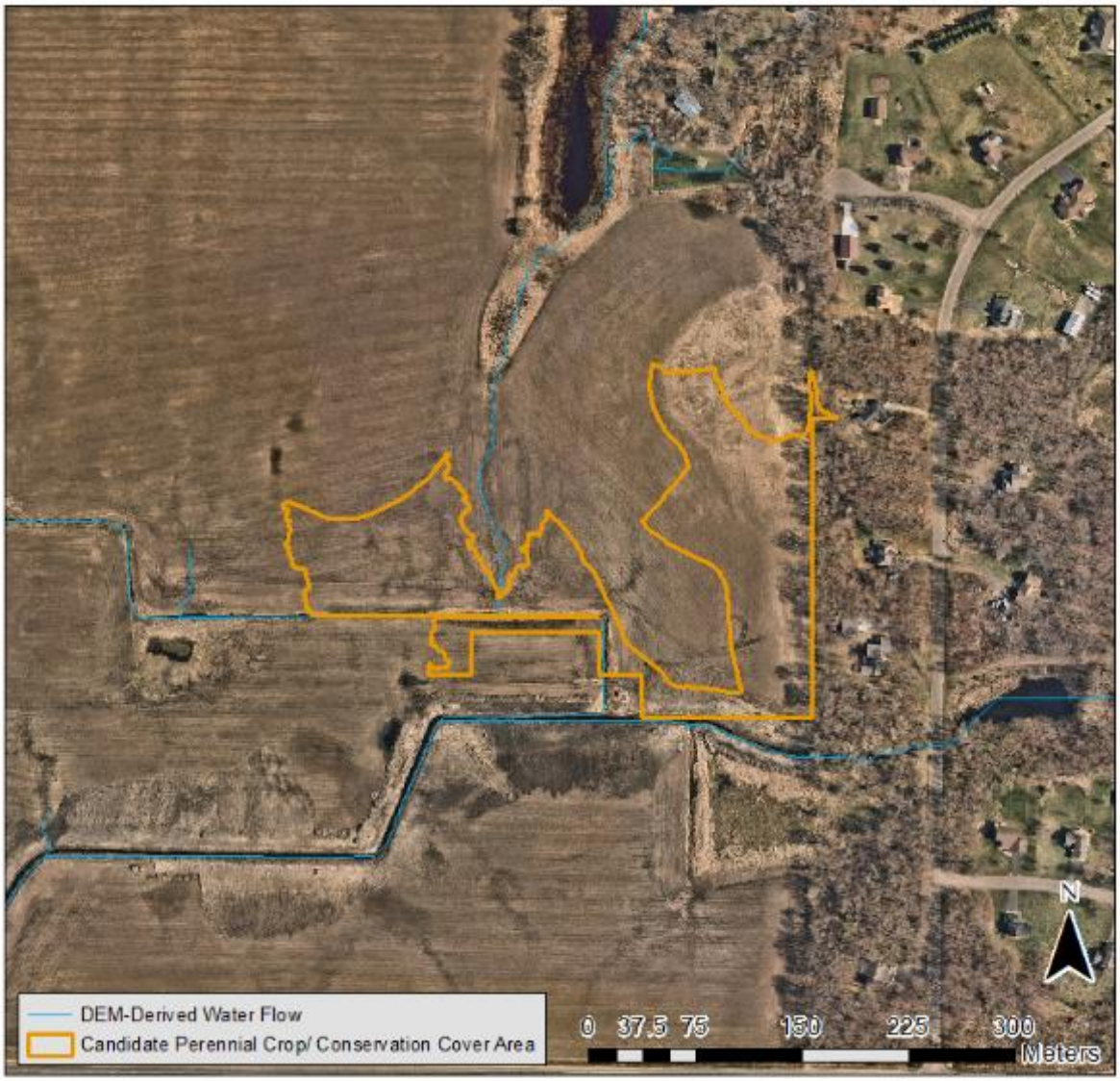
Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

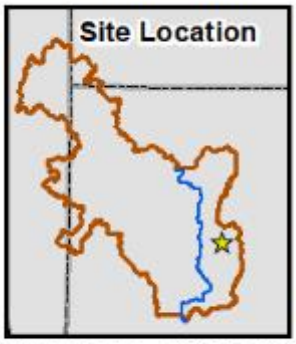


45.311538, -93.385428

Site ID: FB-PC-05 | Field ID: F070102070705_217	
Field Area (acres)	22.5
TP Reduction (lb/yr)	3.96
TSS Reduction (tons/yr)	4.8
TN Reduction (lb/yr)	31.97
Useful Life Total Cost Estimate	68,459
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,726.68**

Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

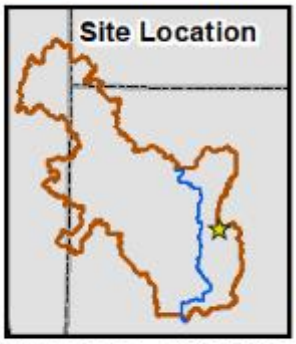




45.330995, -93.390511

Site ID: FB-PC-06 | Field ID: F070102070705_132	
Field Area (acres)	8.9
TP Reduction (lb/yr)	1.49
TSS Reduction (tons/yr)	2.42
TN Reduction (lb/yr)	12.02
Useful Life Total Cost Estimate	26,506
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,777.89**

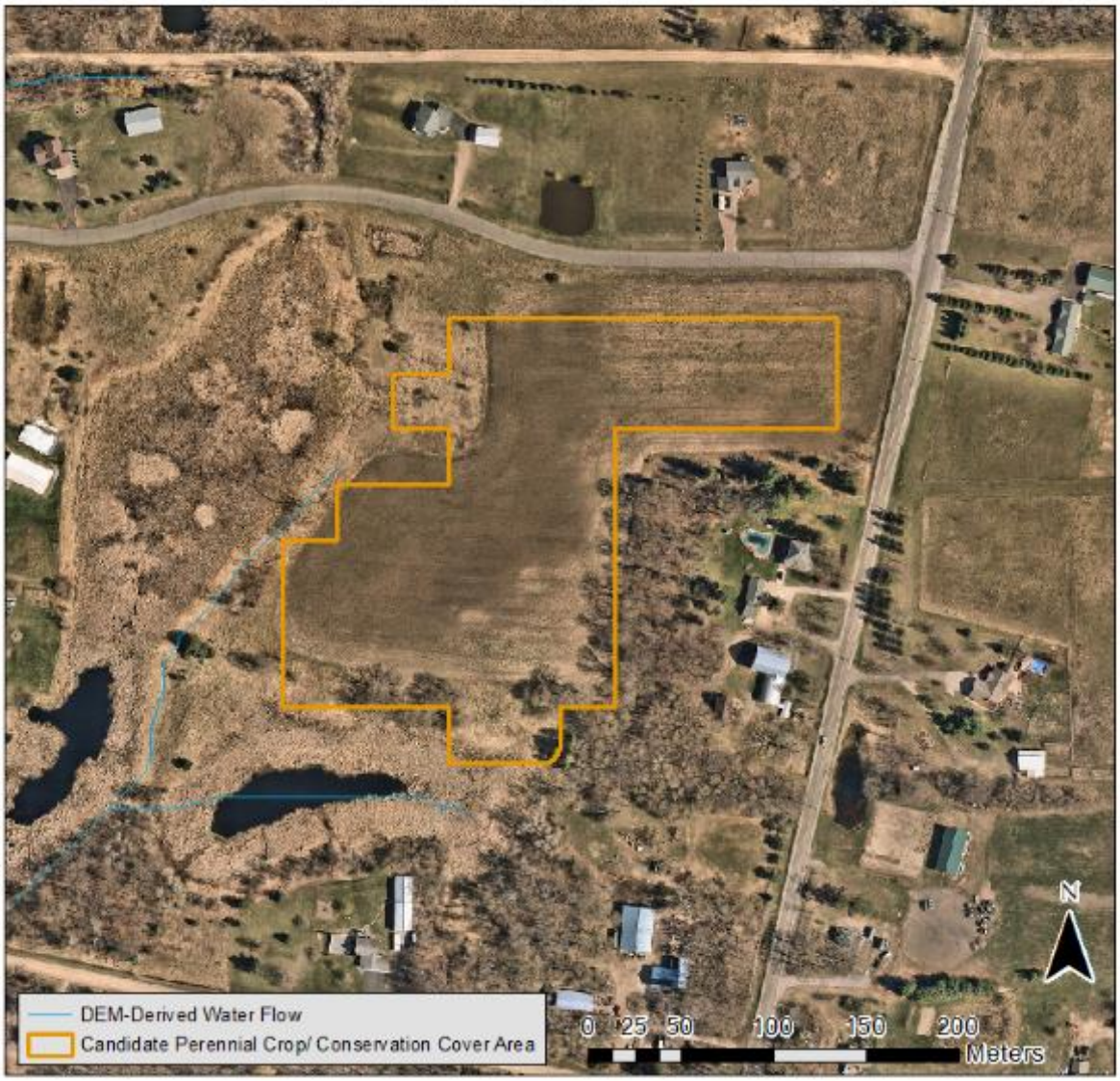
Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

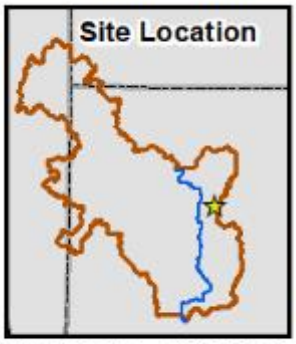


45.337832, -93.394885

Site ID: FB-PC-07| Field ID: F070102070705_115	
Field Area (acres)	11.4
TP Reduction (lb/yr)	1.83
TSS Reduction (tons/yr)	6.65
TN Reduction (lb/yr)	14.76
Useful Life Total Cost Estimate	32,654
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,784.55**

Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

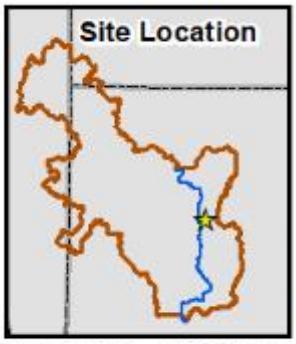




45.350612, -93.398234

Site ID: FB-PC-08 | Field ID: F070102070705_888	
Field Area (acres)	9.6
TP Reduction (lb/yr)	1.56
TSS Reduction (tons/yr)	1.66
TN Reduction (lb/yr)	12.58
Useful Life Total Cost Estimate	28,129
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,802.85**

Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

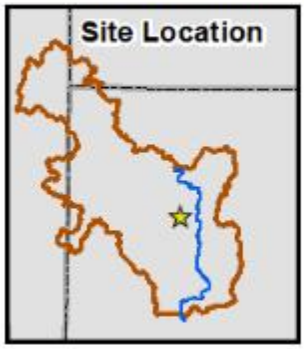


45.343487, -93.405613

Site ID: FB-PC-09| Field ID: F070102070705_166	
Field Area (acres)	5.5
TP Reduction (lb/yr)	0.91
TSS Reduction (tons/yr)	1.89
TN Reduction (lb/yr)	7.35
Useful Life Total Cost Estimate	17,594
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,930.78**

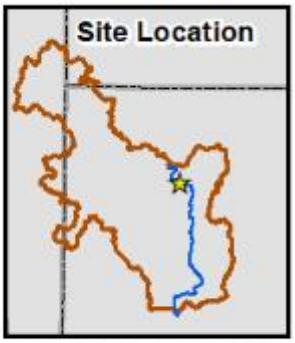
Project boundaries mapped herein were approximated for ranking purposes. If this project is pursued, site-specific information should be used to refine the project area as needed.

Appendix H: Project Profiles: Top Ford Brook Watershed Wetland Restoration Sites



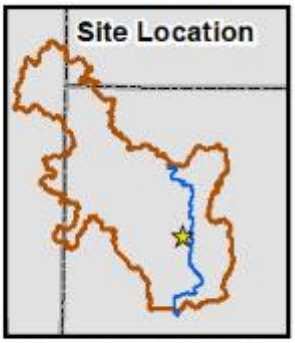
45.344663, -93.423248

Site ID: FB-WR-01	
Practice Area (acres)	3.39
Practice Drainage Area (acres)	320.63
TP Reduction (lb/yr)	18.09
TSS Reduction (tons/yr)	20.22
Max Water Volume Treated (acre-feet/yr)	330.14
Useful Life Total Cost Estimate	27,853
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**102.64**



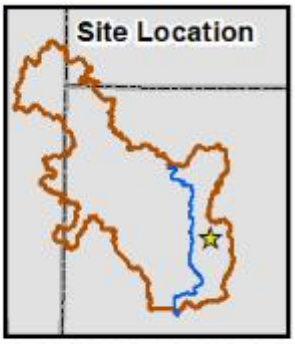
45.360976, -93.418559

Site ID: FB-WR-02	
Practice Area (acres)	2.29
Practice Drainage Area (acres)	205.55
TP Reduction (lb/yr)	9.45
TSS Reduction (tons/yr)	4.9
Max Water Volume Treated (acre-feet/yr)	202.79
Useful Life Total Cost Estimate	23,186
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**163.53**



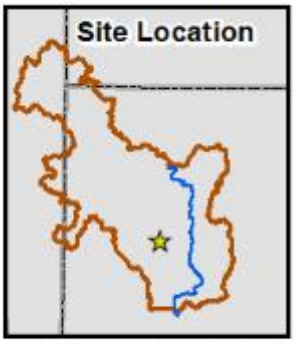
45.331254, -93.416726

Site ID: FB-WR-03	
Practice Area (acres)	1.43
Practice Drainage Area (acres)	89.31
TP Reduction (lb/yr)	7.14
TSS Reduction (tons/yr)	2.35
Max Water Volume Treated (acre-feet/yr)	166.8
Useful Life Total Cost Estimate	18,615
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**173.82**



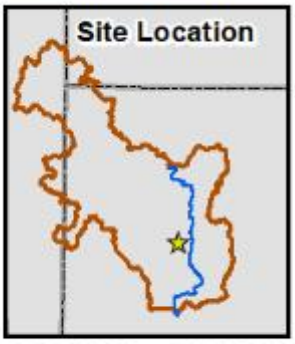
45.330616, -93.394229

Site ID: FB-WR-04	
Practice Area (acres)	1.93
Practice Drainage Area (acres)	54.46
TP Reduction (lb/yr)	6.49
TSS Reduction (tons/yr)	27.04
Max Water Volume Treated (acre-feet/yr)	98.03
Useful Life Total Cost Estimate	21,441
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**220.22**



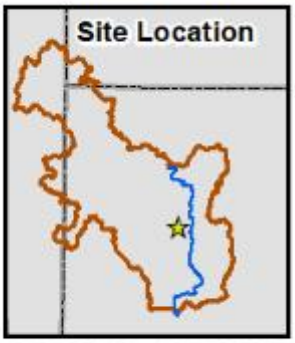
45.328632, -93.434007

Site ID: FB-WR-05	
Practice Area (acres)	1.08
Practice Drainage Area (acres)	52.21
TP Reduction (lb/yr)	3.77
TSS Reduction (tons/yr)	6.83
Max Water Volume Treated (acre-feet/yr)	54.2
Useful Life Total Cost Estimate	16,307
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**288.54**



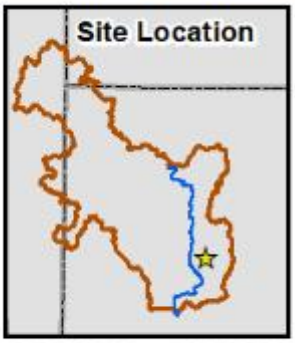
45.328121, -93.41942

Site ID: FB-WR-06	
Practice Area (acres)	2.24
Practice Drainage Area (acres)	65.62
TP Reduction (lb/yr)	5.08
TSS Reduction (tons/yr)	3.69
Max Water Volume Treated (acre-feet/yr)	82.79
Useful Life Total Cost Estimate	22,949
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**301.3**



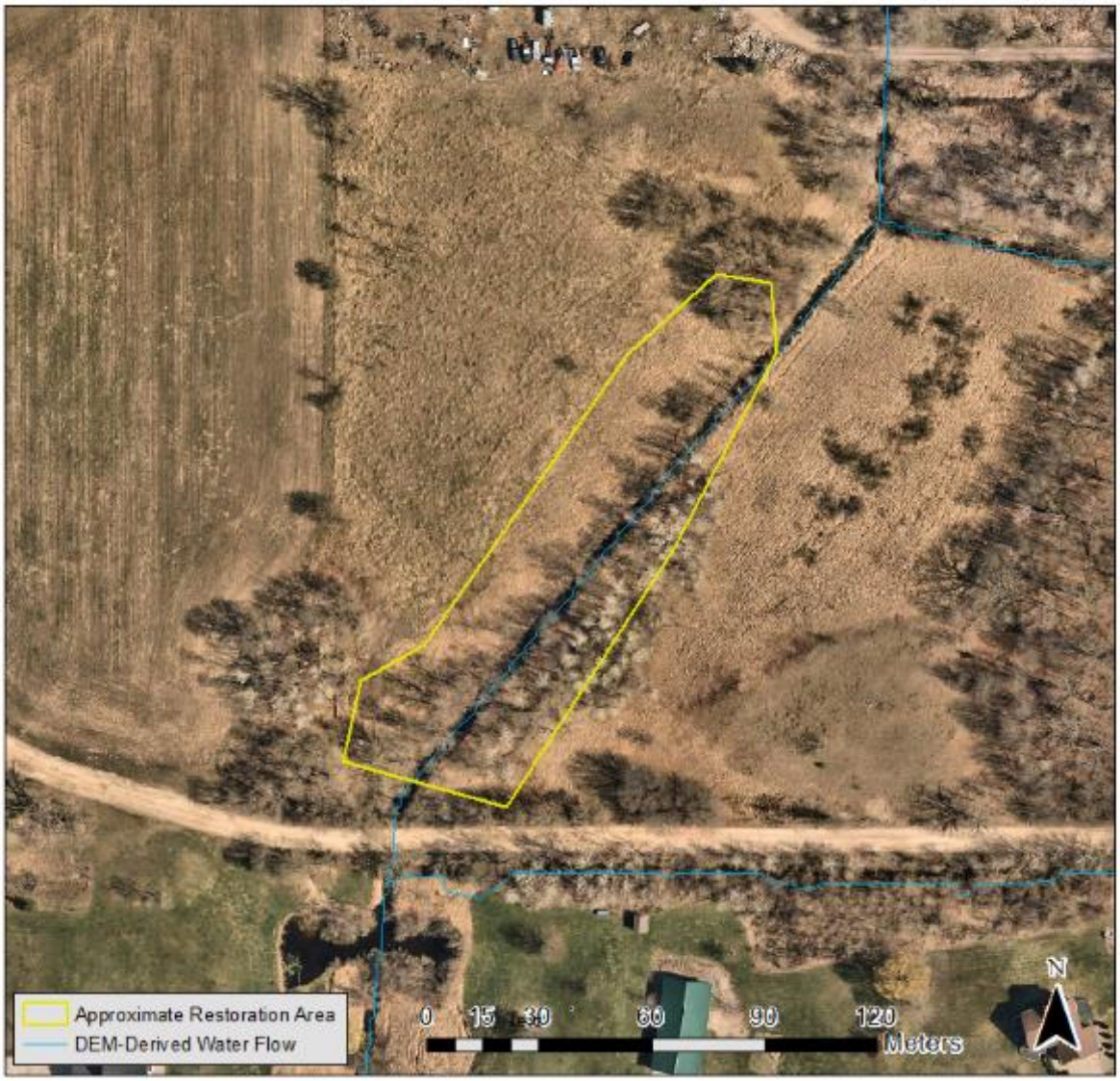
45.336743, -93.420282

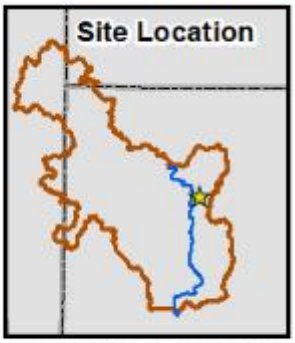
Site ID: FB-WR-07	
Practice Area (acres)	6.32
Practice Drainage Area (acres)	61
TP Reduction (lb/yr)	8
TSS Reduction (tons/yr)	9.32
Max Water Volume Treated (acre-feet/yr)	163.5
Useful Life Total Cost Estimate	37,218
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**310.33**



45.319544, -93.39855

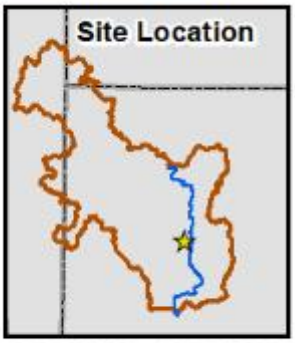
Site ID: FB-WR-08	
Practice Area (acres)	11.42
Practice Drainage Area (acres)	78.89
TP Reduction (lb/yr)	10.13
TSS Reduction (tons/yr)	42.29
Max Water Volume Treated (acre-feet/yr)	148.47
Useful Life Total Cost Estimate	49,039
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**322.63**





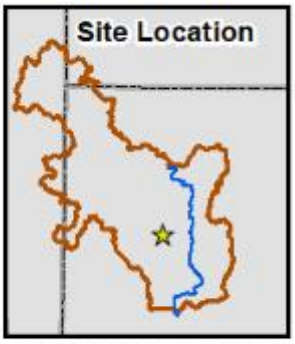
45.353493, -93.403168

Site ID: FB-WR-09	
Practice Area (acres)	1.52
Practice Drainage Area (acres)	85.79
TP Reduction (lb/yr)	3.39
TSS Reduction (tons/yr)	3.96
Max Water Volume Treated (acre-feet/yr)	38.79
Useful Life Total Cost Estimate	19,163
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**376.52**



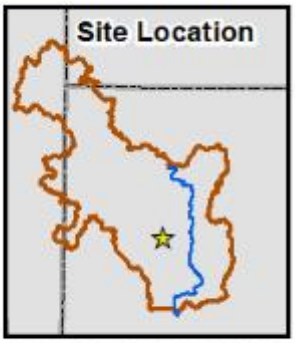
45.329183, -93.415094

Site ID: FB-WR-10	
Practice Area (acres)	0.84
Practice Drainage Area (acres)	80.05
TP Reduction (lb/yr)	2.58
TSS Reduction (tons/yr)	1.93
Max Water Volume Treated (acre-feet/yr)	46.49
Useful Life Total Cost Estimate	14,563
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**376.92**



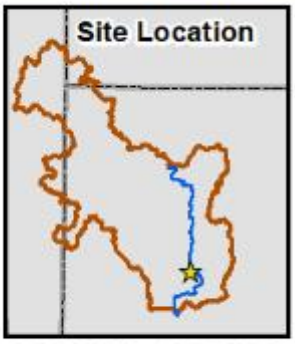
45.332197, -93.432341

Site ID: FB-WR-11	
Practice Area (acres)	3.66
Practice Drainage Area (acres)	60.32
TP Reduction (lb/yr)	4.47
TSS Reduction (tons/yr)	4.24
Max Water Volume Treated (acre-feet/yr)	112.06
Useful Life Total Cost Estimate	28,874
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**430.79**



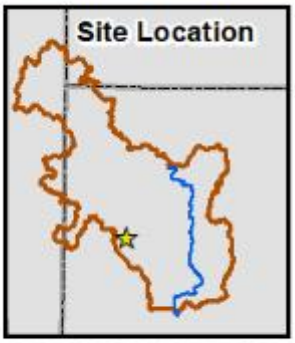
45.330536, -93.432266

Site ID: FB-WR-12	
Practice Area (acres)	5.88
Practice Drainage Area (acres)	72.99
TP Reduction (lb/yr)	4.85
TSS Reduction (tons/yr)	4.31
Max Water Volume Treated (acre-feet/yr)	371.11
Useful Life Total Cost Estimate	36,004
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**494.8**



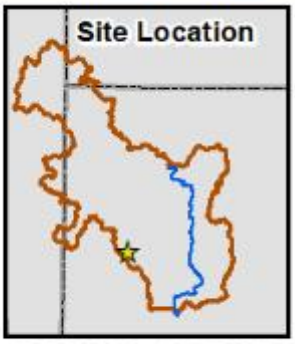
45.312011, -93.409636

Site ID: FB-WR-13	
Practice Area (acres)	9.93
Practice Drainage Area (acres)	72.89
TP Reduction (lb/yr)	6.17
TSS Reduction (tons/yr)	2.4
Max Water Volume Treated (acre-feet/yr)	1154.73
Useful Life Total Cost Estimate	45,954
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**496.87**



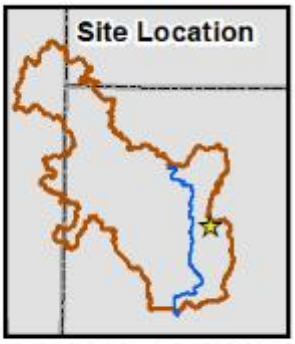
45.330567, -93.460884

Site ID: FB-WR-14	
Practice Area (acres)	1.91
Practice Drainage Area (acres)	230.59
TP Reduction (lb/yr)	2.5
TSS Reduction (tons/yr)	11.12
Max Water Volume Treated (acre-feet/yr)	103.9
Useful Life Total Cost Estimate	21,305
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**568.4**



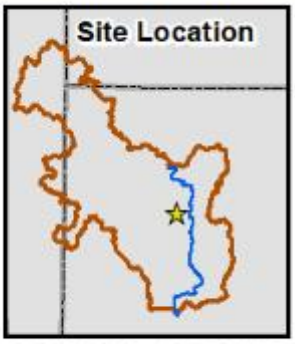
45.32268, -93.459188

Site ID: FB-WR-15	
Practice Area (acres)	12.59
Practice Drainage Area (acres)	96.32
TP Reduction (lb/yr)	5.83
TSS Reduction (tons/yr)	8.64
Max Water Volume Treated (acre-feet/yr)	101.41
Useful Life Total Cost Estimate	51,321
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**586.53**



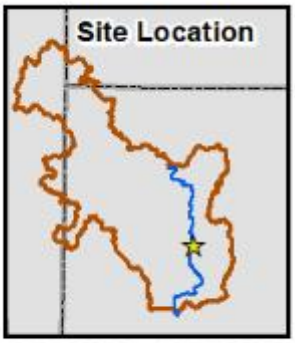
45.337753, -93.395163

Site ID: FB-WR-16	
Practice Area (acres)	10.79
Practice Drainage Area (acres)	50.22
TP Reduction (lb/yr)	5.41
TSS Reduction (tons/yr)	19.42
Max Water Volume Treated (acre-feet/yr)	170.41
Useful Life Total Cost Estimate	47,774
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**588.7**



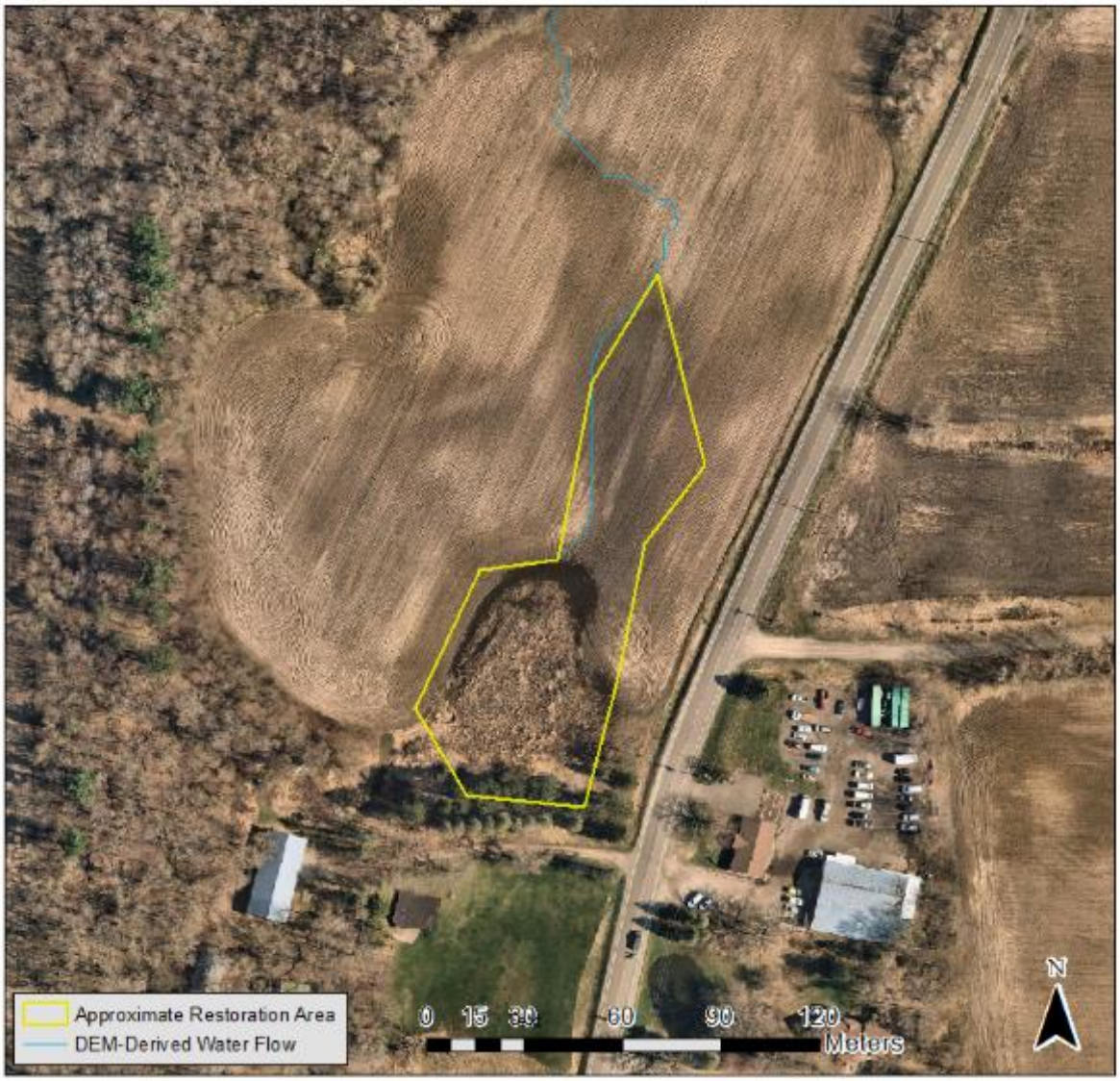
45.344341, -93.421164

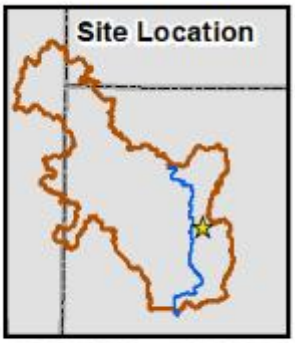
Site ID: FB-WR-17	
Practice Area (acres)	1.33
Practice Drainage Area (acres)	20.28
TP Reduction (lb/yr)	2.03
TSS Reduction (tons/yr)	0.51
Max Water Volume Treated (acre-feet/yr)	111.87
Useful Life Total Cost Estimate	17,983
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**590.02**



45.326679, -93.408352

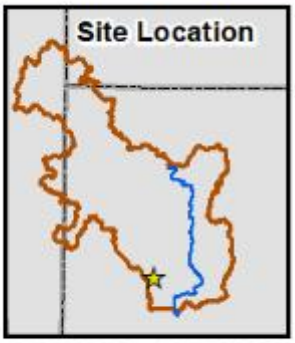
Site ID: FB-WR-18	
Practice Area (acres)	3.04
Practice Drainage Area (acres)	25.74
TP Reduction (lb/yr)	2.97
TSS Reduction (tons/yr)	21.87
Max Water Volume Treated (acre-feet/yr)	174.63
Useful Life Total Cost Estimate	26,485
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**594.01**





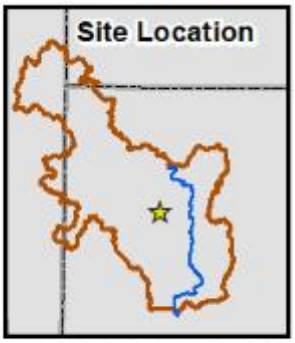
45.33678, -93.40034

Site ID: FB-WR-19	
Practice Area (acres)	1.48
Practice Drainage Area (acres)	16.28
TP Reduction (lb/yr)	2.1
TSS Reduction (tons/yr)	1.66
Max Water Volume Treated (acre-feet/yr)	10.81
Useful Life Total Cost Estimate	18,933
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**601.2**



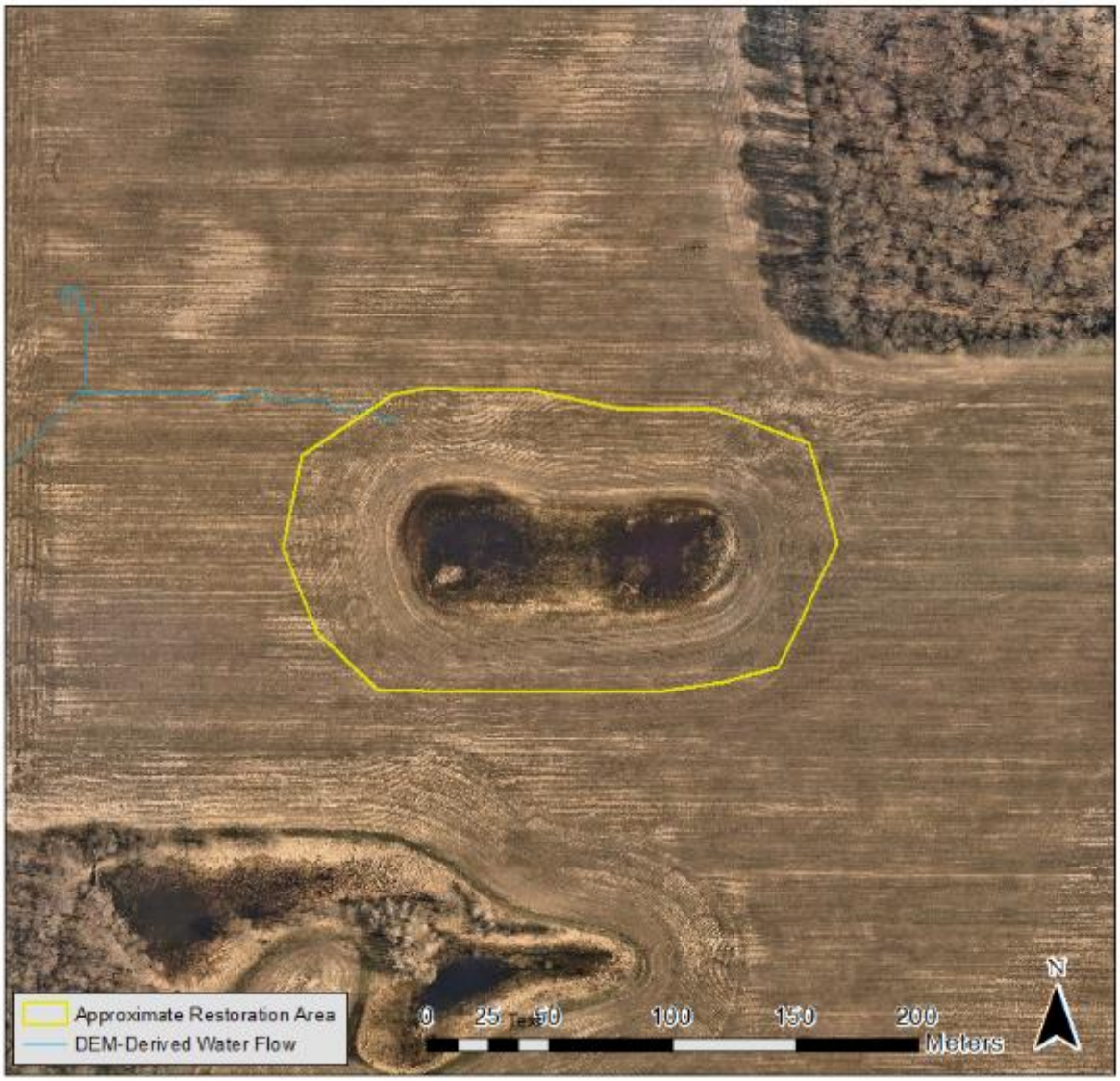
45.308279, -93.439053

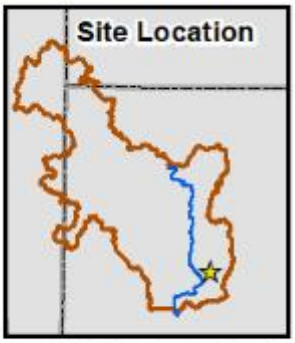
Site ID: FB-WR-20	
Practice Area (acres)	2.67
Practice Drainage Area (acres)	1208.37
TP Reduction (lb/yr)	2.35
TSS Reduction (tons/yr)	127.64
Max Water Volume Treated (acre-feet/yr)	160.69
Useful Life Total Cost Estimate	24,919
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**705.62**



45.344998, -93.433979

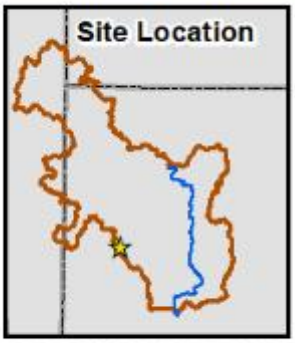
Site ID: FB-WR-21	
Practice Area (acres)	9.1
Practice Drainage Area (acres)	43.08
TP Reduction (lb/yr)	3.61
TSS Reduction (tons/yr)	3.34
Max Water Volume Treated (acre-feet/yr)	490.54
Useful Life Total Cost Estimate	44,120
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**815.26**





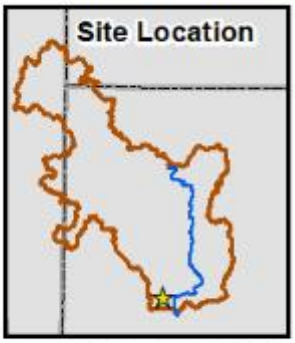
45.312513, -93.395075

Site ID: FB-WR-22	
Practice Area (acres)	5.79
Practice Drainage Area (acres)	20.24
TP Reduction (lb/yr)	2.82
TSS Reduction (tons/yr)	13.99
Max Water Volume Treated (acre-feet/yr)	89.57
Useful Life Total Cost Estimate	35,752
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**844.86**



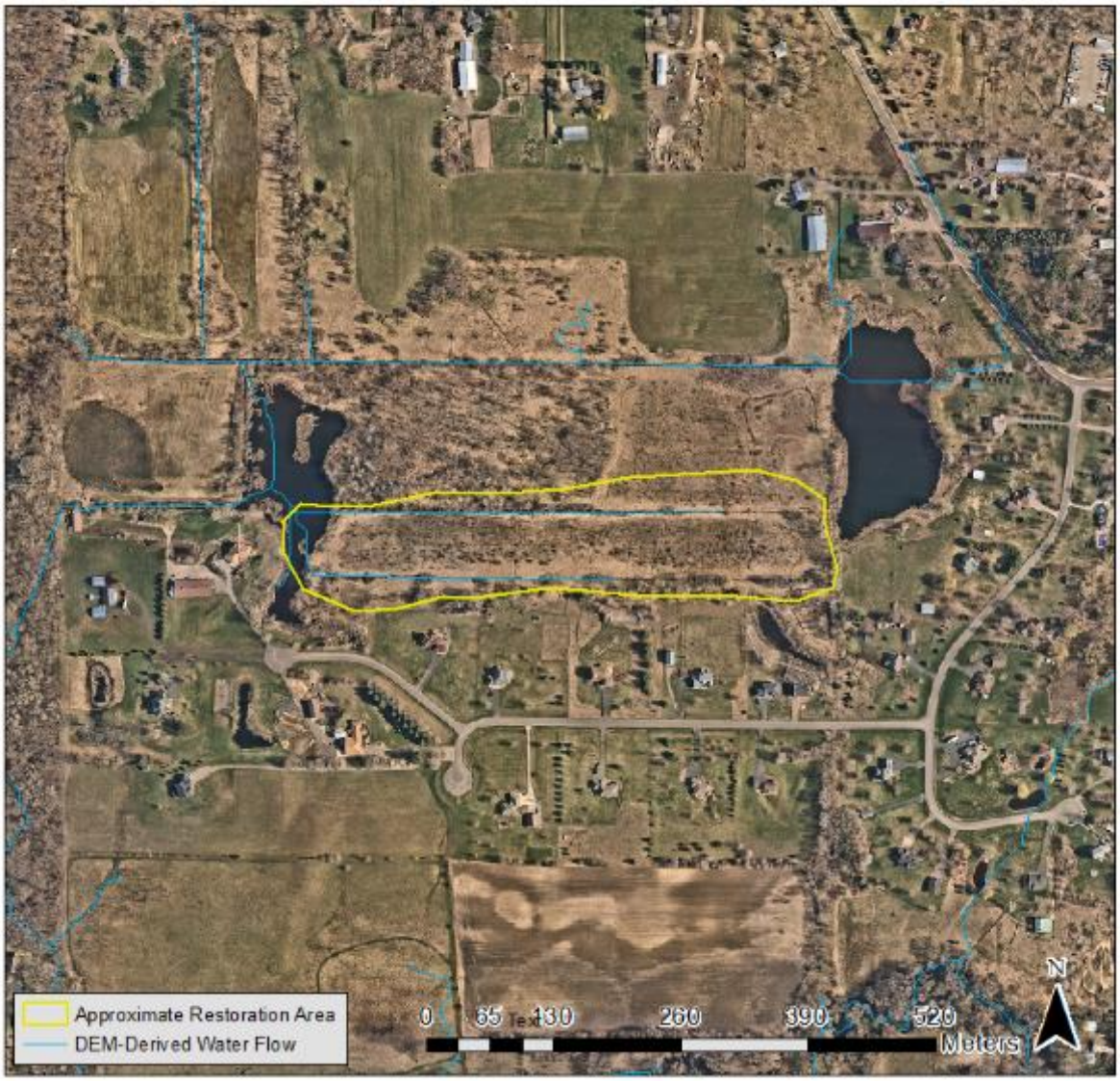
45.325497, -93.465566

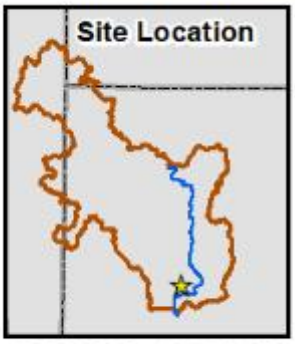
Site ID: FB-WR-23	
Practice Area (acres)	12.76
Practice Drainage Area (acres)	99.45
TP Reduction (lb/yr)	3.8
TSS Reduction (tons/yr)	29.02
Max Water Volume Treated (acre-feet/yr)	30.41
Useful Life Total Cost Estimate	51,652
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**906.52**



45.297795, -93.432079

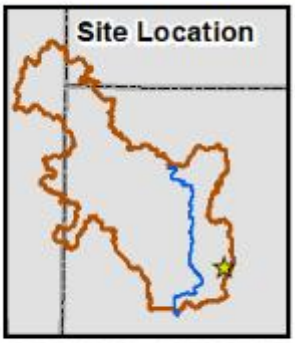
Site ID: FB-WR-24	
Practice Area (acres)	15.67
Practice Drainage Area (acres)	84.37
TP Reduction (lb/yr)	4.12
TSS Reduction (tons/yr)	8.51
Max Water Volume Treated (acre-feet/yr)	145.58
Useful Life Total Cost Estimate	56,838
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**919.68**





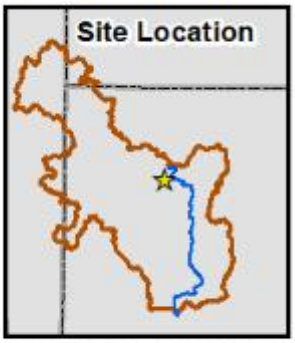
45.30464, -93.417373

Site ID: FB-WR-25	
Practice Area (acres)	15.21
Practice Drainage Area (acres)	34.75
TP Reduction (lb/yr)	3.92
TSS Reduction (tons/yr)	1.67
Max Water Volume Treated (acre-feet/yr)	37
Useful Life Total Cost Estimate	56,054
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**953.98**



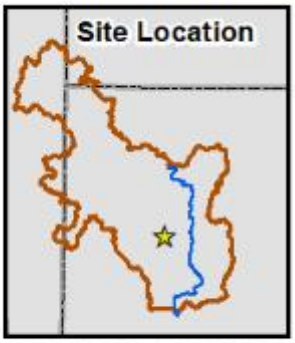
45.314943, -93.384155

Site ID: FB-WR-26	
Practice Area (acres)	0.9
Practice Drainage Area (acres)	7.81
TP Reduction (lb/yr)	0.96
TSS Reduction (tons/yr)	1.11
Max Water Volume Treated (acre-feet/yr)	35.37
Useful Life Total Cost Estimate	14,987
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,037.55**



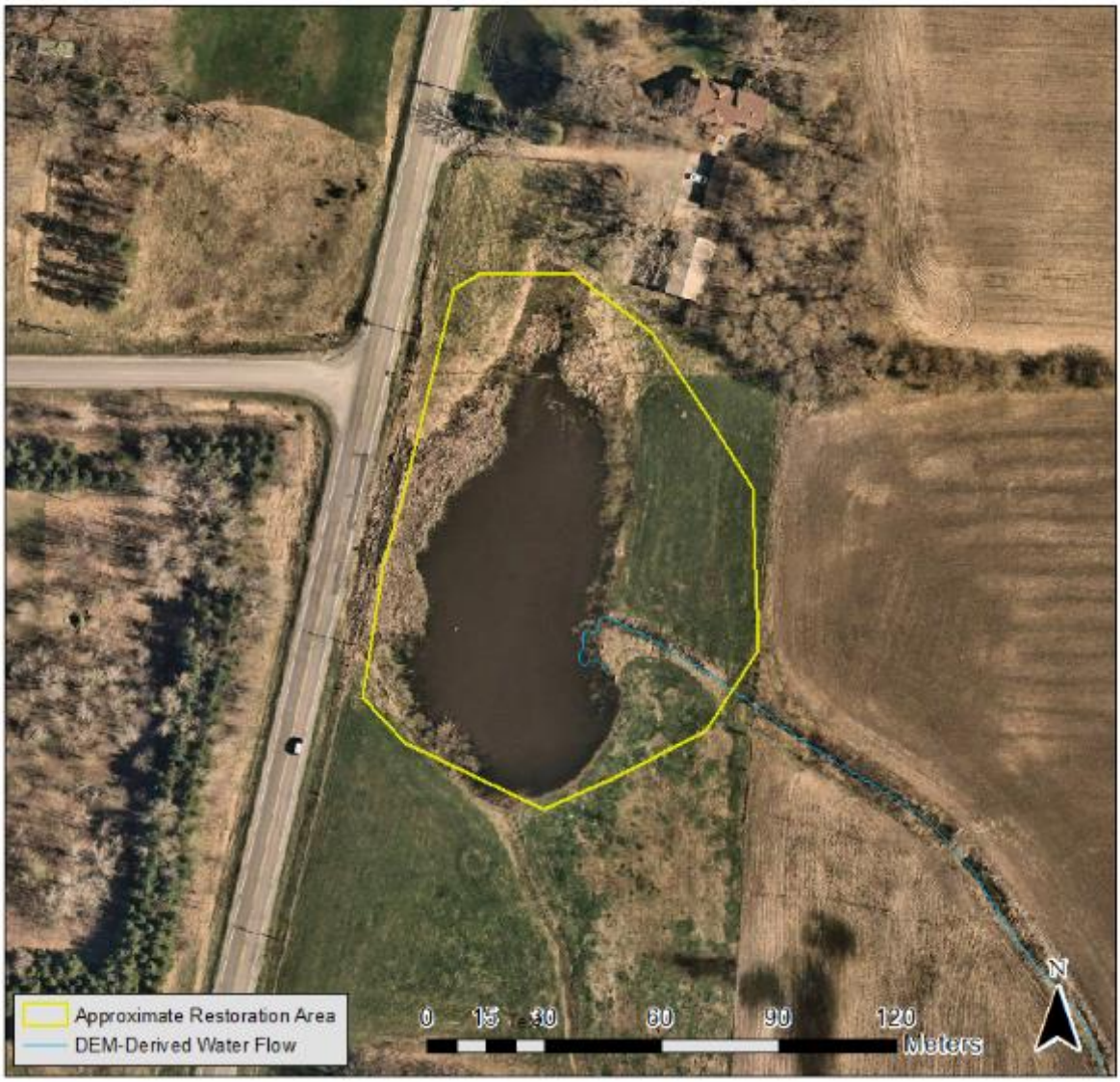
45.362659, -93.430313

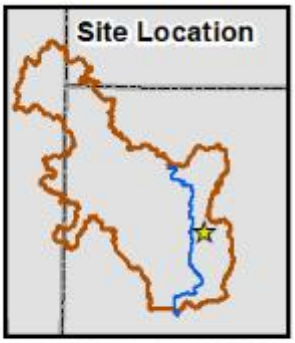
Site ID: FB-WR-27	
Practice Area (acres)	3.11
Practice Drainage Area (acres)	29.92
TP Reduction (lb/yr)	1.67
TSS Reduction (tons/yr)	1.17
Max Water Volume Treated (acre-feet/yr)	85.5
Useful Life Total Cost Estimate	26,749
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,064.79**



45.331262, -93.430122

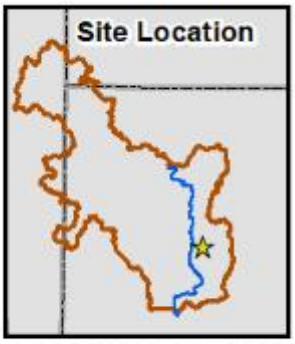
Site ID: FB-WR-28	
Practice Area (acres)	0.5
Practice Drainage Area (acres)	73.26
TP Reduction (lb/yr)	0.66
TSS Reduction (tons/yr)	3.27
Max Water Volume Treated (acre-feet/yr)	31.79
Useful Life Total Cost Estimate	11,405
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,152.6**





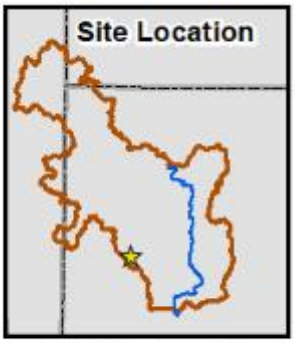
45.334535, -93.399745

Site ID: FB-WR-29	
Practice Area (acres)	2.5
Practice Drainage Area (acres)	13.3
TP Reduction (lb/yr)	1.37
TSS Reduction (tons/yr)	2.51
Max Water Volume Treated (acre-feet/yr)	33.61
Useful Life Total Cost Estimate	24,159
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,172.45**



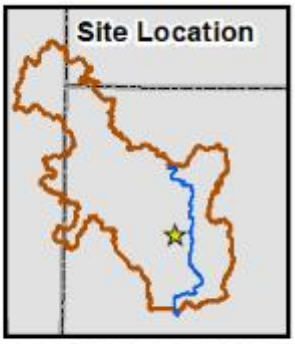
45.325817, -93.401089

Site ID: FB-WR-30	
Practice Area (acres)	6.55
Practice Drainage Area (acres)	12.59
TP Reduction (lb/yr)	2.14
TSS Reduction (tons/yr)	0.16
Max Water Volume Treated (acre-feet/yr)	514.27
Useful Life Total Cost Estimate	37,860
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,180.51**



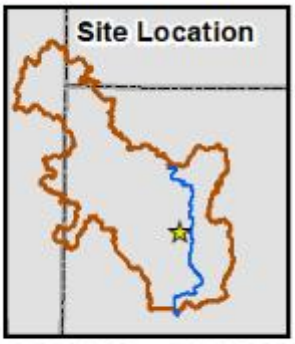
45.320852, -93.456813

Site ID: FB-WR-31	
Practice Area (acres)	14.99
Practice Drainage Area (acres)	51.08
TP Reduction (lb/yr)	2.65
TSS Reduction (tons/yr)	0.53
Max Water Volume Treated (acre-feet/yr)	153.95
Useful Life Total Cost Estimate	55,677
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,399.69**



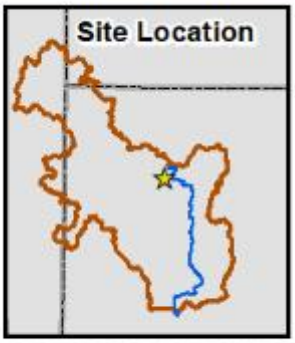
45.332176, -93.422198

Site ID: FB-WR-32	
Practice Area (acres)	1.81
Practice Drainage Area (acres)	18.51
TP Reduction (lb/yr)	0.95
TSS Reduction (tons/yr)	0.9
Max Water Volume Treated (acre-feet/yr)	42.23
Useful Life Total Cost Estimate	20,788
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,457.7**



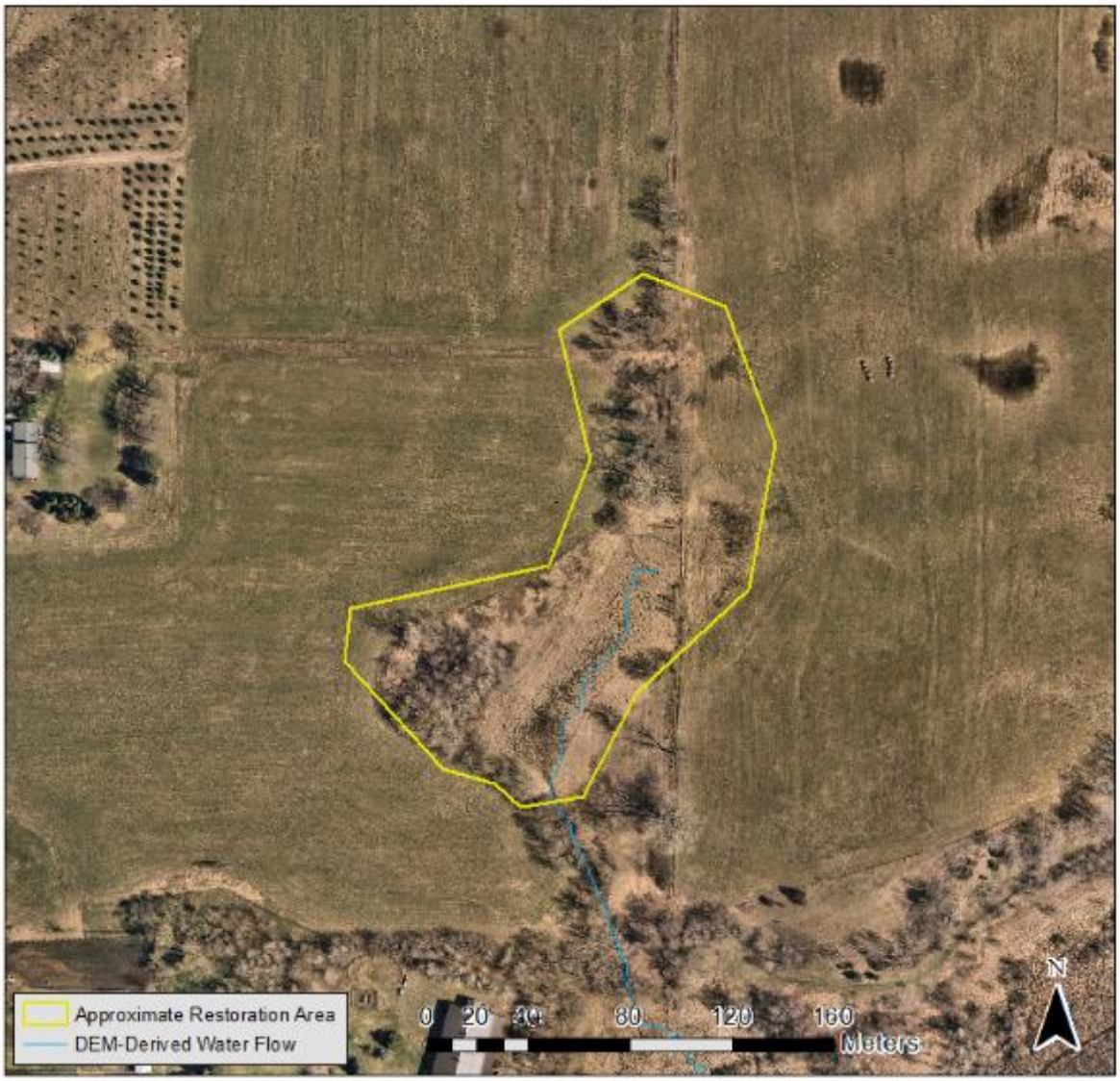
45.334103, -93.41902

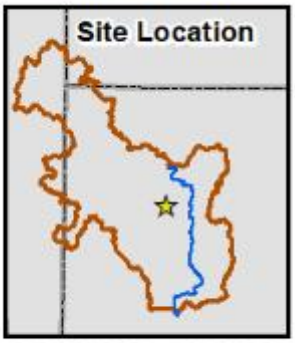
Site ID: FB-WR-33	
Practice Area (acres)	4.21
Practice Drainage Area (acres)	20.44
TP Reduction (lb/yr)	1.4
TSS Reduction (tons/yr)	1.1
Max Water Volume Treated (acre-feet/yr)	222.9
Useful Life Total Cost Estimate	30,806
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,467.64**



45.363556, -93.431125

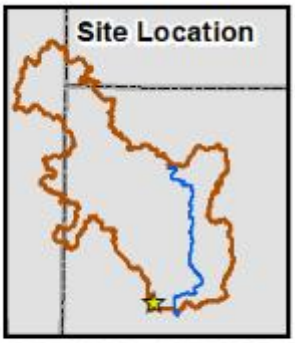
Site ID: FB-WR-34	
Practice Area (acres)	1.1
Practice Drainage Area (acres)	18.36
TP Reduction (lb/yr)	0.74
TSS Reduction (tons/yr)	0.61
Max Water Volume Treated (acre-feet/yr)	11.59
Useful Life Total Cost Estimate	16,504
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,482.57**





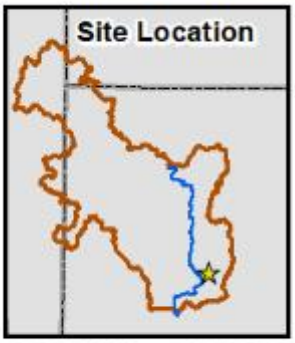
45.348726, -93.42985

Site ID: FB-WR-35	
Practice Area (acres)	4.17
Practice Drainage Area (acres)	19.68
TP Reduction (lb/yr)	1.21
TSS Reduction (tons/yr)	7.89
Max Water Volume Treated (acre-feet/yr)	24.78
Useful Life Total Cost Estimate	30,683
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,689.83**



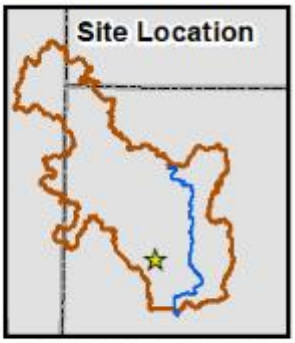
45.294975, -93.438822

Site ID: FB-WR-36	
Practice Area (acres)	7.97
Practice Drainage Area (acres)	24.42
TP Reduction (lb/yr)	1.61
TSS Reduction (tons/yr)	14.6
Max Water Volume Treated (acre-feet/yr)	13.69
Useful Life Total Cost Estimate	41,472
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,713.15**



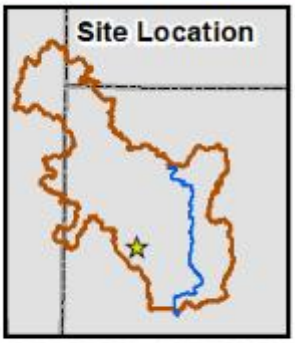
45.311081, -93.39628

Site ID: FB-WR-37	
Practice Area (acres)	3.02
Practice Drainage Area (acres)	8.41
TP Reduction (lb/yr)	0.99
TSS Reduction (tons/yr)	4.86
Max Water Volume Treated (acre-feet/yr)	24.09
Useful Life Total Cost Estimate	26,408
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,770.67**



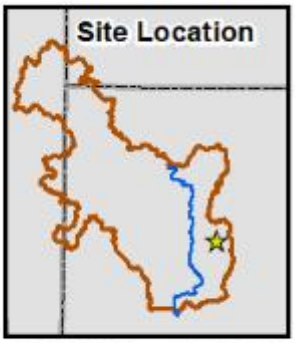
45.31862, -93.438098

Site ID: FB-WR-38	
Practice Area (acres)	22.78
Practice Drainage Area (acres)	79.2
TP Reduction (lb/yr)	2.47
TSS Reduction (tons/yr)	15.68
Max Water Volume Treated (acre-feet/yr)	63.38
Useful Life Total Cost Estimate	67,671
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,824.6**



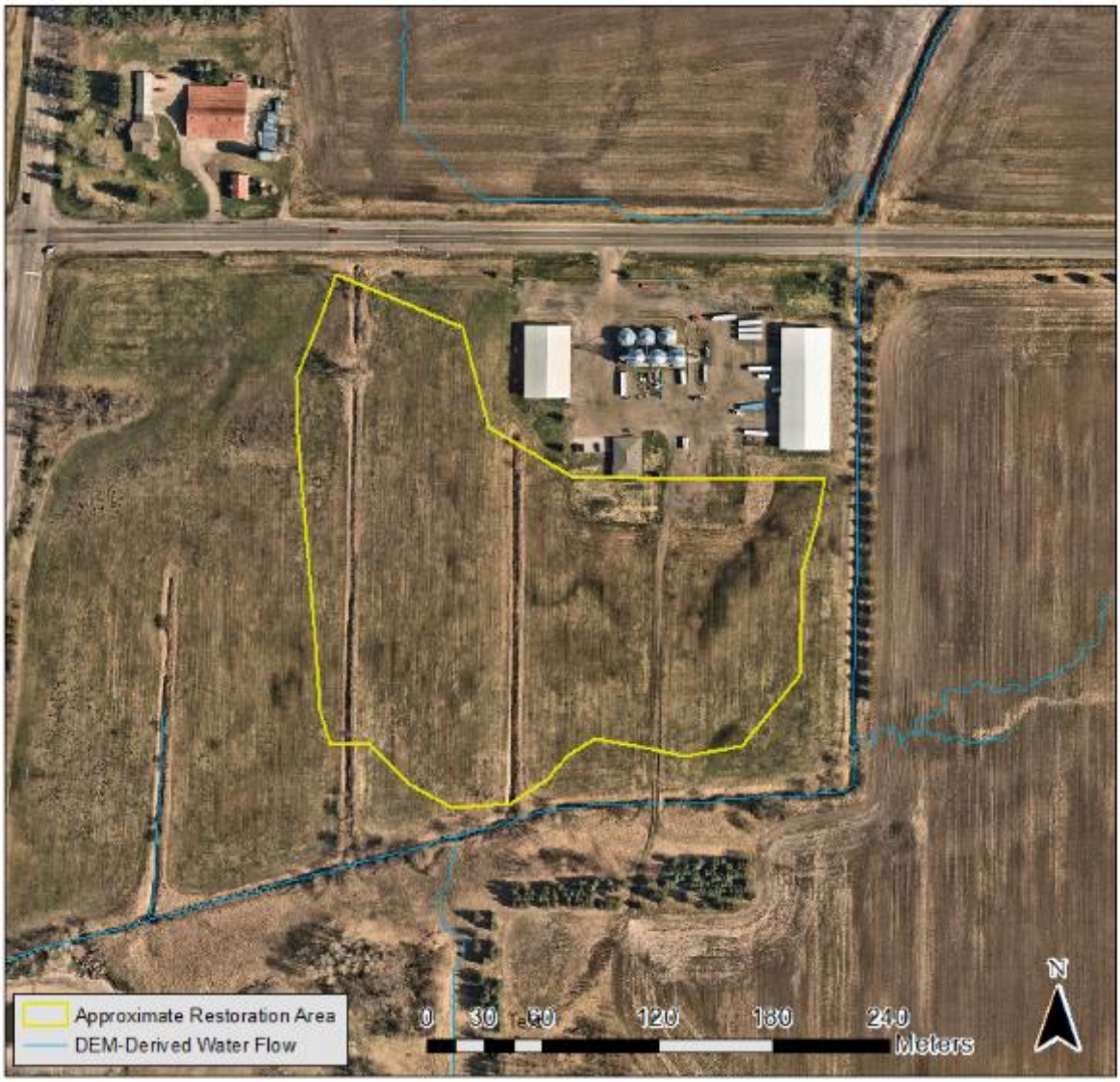
45.325353, -93.451897

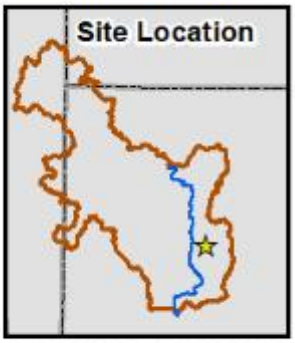
Site ID: FB-WR-39	
Practice Area (acres)	3.27
Practice Drainage Area (acres)	111.91
TP Reduction (lb/yr)	0.96
TSS Reduction (tons/yr)	3.77
Max Water Volume Treated (acre-feet/yr)	38.72
Useful Life Total Cost Estimate	27,388
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,903.1**



45.32914, -93.38949

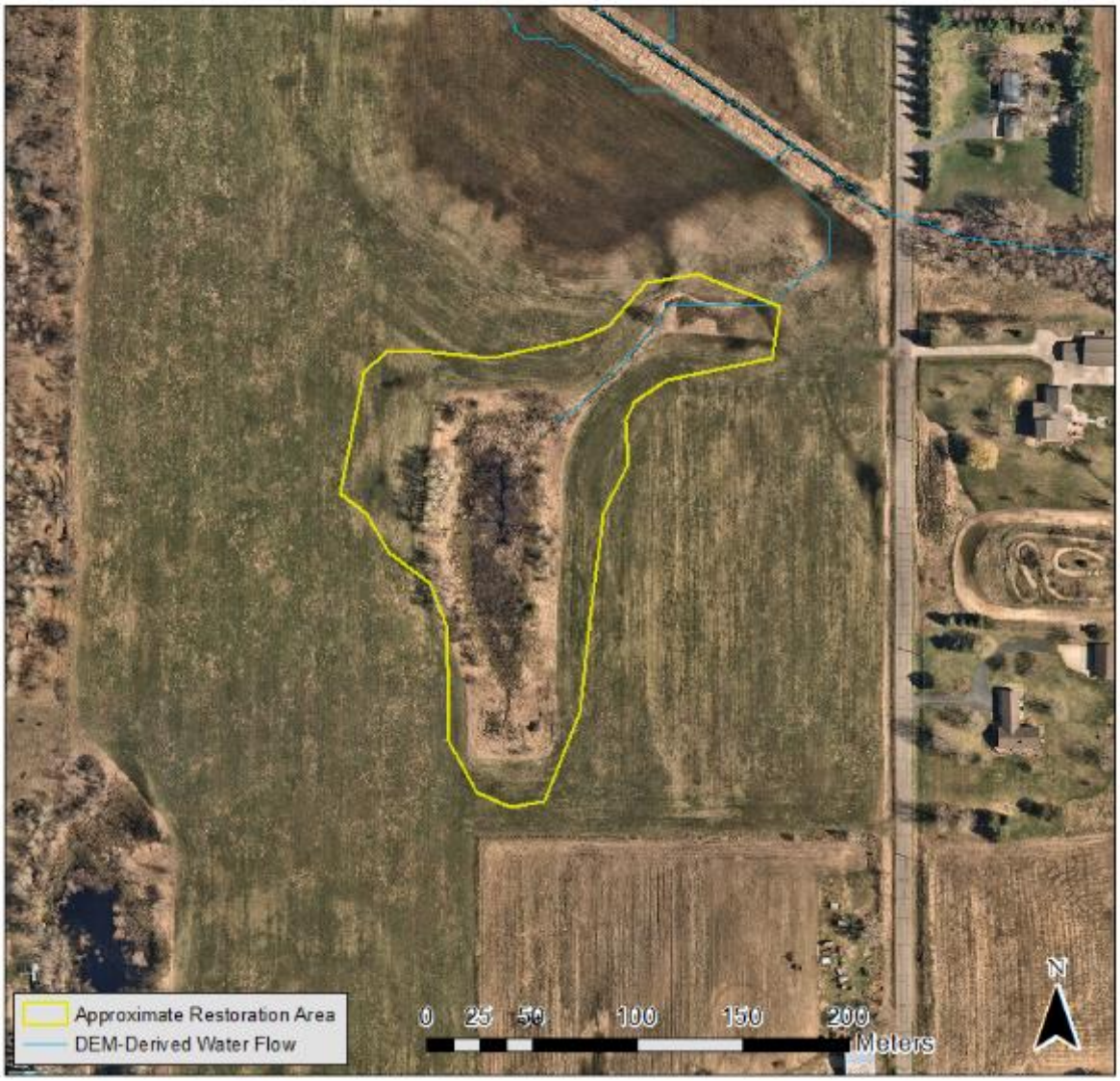
Site ID: FB-WR-40	
Practice Area (acres)	3.56
Practice Drainage Area (acres)	12.79
TP Reduction (lb/yr)	0.95
TSS Reduction (tons/yr)	2.56
Max Water Volume Treated (acre-feet/yr)	147.47
Useful Life Total Cost Estimate	28,483
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,005.82**

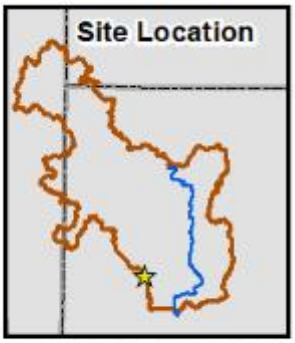




45.326175, -93.398702

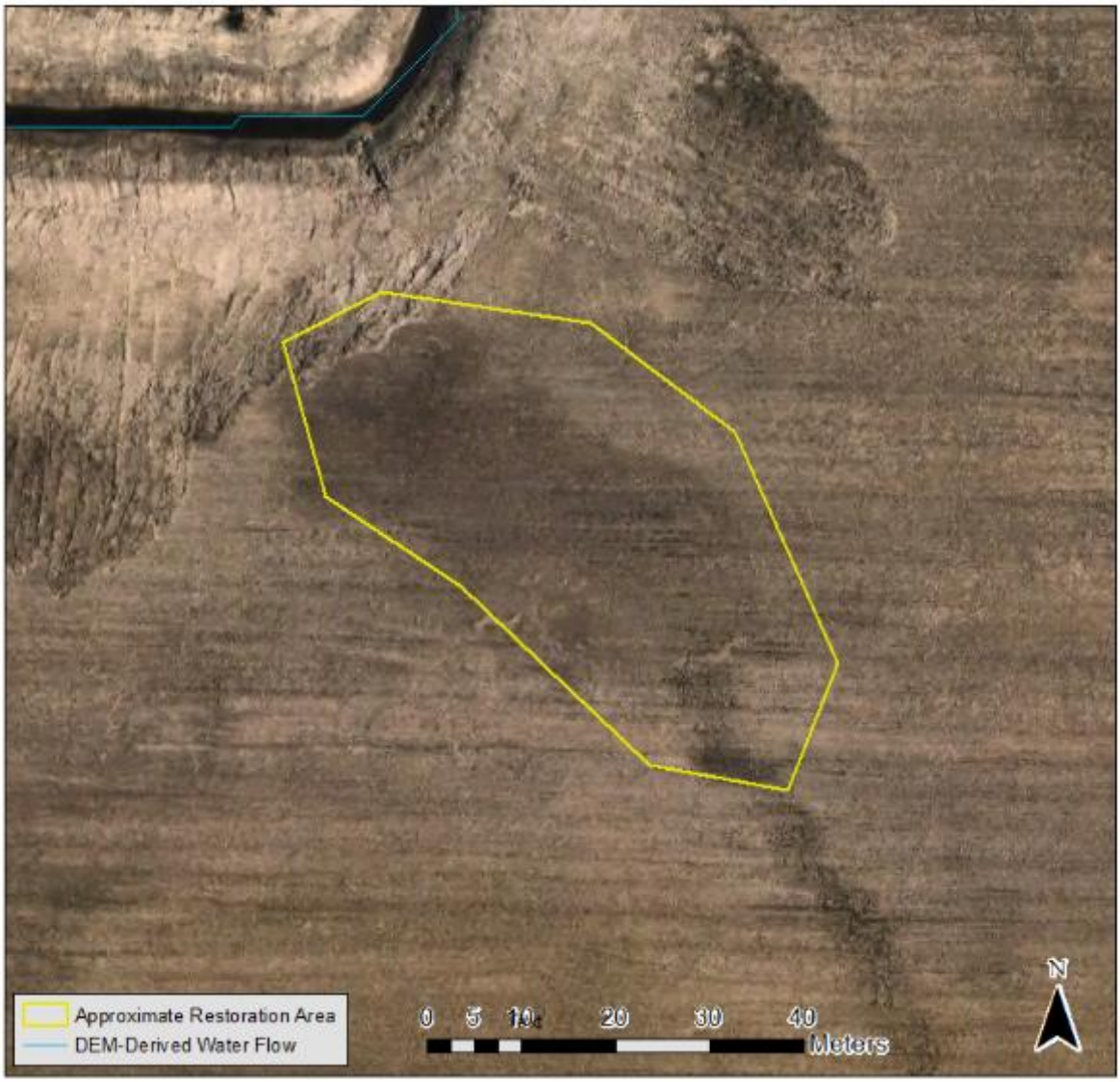
Site ID: FB-WR-41	
Practice Area (acres)	11.45
Practice Drainage Area (acres)	6.91
TP Reduction (lb/yr)	1.58
TSS Reduction (tons/yr)	0.07
Max Water Volume Treated (acre-feet/yr)	900.42
Useful Life Total Cost Estimate	49,105
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,069.9**

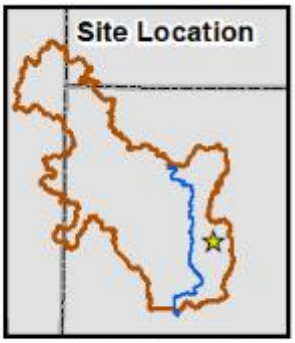




45.309664, -93.446688

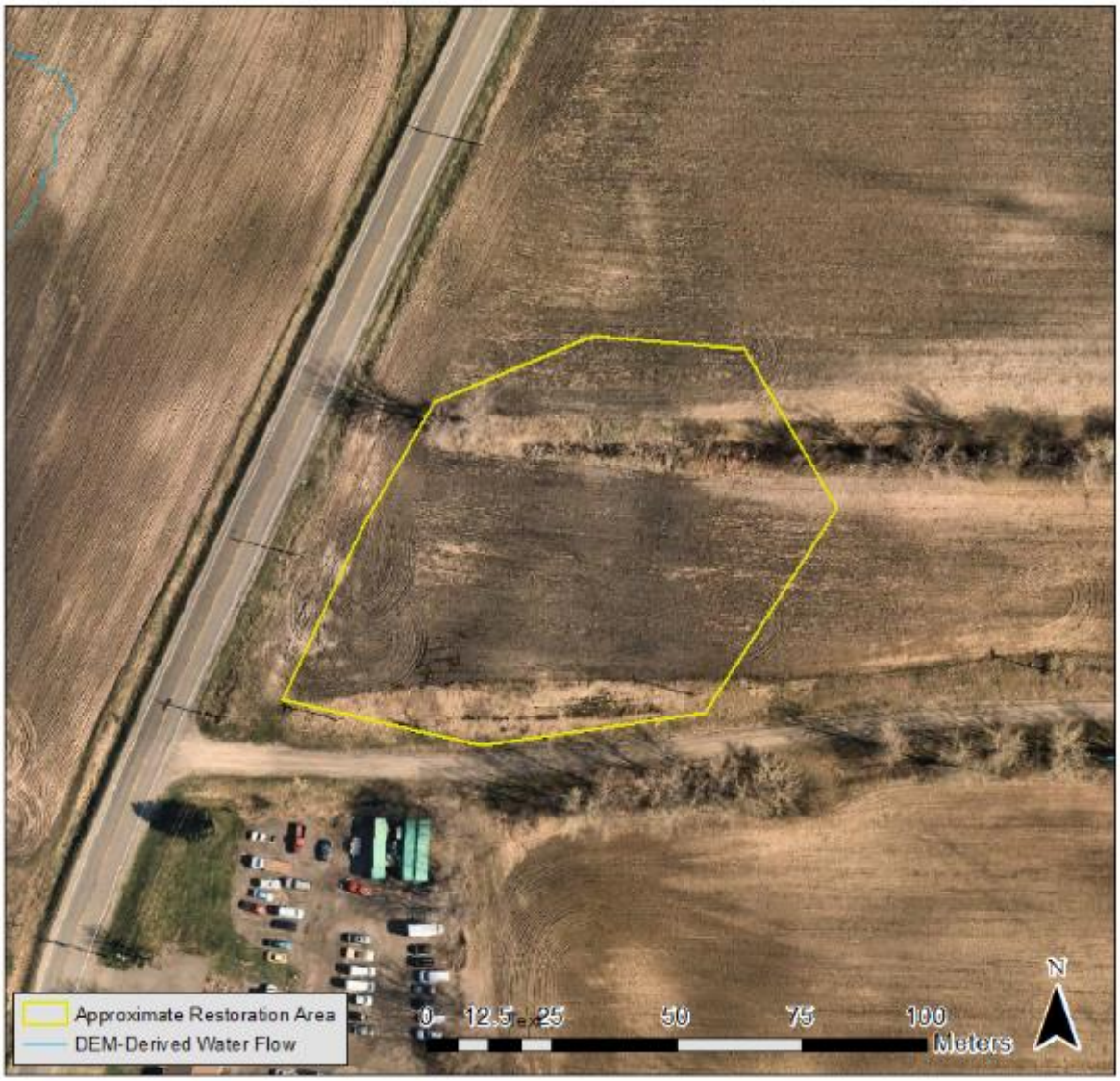
Site ID: FB-WR-42	
Practice Area (acres)	5.54
Practice Drainage Area (acres)	13.19
TP Reduction (lb/yr)	1.12
TSS Reduction (tons/yr)	4.83
Max Water Volume Treated (acre-feet/yr)	62.93
Useful Life Total Cost Estimate	35,019
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,084.16**

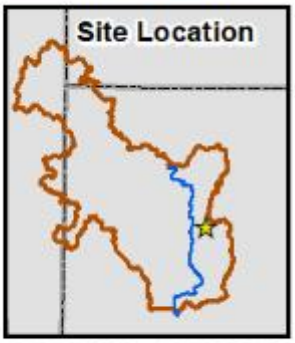




45.328737, -93.392286

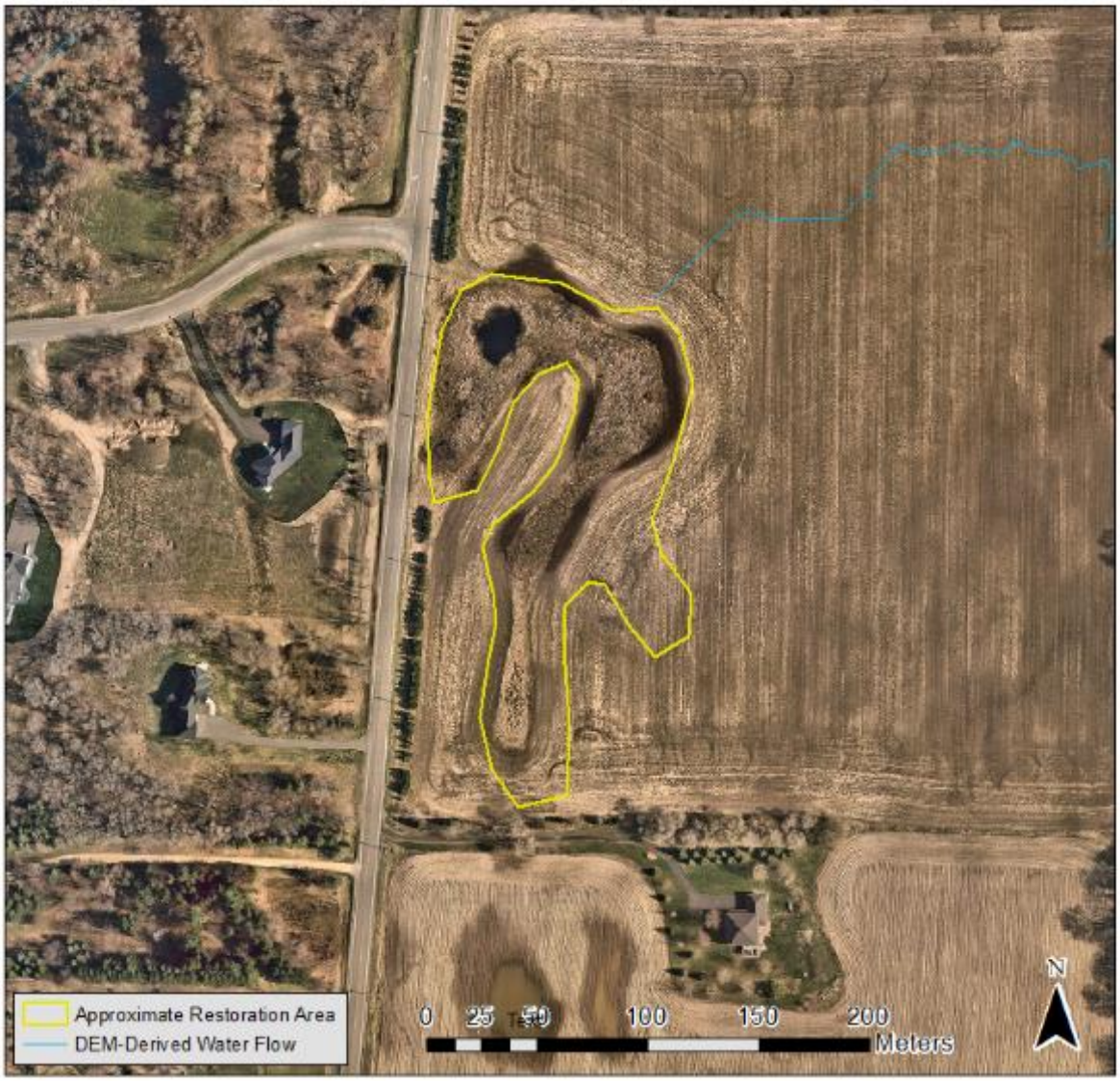
Site ID: FB-WR-43	
Practice Area (acres)	0.44
Practice Drainage Area (acres)	2.18
TP Reduction (lb/yr)	0.34
TSS Reduction (tons/yr)	1.04
Max Water Volume Treated (acre-feet/yr)	6.82
Useful Life Total Cost Estimate	10,700
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,088.2**

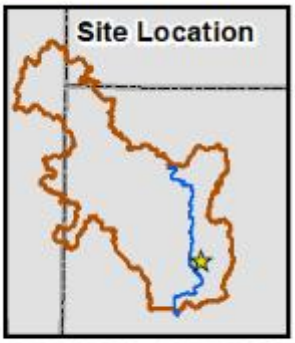




45.337009, -93.398653

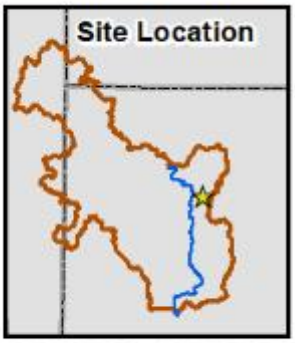
Site ID: FB-WR-44	
Practice Area (acres)	1.54
Practice Drainage Area (acres)	3.14
TP Reduction (lb/yr)	0.6
TSS Reduction (tons/yr)	0.82
Max Water Volume Treated (acre-feet/yr)	25.57
Useful Life Total Cost Estimate	19,255
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,138.42**





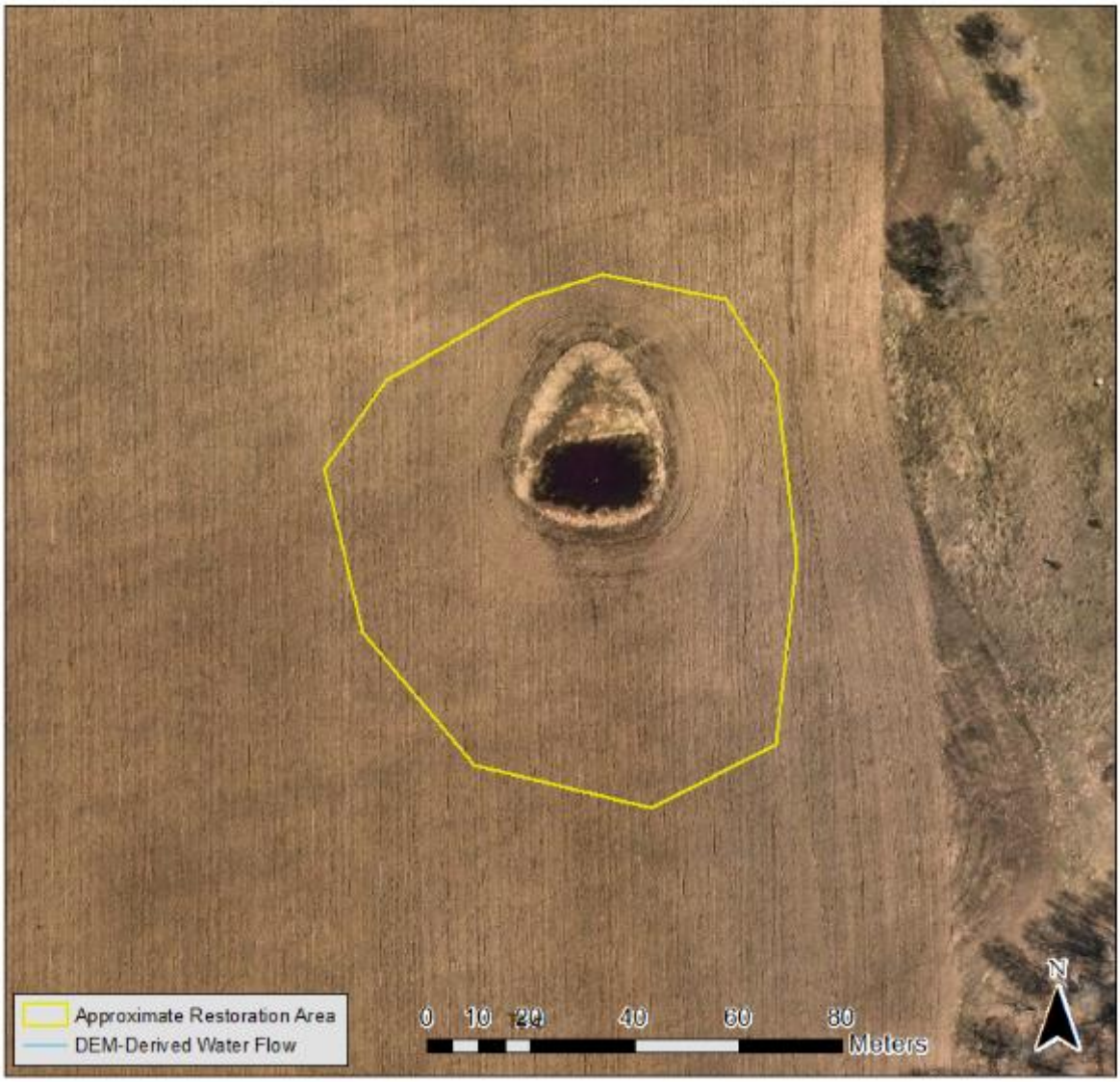
45.318351, -93.402076

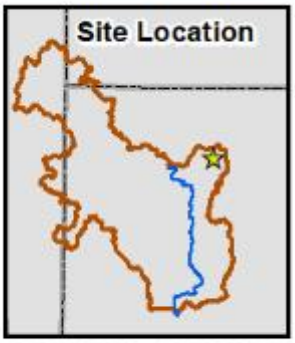
Site ID: FB-WR-45	
Practice Area (acres)	3.94
Practice Drainage Area (acres)	7.51
TP Reduction (lb/yr)	0.87
TSS Reduction (tons/yr)	5.5
Max Water Volume Treated (acre-feet/yr)	104.48
Useful Life Total Cost Estimate	29,857
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,289.42**



45.353663, -93.400835

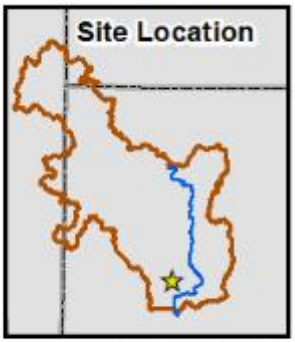
Site ID: FB-WR-46	
Practice Area (acres)	4.9
Practice Drainage Area (acres)	21.58
TP Reduction (lb/yr)	0.91
TSS Reduction (tons/yr)	0.15
Max Water Volume Treated (acre-feet/yr)	27.11
Useful Life Total Cost Estimate	33,064
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,422.65**





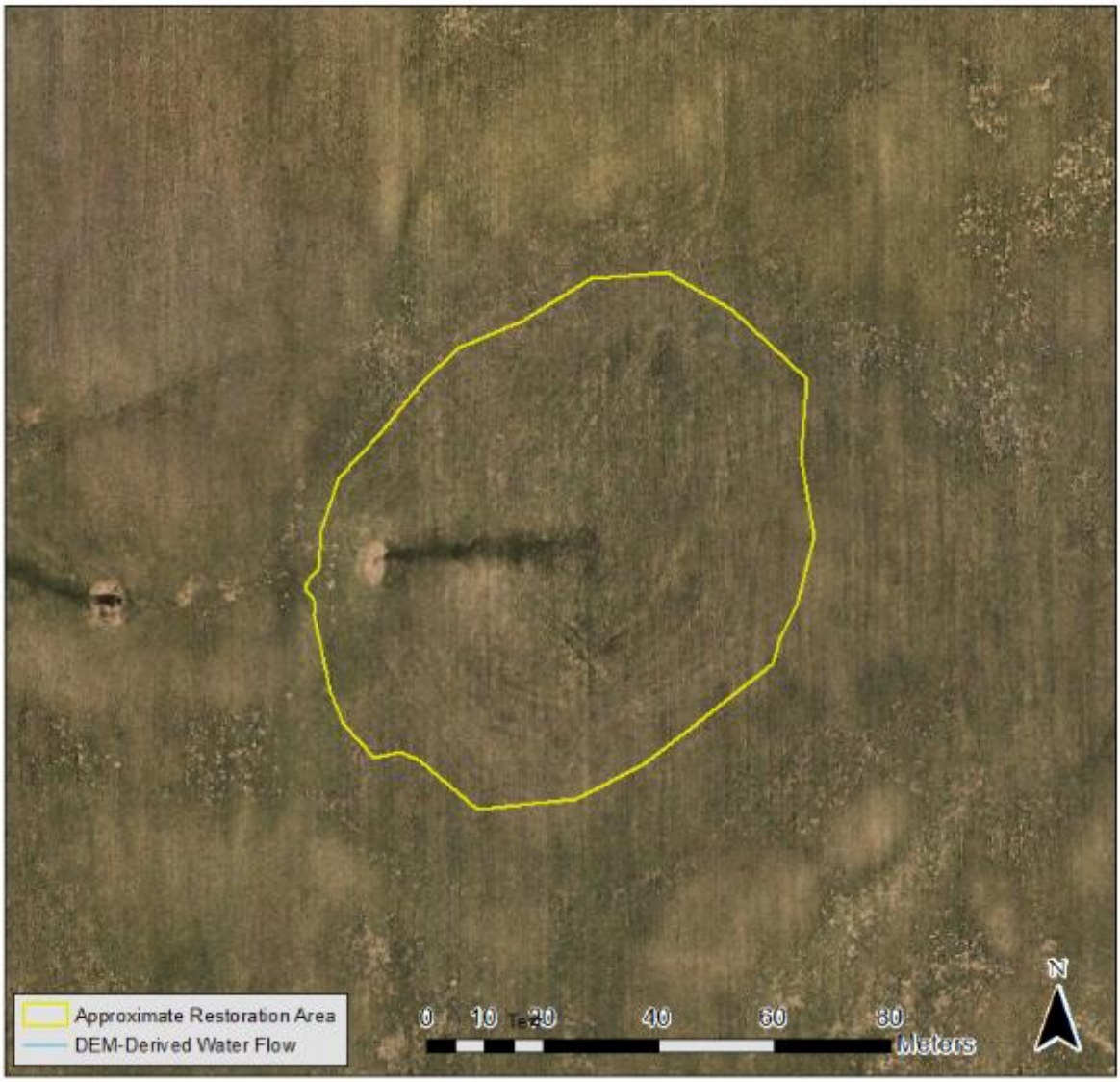
45.374631, -93.392624

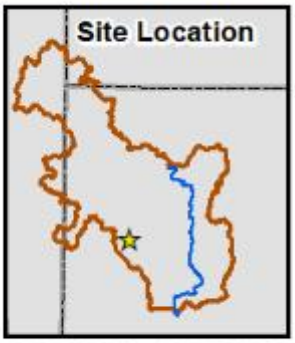
Site ID: FB-WR-47	
Practice Area (acres)	1.74
Practice Drainage Area (acres)	4.67
TP Reduction (lb/yr)	0.55
TSS Reduction (tons/yr)	0.6
Max Water Volume Treated (acre-feet/yr)	46.34
Useful Life Total Cost Estimate	20,436
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,461.27**



45.307226, -93.42404

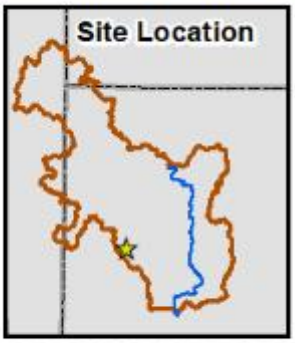
Site ID: FB-WR-48	
Practice Area (acres)	5.83
Practice Drainage Area (acres)	6.34
TP Reduction (lb/yr)	0.93
TSS Reduction (tons/yr)	0.15
Max Water Volume Treated (acre-feet/yr)	4.11
Useful Life Total Cost Estimate	35,848
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,562.16**





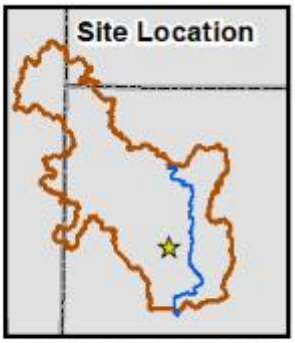
45.329371, -93.457974

Site ID: FB-WR-49	
Practice Area (acres)	1.46
Practice Drainage Area (acres)	6.99
TP Reduction (lb/yr)	0.45
TSS Reduction (tons/yr)	3.33
Max Water Volume Treated (acre-feet/yr)	25.38
Useful Life Total Cost Estimate	18,800
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,774.08**



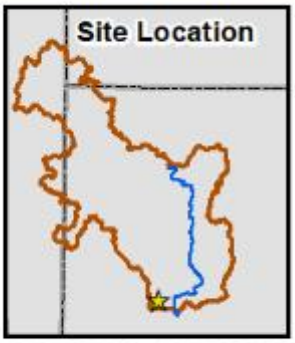
45.325016, -93.460135

Site ID: FB-WR-50	
Practice Area (acres)	1.31
Practice Drainage Area (acres)	4.79
TP Reduction (lb/yr)	0.43
TSS Reduction (tons/yr)	4.67
Max Water Volume Treated (acre-feet/yr)	3.71
Useful Life Total Cost Estimate	17,891
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,779.71**



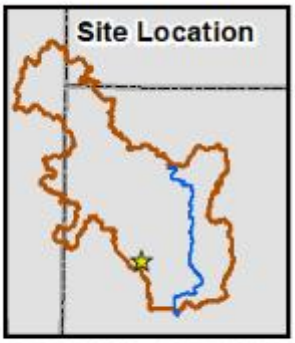
45.325863, -93.426944

Site ID: FB-WR-51	
Practice Area (acres)	2.09
Practice Drainage Area (acres)	11.27
TP Reduction (lb/yr)	0.53
TSS Reduction (tons/yr)	0.87
Max Water Volume Treated (acre-feet/yr)	10.25
Useful Life Total Cost Estimate	22,216
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,816.52**



45.295672, -93.435235

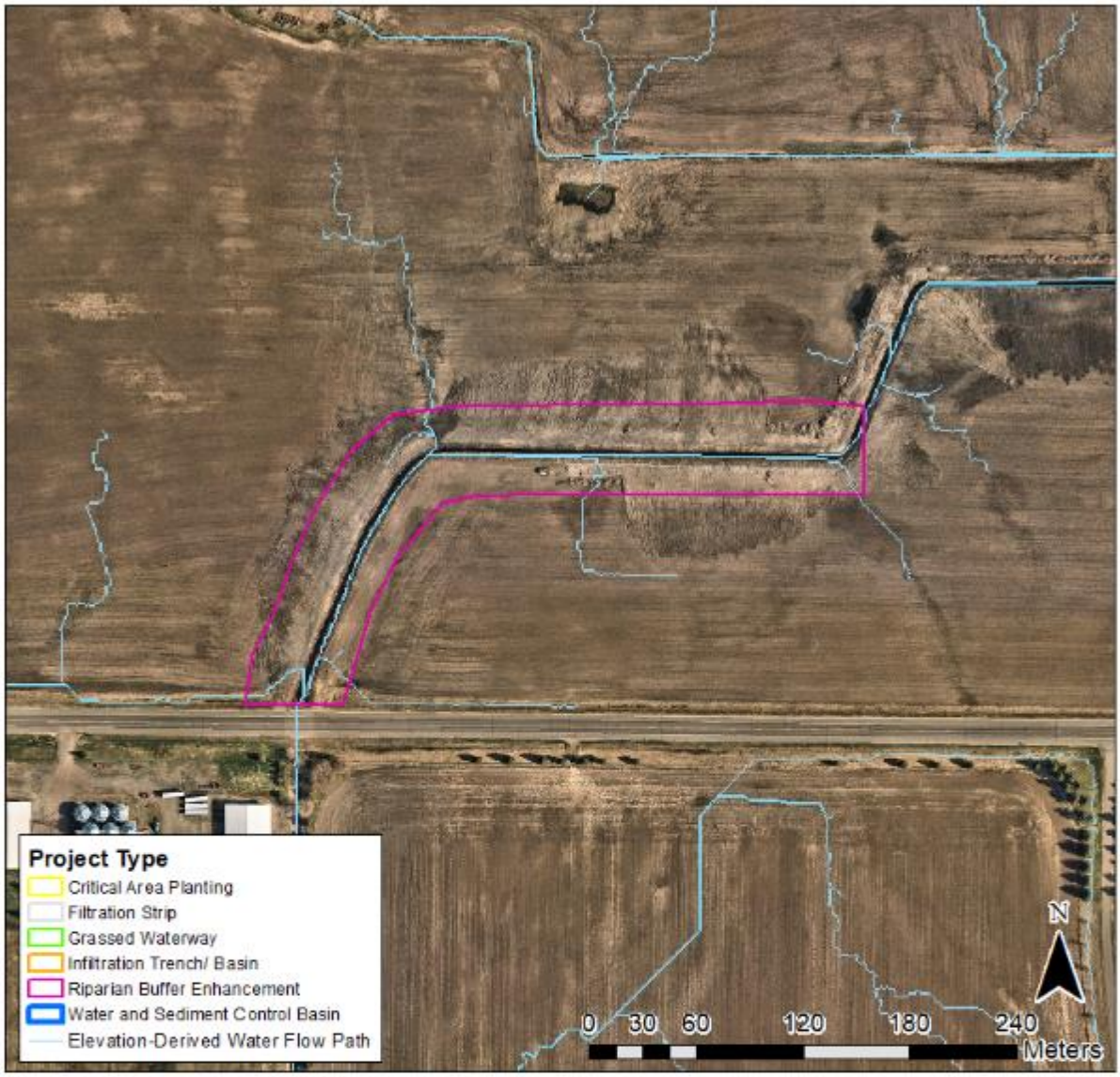
Site ID: FB-WR-52	
Practice Area (acres)	4.28
Practice Drainage Area (acres)	6.67
TP Reduction (lb/yr)	0.71
TSS Reduction (tons/yr)	5.7
Max Water Volume Treated (acre-feet/yr)	4.66
Useful Life Total Cost Estimate	31,058
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,896.39**



45.317901, -93.448484

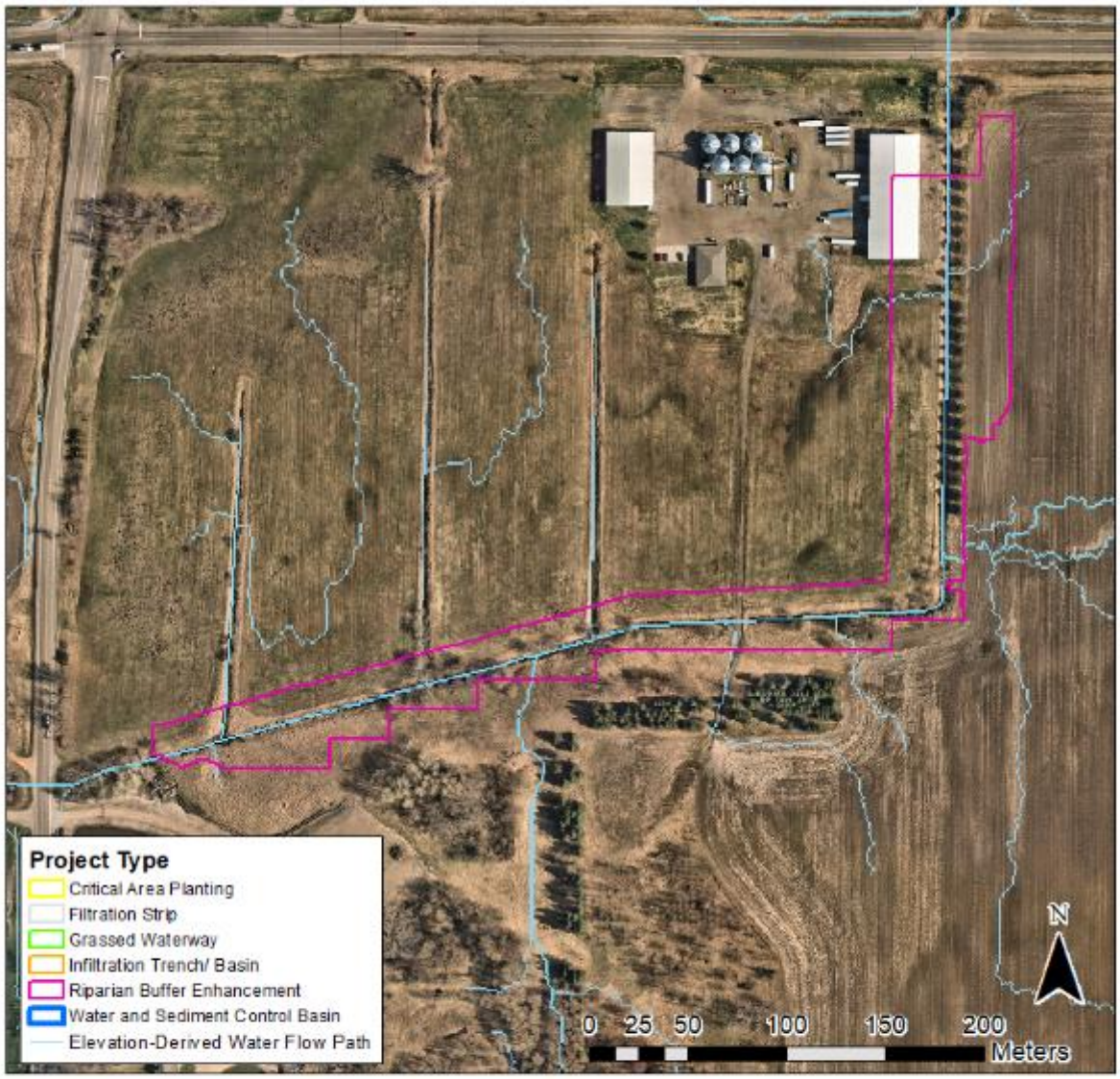
Site ID: FB-WR-53	
Practice Area (acres)	2.15
Practice Drainage Area (acres)	16
TP Reduction (lb/yr)	0.5
TSS Reduction (tons/yr)	0.63
Max Water Volume Treated (acre-feet/yr)	41.3
Useful Life Total Cost Estimate	22,510
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**3,007.91**

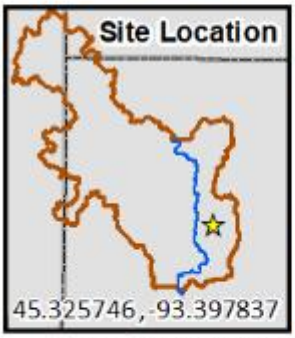
Appendix I: Project Profiles: Top Candidate Sites for Riparian Buffer Enhancement



Site ID: FB-RB-01 | Field ID: F070102070705_132	
Practice Type	Riparian Buffer Enhancement
Practice Area (acres)	1.09
TP Reduction (lbs/yr)	5.5
TSS Reduction (tons/yr)	0
TN Reduction (lbs/yr)	14.84
Useful Life (years)	10
Useful Life Total Cost Estimate	3,893
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**70.77**

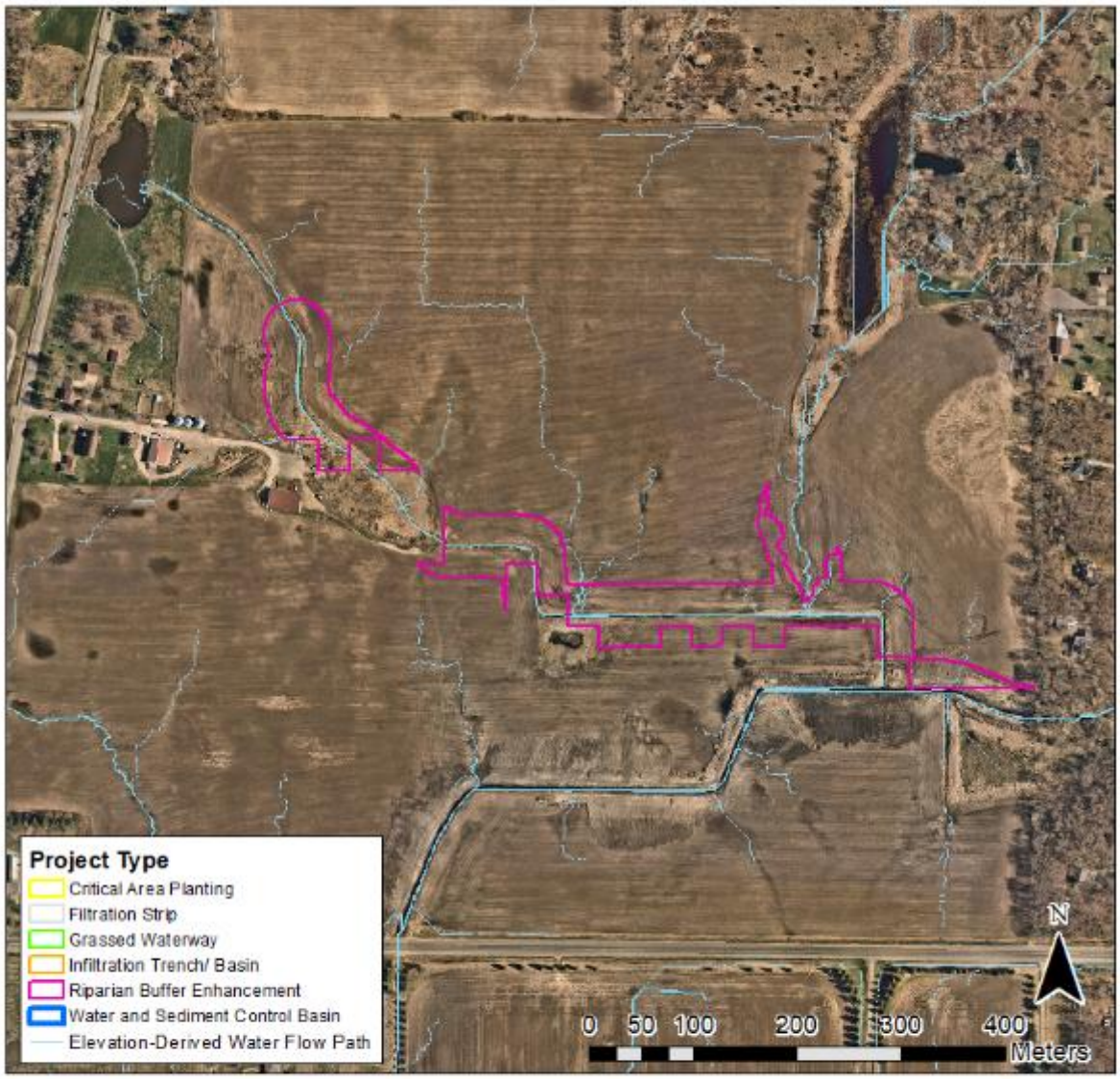
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

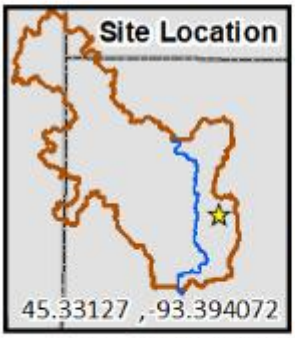




Site ID: FB-RB-02 | Field ID: F070102070705_437	
Practice Type	Riparian Buffer Enhancement
Practice Area (acres)	5.3
TP Reduction (lbs/yr)	8.08
TSS Reduction (tons/yr)	0
TN Reduction (lbs/yr)	23.08
Useful Life (years)	10
Useful Life Total Cost Estimate	16,034
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**198.49**

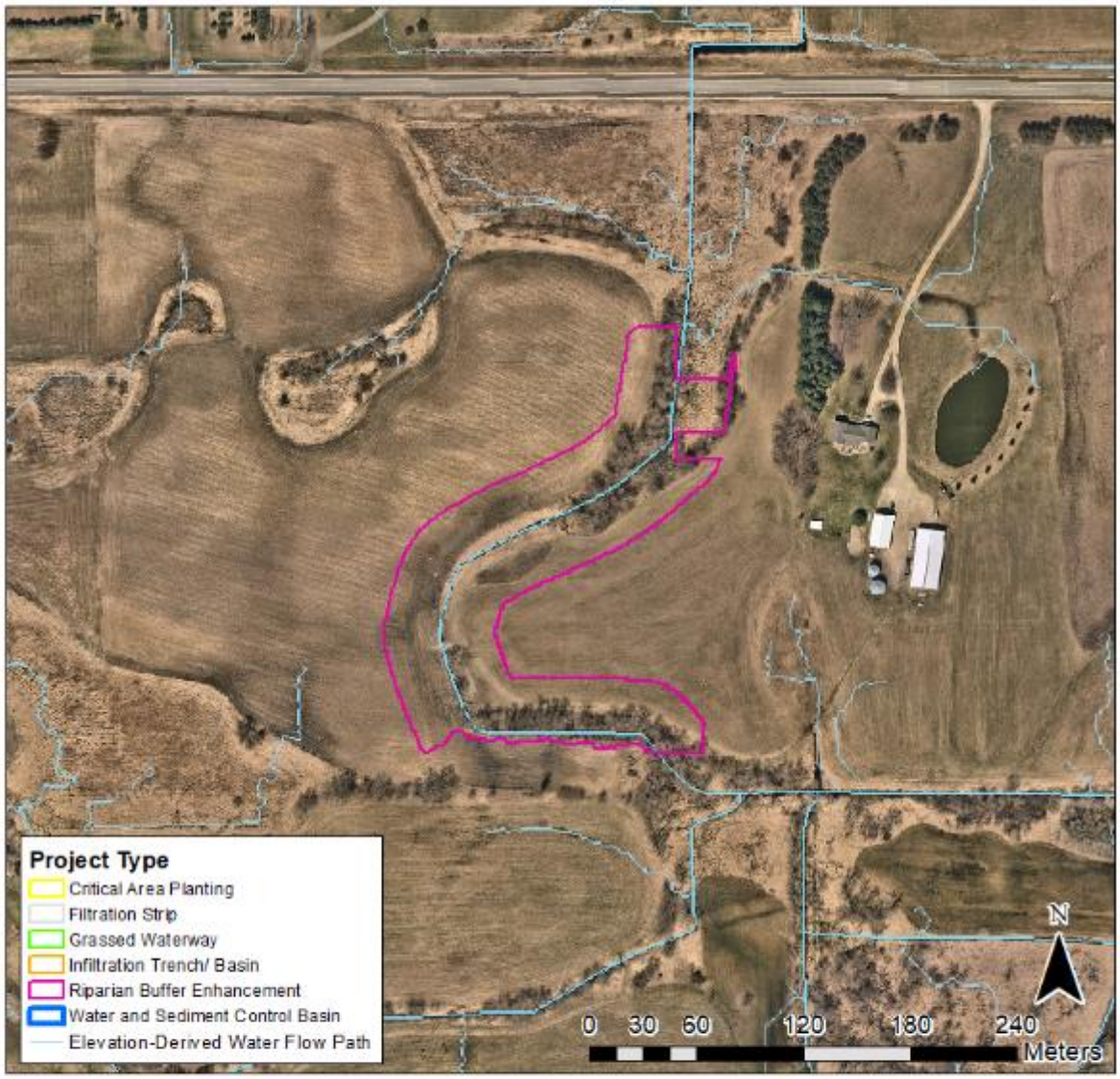
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

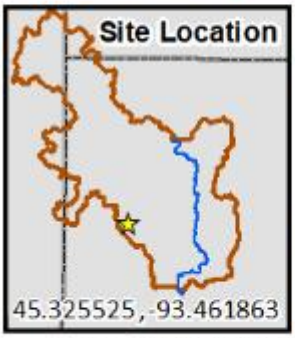




Site ID: FB-RB-03 | Field ID: F070102070705_132	
Practice Type	Riparian Buffer Enhancement
Practice Area (acres)	3.41
TP Reduction (lbs/yr)	4.04
TSS Reduction (tons/yr)	0.02
TN Reduction (lbs/yr)	20.69
Useful Life (years)	10
Useful Life Total Cost Estimate	10,782
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**267.21**

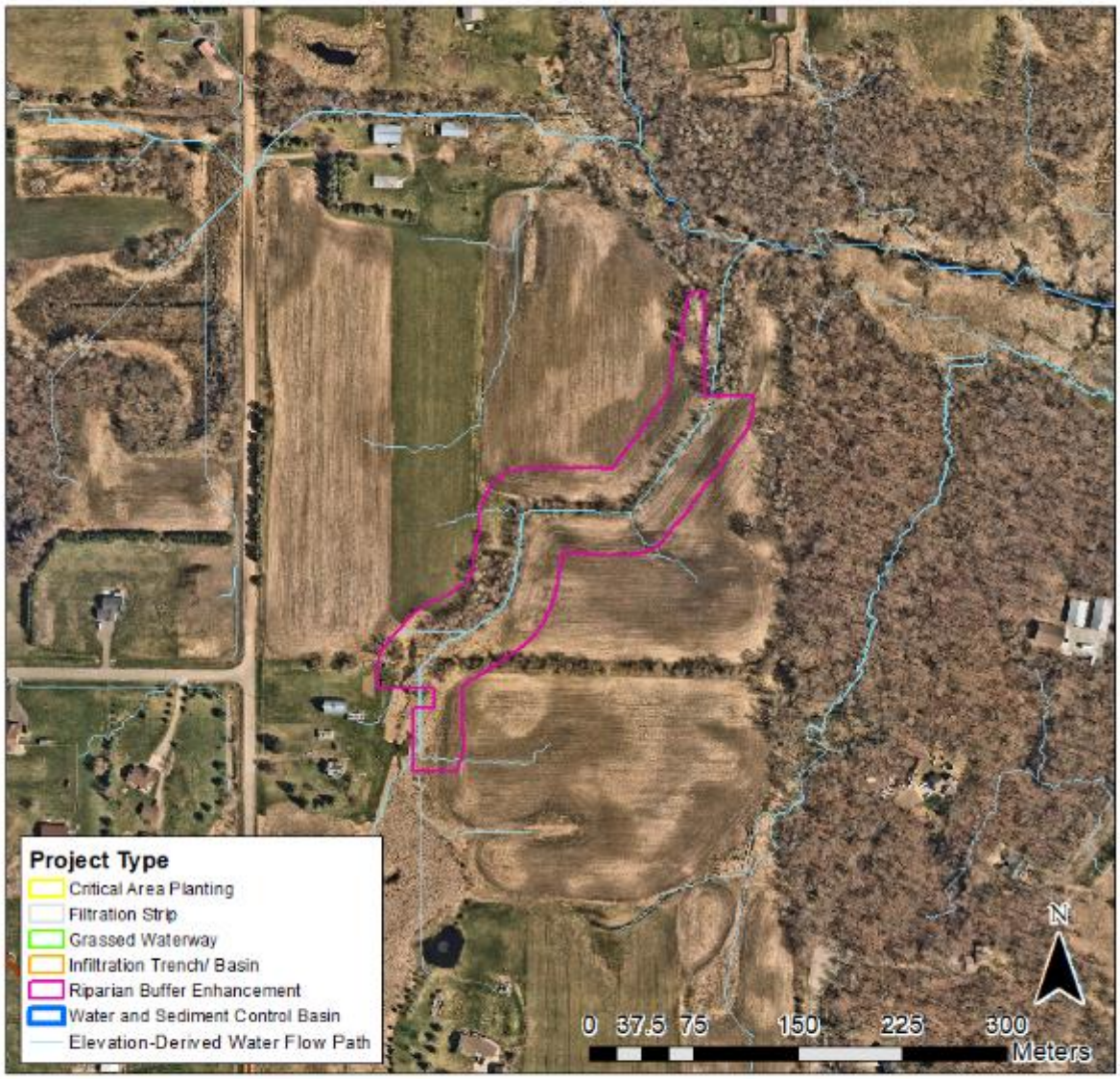
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

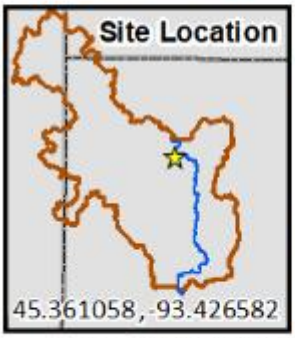




Site ID: FB-RB-04 | Field ID: F070102070705_65	
Practice Type	Riparian Buffer Enhancement
Practice Area (acres)	5.21
TP Reduction (lbs/yr)	2.08
TSS Reduction (tons/yr)	0
TN Reduction (lbs/yr)	7.33
Useful Life (years)	10
Useful Life Total Cost Estimate	15,783
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**757.30**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

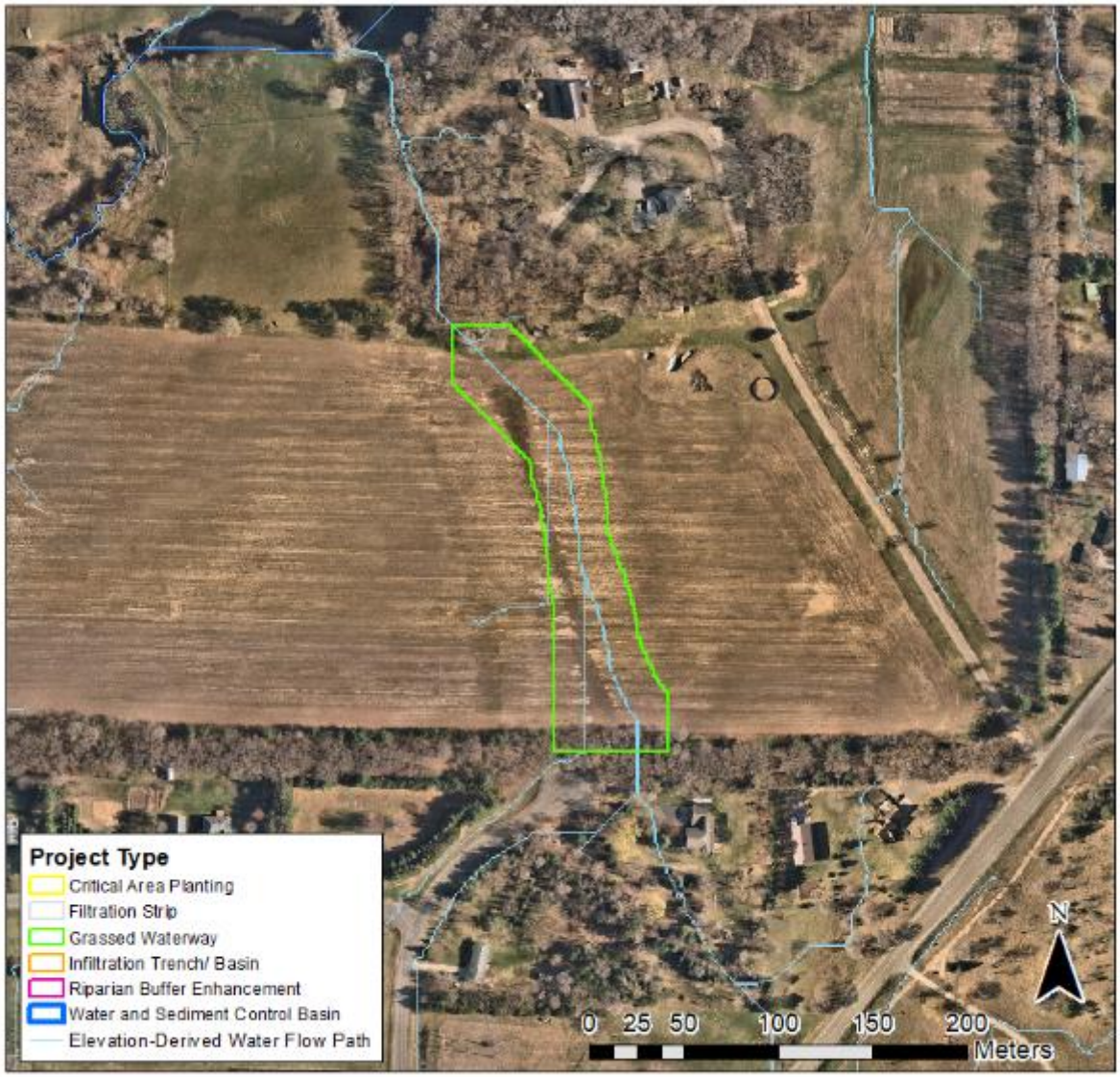


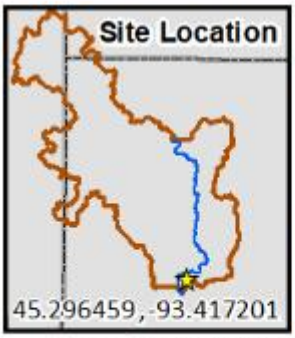


Site ID: FB-RB-05 | Field ID: F070102070705_81	
Practice Type	Riparian Buffer Enhancement
Practice Area (acres)	5.94
TP Reduction (lbs/yr)	2.15
TSS Reduction (tons/yr)	0.17
TN Reduction (lbs/yr)	19.02
Useful Life (years)	10
Useful Life Total Cost Estimate	17,751
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**826.19**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

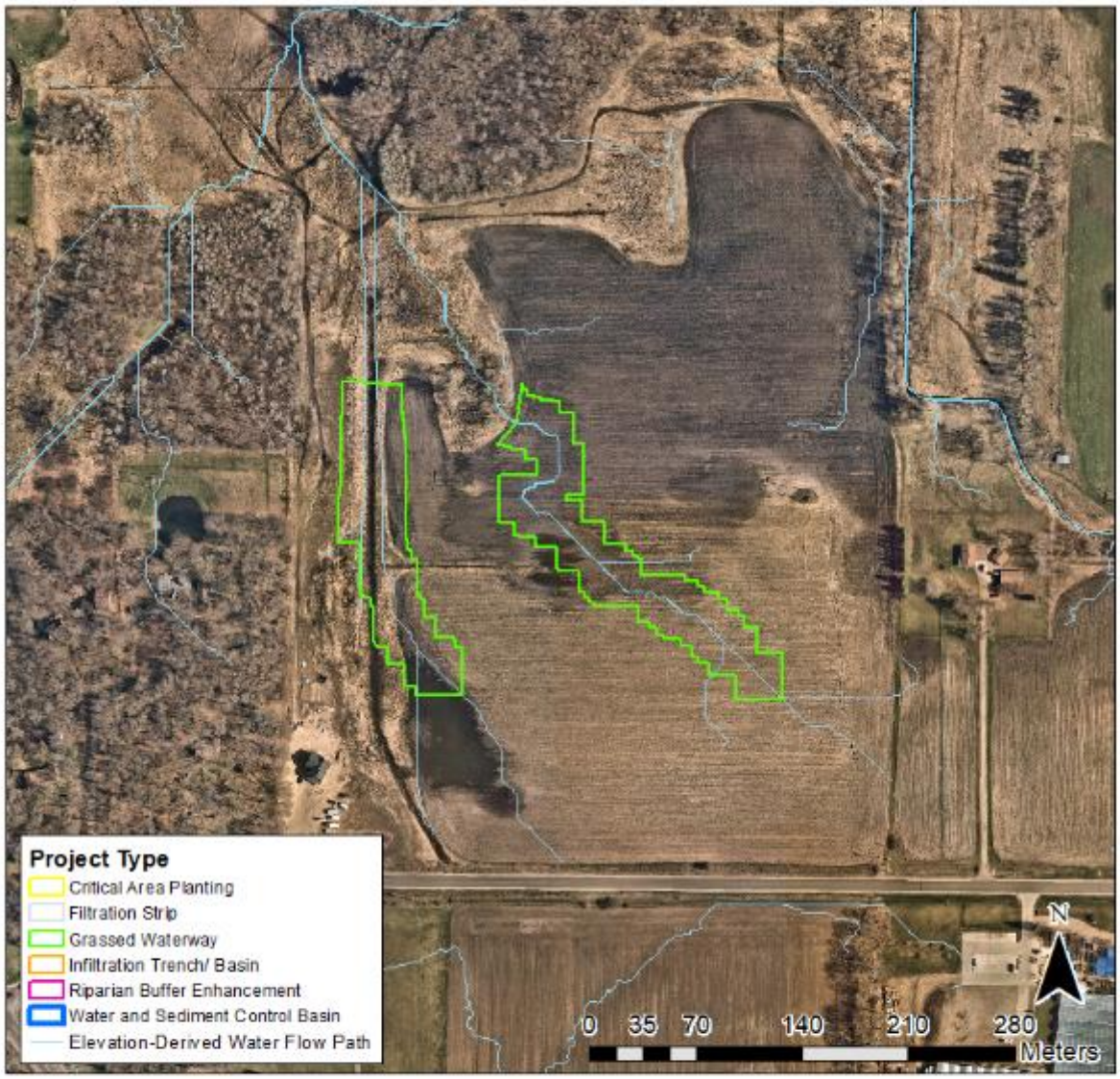
Appendix J: Project Profiles: Top Candidate Sites for Grassed Waterways

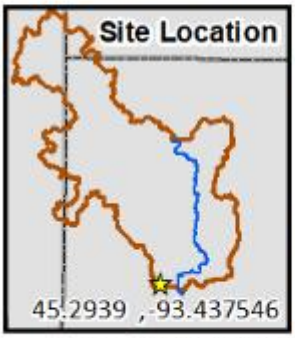




Site ID:FB-GW-01| Field ID: F070102070705_289	
Practice Type	Grassed Waterway
Practice Area (acres)	2.58
TP Reduction (lbs/yr)	0.89
TSS Reduction (tons/yr)	3.87
TN Reduction (lbs/yr)	15.81
Useful Life (years)	20
Useful Life Total Cost Estimate	6,916
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**386.48**

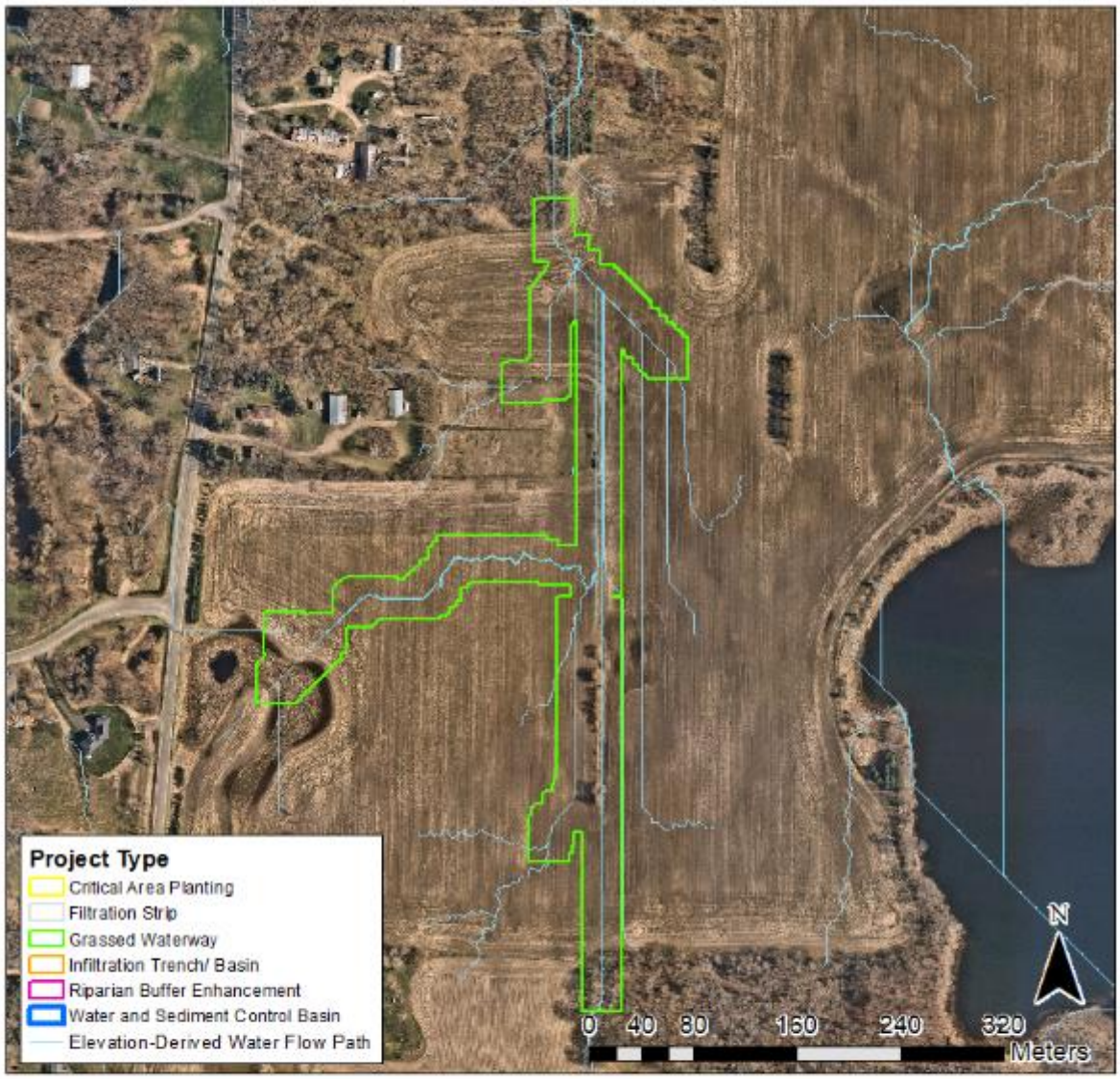
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

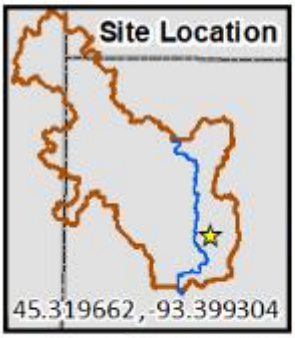




Site ID:FB-GW-02| Field ID: F070102070705_462	
Practice Type	Grassed Waterway
Practice Area (acres)	7.51
TP Reduction (lbs/yr)	2.31
TSS Reduction (tons/yr)	9.69
TN Reduction (lbs/yr)	47.93
Useful Life (years)	20
Useful Life Total Cost Estimate	20,389
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**442.11**

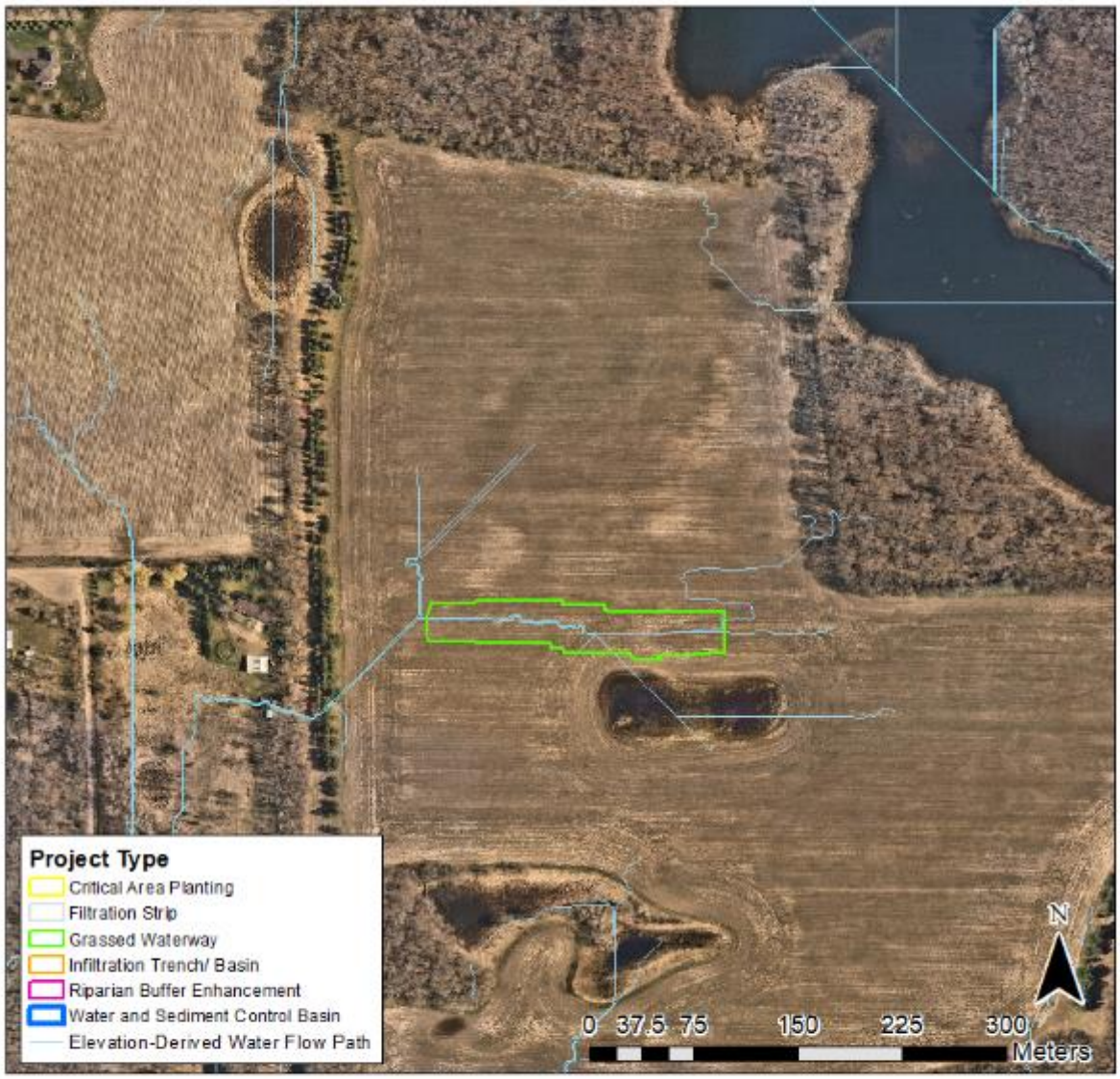
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

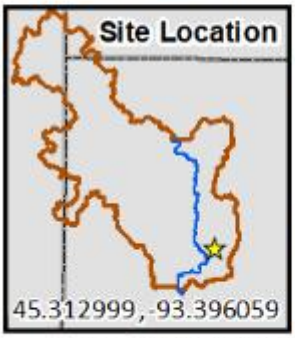




Site ID:FB-GW-03| Field ID: F070102070705_207	
Practice Type	Grassed Waterway
Practice Area (acres)	10.81
TP Reduction (lbs/yr)	3
TSS Reduction (tons/yr)	12.29
TN Reduction (lbs/yr)	61.72
Useful Life (years)	20
Useful Life Total Cost Estimate	27,546
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**459.32**

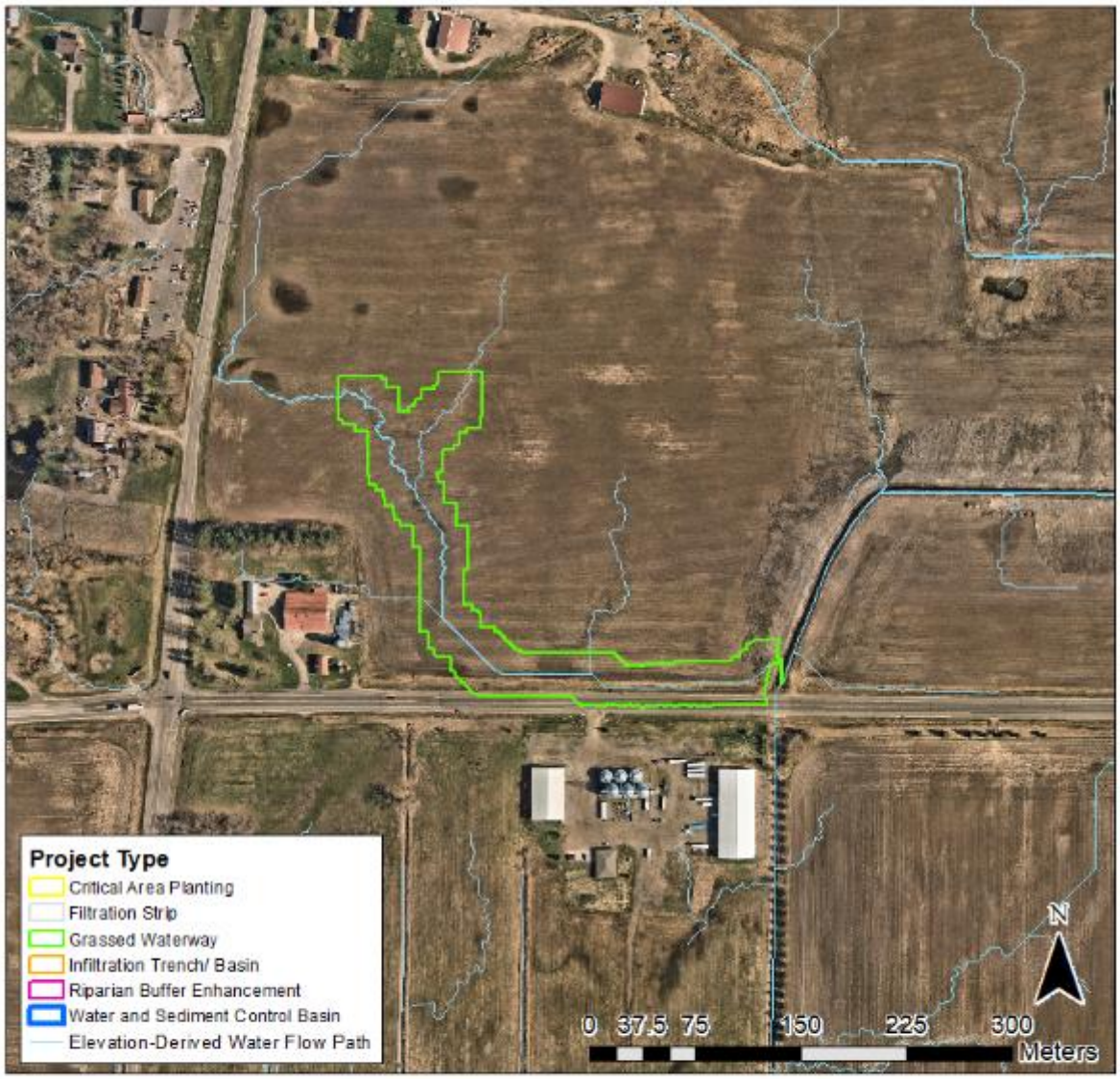
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

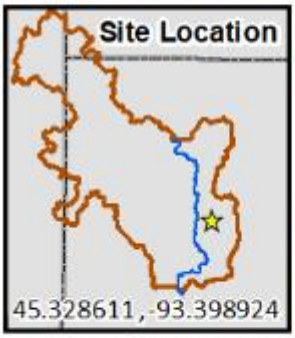




Site ID:FB-GW-04| Field ID: F070102070705_217	
Practice Type	Grassed Waterway
Practice Area (acres)	2.69
TP Reduction (lbs/yr)	0.83
TSS Reduction (tons/yr)	3.4
TN Reduction (lbs/yr)	17.08
Useful Life (years)	20
Useful Life Total Cost Estimate	7,997
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**480.63**

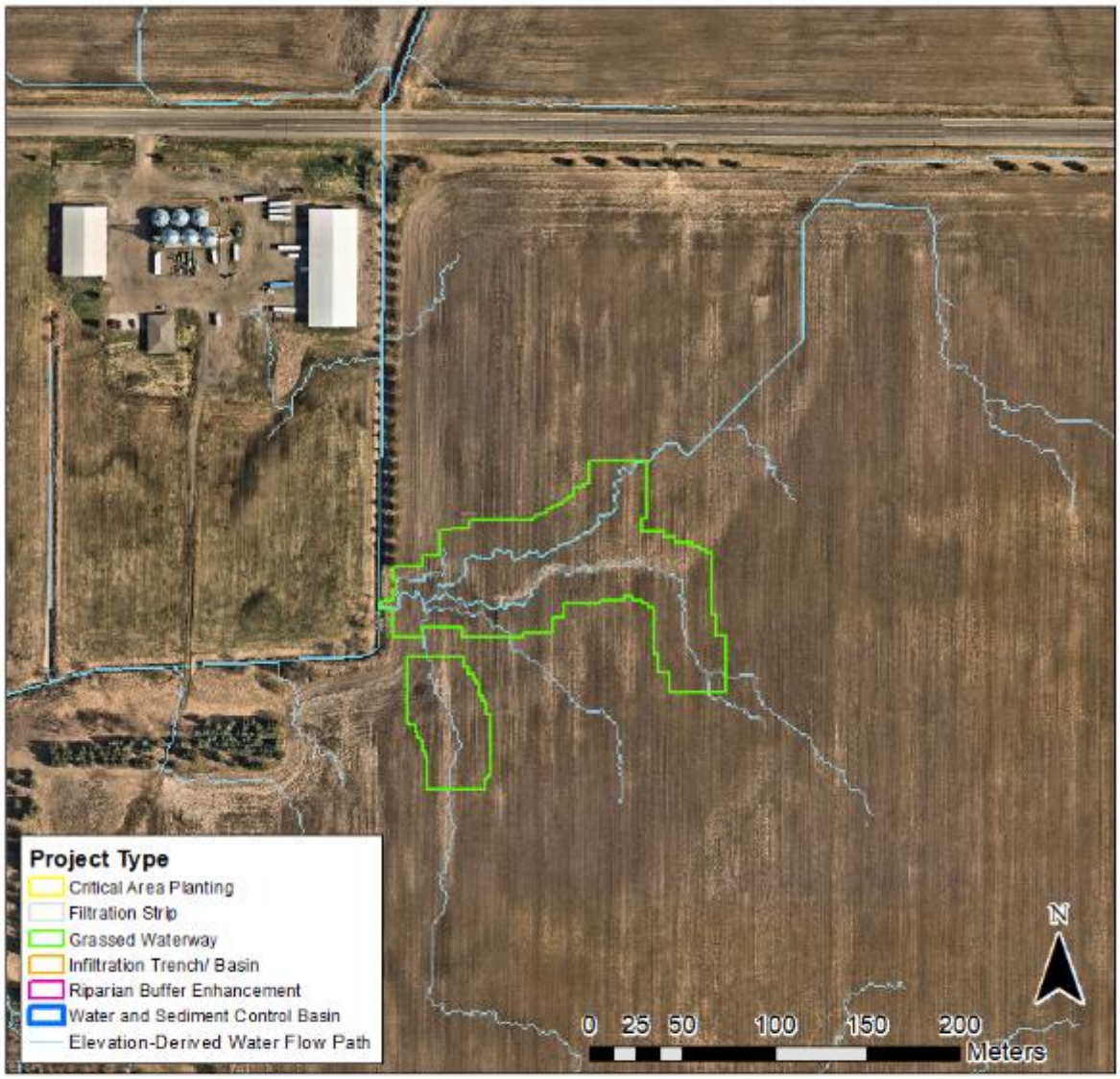
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

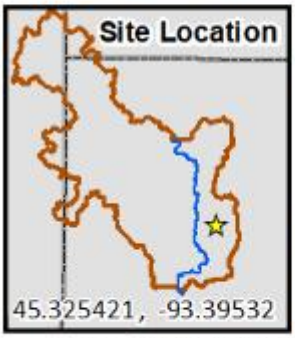




Site ID:FB-GW-05| Field ID: F070102070705_132	
Practice Type	Grassed Waterway
Practice Area (acres)	4.4
TP Reduction (lbs/yr)	1.38
TSS Reduction (tons/yr)	6.62
TN Reduction (lbs/yr)	25.28
Useful Life (years)	20
Useful Life Total Cost Estimate	13,586
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**490.90**

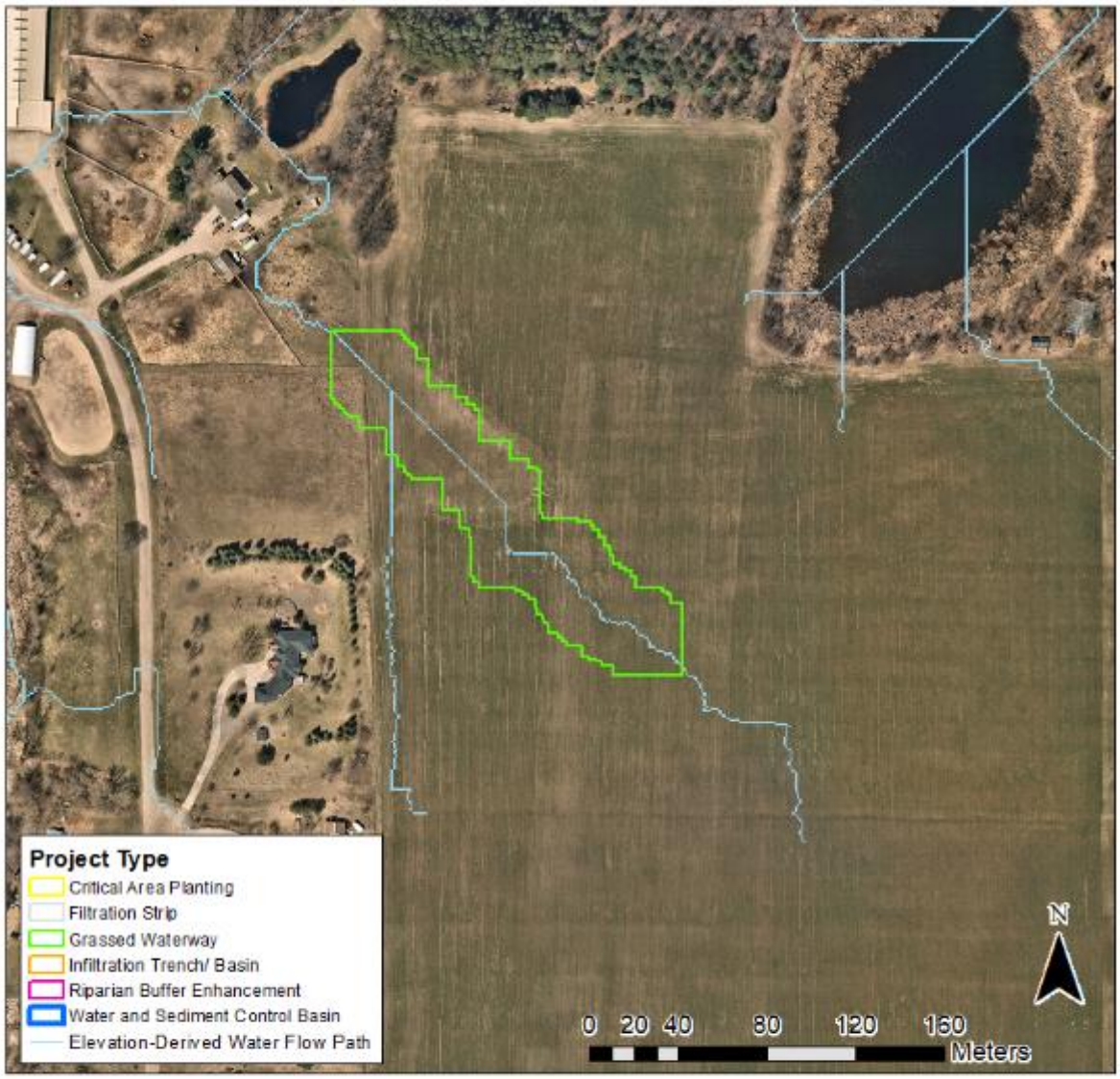
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

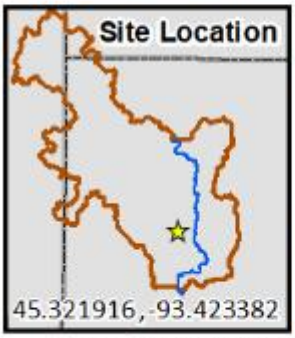




Site ID:FB-GW-06| Field ID: F070102070705_437	
Practice Type	Grassed Waterway
Practice Area (acres)	3.39
TP Reduction (lbs/yr)	0.96
TSS Reduction (tons/yr)	3.66
TN Reduction (lbs/yr)	19.76
Useful Life (years)	20
Useful Life Total Cost Estimate	9,542
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**495.34**

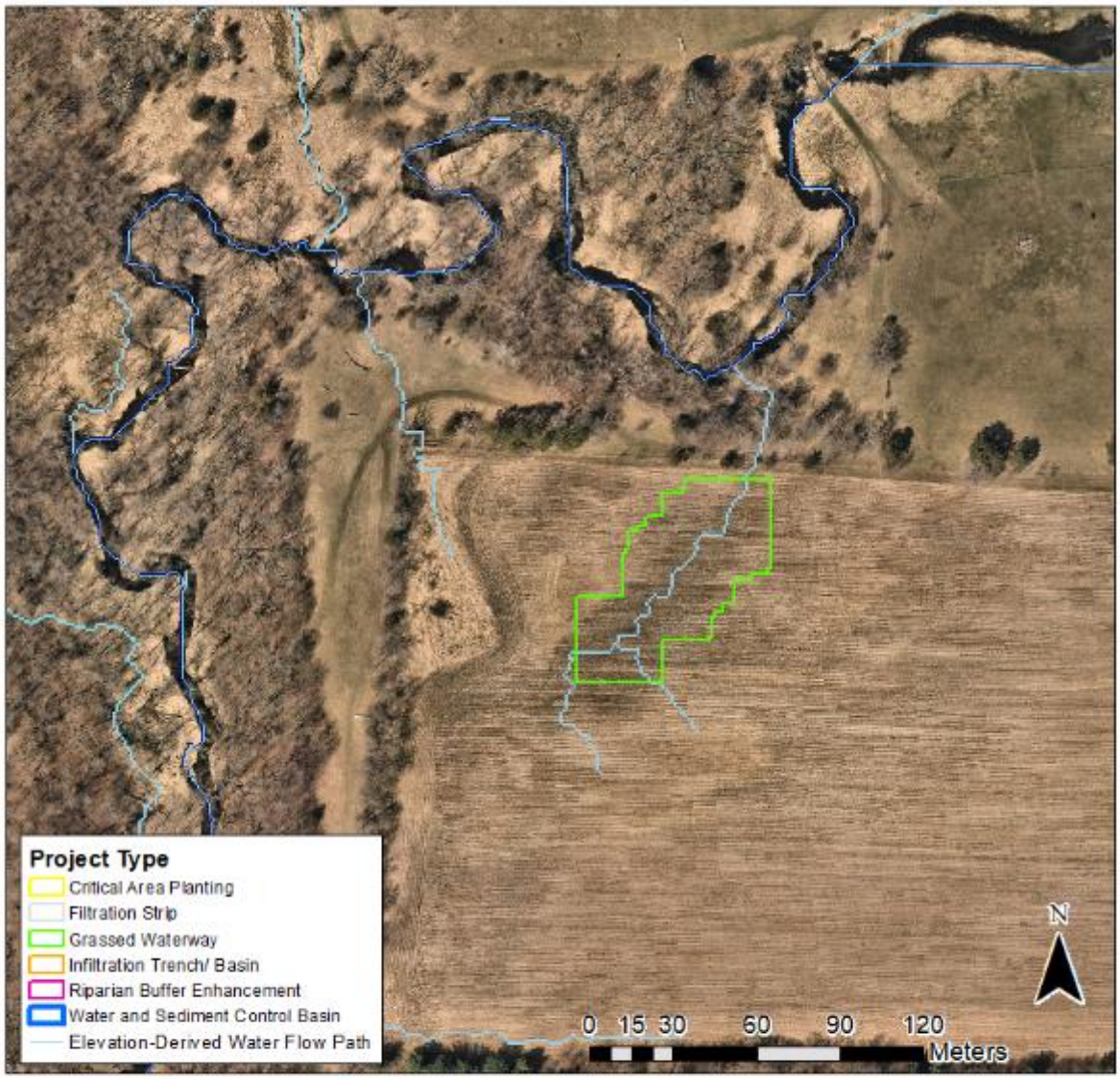
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

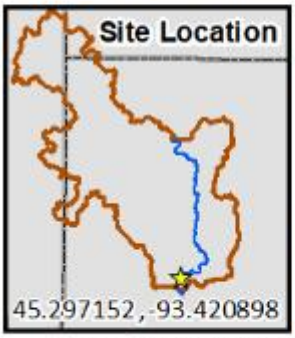




Site ID:FB-GW-07| Field ID: F070102070705_478	
Practice Type	Grassed Waterway
Practice Area (acres)	2.01
TP Reduction (lbs/yr)	0.61
TSS Reduction (tons/yr)	0.23
TN Reduction (lbs/yr)	12.37
Useful Life (years)	20
Useful Life Total Cost Estimate	6,239
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**512.53**

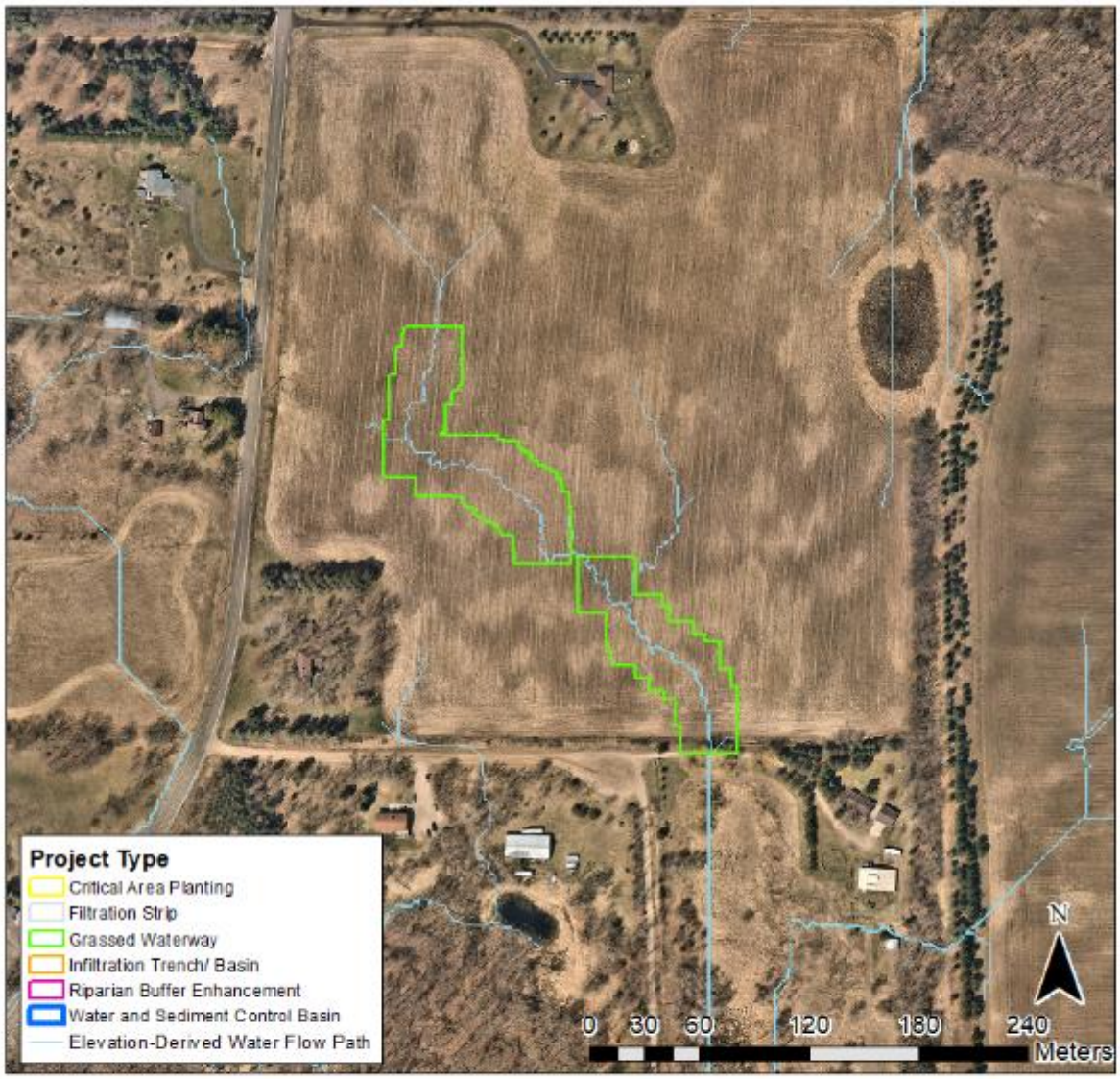
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

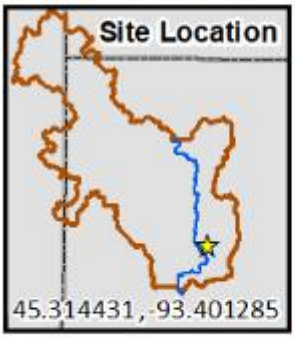




Site ID:FB-GW-08| Field ID: F070102070705_289	
Practice Type	Grassed Waterway
Practice Area (acres)	0.78
TP Reduction (lbs/yr)	0.26
TSS Reduction (tons/yr)	1.68
TN Reduction (lbs/yr)	5.32
Useful Life (years)	20
Useful Life Total Cost Estimate	2,827
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**545.02**

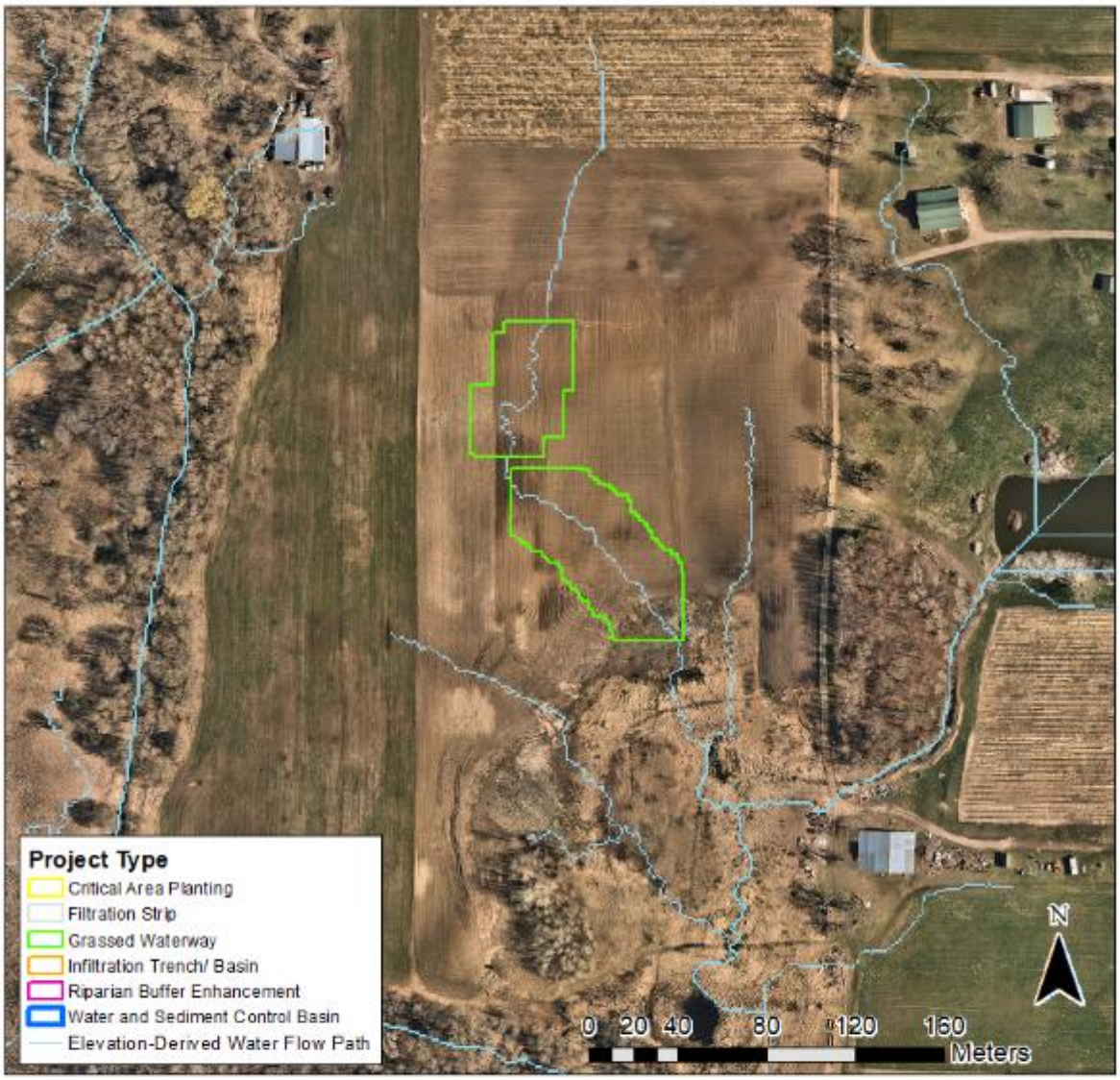
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

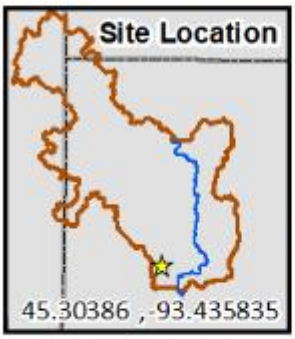




Site ID:FB-GW-09| Field ID: F070102070705_485	
Practice Type	Grassed Waterway
Practice Area (acres)	2.66
TP Reduction (lbs/yr)	0.8
TSS Reduction (tons/yr)	2.87
TN Reduction (lbs/yr)	16.28
Useful Life (years)	20
Useful Life Total Cost Estimate	8,782
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**549.56**

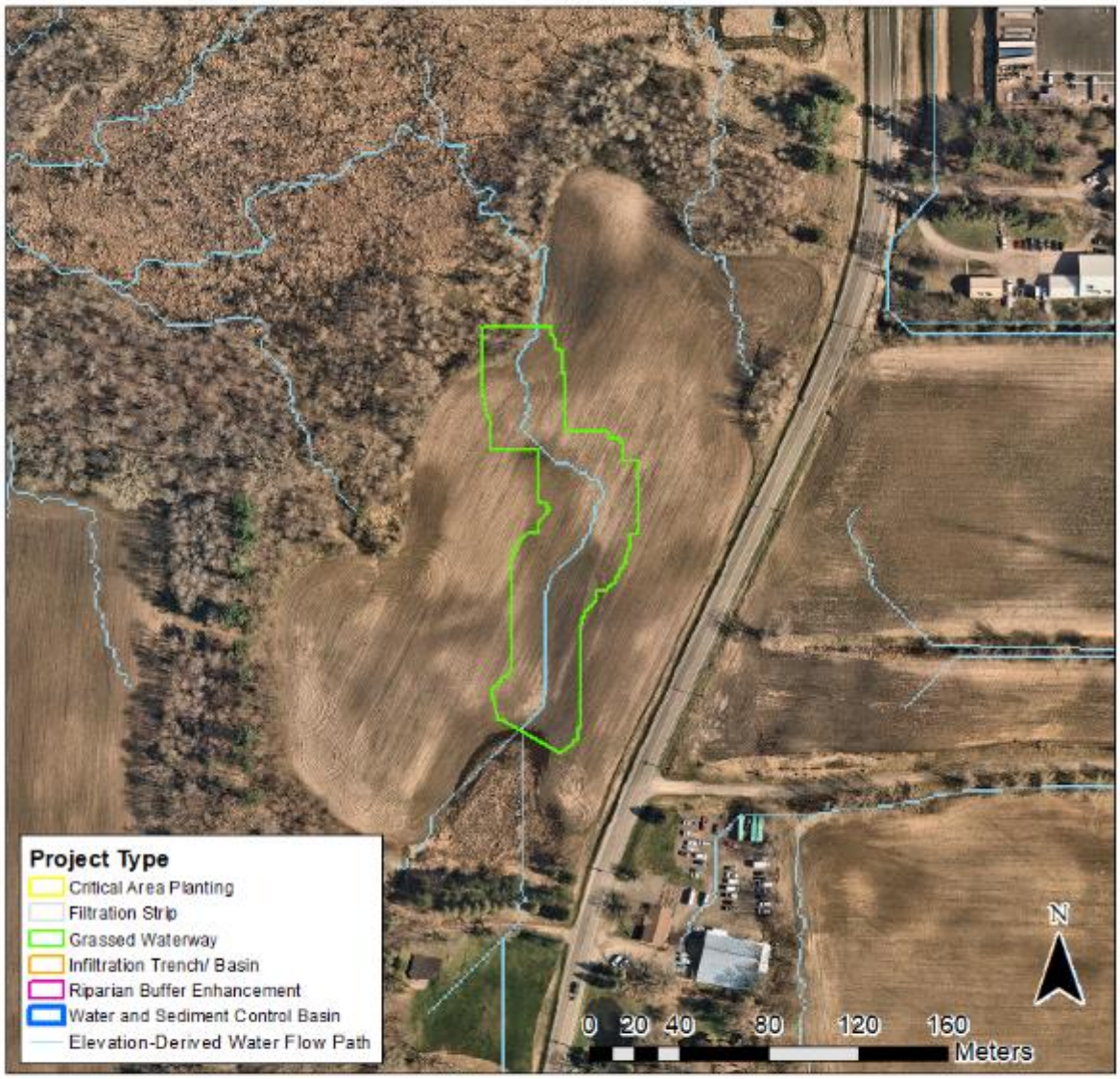
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

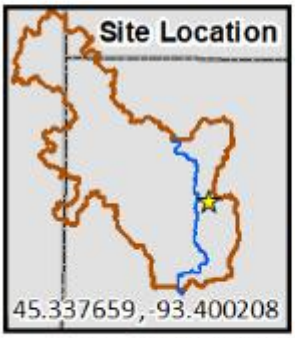




Site ID:FB-GW-10| Field ID: F070102070705_499	
Practice Type	Grassed Waterway
Practice Area (acres)	1.51
TP Reduction (lbs/yr)	0.47
TSS Reduction (tons/yr)	2.11
TN Reduction (lbs/yr)	9.53
Useful Life (years)	20
Useful Life Total Cost Estimate	5,190
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**554.11**

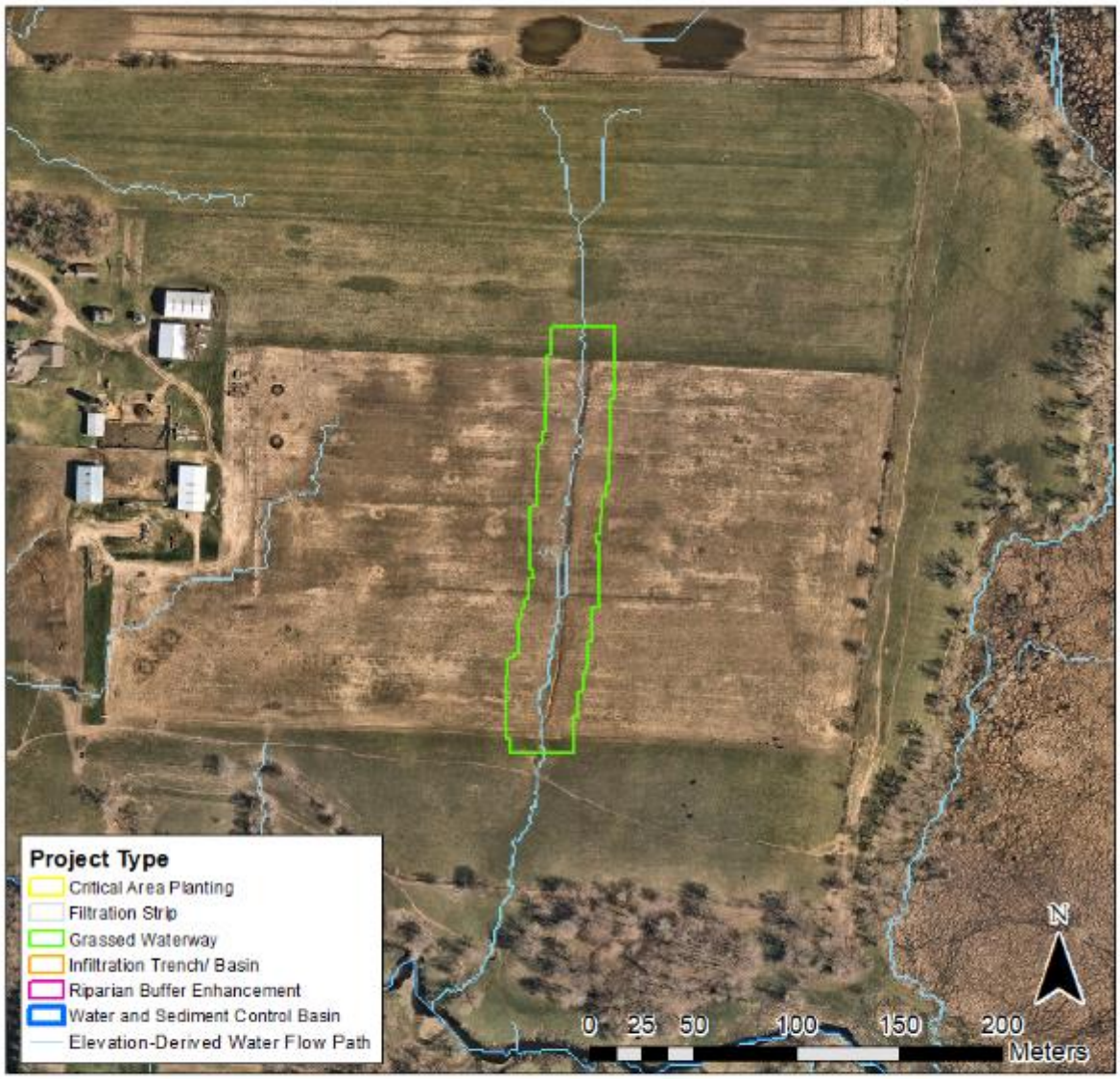
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

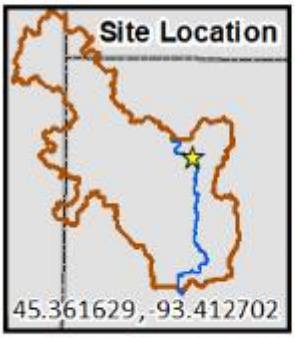




Site ID:FB-GW-11| Field ID: F070102070705_889	
Practice Type	Grassed Waterway
Practice Area (acres)	2.42
TP Reduction (lbs/yr)	0.67
TSS Reduction (tons/yr)	1.47
TN Reduction (lbs/yr)	12.98
Useful Life (years)	20
Useful Life Total Cost Estimate	7,791
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**582.35**

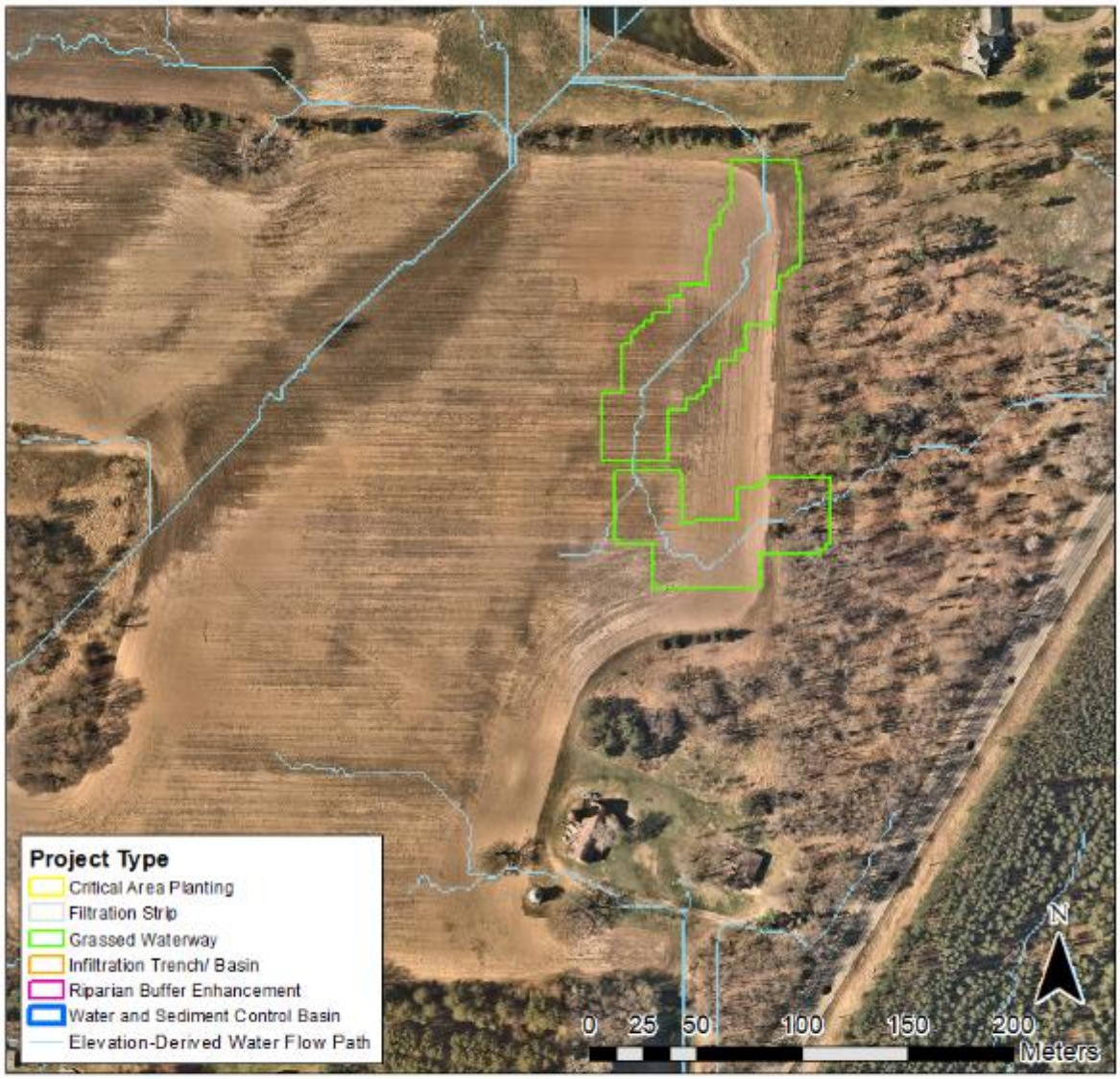
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

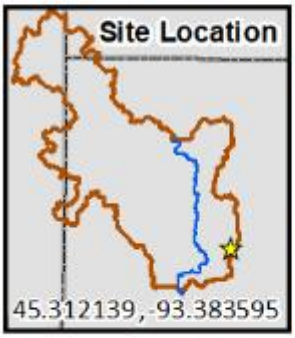




Site ID:FB-GW-12| Field ID: F070102070705_60	
Practice Type	Grassed Waterway
Practice Area (acres)	1.73
TP Reduction (lbs/yr)	0.43
TSS Reduction (tons/yr)	0.98
TN Reduction (lbs/yr)	8.58
Useful Life (years)	20
Useful Life Total Cost Estimate	5,236
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**614.58**

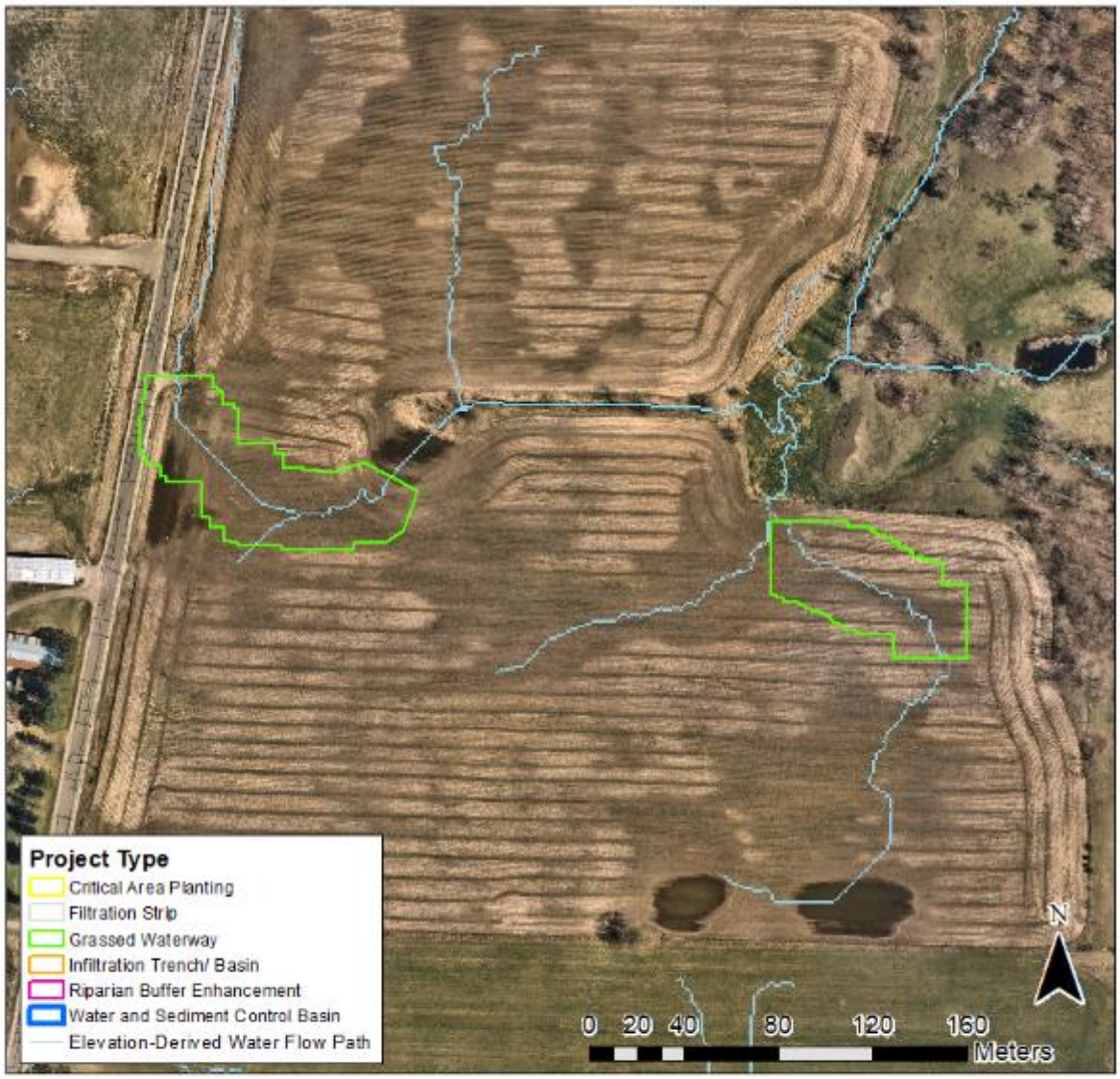
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

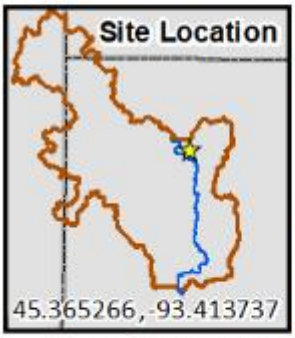




Site ID:FB-GW-13| Field ID: F070102070705_217	
Practice Type	Grassed Waterway
Practice Area (acres)	2.4
TP Reduction (lbs/yr)	0.65
TSS Reduction (tons/yr)	1.14
TN Reduction (lbs/yr)	13.37
Useful Life (years)	20
Useful Life Total Cost Estimate	8,235
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**631.43**

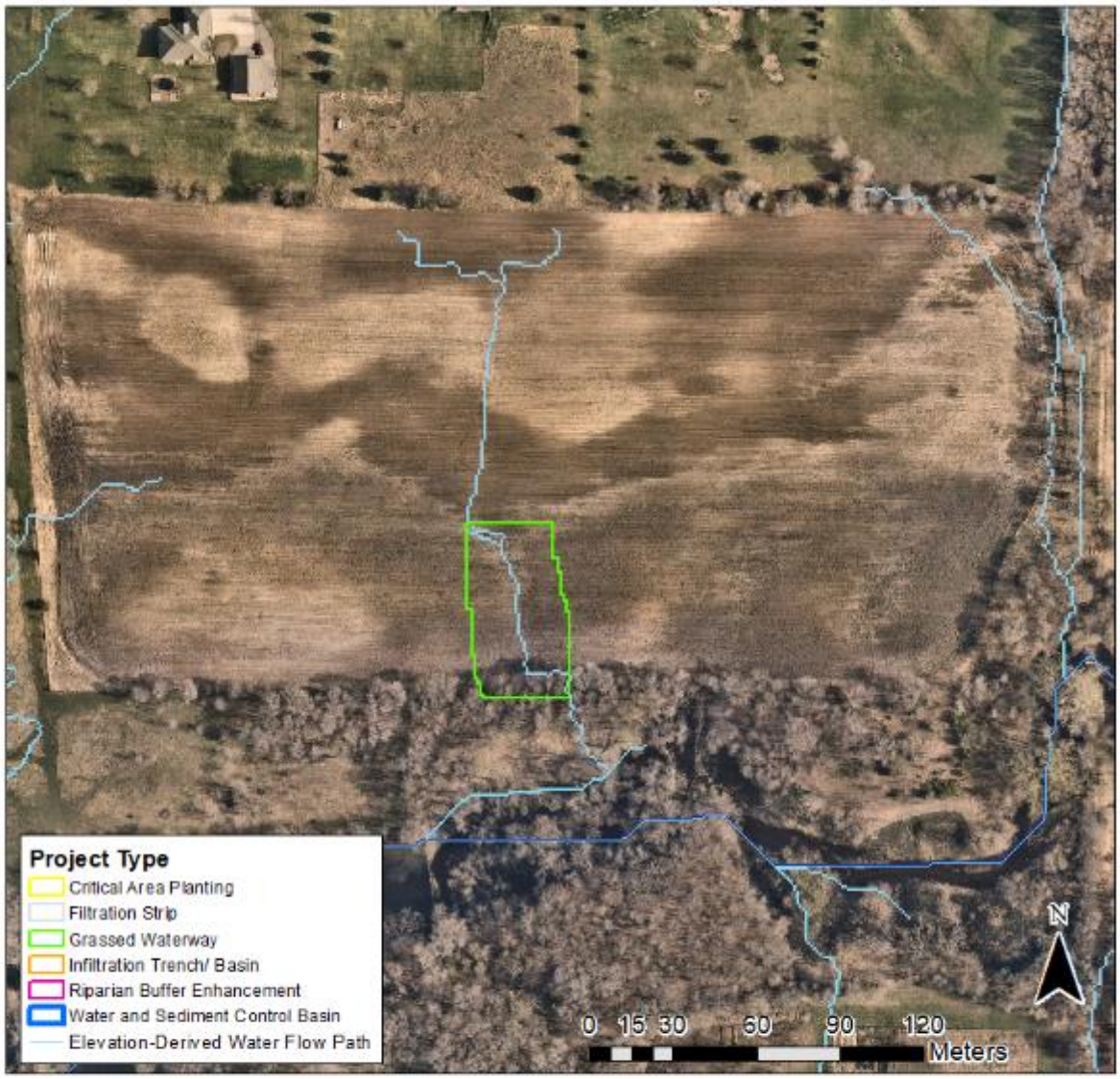
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

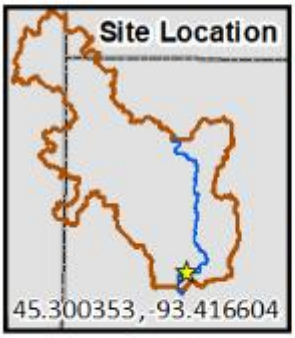




Site ID:FB-GW-14| Field ID: F070102070705_547	
Practice Type	Grassed Waterway
Practice Area (acres)	3.93
TP Reduction (lbs/yr)	0.95
TSS Reduction (tons/yr)	3.23
TN Reduction (lbs/yr)	18.47
Useful Life (years)	20
Useful Life Total Cost Estimate	12,546
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**659.09**

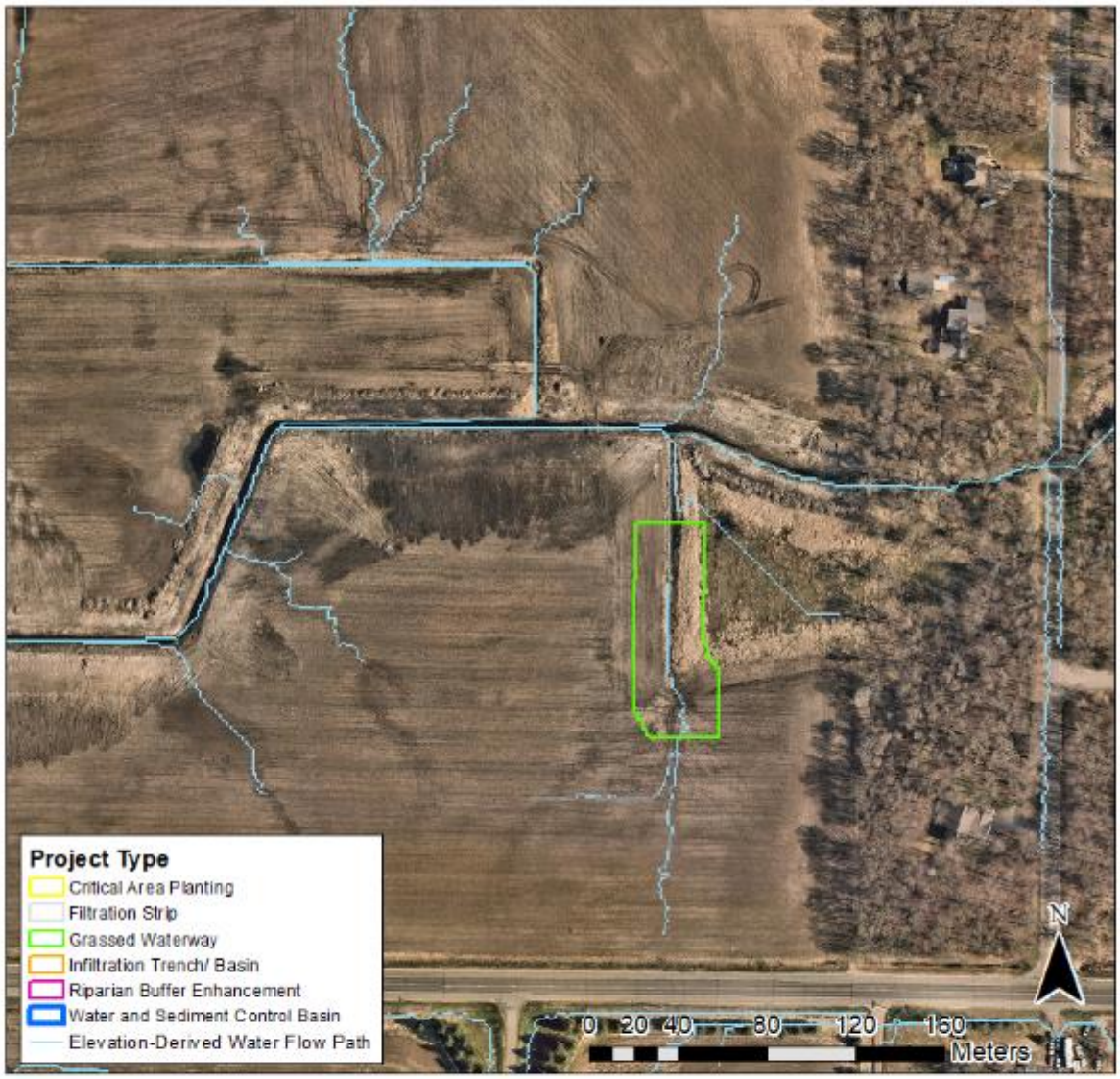
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.





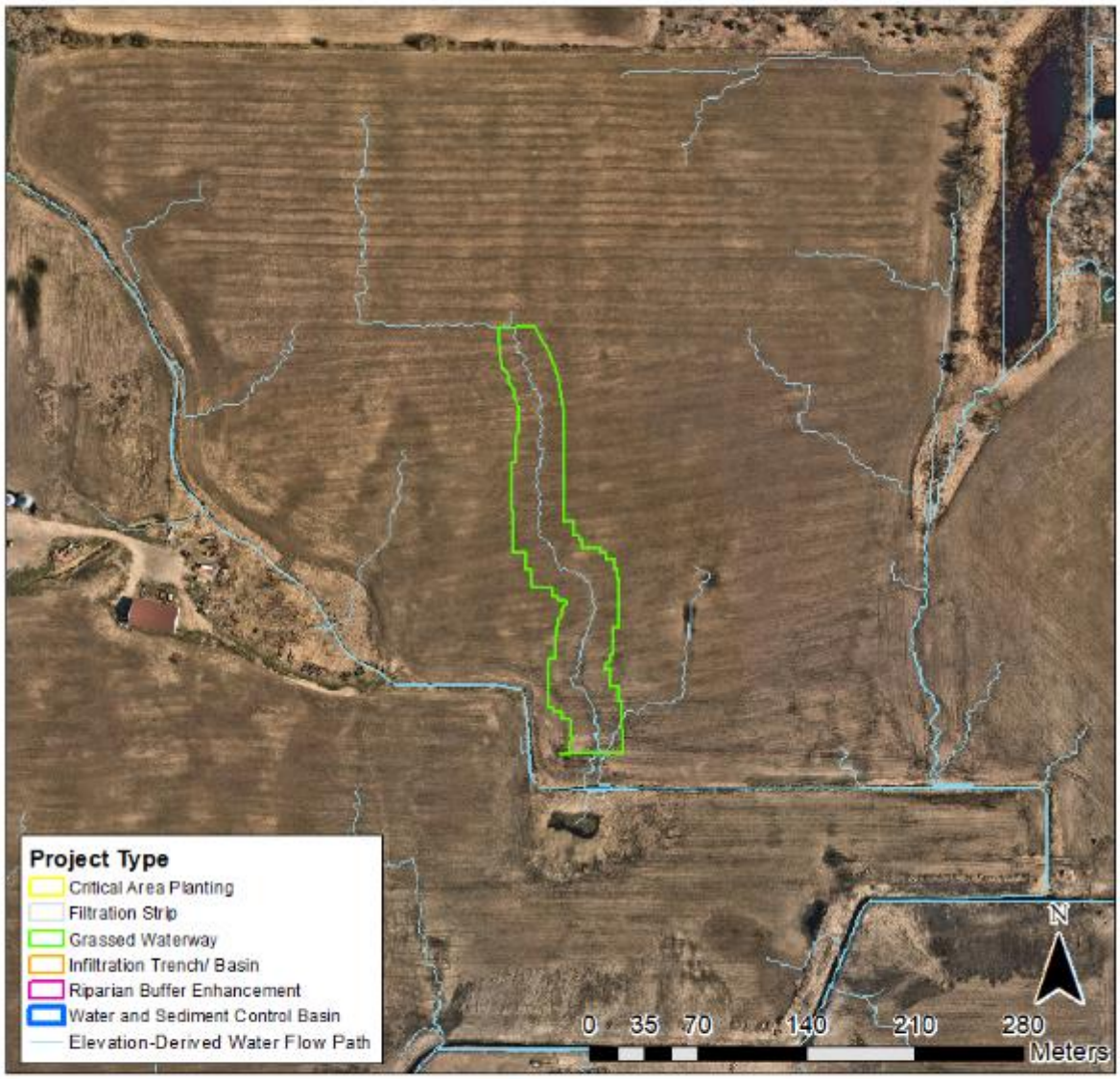
Site ID:FB-GW-15| Field ID: F070102070705_344	
Practice Type	Grassed Waterway
Practice Area (acres)	0.52
TP Reduction (lbs/yr)	0.14
TSS Reduction (tons/yr)	0.97
TN Reduction (lbs/yr)	2.9
Useful Life (years)	20
Useful Life Total Cost Estimate	1,977
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**719.21**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



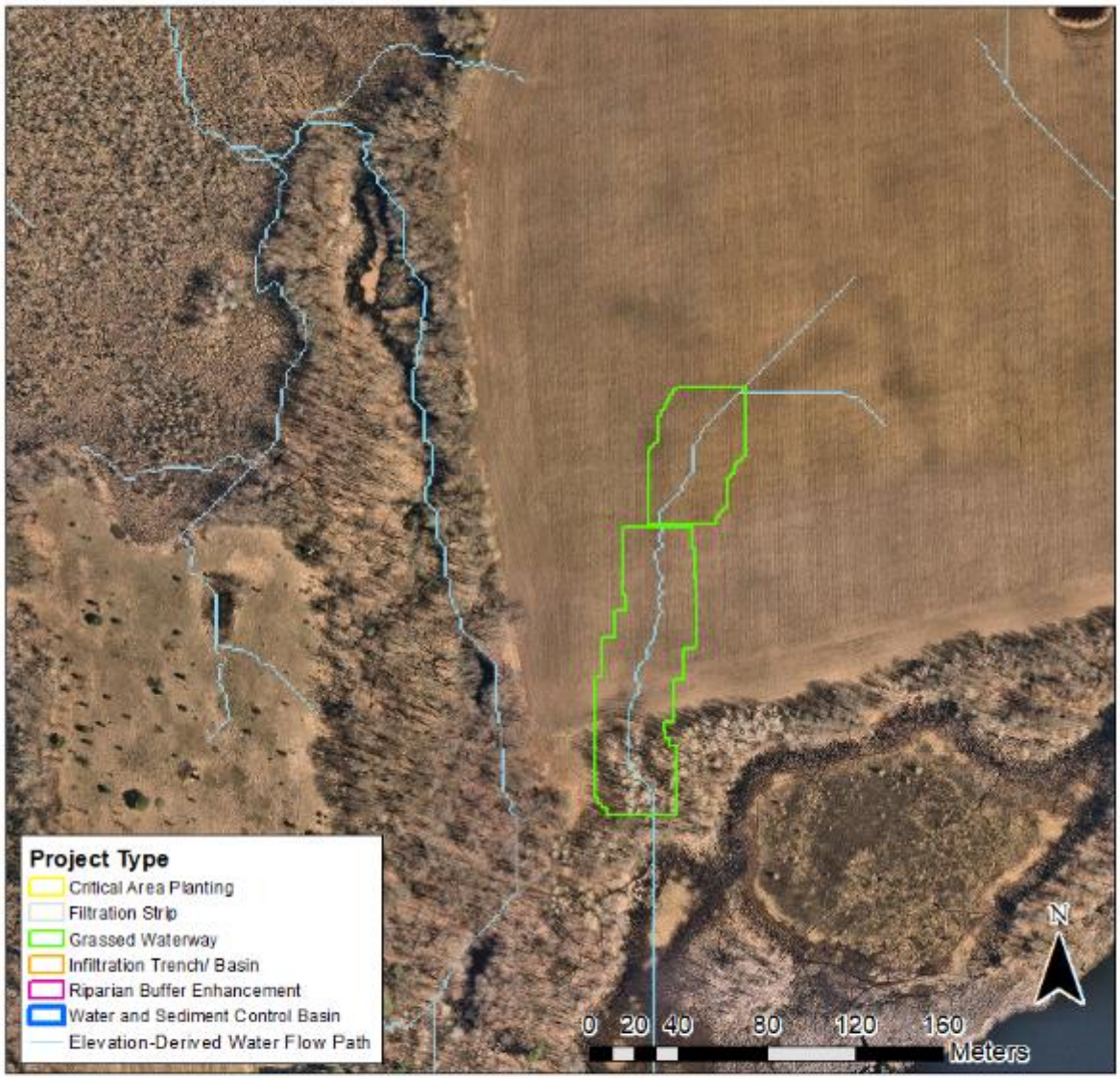
Site ID:FB-GW-16| Field ID: F070102070705_132	
Practice Type	Grassed Waterway
Practice Area (acres)	0.8
TP Reduction (lbs/yr)	0.19
TSS Reduction (tons/yr)	0.65
TN Reduction (lbs/yr)	4.13
Useful Life (years)	20
Useful Life Total Cost Estimate	2,683
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**724.54**

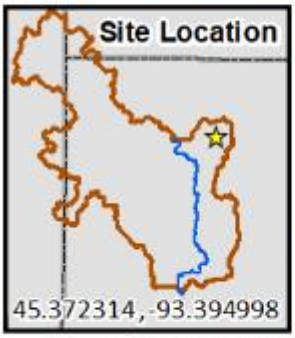
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID:FB-GW-17| Field ID: F070102070705_132	
Practice Type	Grassed Waterway
Practice Area (acres)	7.55
TP Reduction (lbs/yr)	1.97
TSS Reduction (tons/yr)	9.88
TN Reduction (lbs/yr)	41.06
Useful Life (years)	20
Useful Life Total Cost Estimate	28,749
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**729.91**

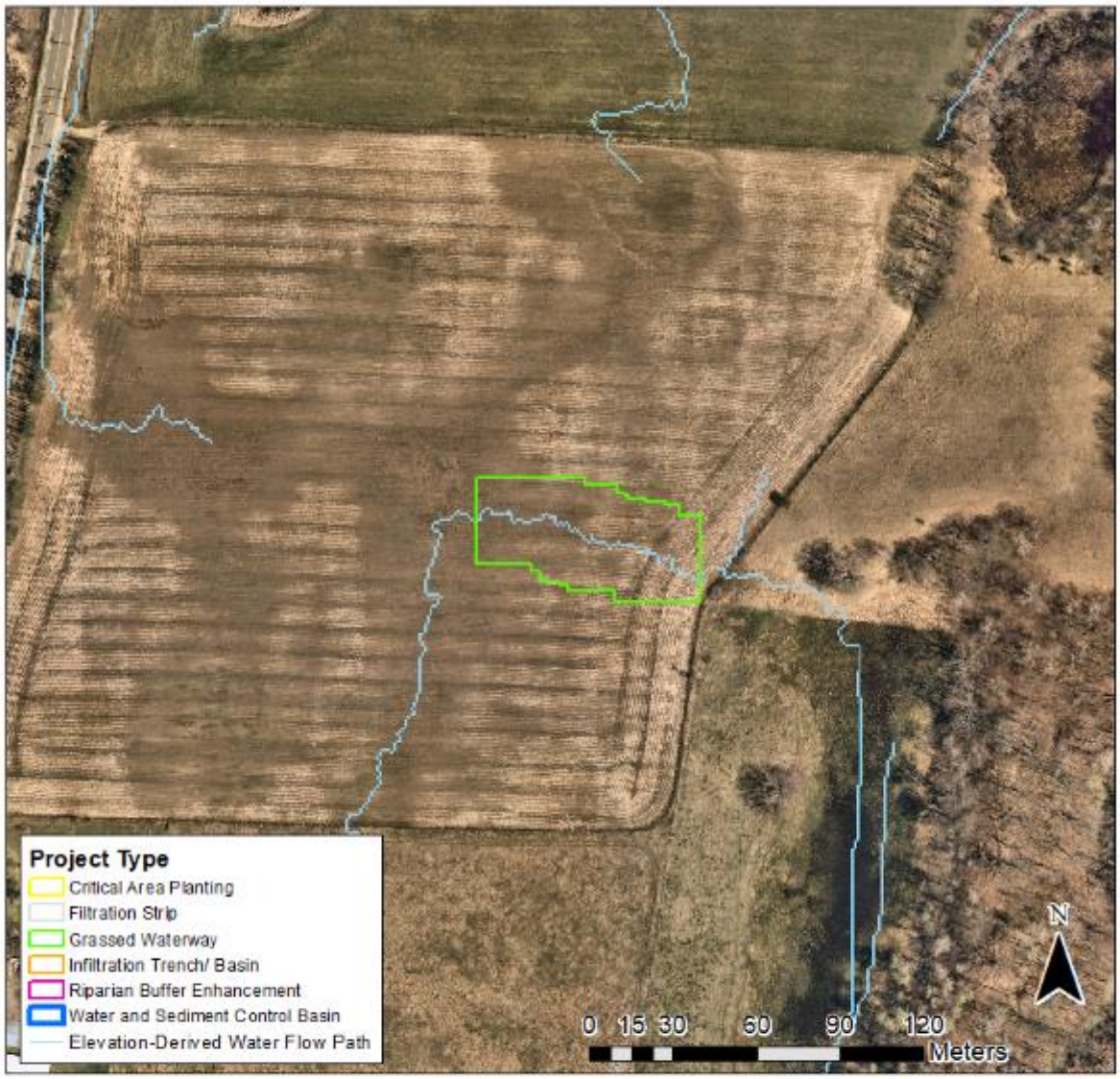
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

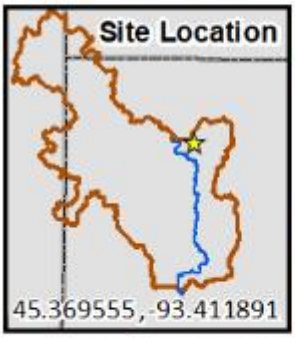




Site ID:FB-GW-18| Field ID: F070102070705_261	
Practice Type	Grassed Waterway
Practice Area (acres)	1.69
TP Reduction (lbs/yr)	0.39
TSS Reduction (tons/yr)	0.3
TN Reduction (lbs/yr)	8.22
Useful Life (years)	20
Useful Life Total Cost Estimate	5,735
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**730.09**

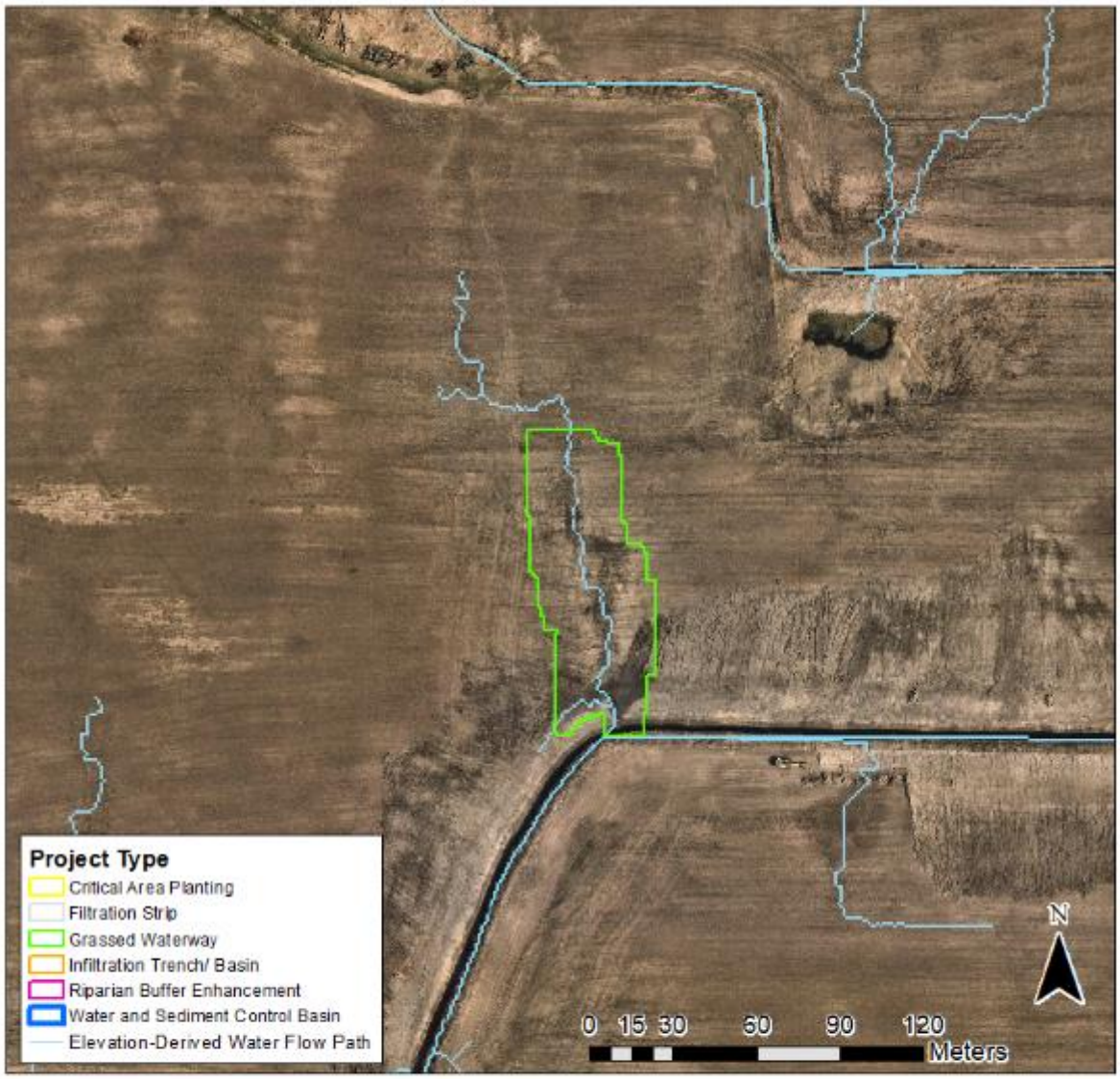
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

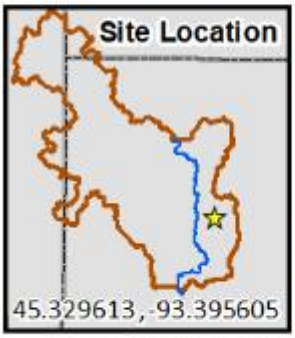




Site ID:FB-GW-19| Field ID: F070102070705_548	
Practice Type	Grassed Waterway
Practice Area (acres)	0.71
TP Reduction (lbs/yr)	0.17
TSS Reduction (tons/yr)	0.32
TN Reduction (lbs/yr)	3.41
Useful Life (years)	20
Useful Life Total Cost Estimate	2,486
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**734.39**

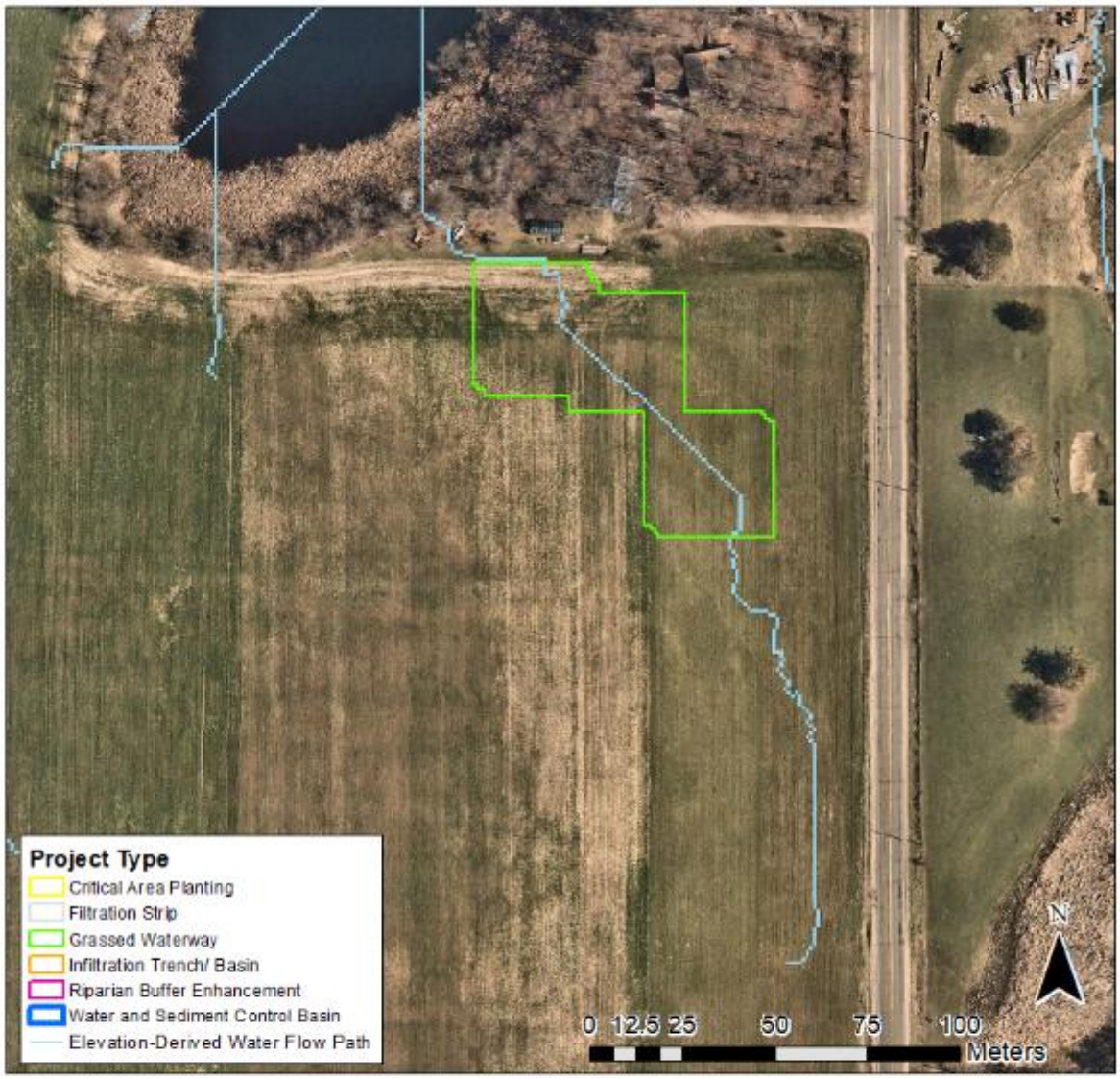
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.





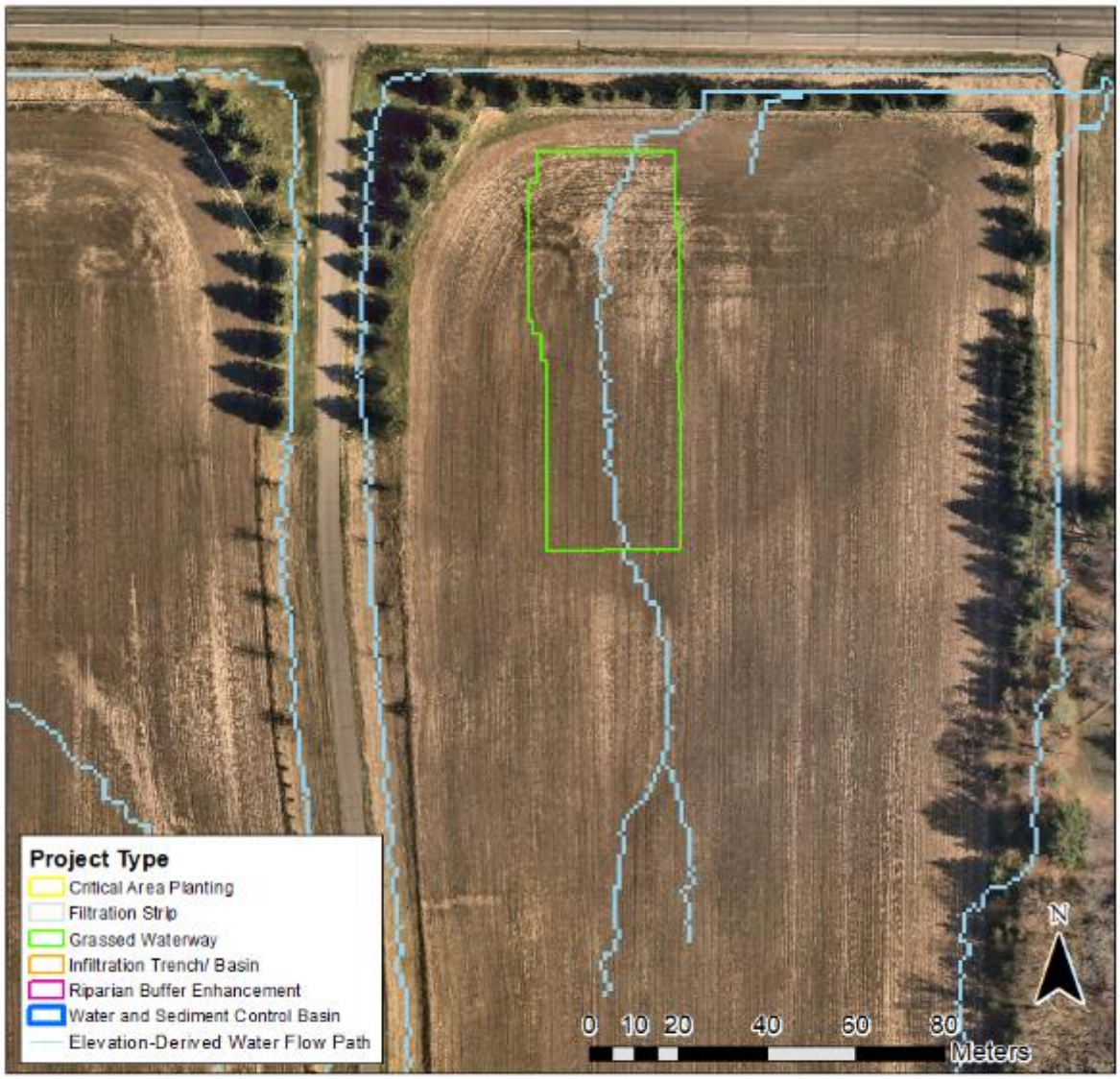
Site ID:FB-GW-20| Field ID: F070102070705_132	
Practice Type	Grassed Waterway
Practice Area (acres)	0.95
TP Reduction (lbs/yr)	0.21
TSS Reduction (tons/yr)	1.57
TN Reduction (lbs/yr)	4.65
Useful Life (years)	20
Useful Life Total Cost Estimate	3,302
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**786.16**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



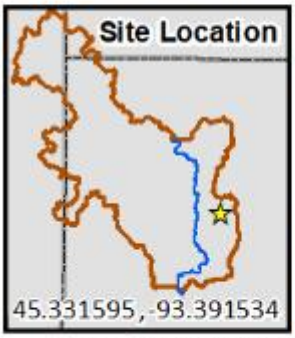
Site ID:FB-GW-21| Field ID: F070102070705_478	
Practice Type	Grassed Waterway
Practice Area (acres)	0.78
TP Reduction (lbs/yr)	0.18
TSS Reduction (tons/yr)	0.01
TN Reduction (lbs/yr)	3.97
Useful Life (years)	20
Useful Life Total Cost Estimate	3,064
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**861.56**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID:FB-GW-22| Field ID: F070102070705_437	
Practice Type	Grassed Waterway
Practice Area (acres)	0.62
TP Reduction (lbs/yr)	0.14
TSS Reduction (tons/yr)	0.36
TN Reduction (lbs/yr)	2.82
Useful Life (years)	20
Useful Life Total Cost Estimate	2,821
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**973.32**

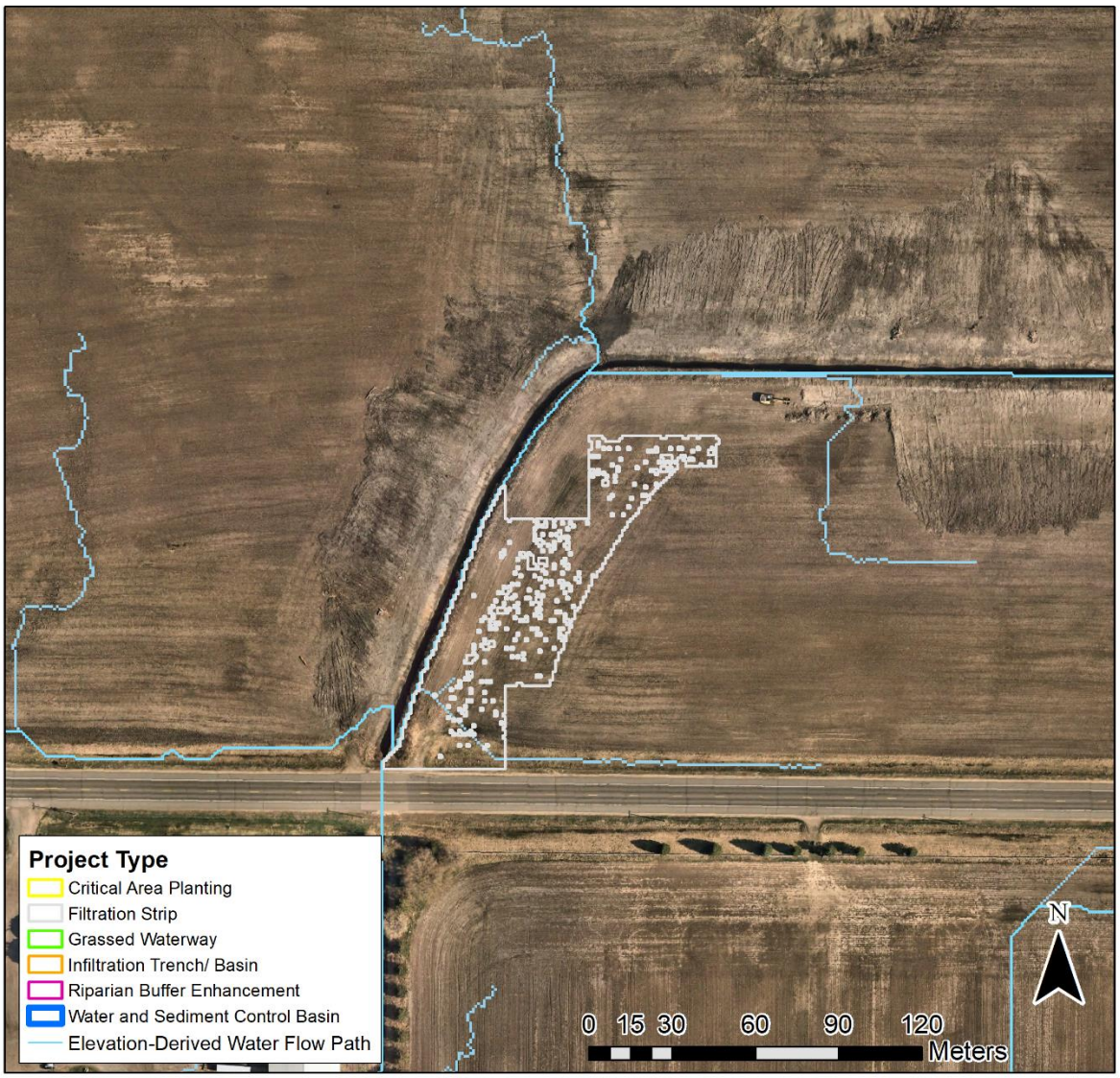
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

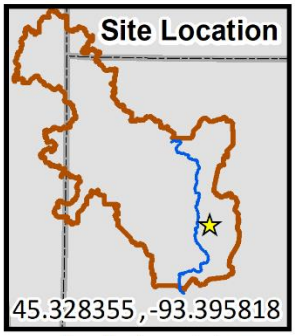


Site ID:FB-GW-23| Field ID: F070102070705_132	
Practice Type	Grassed Waterway
Practice Area (acres)	1.07
TP Reduction (lbs/yr)	0.27
TSS Reduction (tons/yr)	0.96
TN Reduction (lbs/yr)	5.83
Useful Life (years)	20
Useful Life Total Cost Estimate	5,426
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**997.90**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

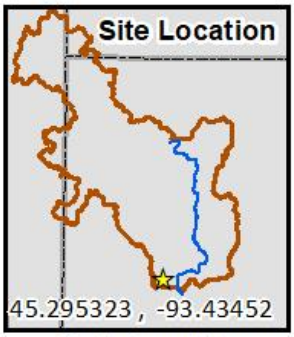
Appendix K: Project Profiles: Top Candidate Sites for Filtration Strips





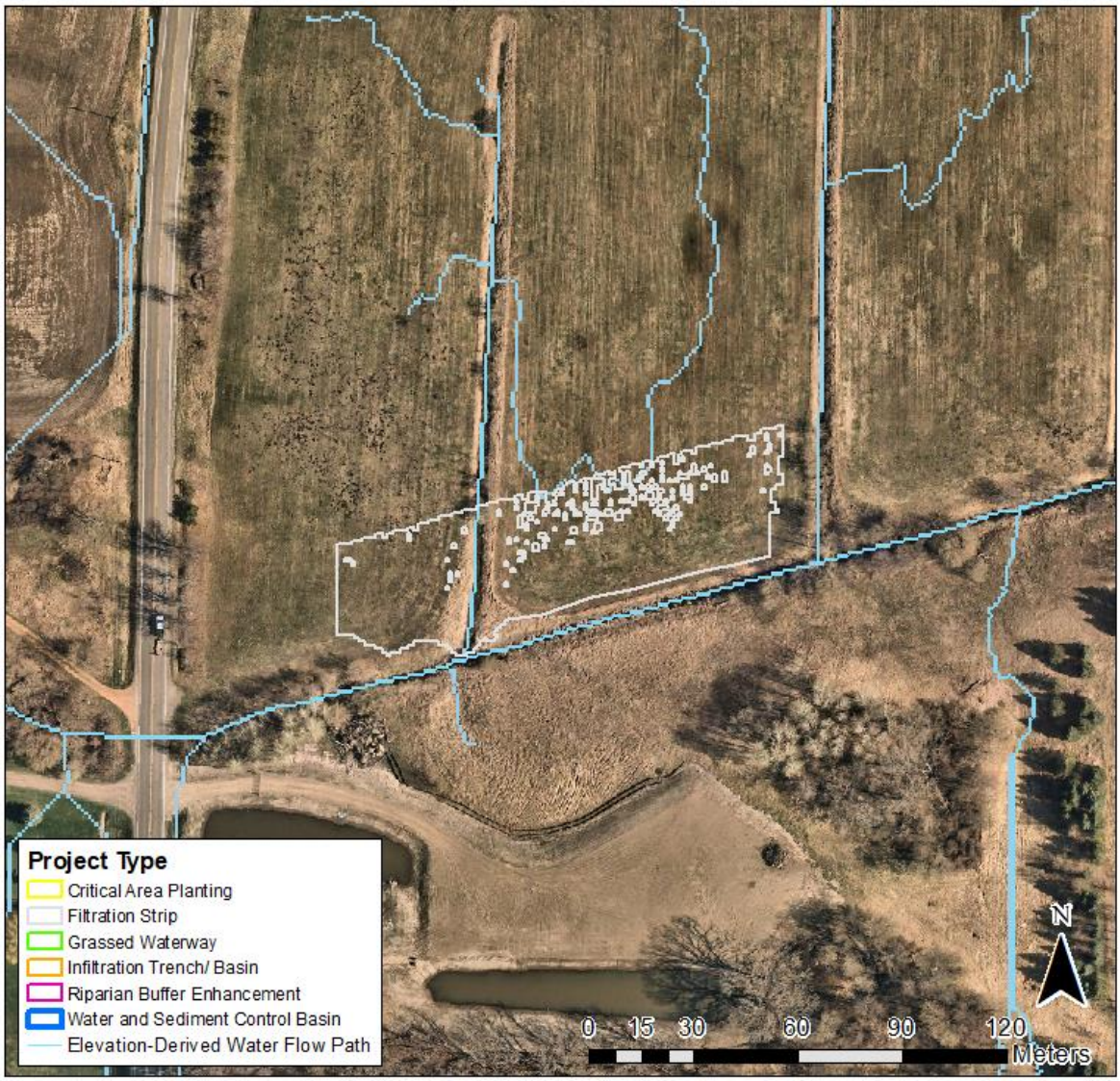
Site ID: FB-FS-01 | Field ID: F070102070705_132	
Practice Type	Filtration Strip
Practice Area (acres)	1.13
TP Reduction (lbs/yr)	0.9
TSS Reduction (tons/yr)	2.93
TN Reduction (lbs/yr)	11.05
Useful Life (years)	10
Useful Life Total Cost Estimate	2,560
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**283.71**

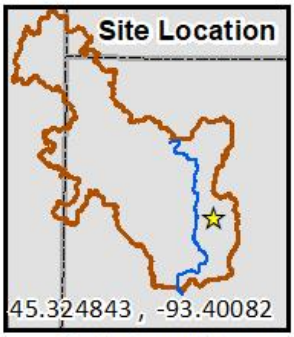
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID: FB-FS-02 | Field ID: F070102070705_462	
Practice Type	Filtration Strip
Practice Area (acres)	1.03
TP Reduction (lbs/yr)	0.91
TSS Reduction (tons/yr)	3.96
TN Reduction (lbs/yr)	19.55
Useful Life (years)	10
Useful Life Total Cost Estimate	2,611
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**285.48**

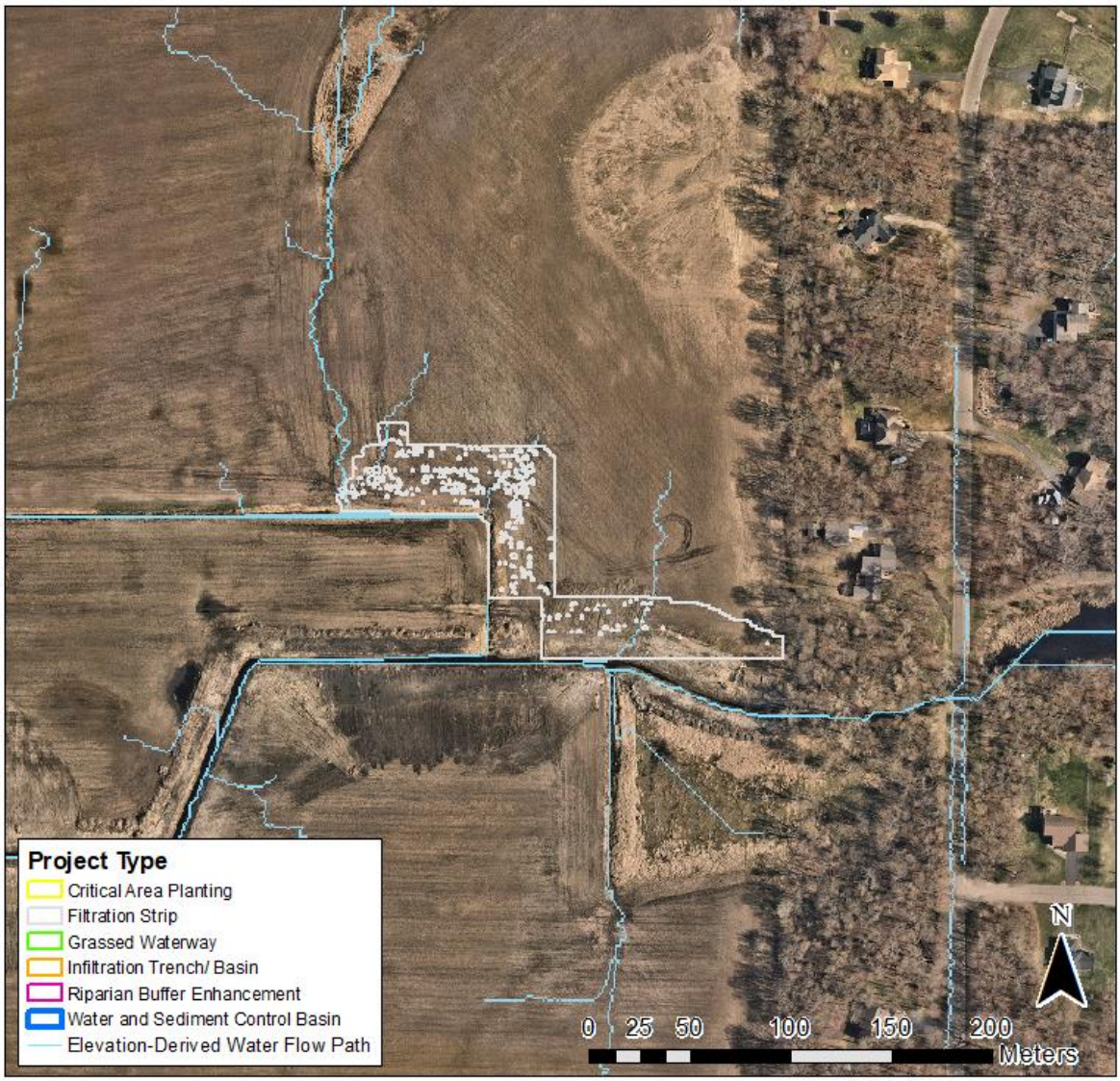
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

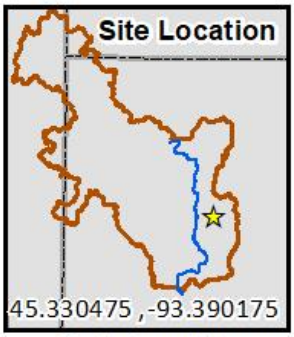




Site ID: FB-FS-03 | Field ID: F070102070705_441	
Practice Type	Filtration Strip
Practice Area (acres)	0.75
TP Reduction (lbs/yr)	0.81
TSS Reduction (tons/yr)	0
TN Reduction (lbs/yr)	6.93
Useful Life (years)	10
Useful Life Total Cost Estimate	2,746
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**339.66**

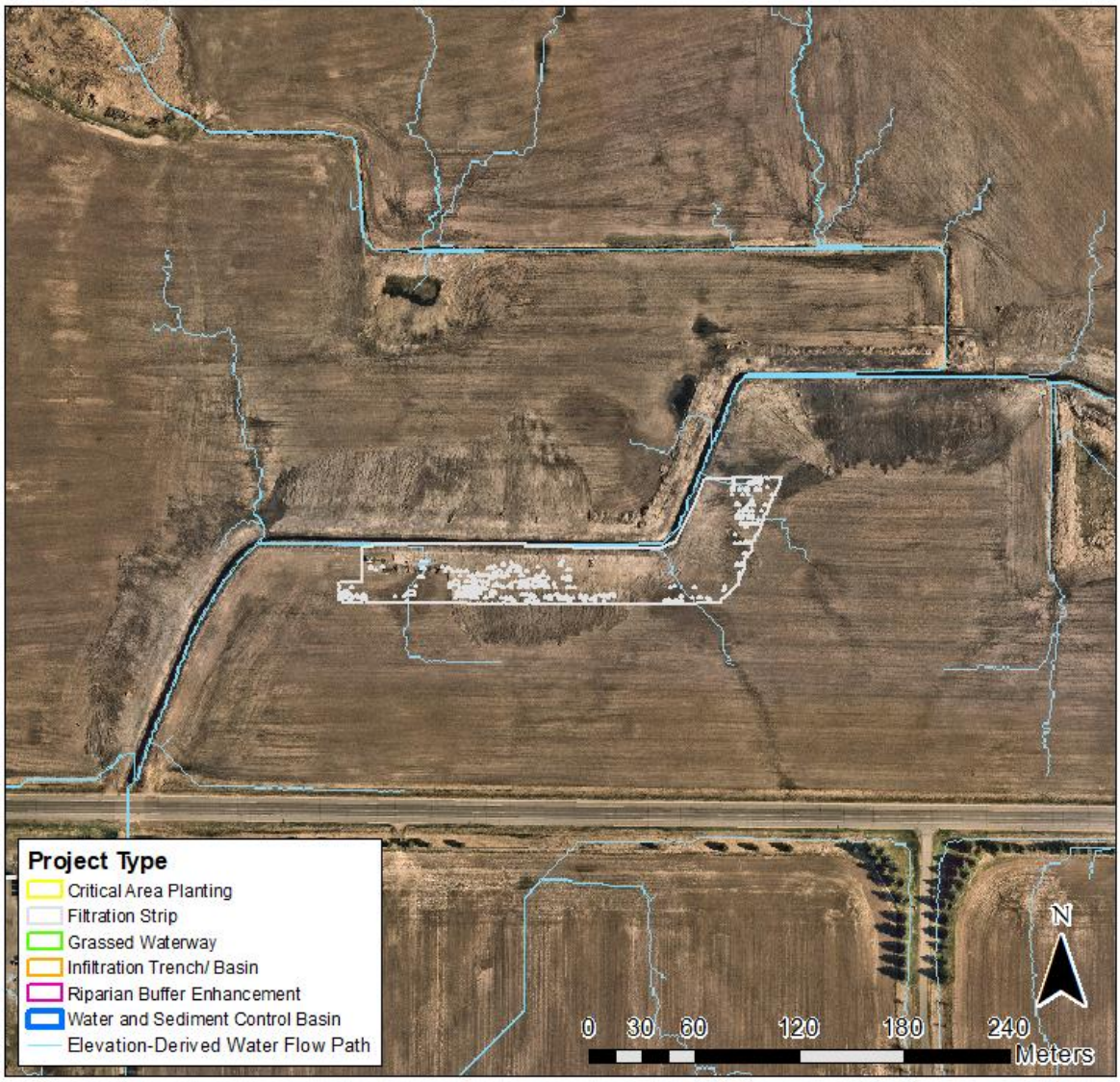
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

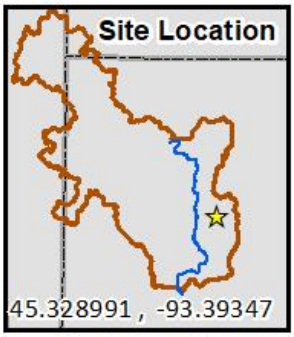




Site ID: FB-FS-04 | Field ID: F070102070705_132	
Practice Type	Filtration Strip
Practice Area (acres)	1.89
TP Reduction (lbs/yr)	0.46
TSS Reduction (tons/yr)	1.48
TN Reduction (lbs/yr)	9.68
Useful Life (years)	10
Useful Life Total Cost Estimate	2,538
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**551.25**

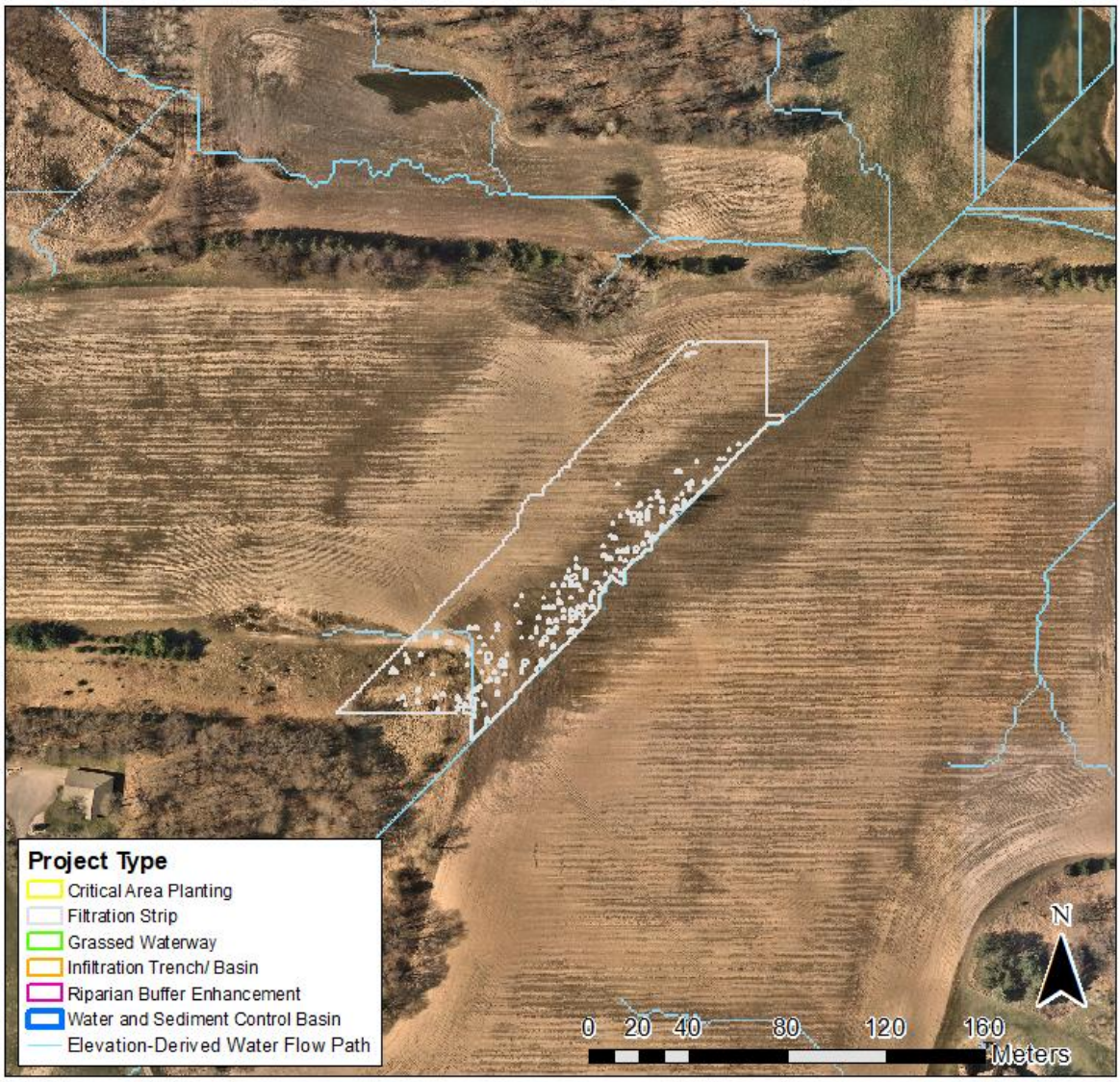
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

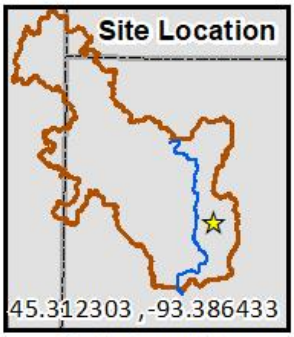




Site ID: FB-FS-05 | Field ID: F070102070705_132	
Practice Type	Filtration Strip
Practice Area (acres)	1.41
TP Reduction (lbs/yr)	0.43
TSS Reduction (tons/yr)	0.78
TN Reduction (lbs/yr)	6.32
Useful Life (years)	10
Useful Life Total Cost Estimate	2,548
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**588.80**

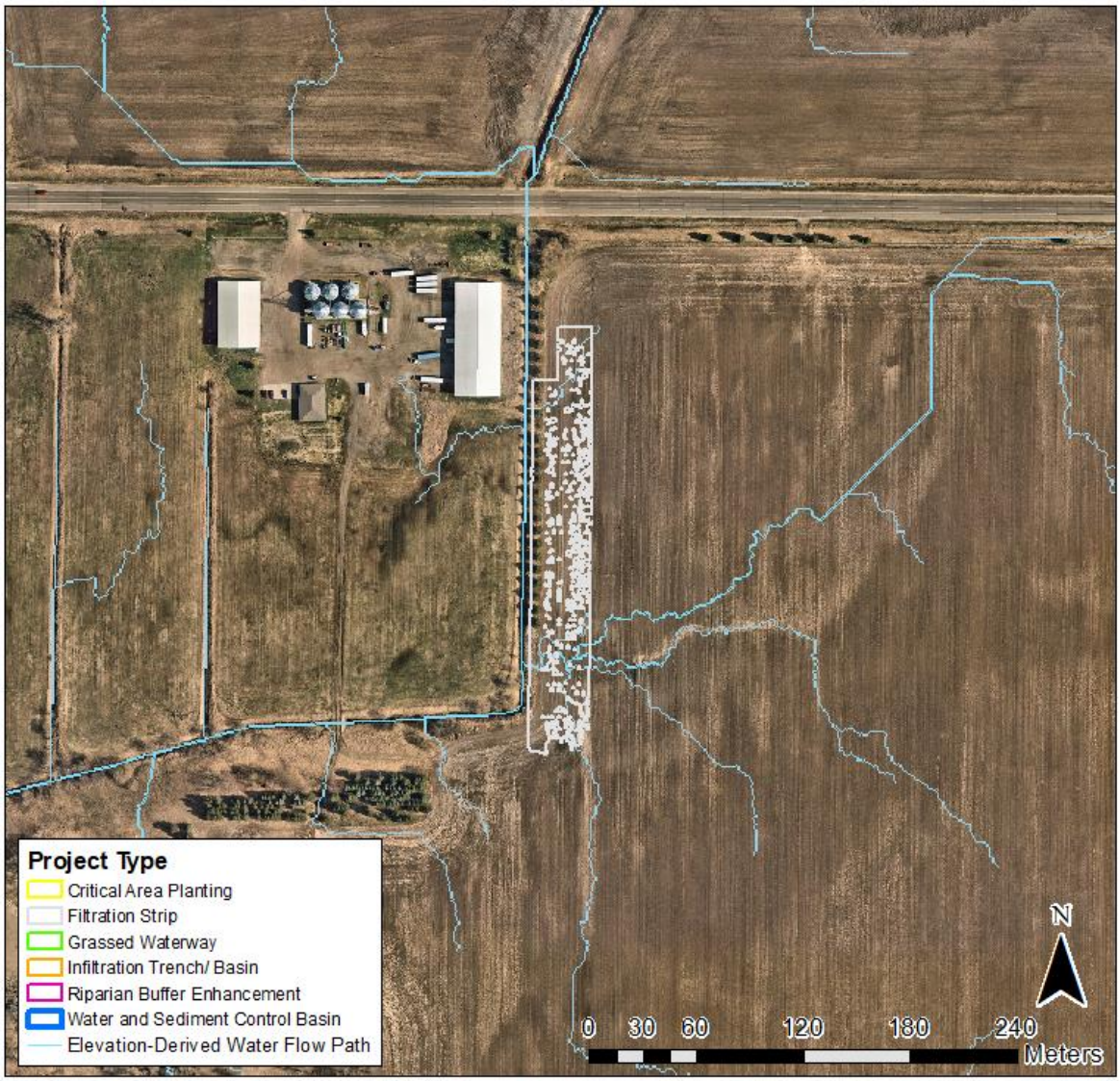
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

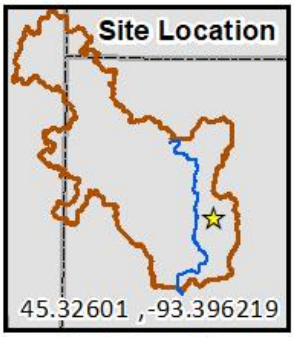




Site ID: FB-FS-06 | Field ID: F070102070705_217	
Practice Type	Filtration Strip
Practice Area (acres)	2.2
TP Reduction (lbs/yr)	0.39
TSS Reduction (tons/yr)	0.94
TN Reduction (lbs/yr)	7.2
Useful Life (years)	10
Useful Life Total Cost Estimate	2,521
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**645.32**

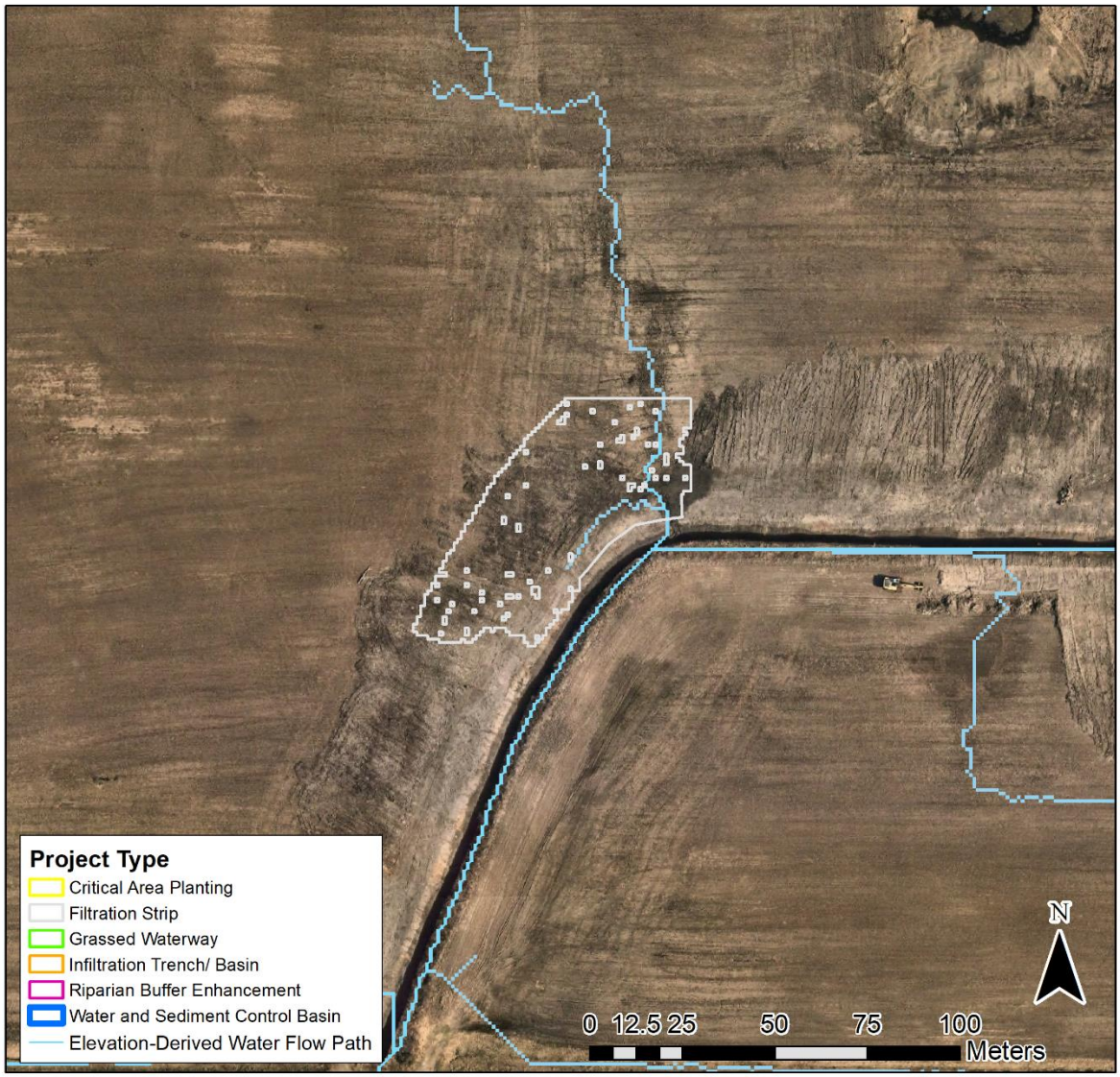
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

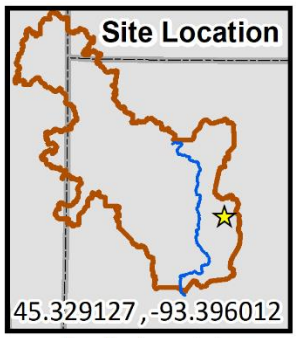




Site ID: FB-FS-07 | Field ID: F070102070705_437	
Practice Type	Filtration Strip
Practice Area (acres)	1.21
TP Reduction (lbs/yr)	0.33
TSS Reduction (tons/yr)	0.15
TN Reduction (lbs/yr)	4.67
Useful Life (years)	10
Useful Life Total Cost Estimate	2,561
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**765.86**

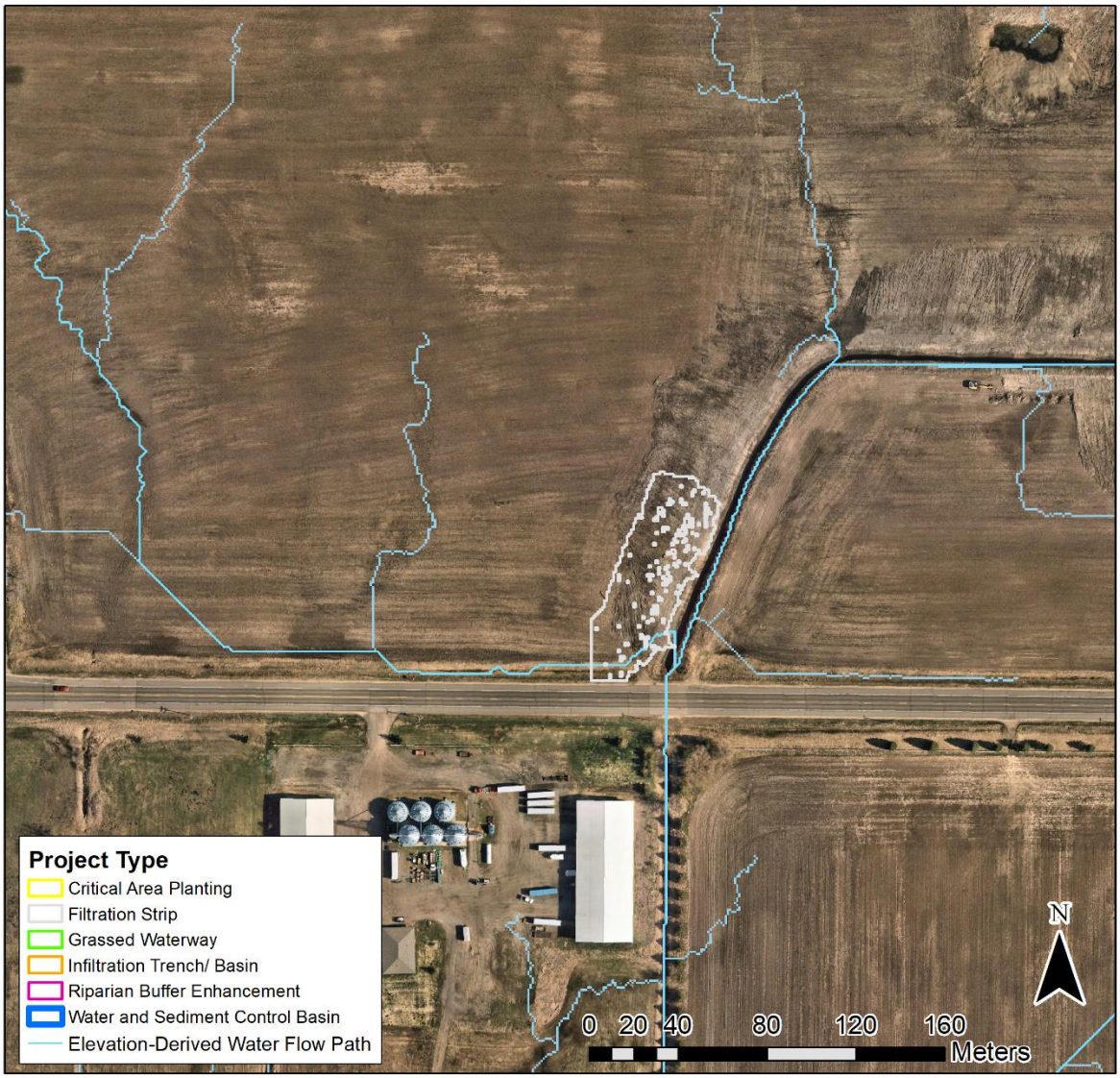
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

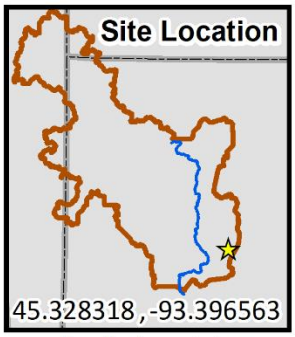




Site ID: FB-FS-08 | Field ID: F070102070705_132	
Practice Type	Filtration Strip
Practice Area (acres)	0.6
TP Reduction (lbs/yr)	0.29
TSS Reduction (tons/yr)	1.22
TN Reduction (lbs/yr)	6.42
Useful Life (years)	10
Useful Life Total Cost Estimate	2,450
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**854.32**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

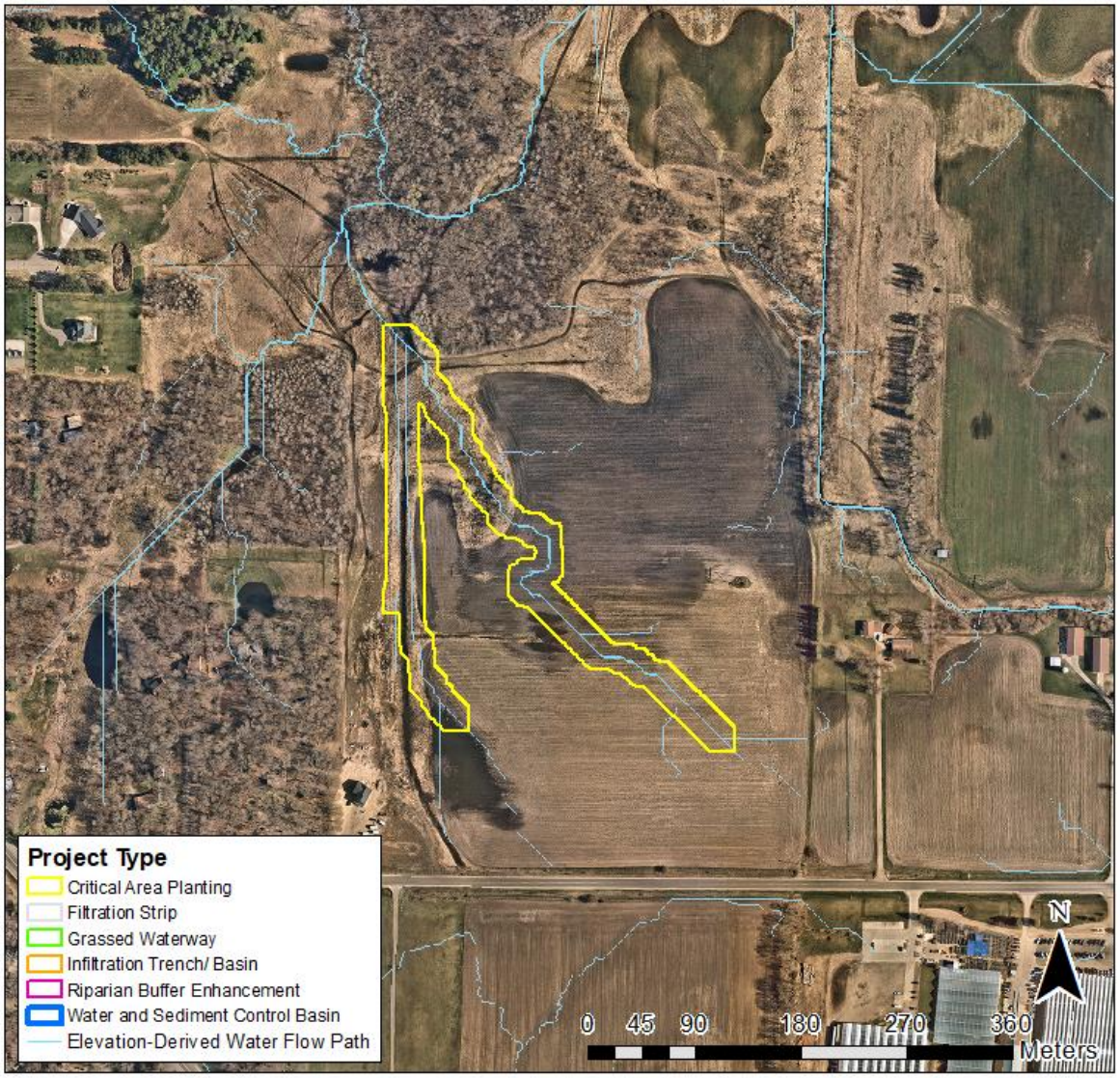


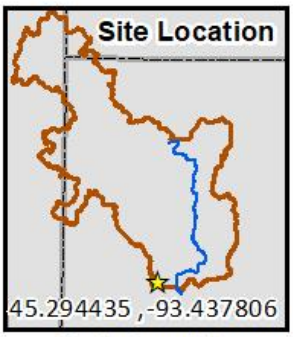


Site ID: FB-FS-09 | Field ID: F070102070705_132	
Practice Type	Filtration Strip
Practice Area (acres)	0.68
TP Reduction (lbs/yr)	0.17
TSS Reduction (tons/yr)	0.77
TN Reduction (lbs/yr)	3.71
Useful Life (years)	10
Useful Life Total Cost Estimate	2,368
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,404.05**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

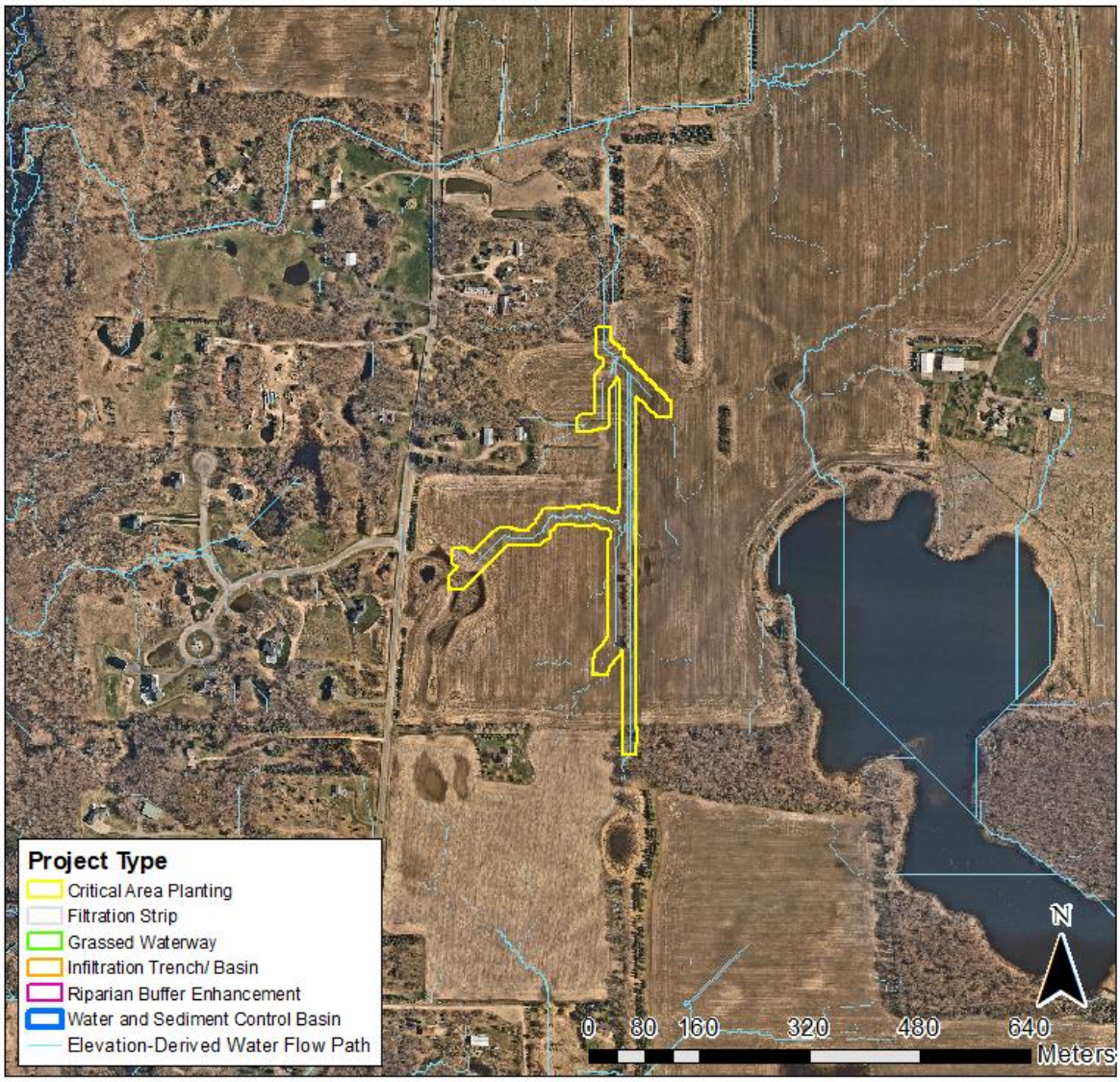
Appendix L: Project Profiles: Top Candidate Sites for Critical Area Planting

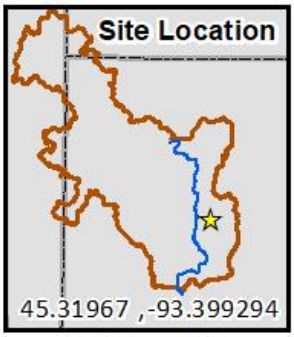




Site ID: FB-CP-01 | Field ID: F070102070705_462	
Practice Type	Critical Area Planting
Practice Area (acres)	5.74
TP Reduction (lbs/yr)	1.78
TSS Reduction (tons/yr)	8.2
TN Reduction (lbs/yr)	36.92
Useful Life (years)	10
Useful Life Total Cost Estimate	17,887
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,002.39**

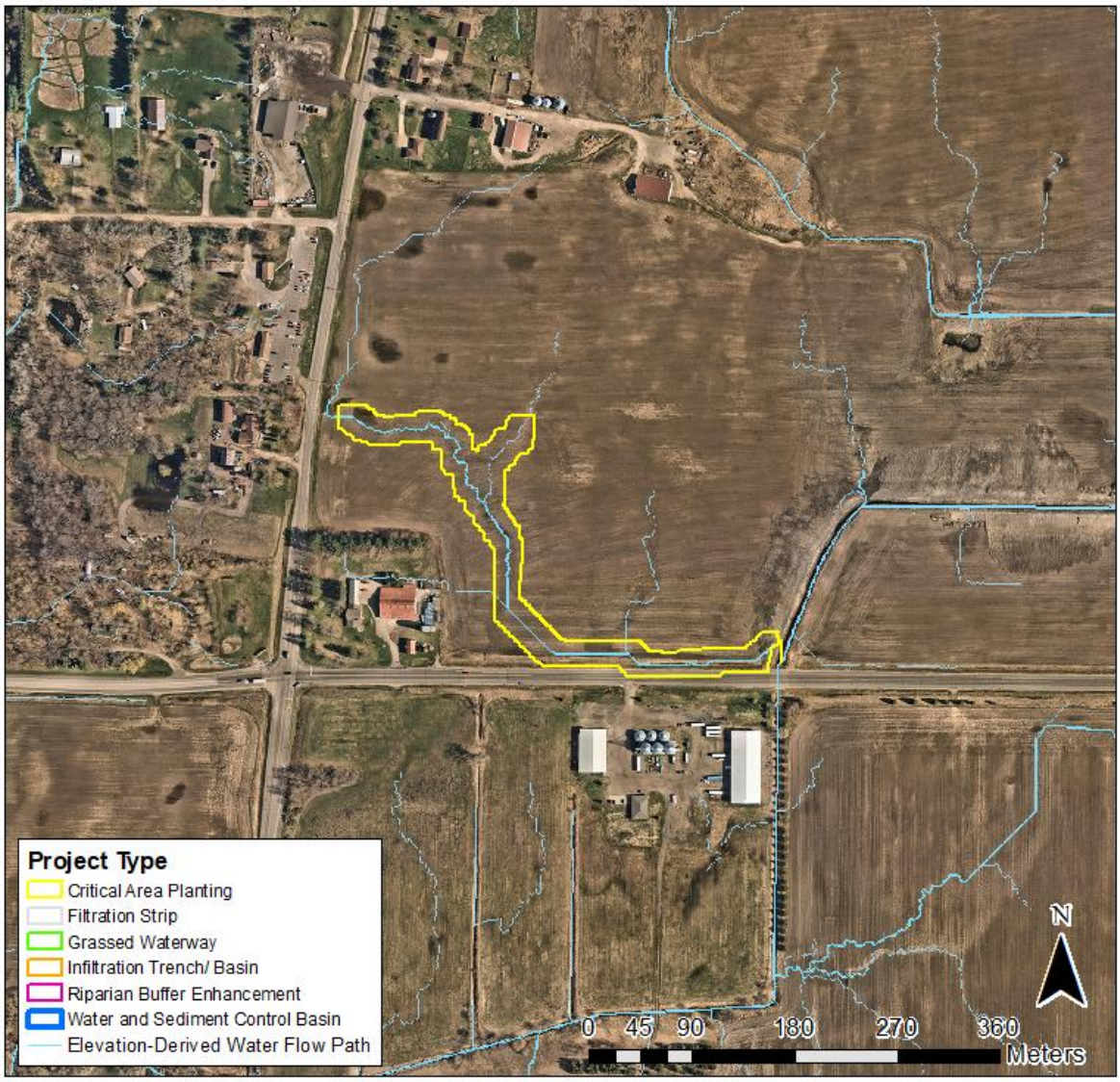
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

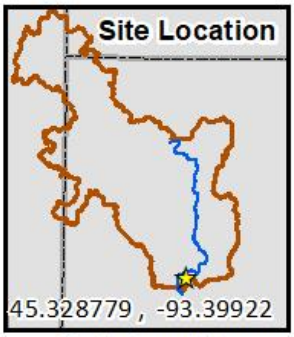




Site ID: FB-CP-02 | Field ID: F070102070705_207	
Practice Type	Critical Area Planting
Practice Area (acres)	7.97
TP Reduction (lbs/yr)	2.23
TSS Reduction (tons/yr)	10.03
TN Reduction (lbs/yr)	45.81
Useful Life (years)	10
Useful Life Total Cost Estimate	23,612
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,059.73**

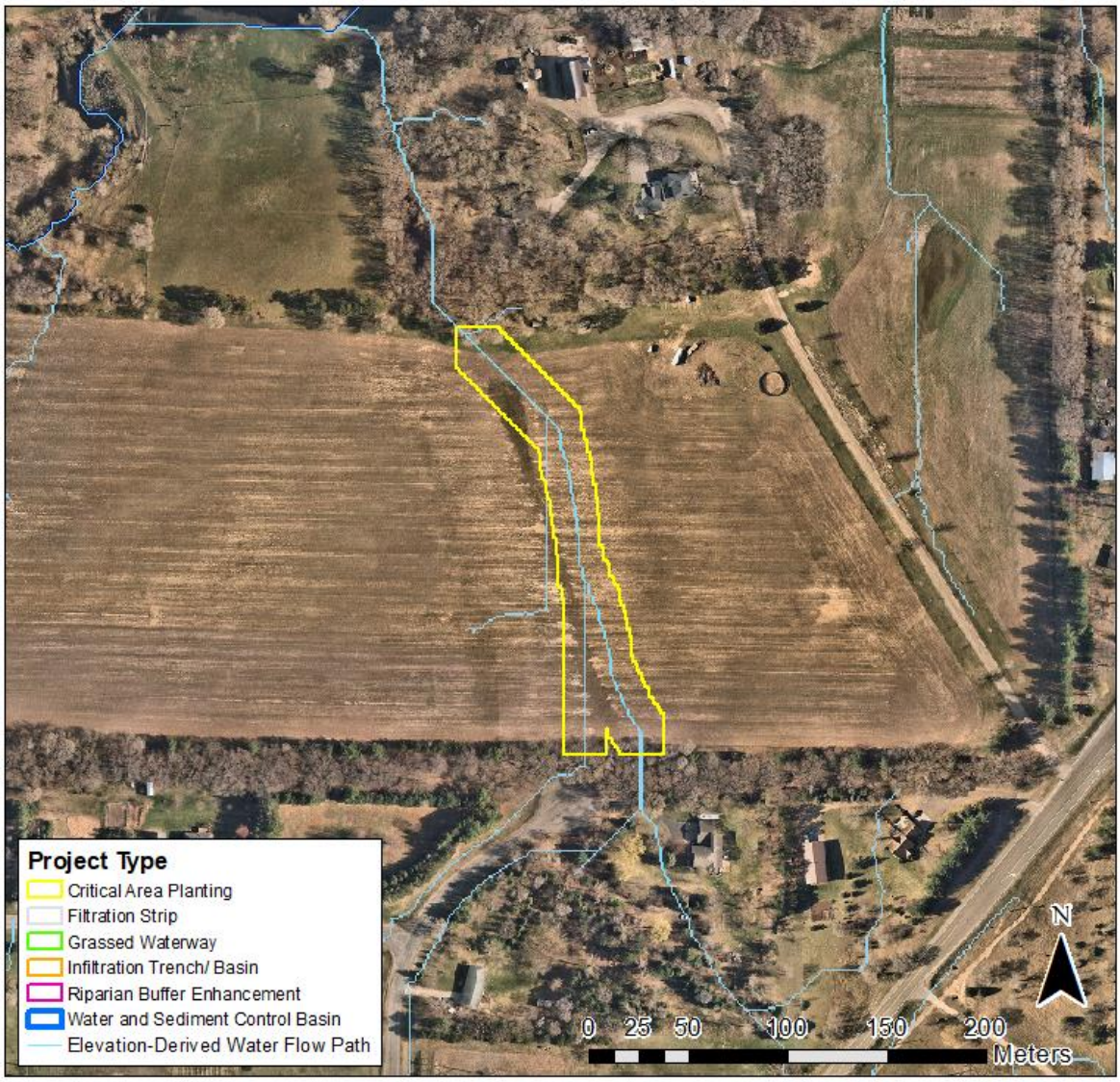
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

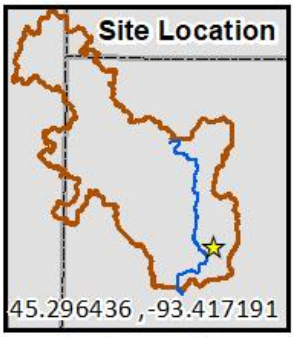




Site ID: FB-CP-03 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	4.07
TP Reduction (lbs/yr)	1.26
TSS Reduction (tons/yr)	5.99
TN Reduction (lbs/yr)	22.94
Useful Life (years)	10
Useful Life Total Cost Estimate	13,362
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,064.56**

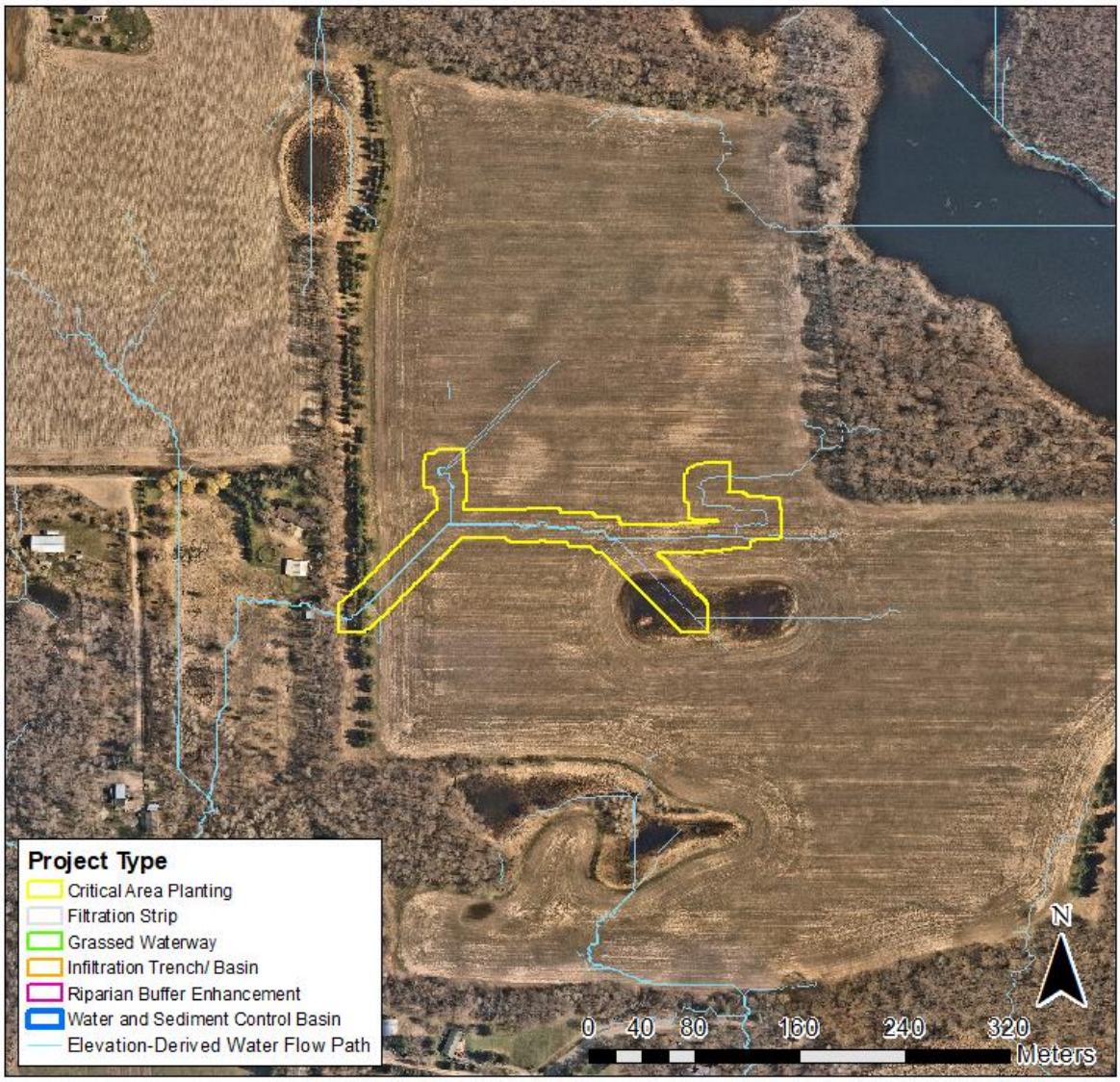
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

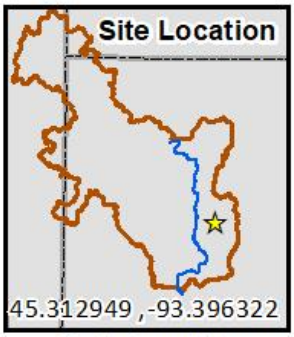




Site ID: FB-CP-04 | Field ID: F070102070705_289	
Practice Type	Critical Area Planting
Practice Area (acres)	1.76
TP Reduction (lbs/yr)	0.61
TSS Reduction (tons/yr)	3.1
TN Reduction (lbs/yr)	11.09
Useful Life (years)	10
Useful Life Total Cost Estimate	6,558
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,083.08**

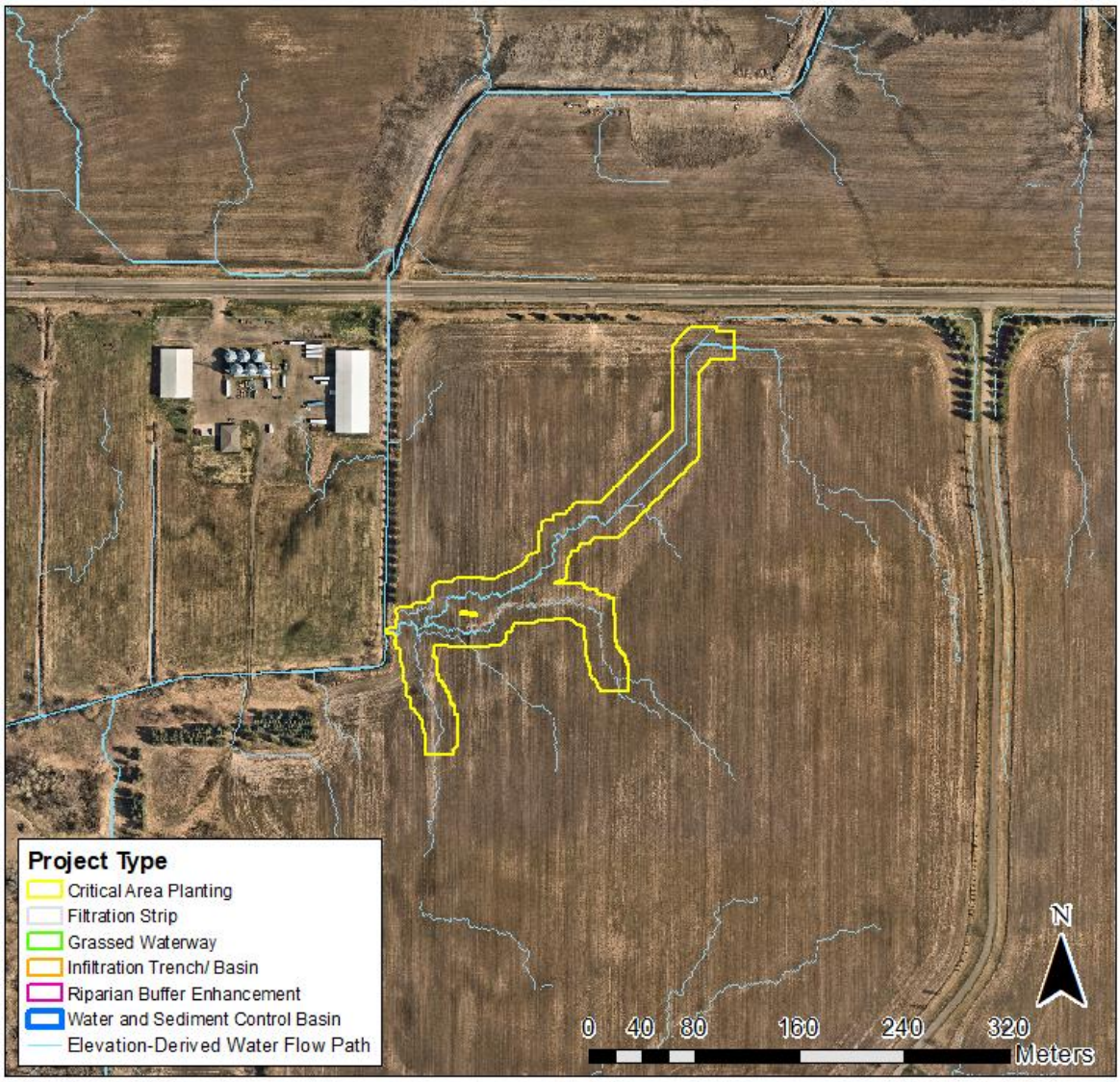
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

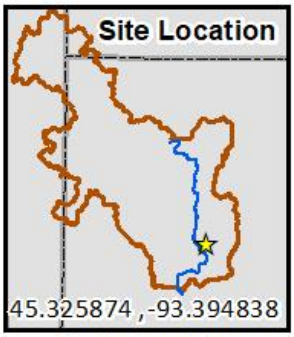




Site ID: FB-CP-05 | Field ID: F070102070705_217	
Practice Type	Critical Area Planting
Practice Area (acres)	3.58
TP Reduction (lbs/yr)	1.09
TSS Reduction (tons/yr)	3.94
TN Reduction (lbs/yr)	22.31
Useful Life (years)	10
Useful Life Total Cost Estimate	11,975
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,097.50**

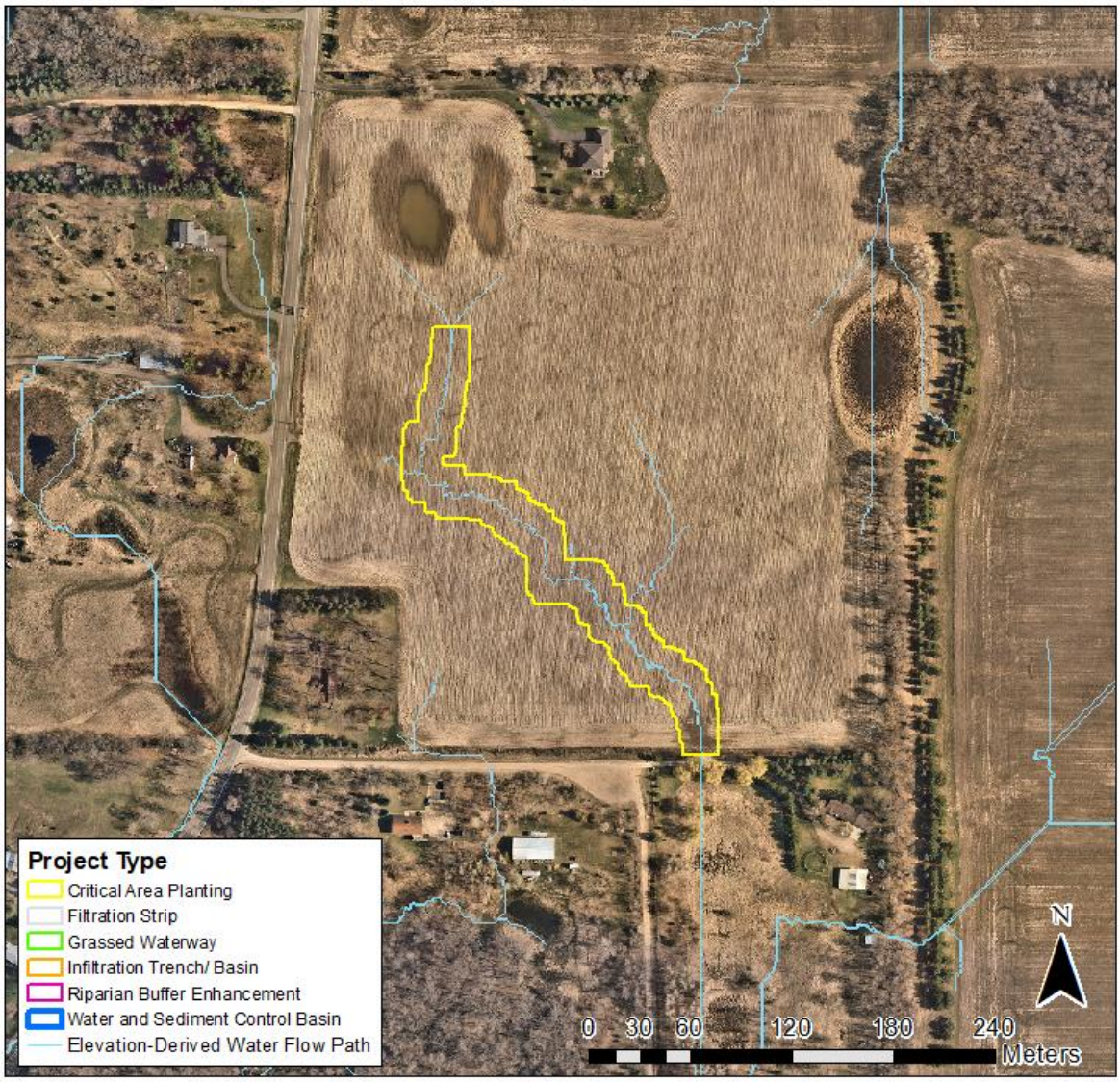
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

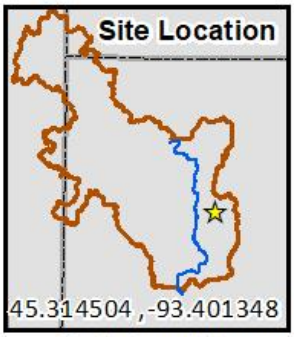




Site ID: FB-CP-06 | Field ID: F070102070705_437	
Practice Type	Critical Area Planting
Practice Area (acres)	4.2
TP Reduction (lbs/yr)	1.18
TSS Reduction (tons/yr)	3.98
TN Reduction (lbs/yr)	24.24
Useful Life (years)	10
Useful Life Total Cost Estimate	13,718
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,158.72**

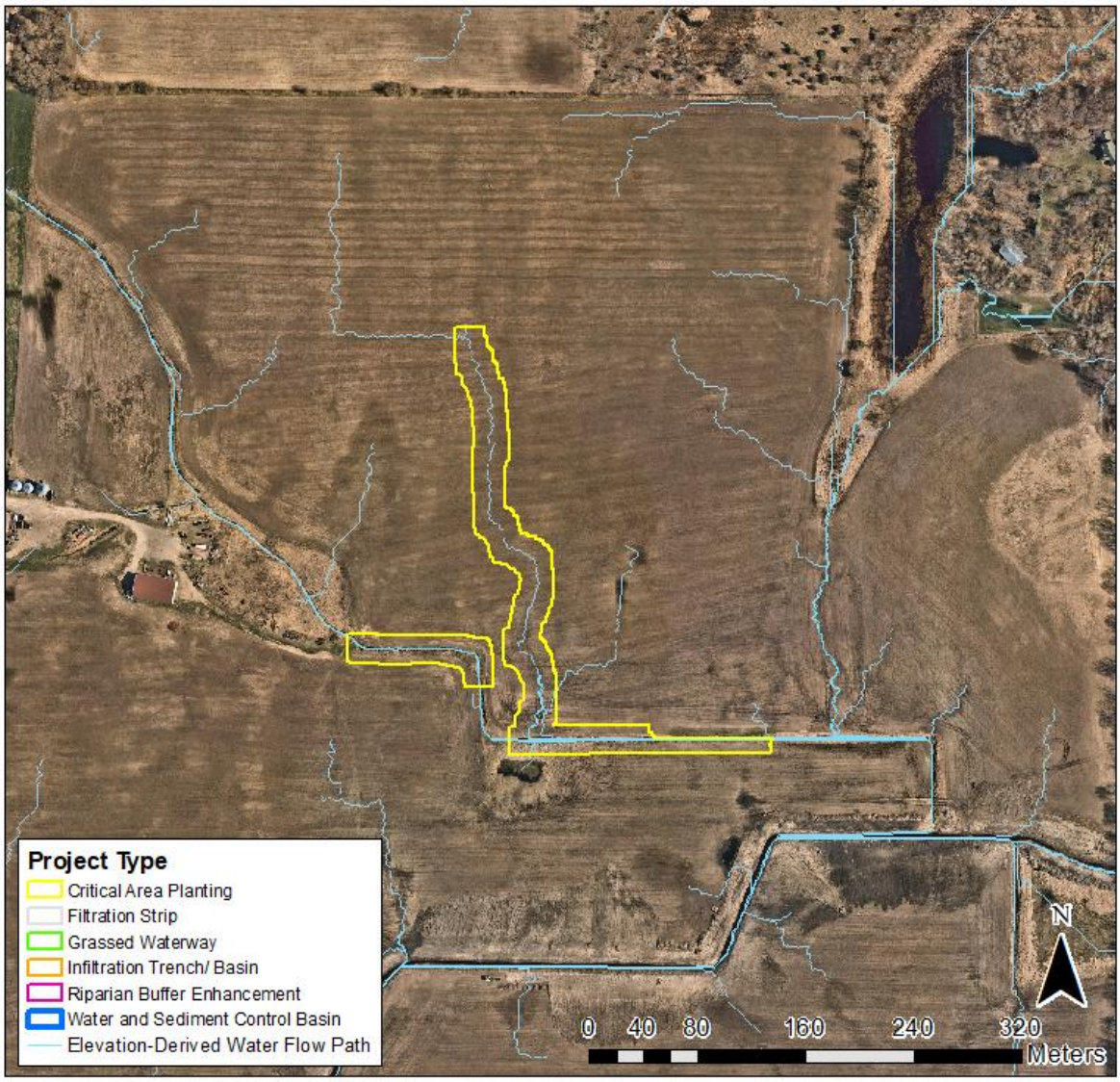
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

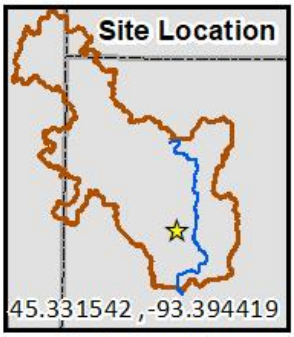




Site ID: FB-CP-07 | Field ID: F070102070705_485	
Practice Type	Critical Area Planting
Practice Area (acres)	2.35
TP Reduction (lbs/yr)	0.72
TSS Reduction (tons/yr)	2.41
TN Reduction (lbs/yr)	14.65
Useful Life (years)	10
Useful Life Total Cost Estimate	8,366
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,168.65**

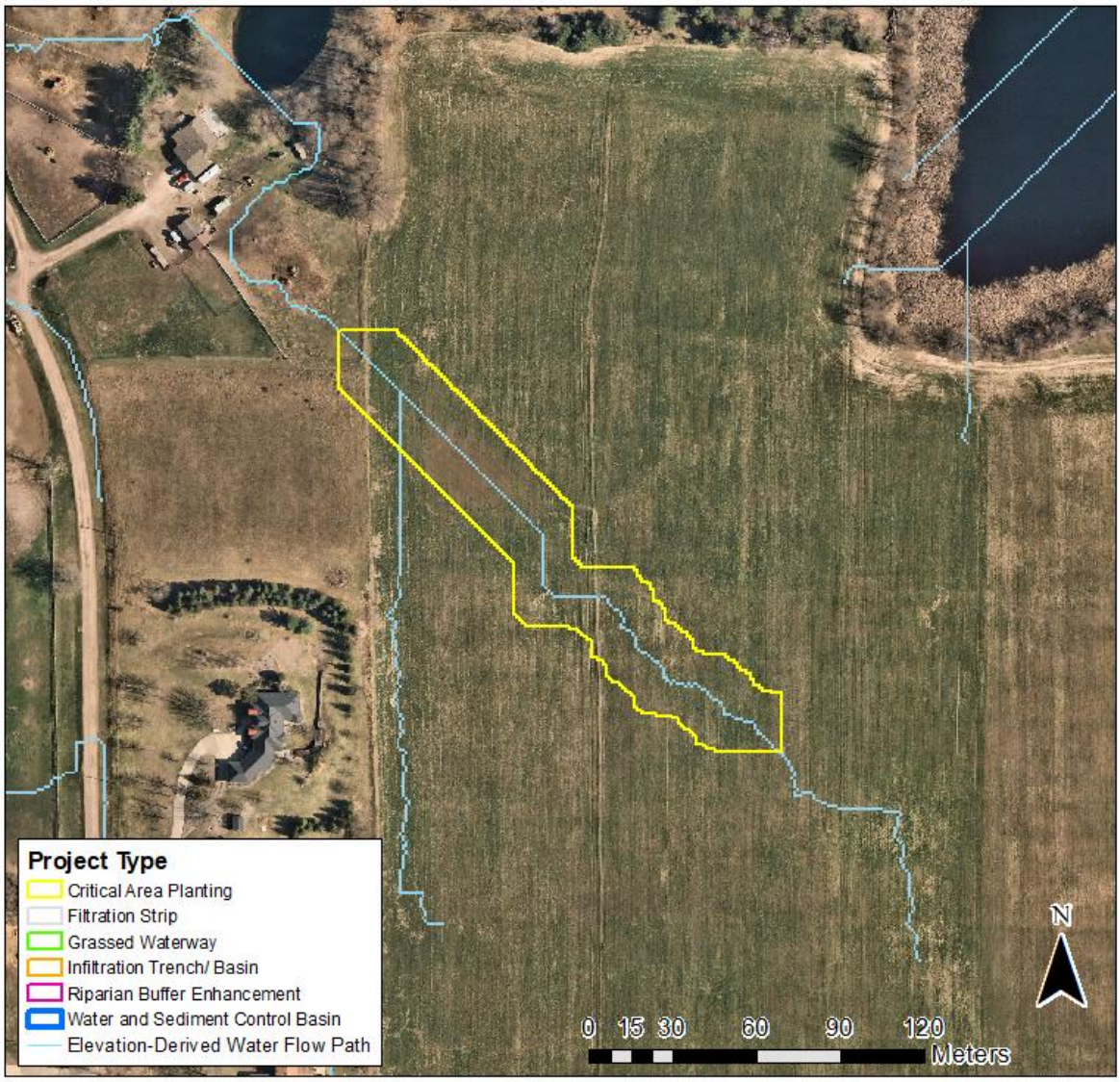
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

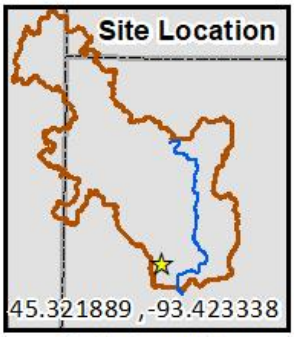




Site ID: FB-CP-08 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	3.57
TP Reduction (lbs/yr)	0.96
TSS Reduction (tons/yr)	7.01
TN Reduction (lbs/yr)	19.87
Useful Life (years)	10
Useful Life Total Cost Estimate	11,936
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,237.56**

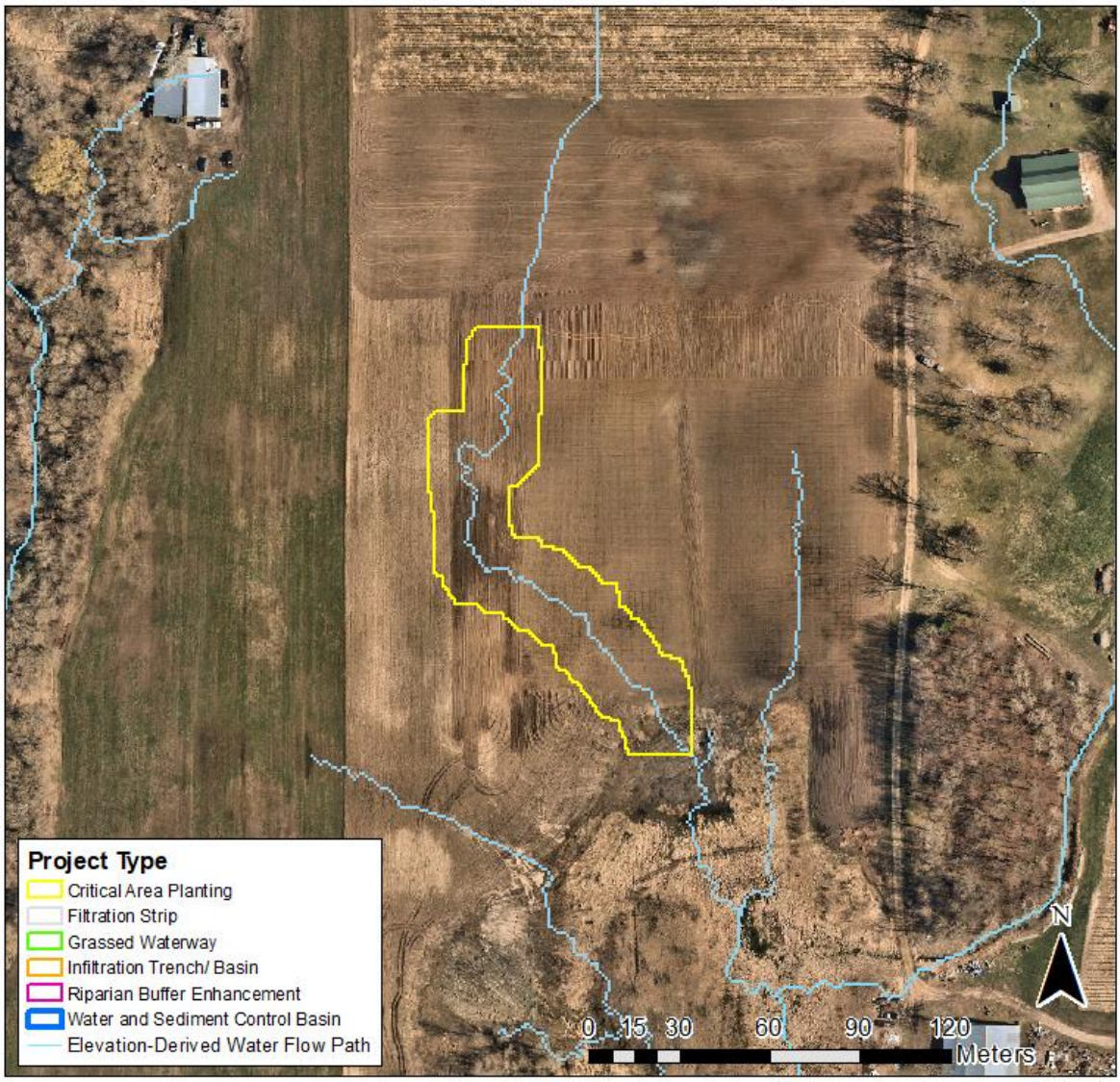
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

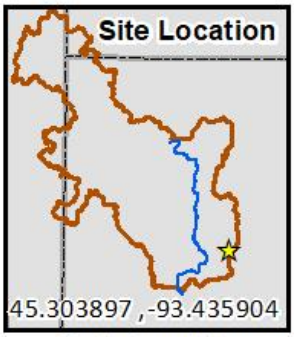




Site ID: FB-CP-09 | Field ID: F070102070705_478	
Practice Type	Critical Area Planting
Practice Area (acres)	1.48
TP Reduction (lbs/yr)	0.45
TSS Reduction (tons/yr)	0.17
TN Reduction (lbs/yr)	9.27
Useful Life (years)	10
Useful Life Total Cost Estimate	5,657
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,245.23**

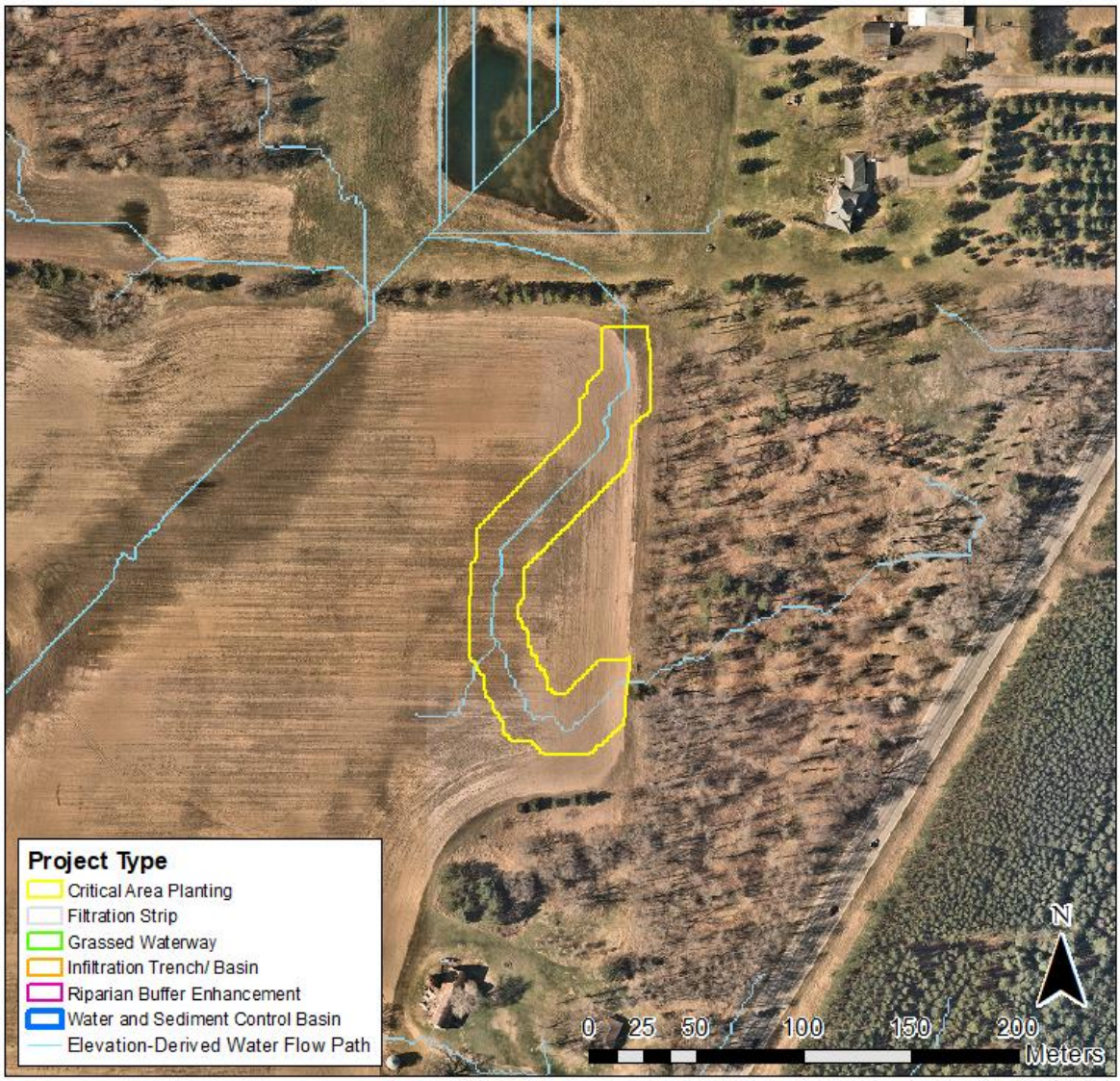
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

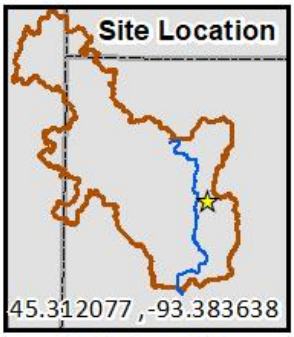




Site ID: FB-CP-10 | Field ID: F070102070705_499	
Practice Type	Critical Area Planting
Practice Area (acres)	1.2
TP Reduction (lbs/yr)	0.38
TSS Reduction (tons/yr)	1.75
TN Reduction (lbs/yr)	7.65
Useful Life (years)	10
Useful Life Total Cost Estimate	4,733
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,261.29**

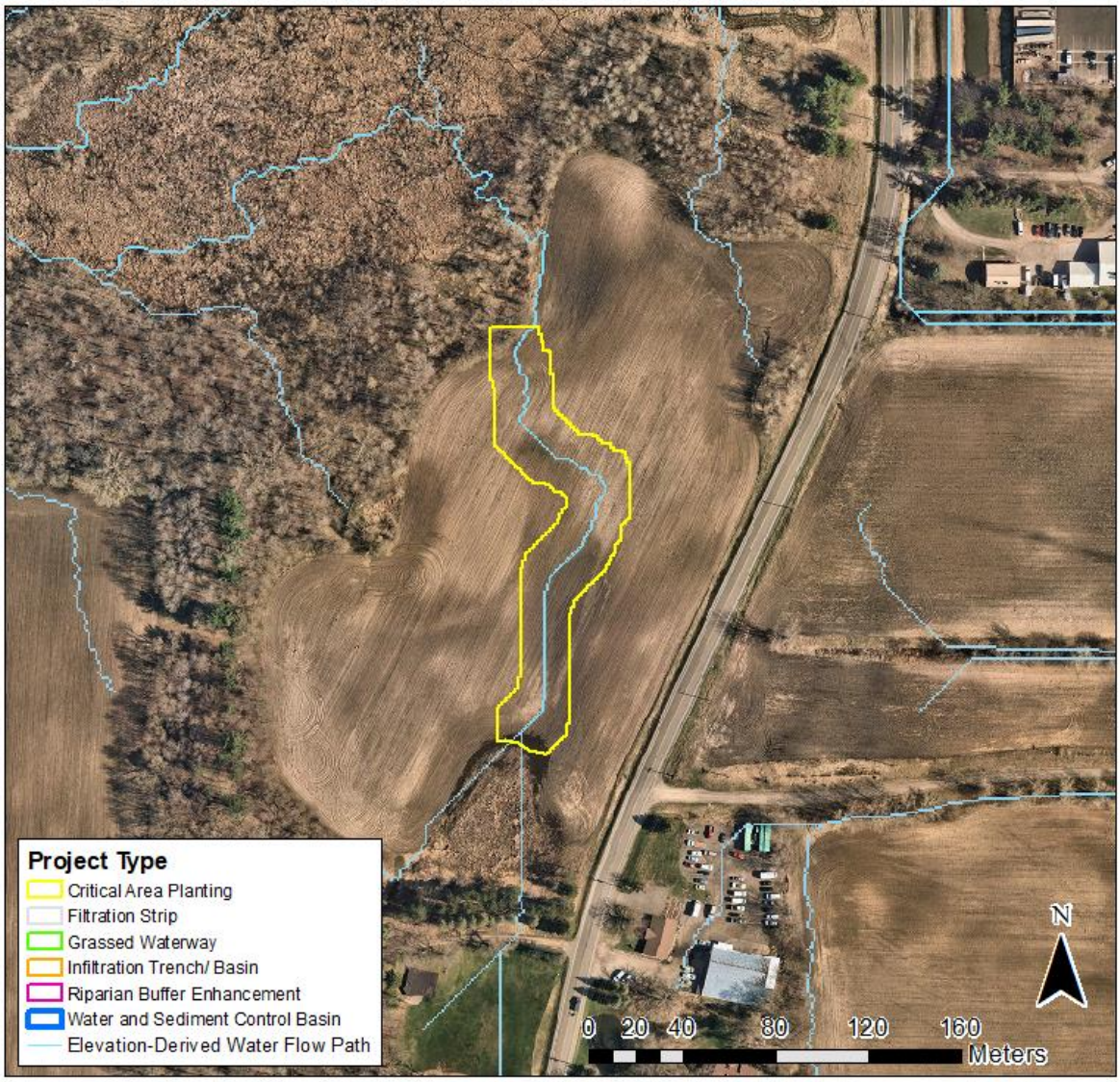
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

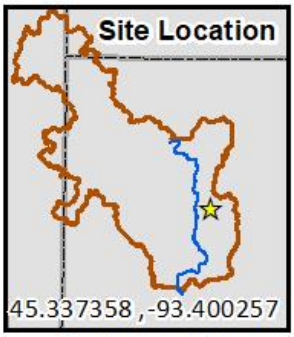




Site ID: FB-CP-11 | Field ID: F070102070705_217	
Practice Type	Critical Area Planting
Practice Area (acres)	1.88
TP Reduction (lbs/yr)	0.53
TSS Reduction (tons/yr)	0.96
TN Reduction (lbs/yr)	10.91
Useful Life (years)	10
Useful Life Total Cost Estimate	6,943
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,304.44**

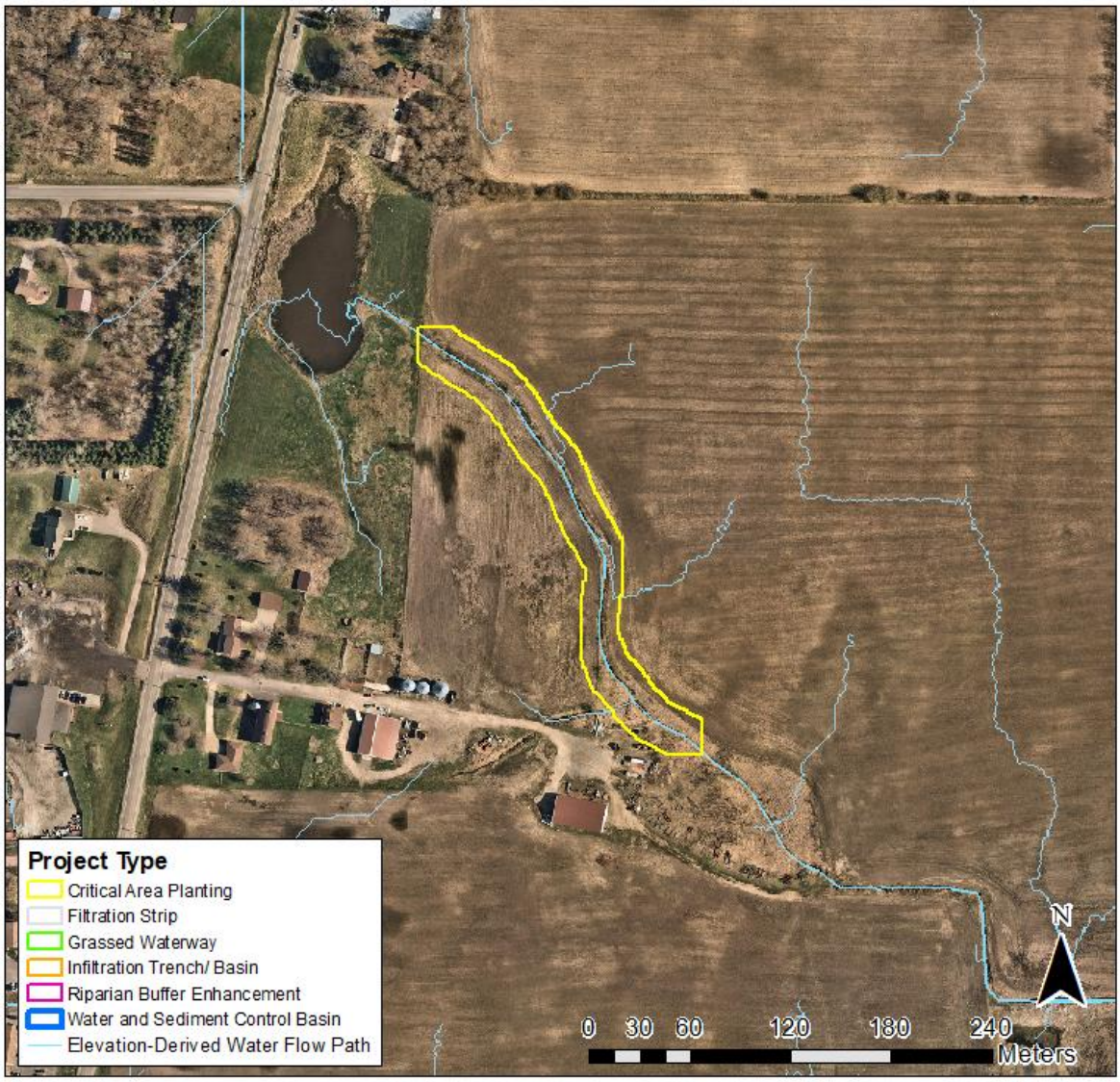
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

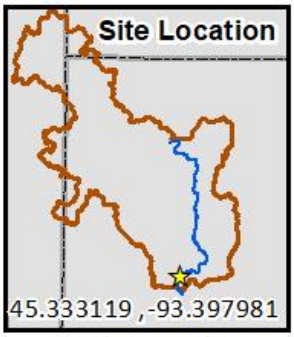




Site ID: FB-CP-12 | Field ID: F070102070705_889	
Practice Type	Critical Area Planting
Practice Area (acres)	1.74
TP Reduction (lbs/yr)	0.48
TSS Reduction (tons/yr)	1.19
TN Reduction (lbs/yr)	9.56
Useful Life (years)	10
Useful Life Total Cost Estimate	6,476
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,337.98**

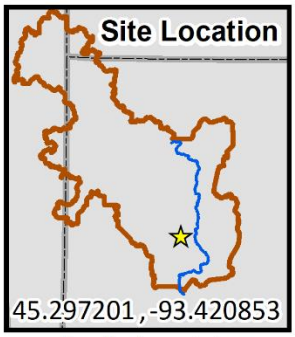
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.





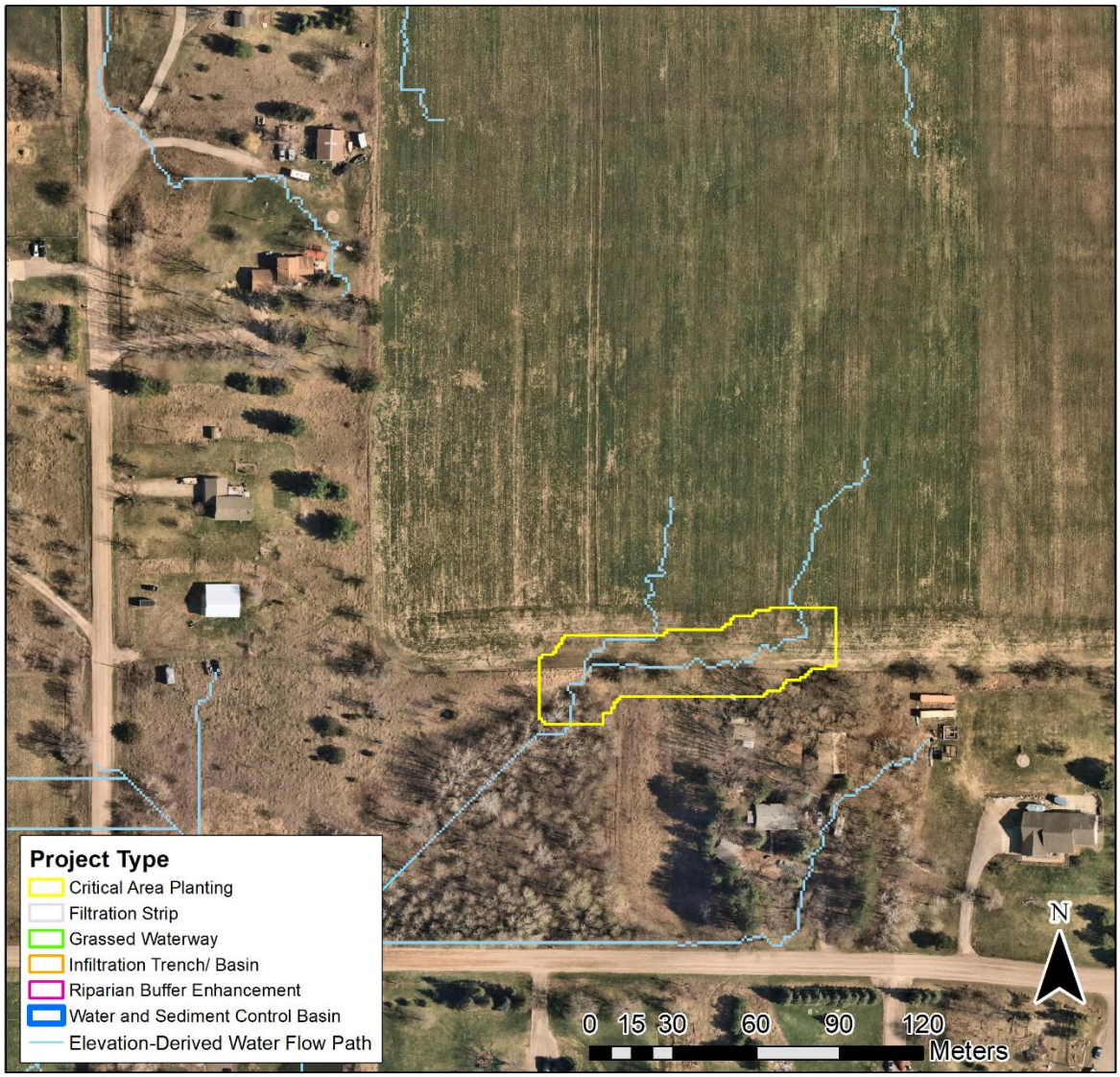
Site ID: FB-CP-13 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	2.09
TP Reduction (lbs/yr)	0.56
TSS Reduction (tons/yr)	2.88
TN Reduction (lbs/yr)	11.51
Useful Life (years)	10
Useful Life Total Cost Estimate	7,592
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,363.20**

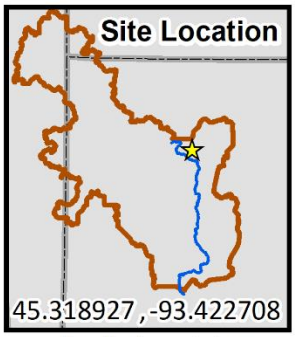
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID: FB-CP-14 | Field ID: F070102070705_289	
Practice Type	Critical Area Planting
Practice Area (acres)	0.67
TP Reduction (lbs/yr)	0.21
TSS Reduction (tons/yr)	1.35
TN Reduction (lbs/yr)	4.31
Useful Life (years)	10
Useful Life Total Cost Estimate	2,882
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,380.98**

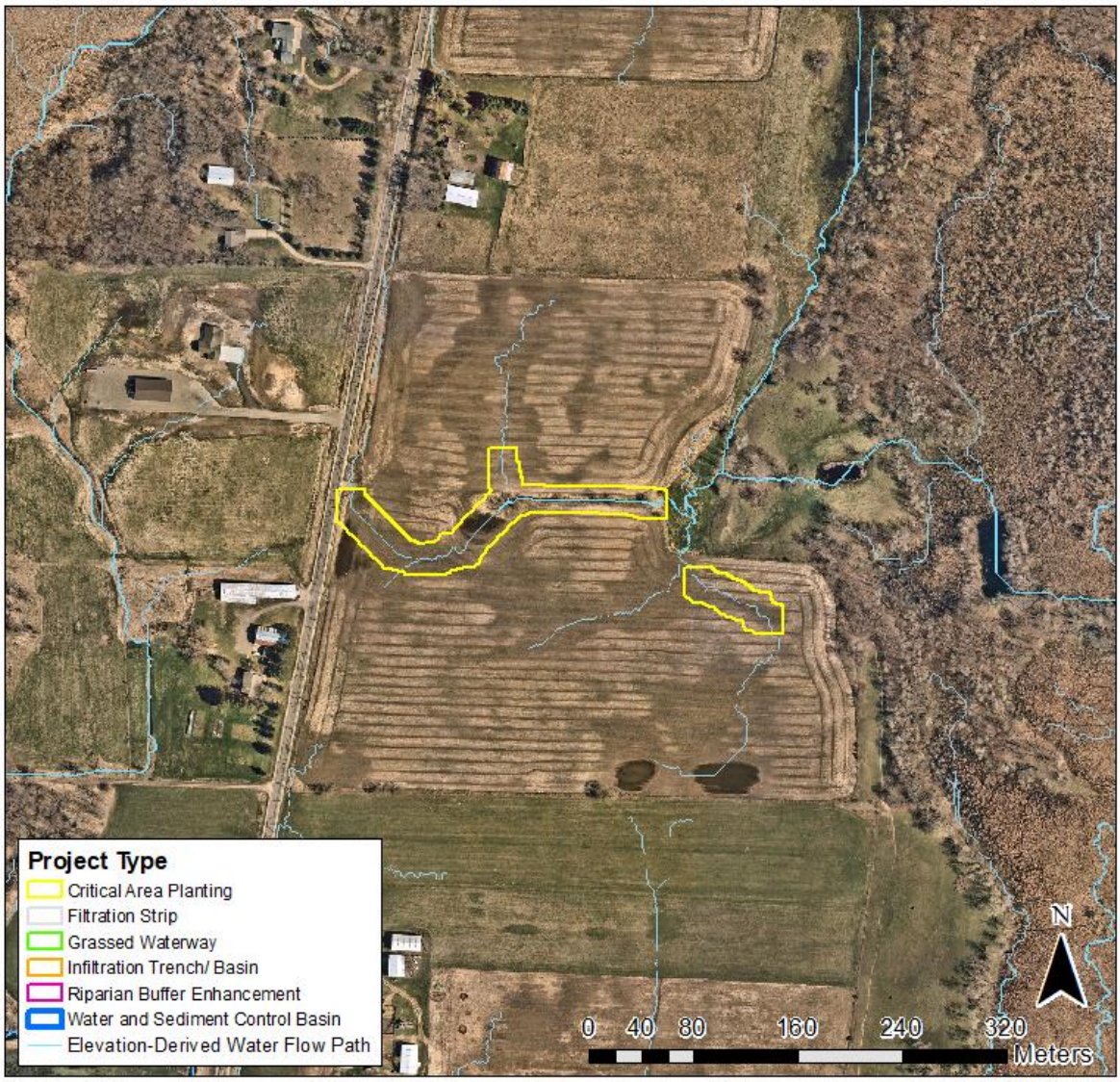
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

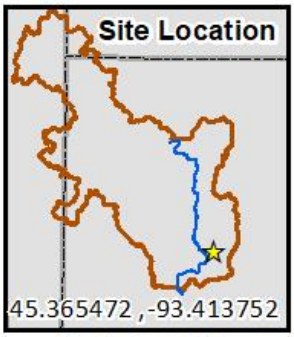




Site ID: FB-CP-15 | Field ID: F070102070705_478	
Practice Type	Critical Area Planting
Practice Area (acres)	0.69
TP Reduction (lbs/yr)	0.21
TSS Reduction (tons/yr)	0.34
TN Reduction (lbs/yr)	4.23
Useful Life (years)	10
Useful Life Total Cost Estimate	2,950
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,412.22**

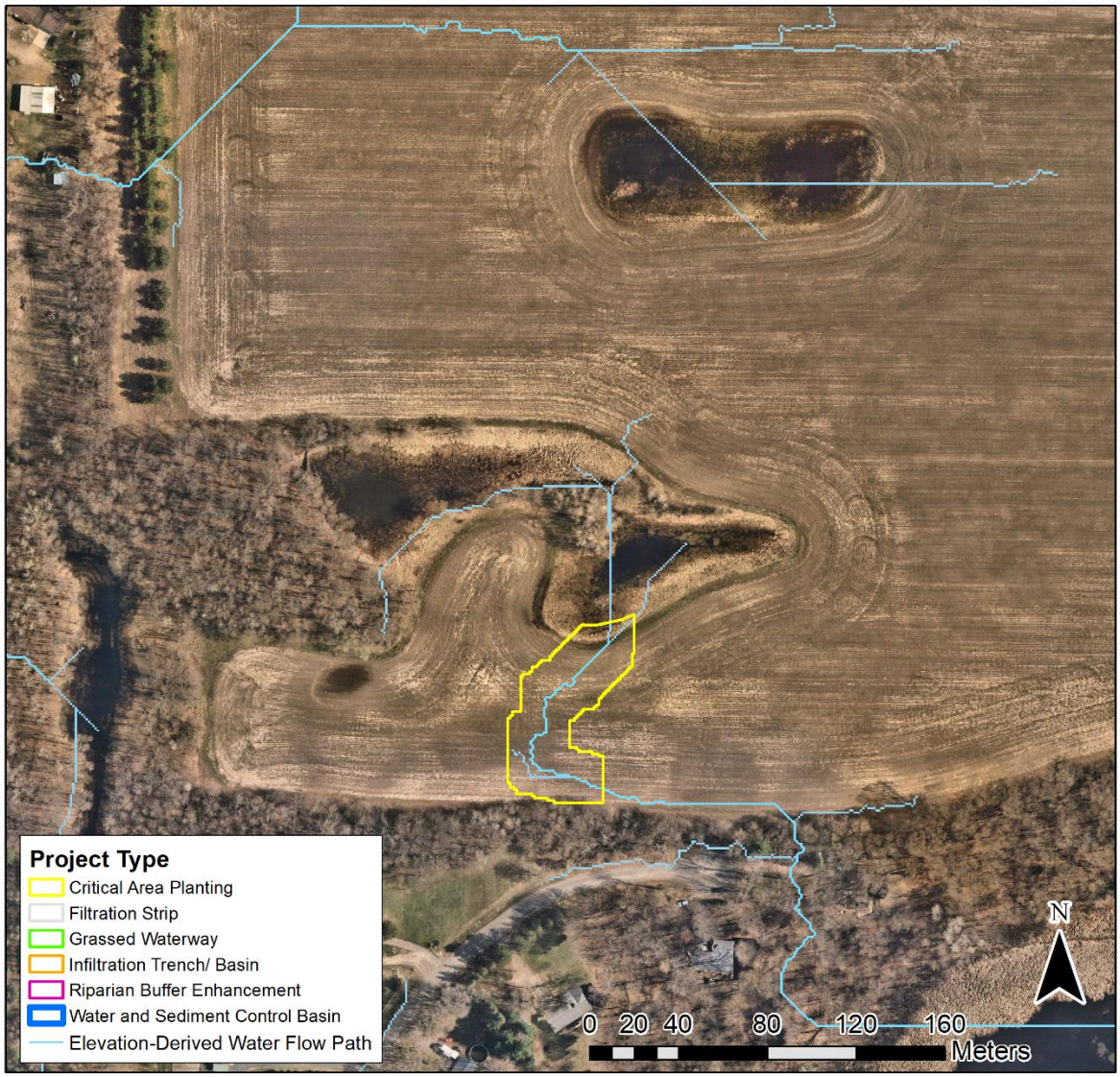
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

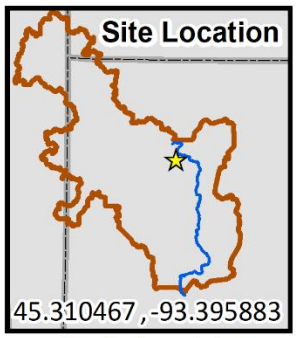




Site ID: FB-CP-16 | Field ID: F070102070705_547	
Practice Type	Critical Area Planting
Practice Area (acres)	2.67
TP Reduction (lbs/yr)	0.65
TSS Reduction (tons/yr)	2.62
TN Reduction (lbs/yr)	13.04
Useful Life (years)	10
Useful Life Total Cost Estimate	9,342
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,431.44**

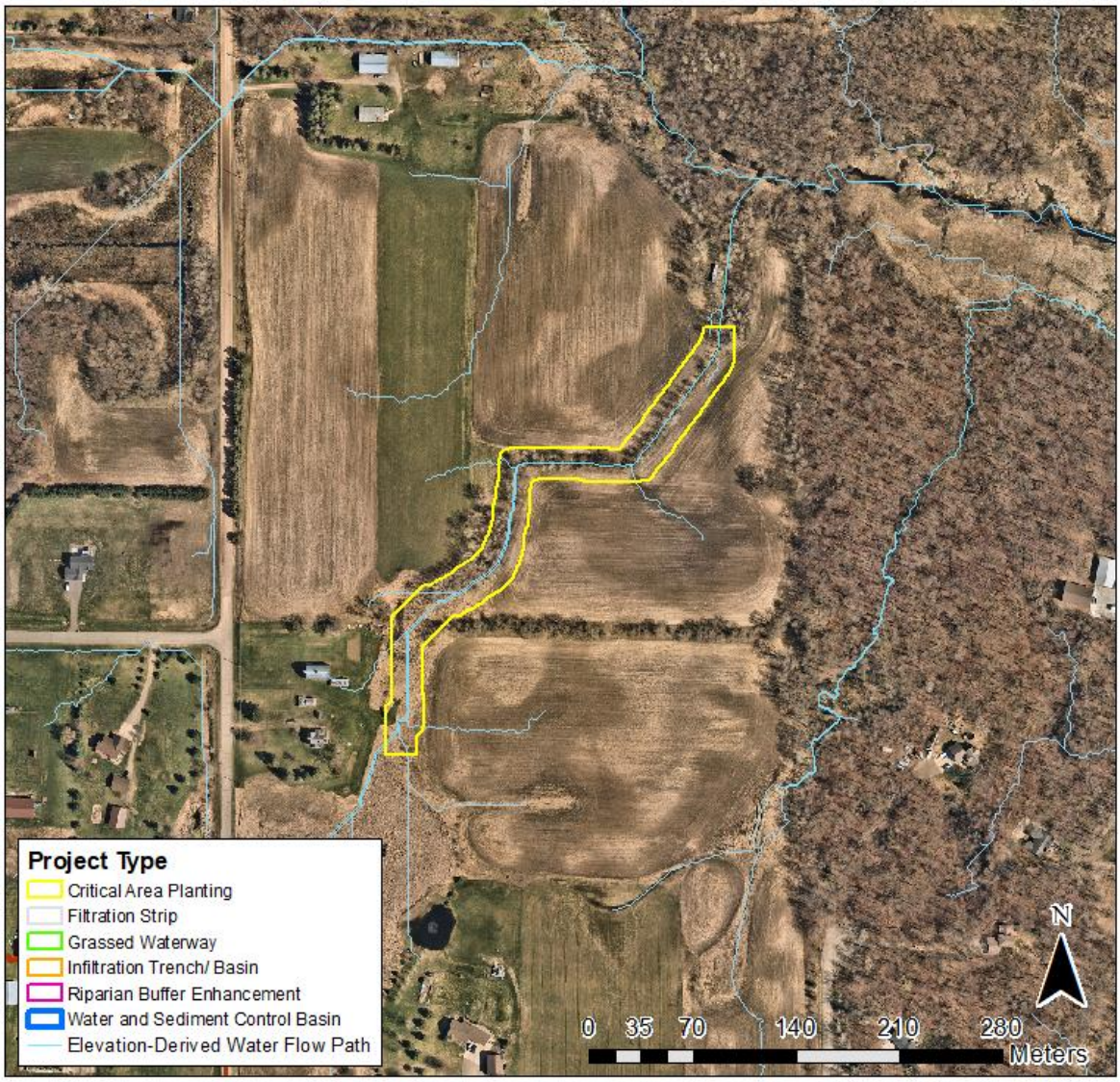
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

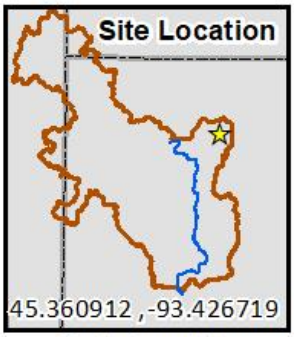




Site ID: FB-CP-17 | Field ID: F070102070705_217	
Practice Type	Critical Area Planting
Practice Area (acres)	1.02
TP Reduction (lbs/yr)	0.29
TSS Reduction (tons/yr)	0.88
TN Reduction (lbs/yr)	5.9
Useful Life (years)	10
Useful Life Total Cost Estimate	4,118
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,433.81**

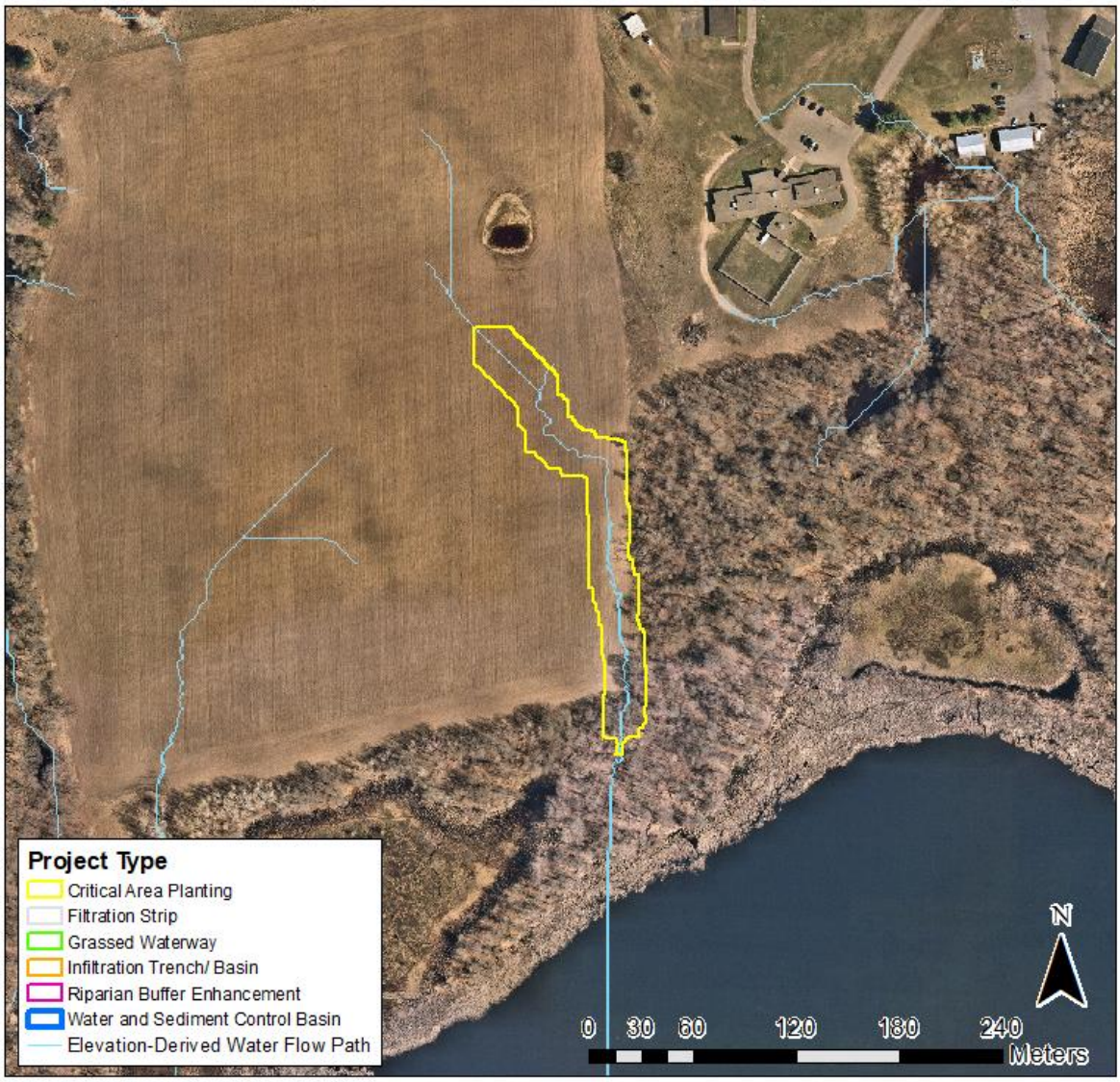
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

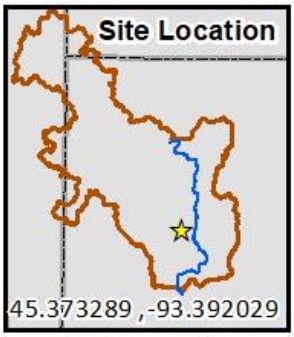




Site ID: FB-CP-18 | Field ID: F070102070705_81	
Practice Type	Critical Area Planting
Practice Area (acres)	2.62
TP Reduction (lbs/yr)	0.64
TSS Reduction (tons/yr)	3.81
TN Reduction (lbs/yr)	12.93
Useful Life (years)	10
Useful Life Total Cost Estimate	9,180
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,440.68**

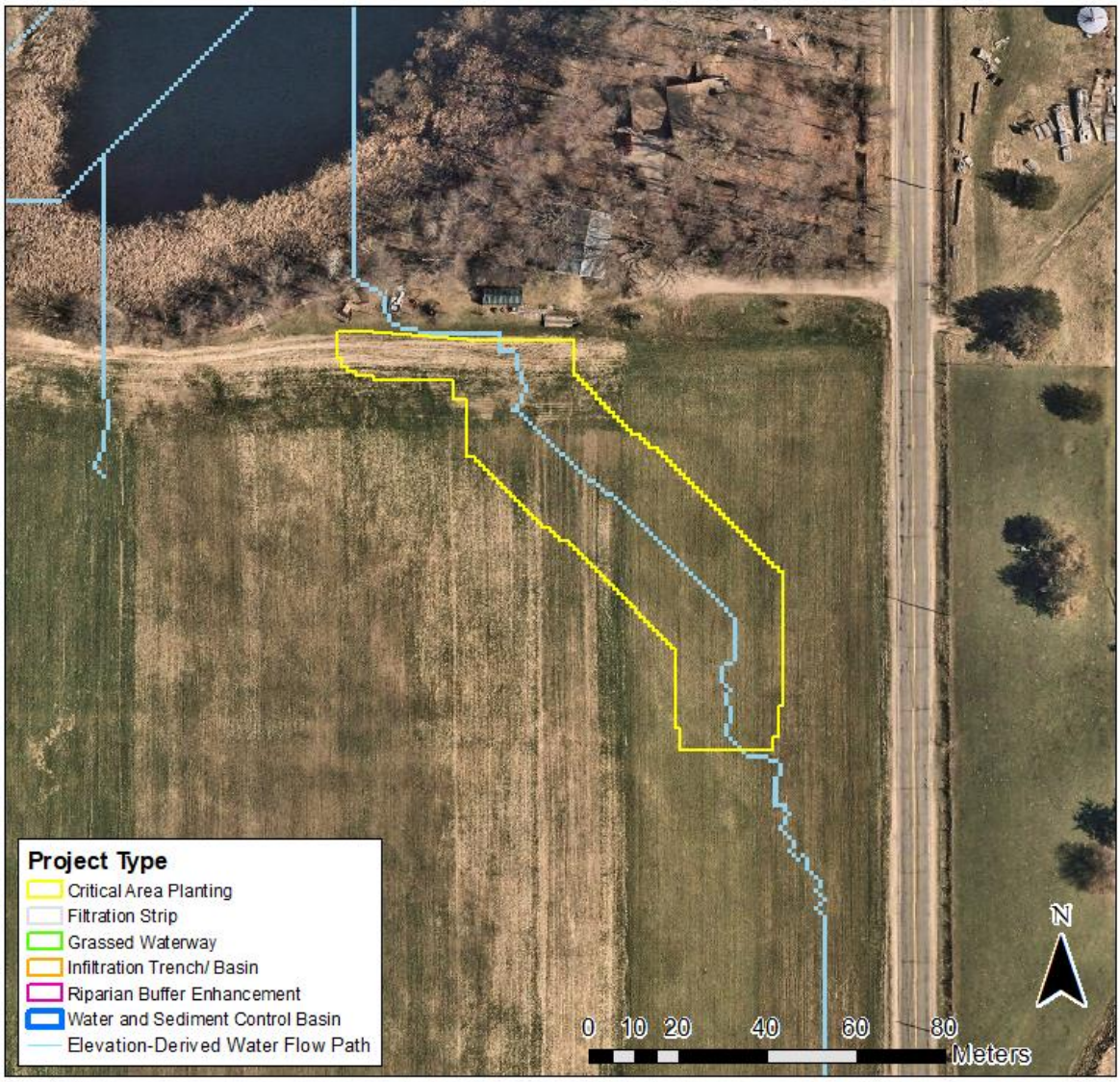
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

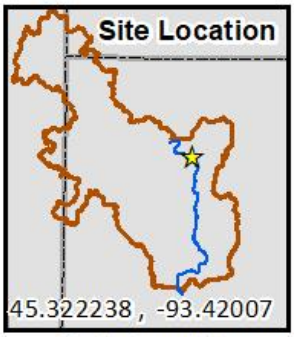




Site ID: FB-CP-19 | Field ID: F070102070705_261	
Practice Type	Critical Area Planting
Practice Area (acres)	1.73
TP Reduction (lbs/yr)	0.43
TSS Reduction (tons/yr)	0.21
TN Reduction (lbs/yr)	8.94
Useful Life (years)	10
Useful Life Total Cost Estimate	6,449
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,493.55**

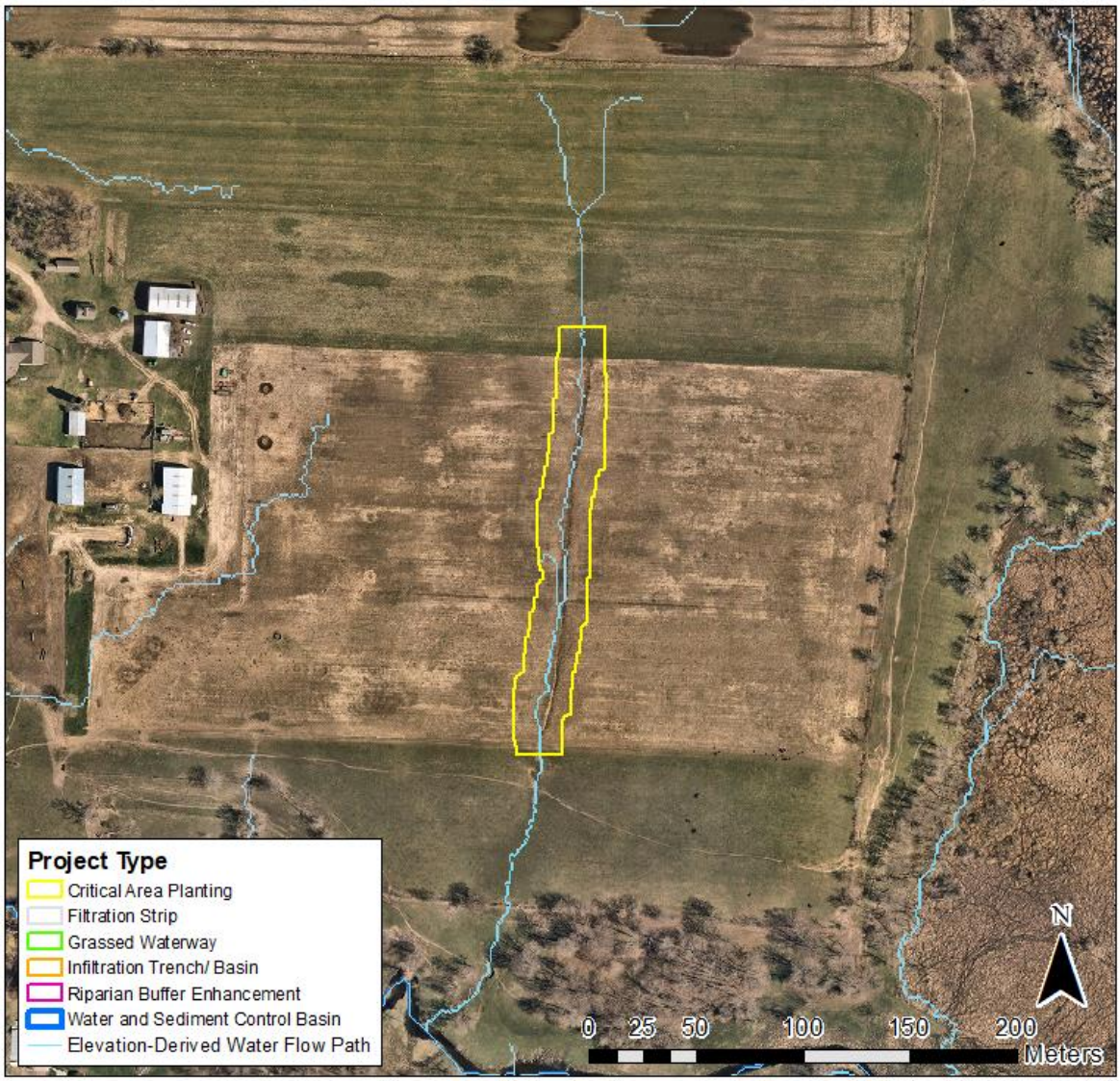
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

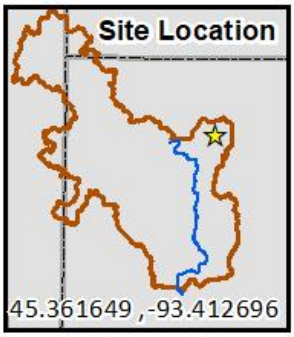




Site ID: FB-CP-20 | Field ID: F070102070705_478	
Practice Type	Critical Area Planting
Practice Area (acres)	1
TP Reduction (lbs/yr)	0.26
TSS Reduction (tons/yr)	0.03
TN Reduction (lbs/yr)	5.5
Useful Life (years)	10
Useful Life Total Cost Estimate	4,044
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,552.57**

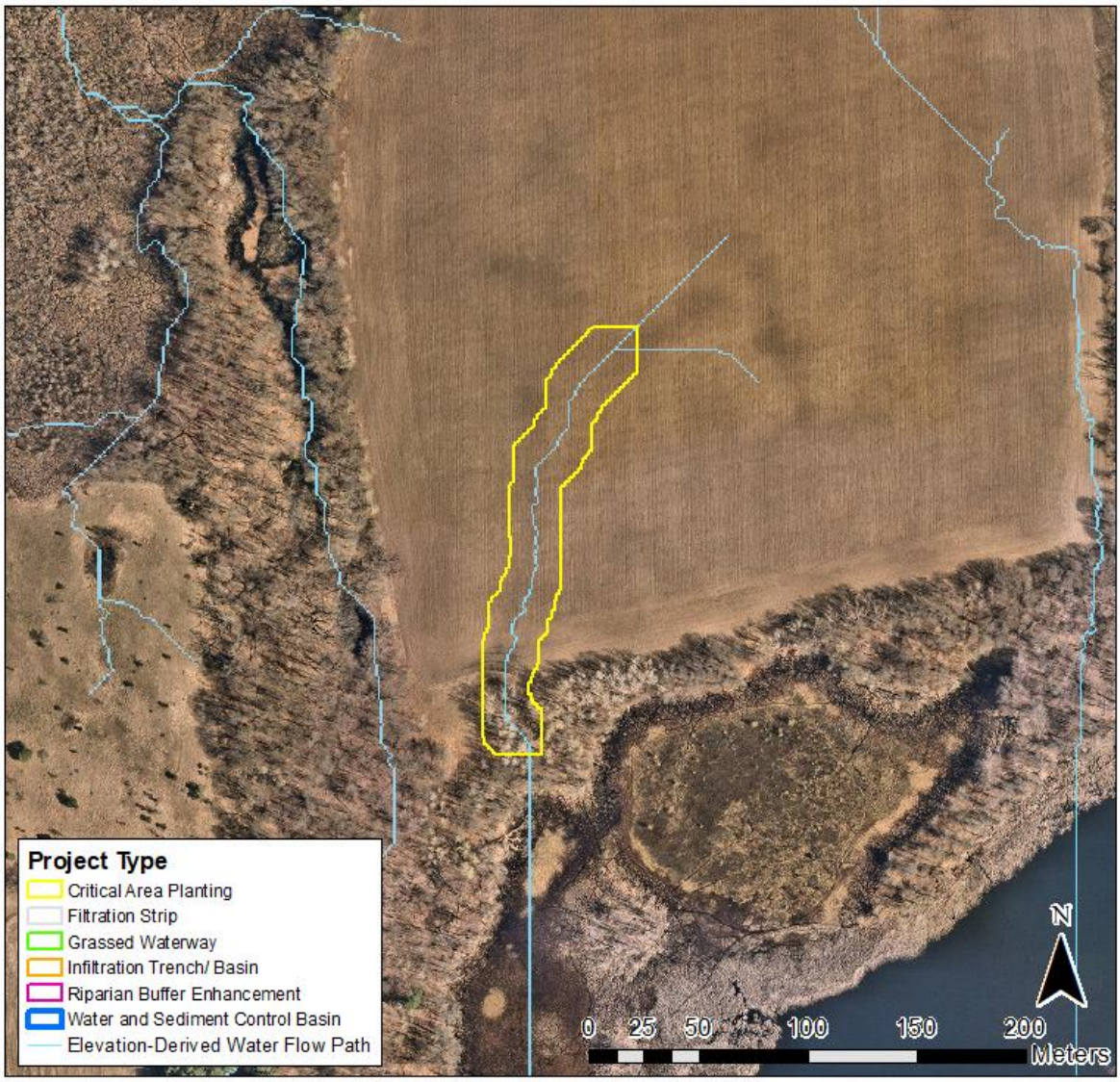
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

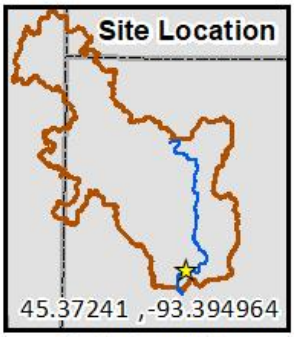




Site ID: FB-CP-21 | Field ID: F070102070705_60	
Practice Type	Critical Area Planting
Practice Area (acres)	1.21
TP Reduction (lbs/yr)	0.3
TSS Reduction (tons/yr)	0.74
TN Reduction (lbs/yr)	6.17
Useful Life (years)	10
Useful Life Total Cost Estimate	4,771
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,566.27**

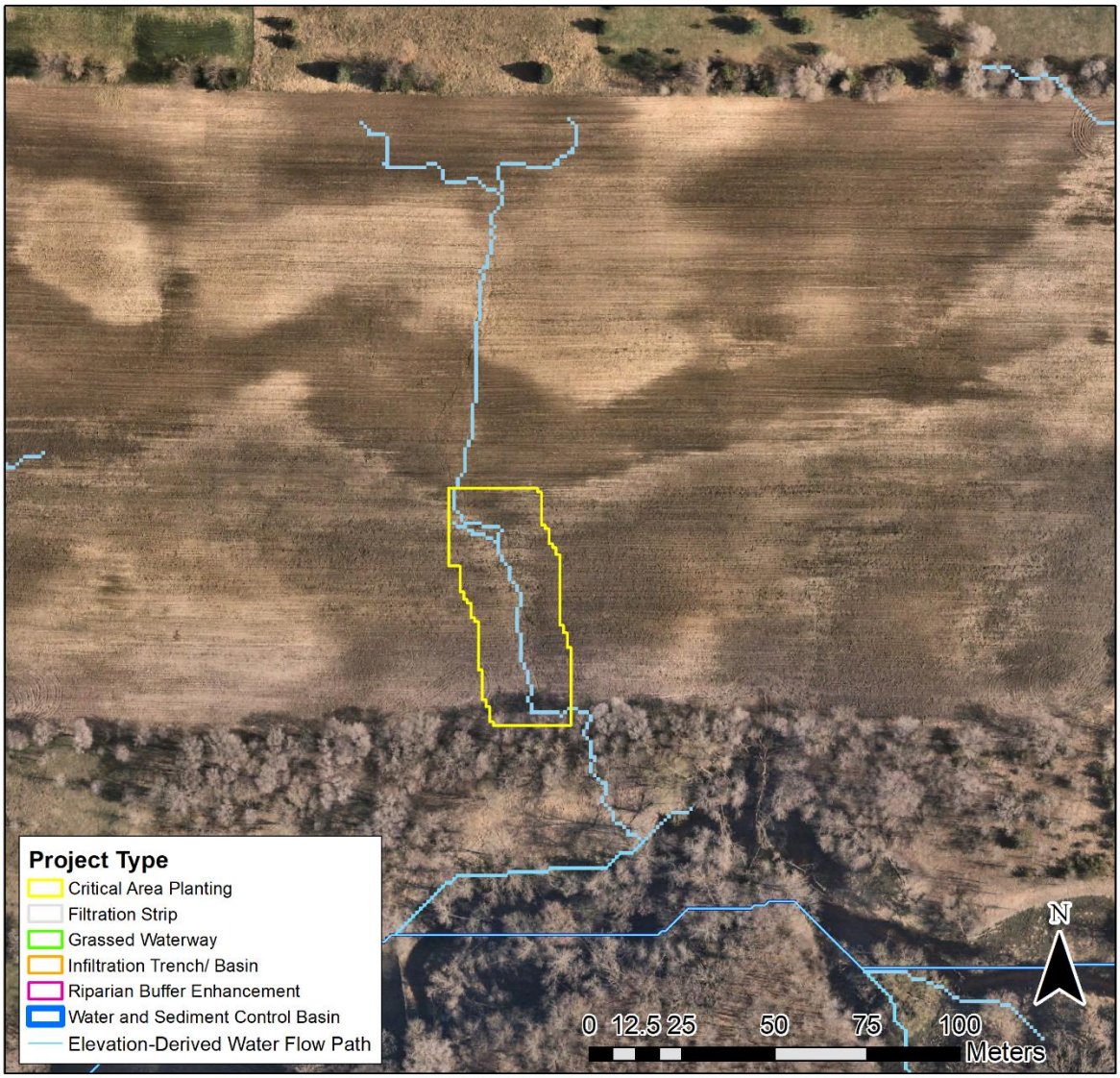
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

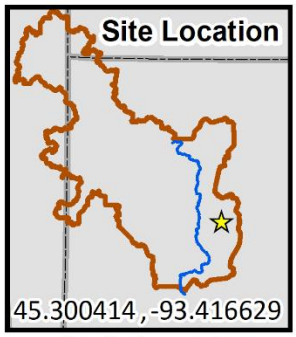




Site ID: FB-CP-22 | Field ID: F070102070705_261	
Practice Type	Critical Area Planting
Practice Area (acres)	1.32
TP Reduction (lbs/yr)	0.32
TSS Reduction (tons/yr)	0.25
TN Reduction (lbs/yr)	6.68
Useful Life (years)	10
Useful Life Total Cost Estimate	5,150
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,598.88**

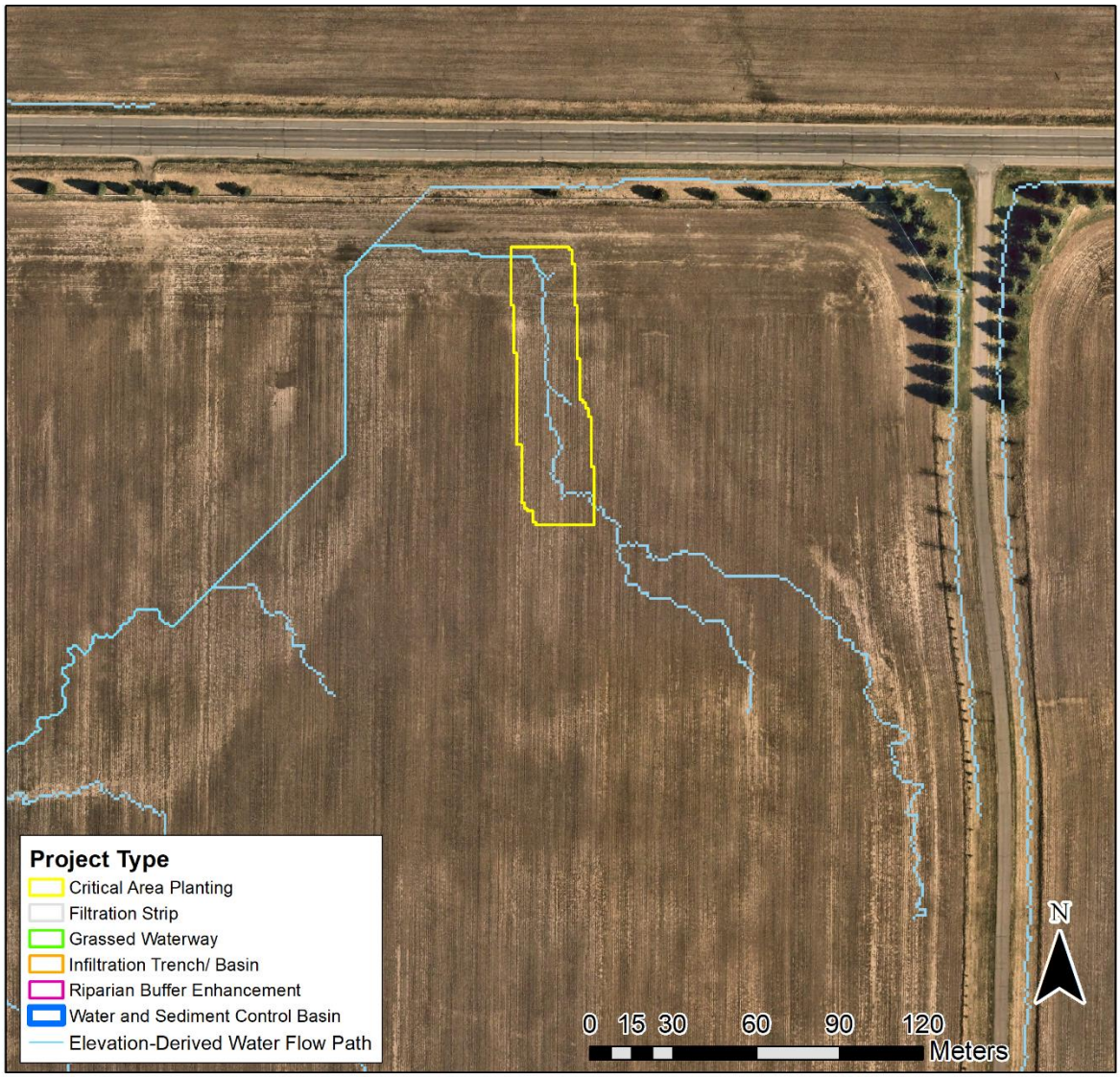
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

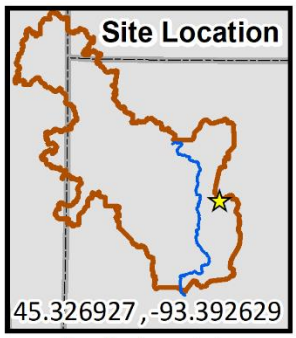




Site ID: FB-CP-23 | Field ID: F070102070705_344	
Practice Type	Critical Area Planting
Practice Area (acres)	0.4
TP Reduction (lbs/yr)	0.12
TSS Reduction (tons/yr)	0.78
TN Reduction (lbs/yr)	2.38
Useful Life (years)	10
Useful Life Total Cost Estimate	1,849
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,608.14**

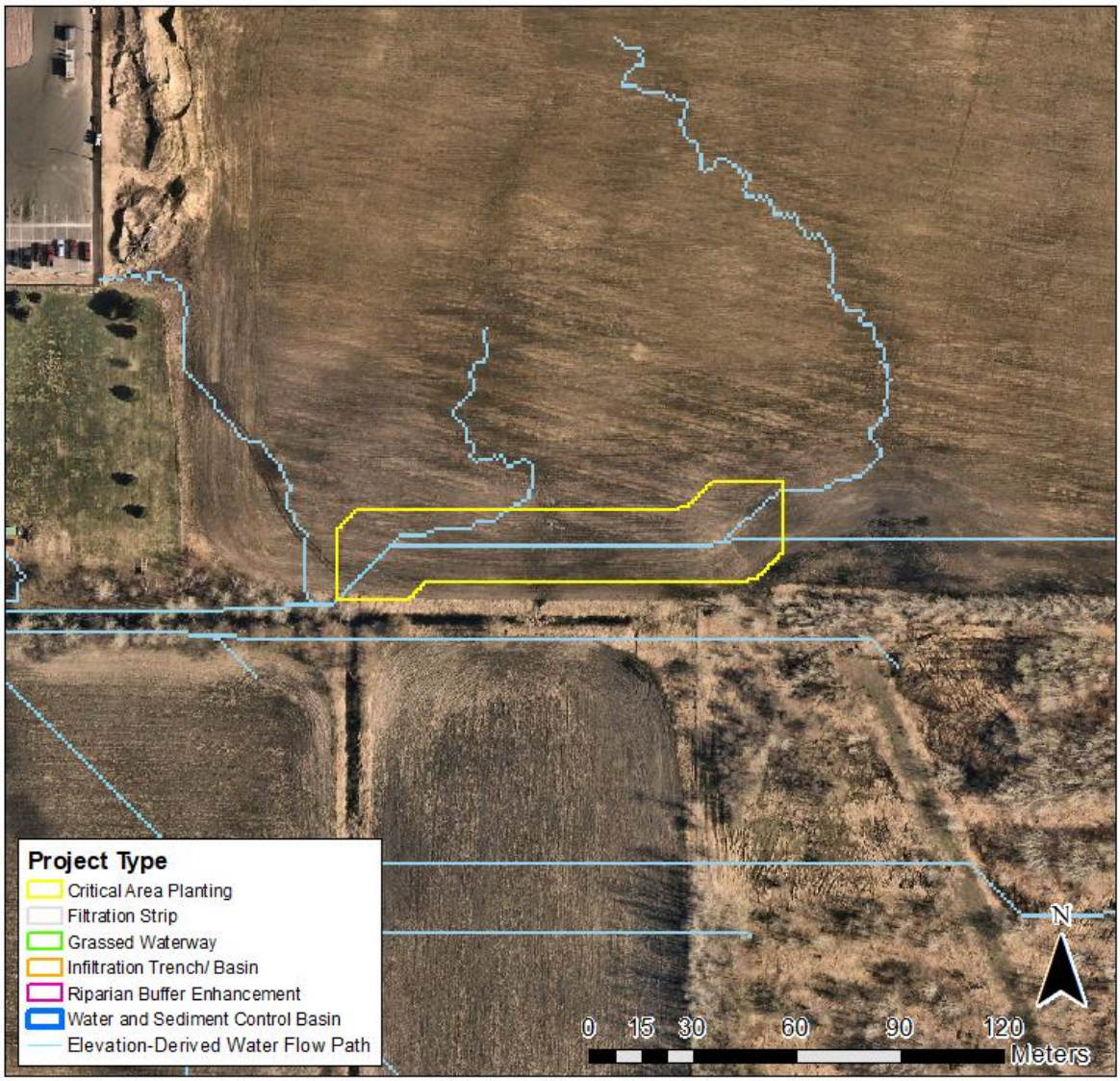
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

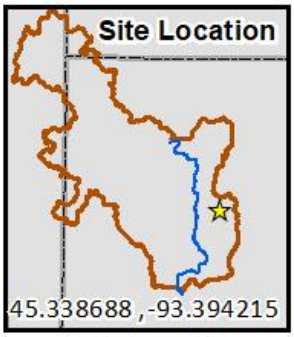




Site ID: FB-CP-24 | Field ID: F070102070705_437	
Practice Type	Critical Area Planting
Practice Area (acres)	0.59
TP Reduction (lbs/yr)	0.16
TSS Reduction (tons/yr)	0.34
TN Reduction (lbs/yr)	3.22
Useful Life (years)	10
Useful Life Total Cost Estimate	2,602
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,633.72**

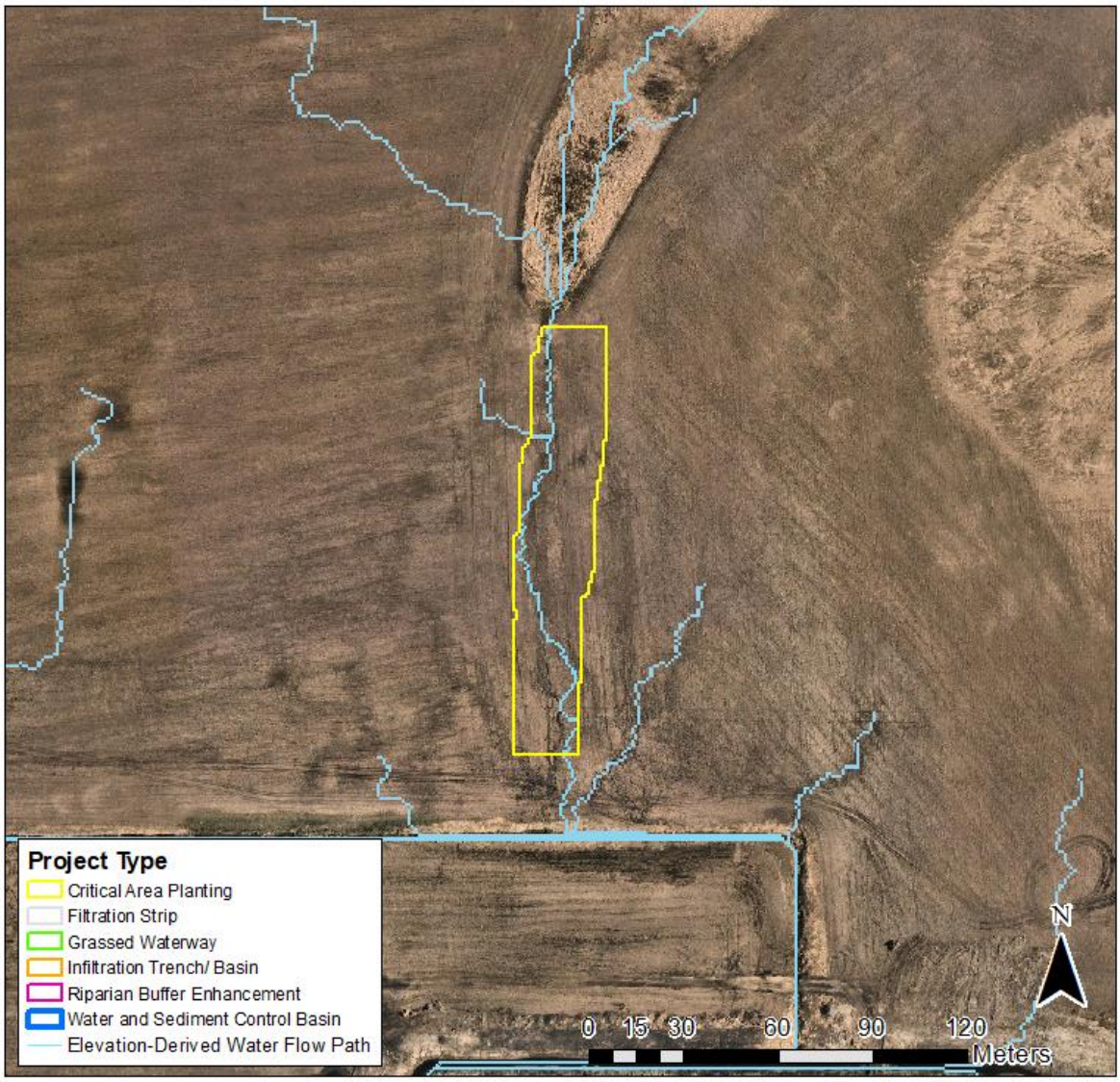
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

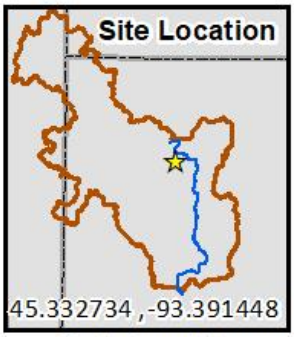




Site ID: FB-CP-25 | Field ID: F070102070705_92	
Practice Type	Critical Area Planting
Practice Area (acres)	0.73
TP Reduction (lbs/yr)	0.19
TSS Reduction (tons/yr)	0.72
TN Reduction (lbs/yr)	4
Useful Life (years)	10
Useful Life Total Cost Estimate	3,118
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,643.47**

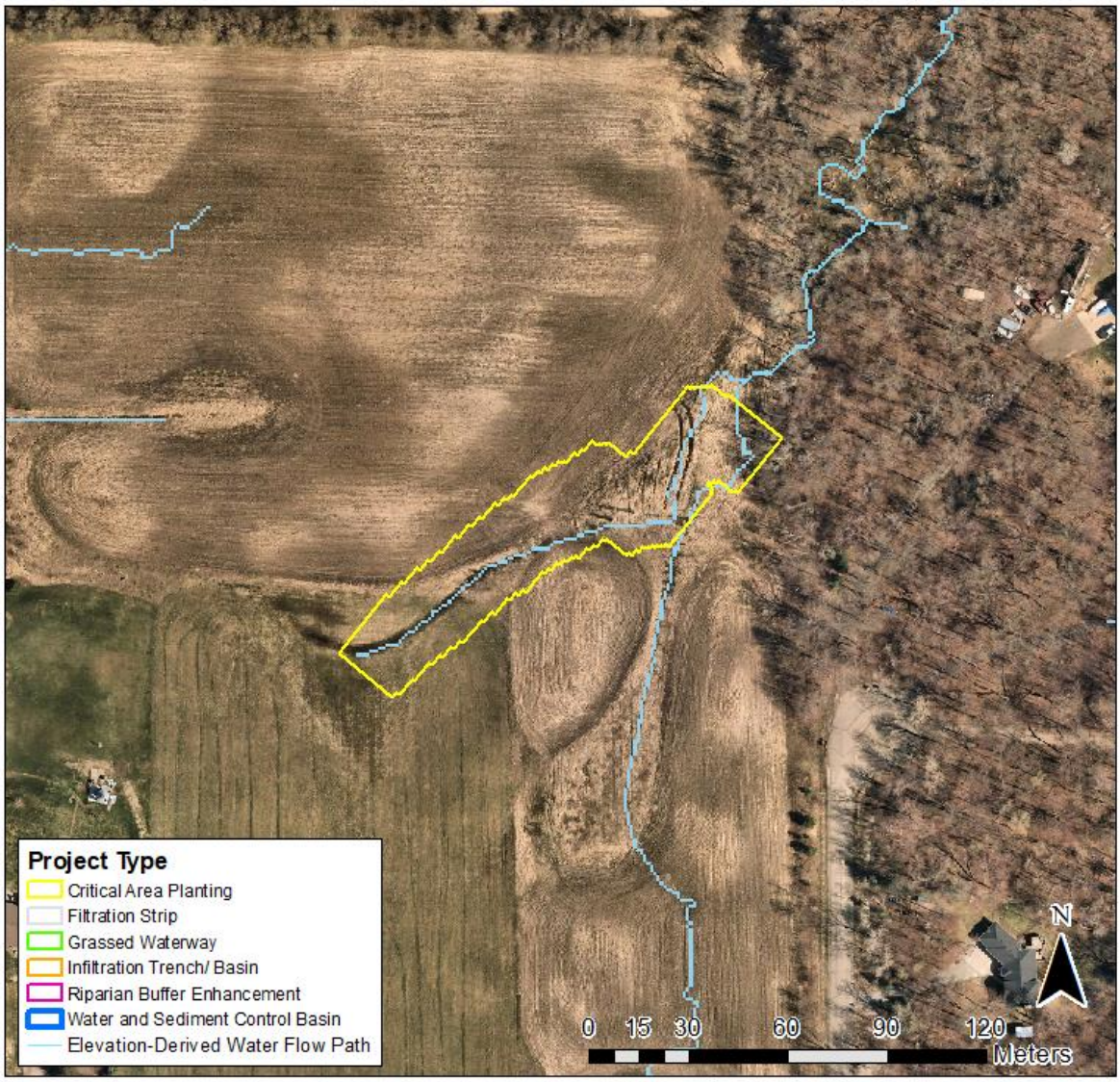
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

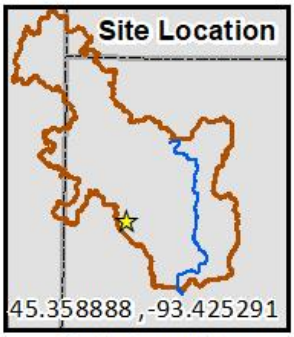




Site ID: FB-CP-26 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	0.78
TP Reduction (lbs/yr)	0.2
TSS Reduction (tons/yr)	0.82
TN Reduction (lbs/yr)	4.27
Useful Life (years)	10
Useful Life Total Cost Estimate	3,301
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,667.06**

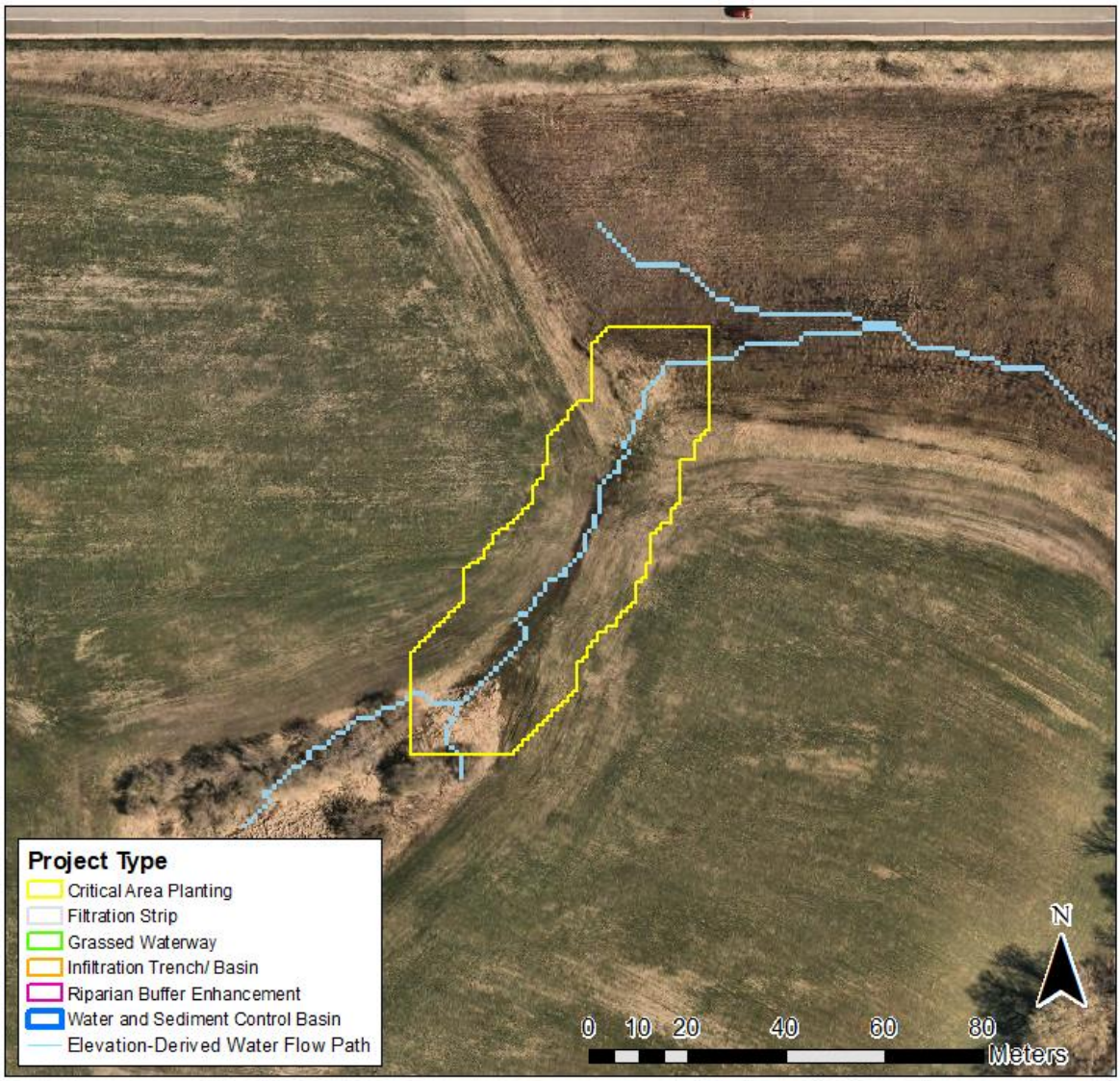
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

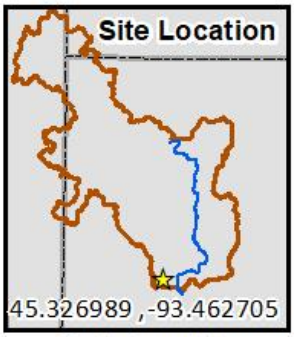




Site ID: FB-CP-27 | Field ID: F070102070705_81	
Practice Type	Critical Area Planting
Practice Area (acres)	0.95
TP Reduction (lbs/yr)	0.23
TSS Reduction (tons/yr)	0.06
TN Reduction (lbs/yr)	4.74
Useful Life (years)	10
Useful Life Total Cost Estimate	3,867
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,682.09**

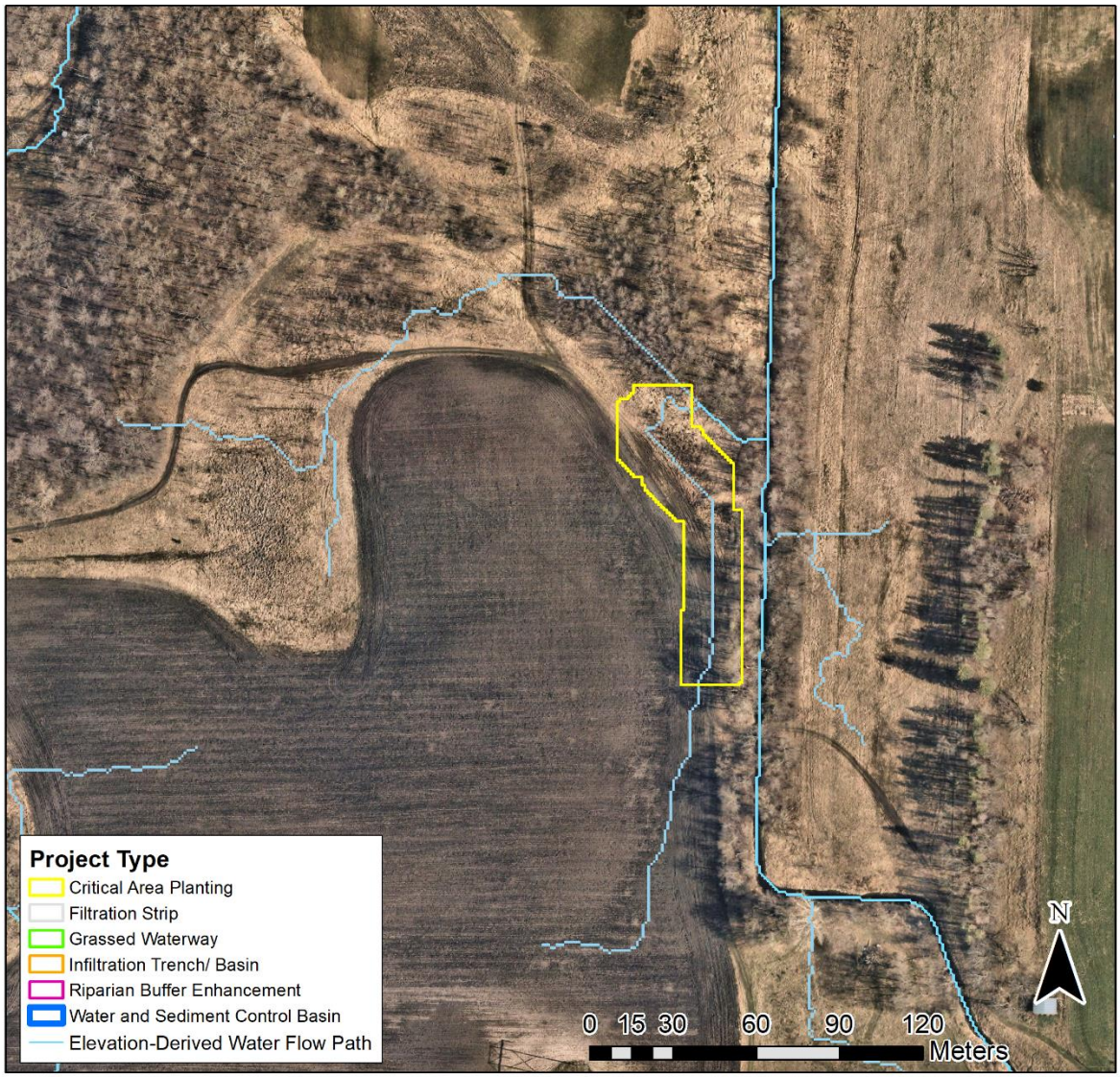
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

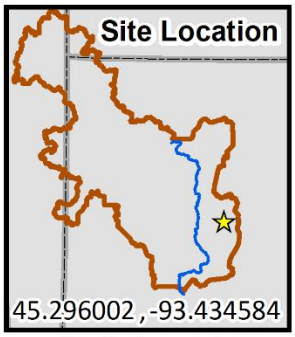




Site ID: FB-CP-28 | Field ID: F070102070705_65	
Practice Type	Critical Area Planting
Practice Area (acres)	0.65
TP Reduction (lbs/yr)	0.16
TSS Reduction (tons/yr)	0.35
TN Reduction (lbs/yr)	3.57
Useful Life (years)	10
Useful Life Total Cost Estimate	2,802
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,726.08**

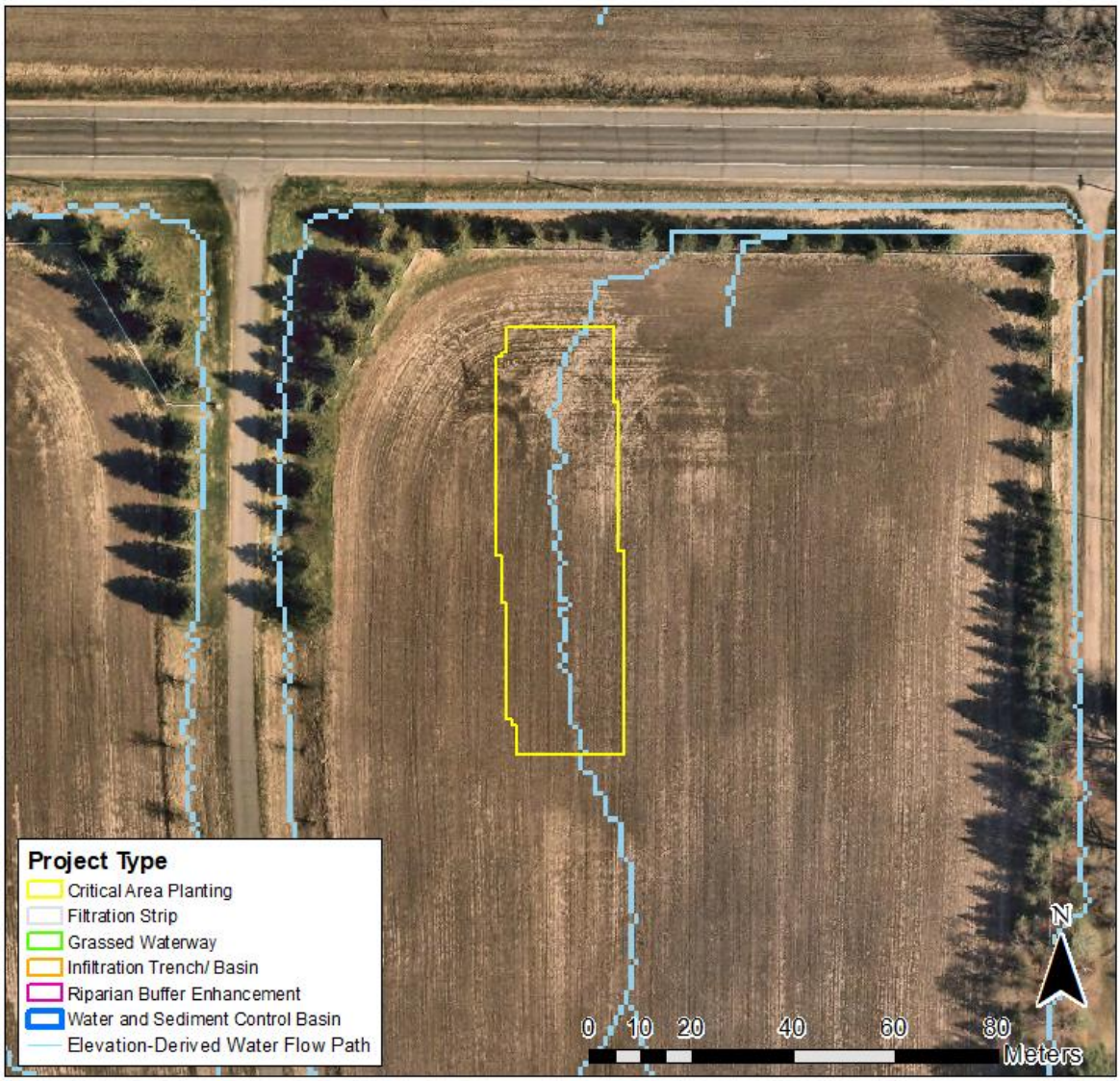
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

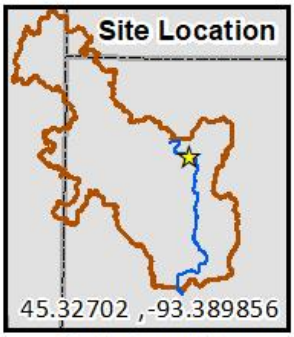




Site ID: FB-CP-29 | Field ID: F070102070705_462	
Practice Type	Critical Area Planting
Practice Area (acres)	0.68
TP Reduction (lbs/yr)	0.17
TSS Reduction (tons/yr)	0.28
TN Reduction (lbs/yr)	3.79
Useful Life (years)	10
Useful Life Total Cost Estimate	2,920
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,768.67**

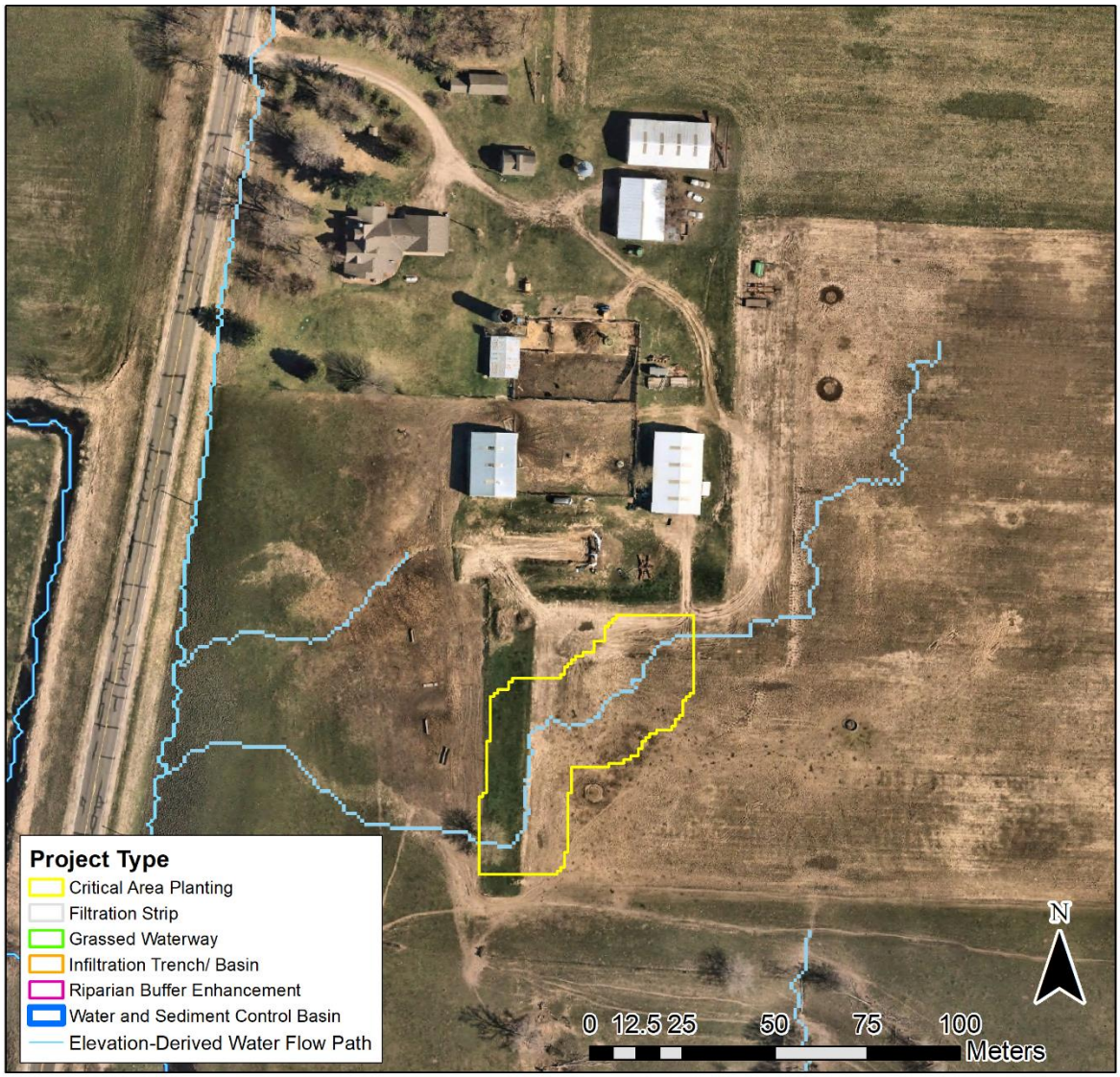
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

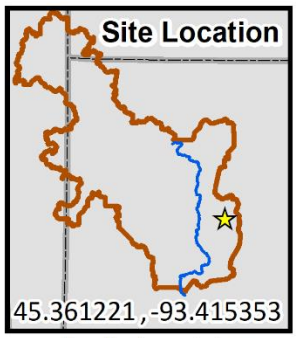




Site ID: FB-CP-30 | Field ID: F070102070705_437	
Practice Type	Critical Area Planting
Practice Area (acres)	0.48
TP Reduction (lbs/yr)	0.12
TSS Reduction (tons/yr)	0.29
TN Reduction (lbs/yr)	2.43
Useful Life (years)	10
Useful Life Total Cost Estimate	2,180
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,788.76**

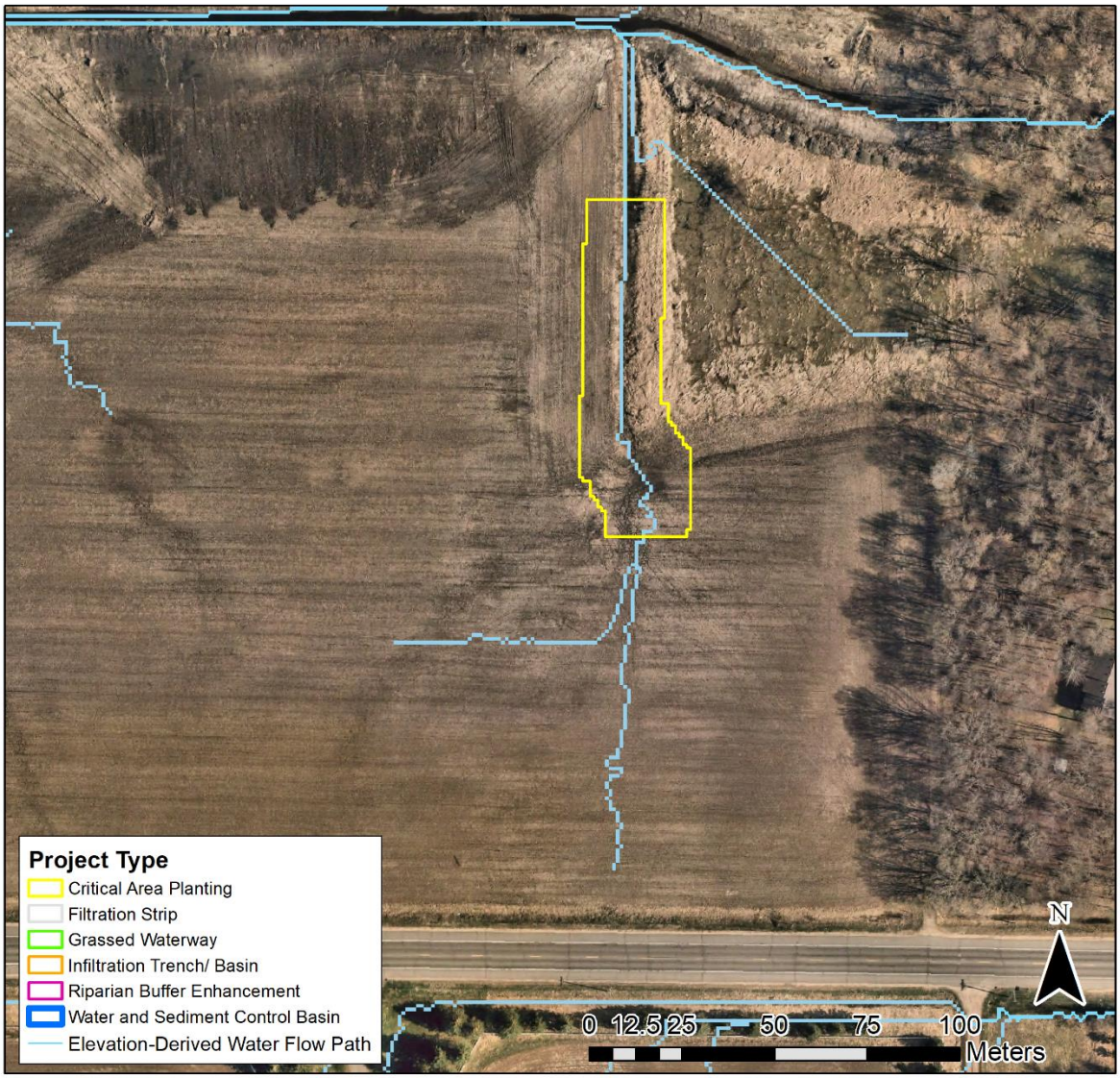
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

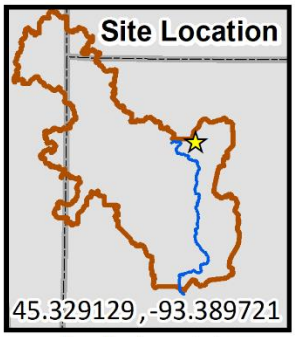




Site ID: FB-CP-31 | Field ID: F070102070705_60	
Practice Type	Critical Area Planting
Practice Area (acres)	0.56
TP Reduction (lbs/yr)	0.14
TSS Reduction (tons/yr)	0.38
TN Reduction (lbs/yr)	2.81
Useful Life (years)	10
Useful Life Total Cost Estimate	2,490
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,789.89**

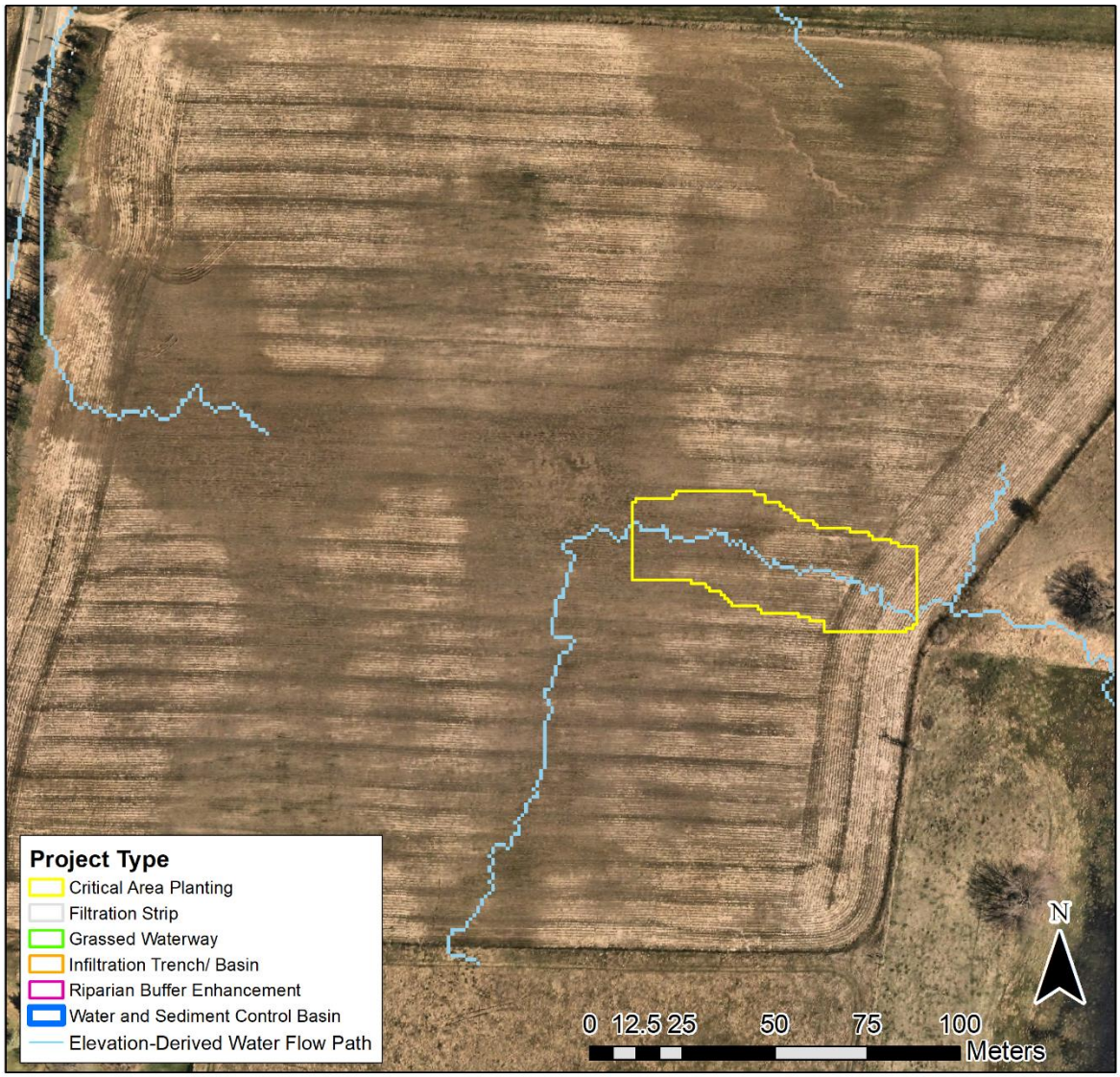
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

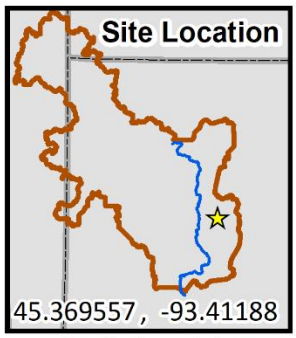




Site ID: FB-CP-32 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	0.52
TP Reduction (lbs/yr)	0.13
TSS Reduction (tons/yr)	0.52
TN Reduction (lbs/yr)	2.8
Useful Life (years)	10
Useful Life Total Cost Estimate	2,344
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,813.60**

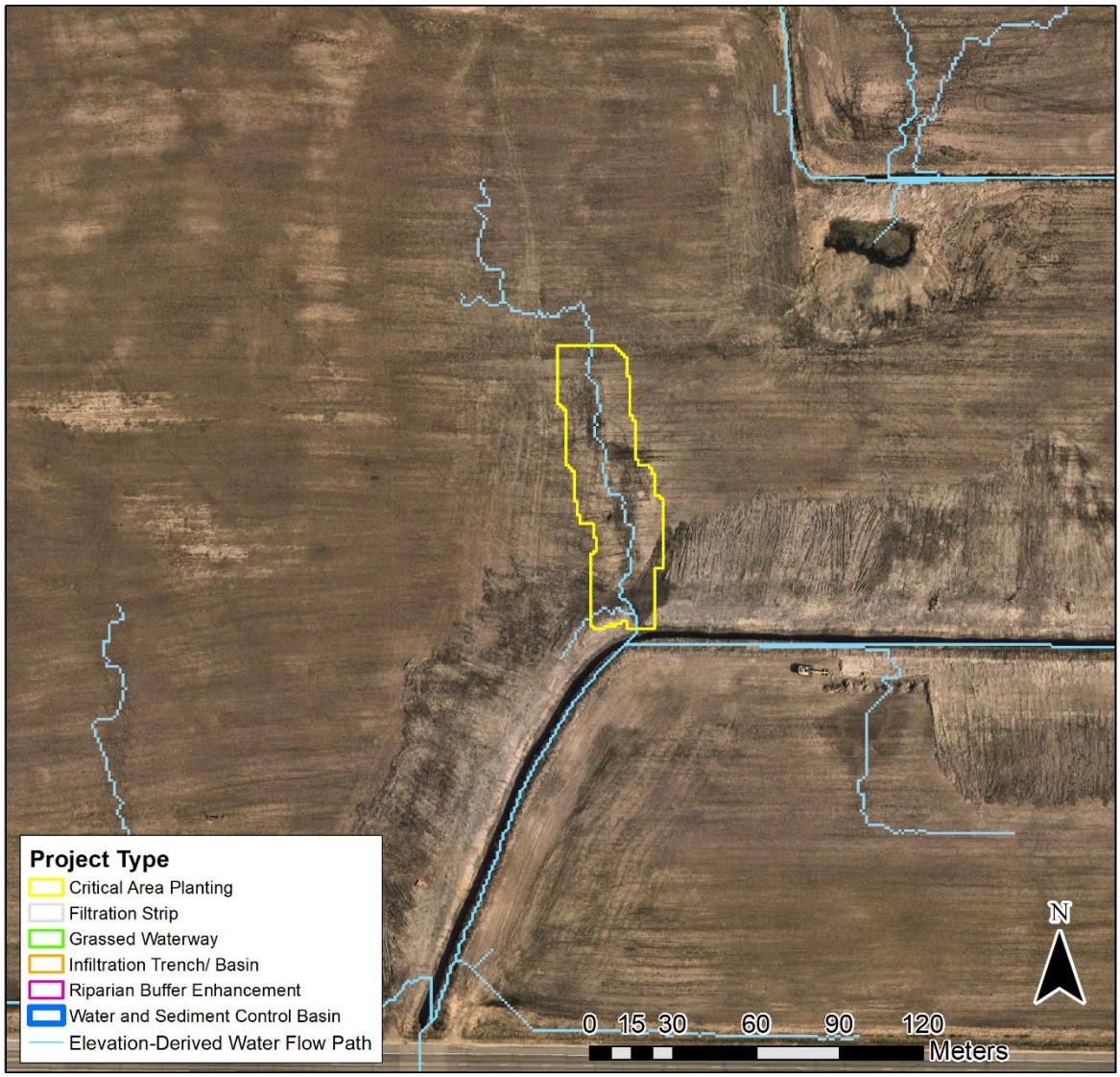
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

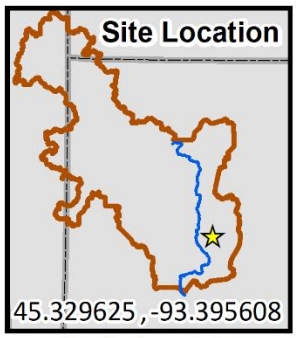




Site ID: FB-CP-33 | Field ID: F070102070705_548	
Practice Type	Critical Area Planting
Practice Area (acres)	0.5
TP Reduction (lbs/yr)	0.12
TSS Reduction (tons/yr)	0.24
TN Reduction (lbs/yr)	2.41
Useful Life (years)	10
Useful Life Total Cost Estimate	2,242
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,879.26**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

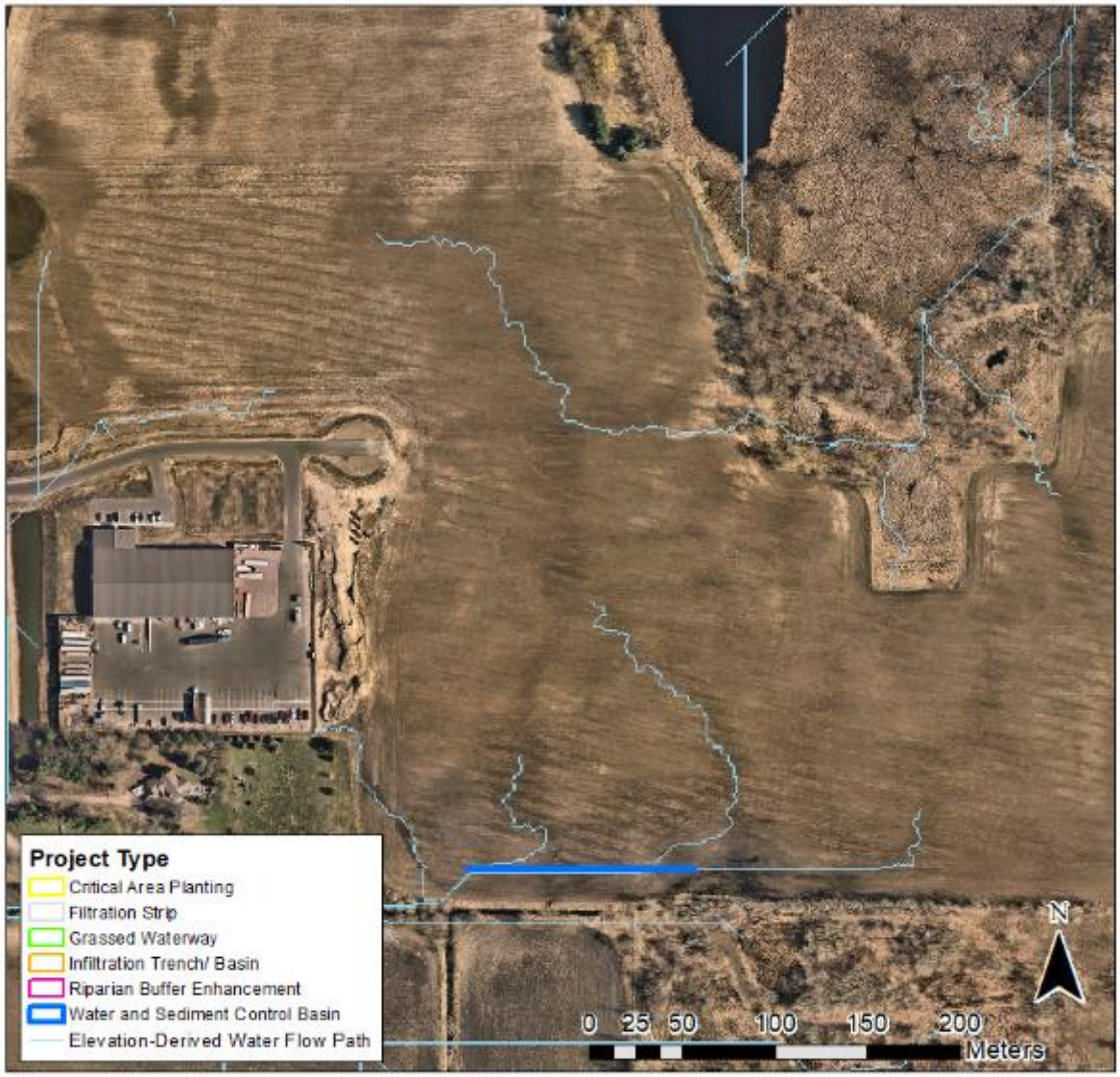


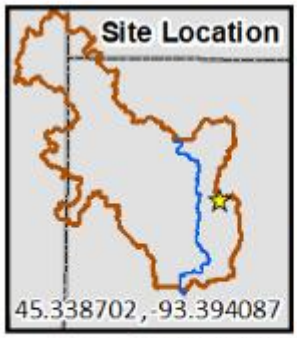


Site ID: FB-CP-34 | Field ID: F070102070705_132	
Practice Type	Critical Area Planting
Practice Area (acres)	0.64
TP Reduction (lbs/yr)	0.15
TSS Reduction (tons/yr)	0.89
TN Reduction (lbs/yr)	3.2
Useful Life (years)	10
Useful Life Total Cost Estimate	2,773
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,885.58**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

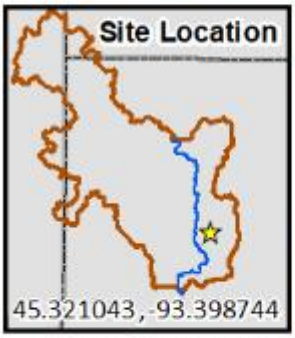
Appendix M: Project Profiles: Top Candidate Sites for Water and Sediment Control Basins





Site ID: FB-WB-02| Field ID: F070102070705_92	
Practice Type	Water and Sediment Control Basin
Practice Area (acres)	0.03
TP Reduction (lbs/yr)	0.46
TSS Reduction (tons/yr)	1.08
TN Reduction (lbs/yr)	6.53
Useful Life (years)	10
Useful Life Total Cost Estimate	11,620
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,527.70**

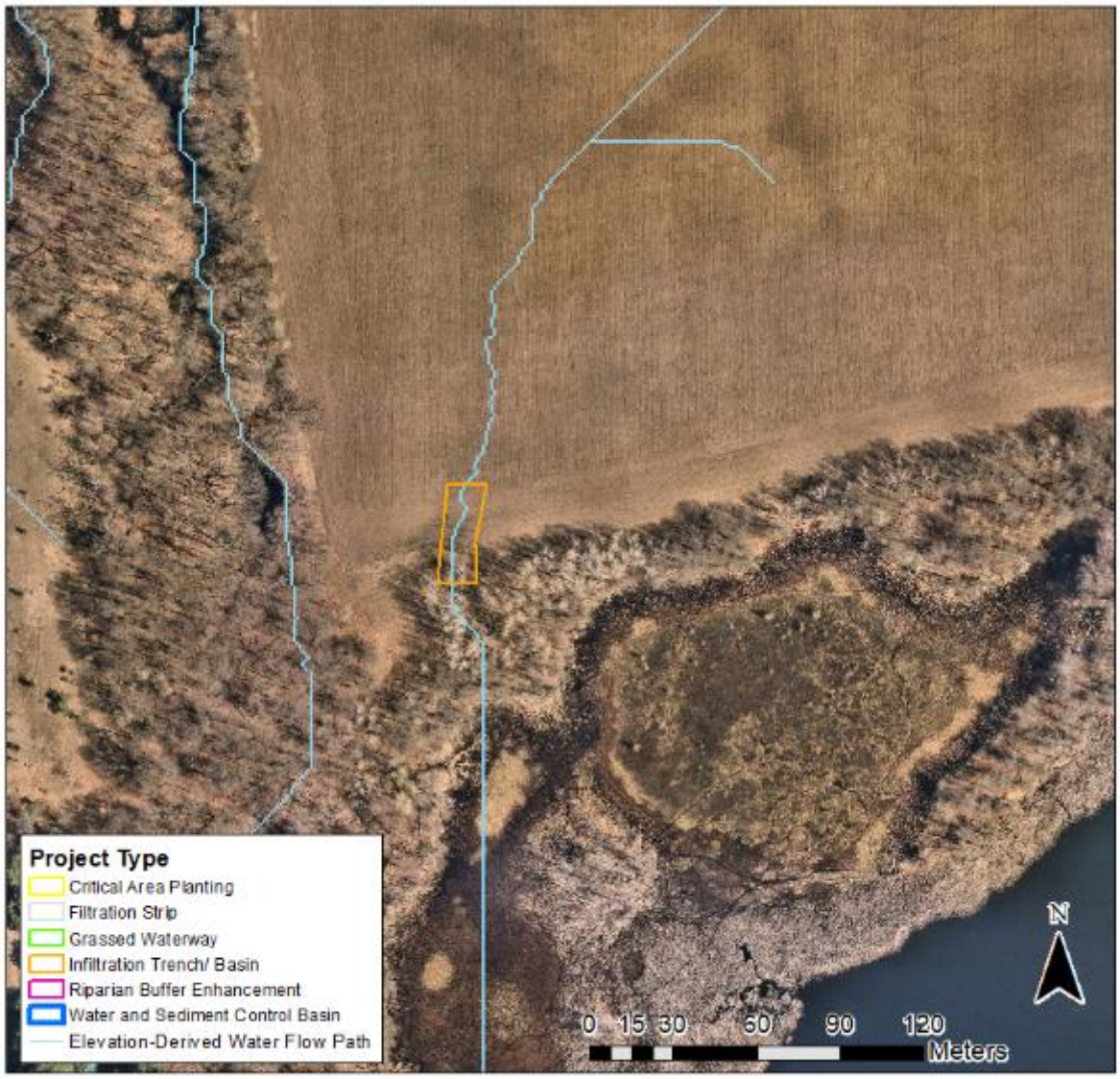
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

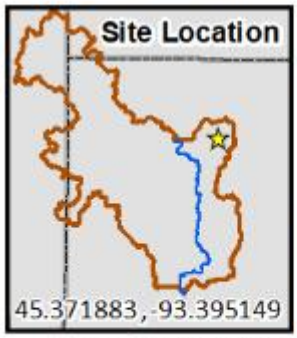


Site ID: FB-WB-01| Field ID: F070102070705_437	
Practice Type	Water and Sediment Control Basin
Practice Area (acres)	0.09
TP Reduction (lbs/yr)	2.01
TSS Reduction (tons/yr)	4.29
TN Reduction (lbs/yr)	21.6
Useful Life (years)	10
Useful Life Total Cost Estimate	11,397
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**567.16**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

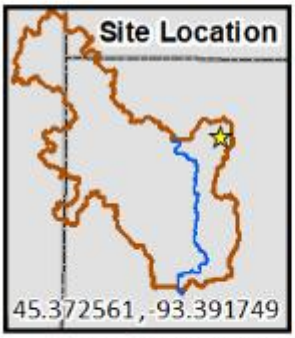
Appendix N: Project Profiles: Top Candidate Sites for Infiltration Trenches/ Basins





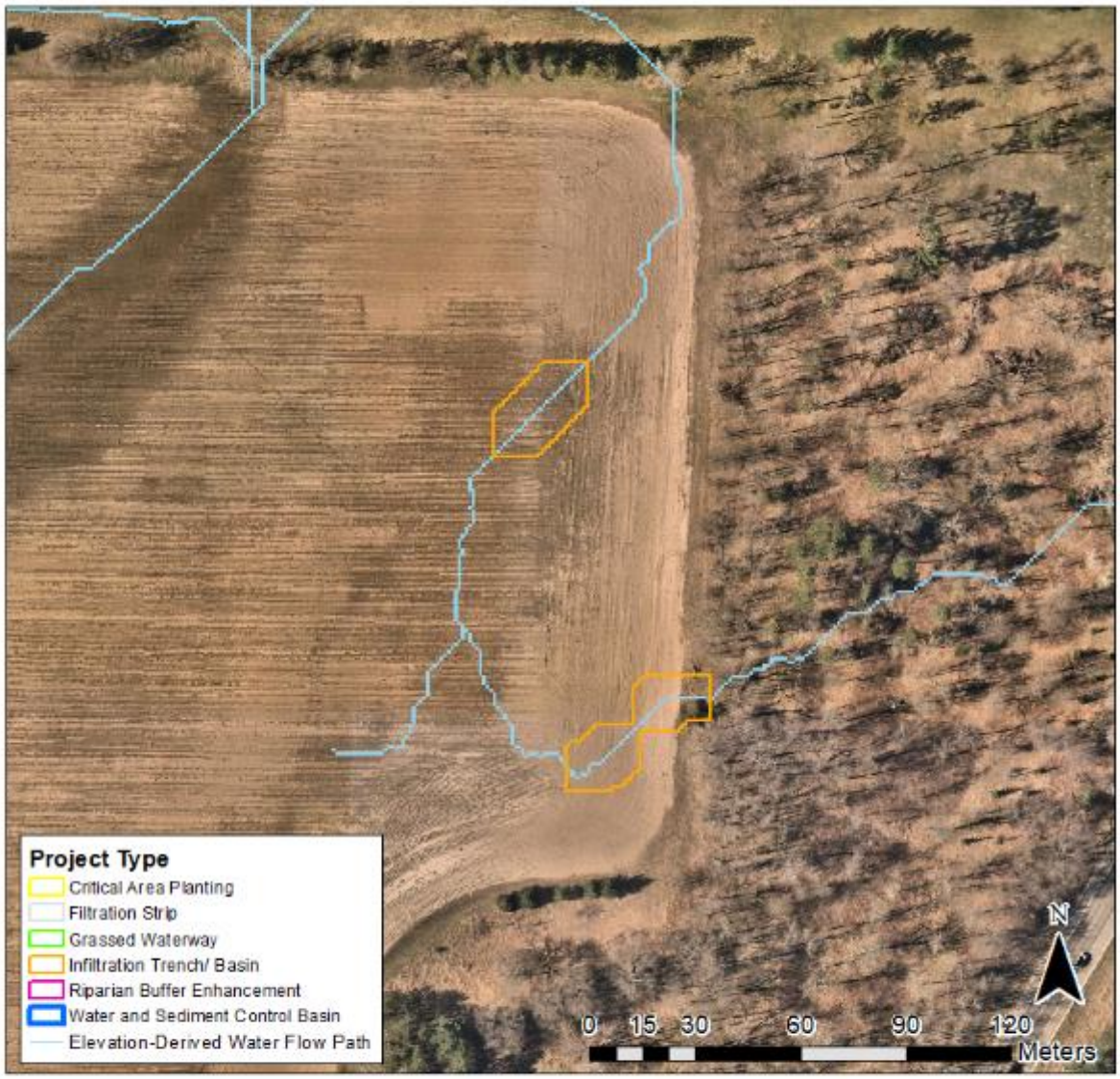
Site ID: FB-IT-01 | Field ID: F070102070705_261	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.3
TP Reduction (lbs/yr)	2.53
TSS Reduction (tons/yr)	1.59
TN Reduction (lbs/yr)	48.9
Useful Life (years)	20
Useful Life Total Cost Estimate	25,963
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**513.99**

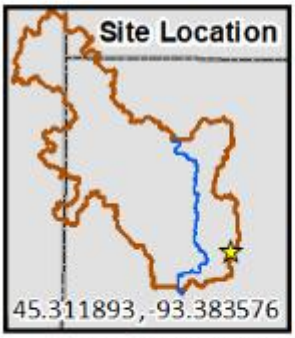
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID: FB-IT-02 | Field ID: F070102070705_261	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.41
TP Reduction (lbs/yr)	2.32
TSS Reduction (tons/yr)	1.87
TN Reduction (lbs/yr)	44.52
Useful Life (years)	20
Useful Life Total Cost Estimate	25,147
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**541.26**

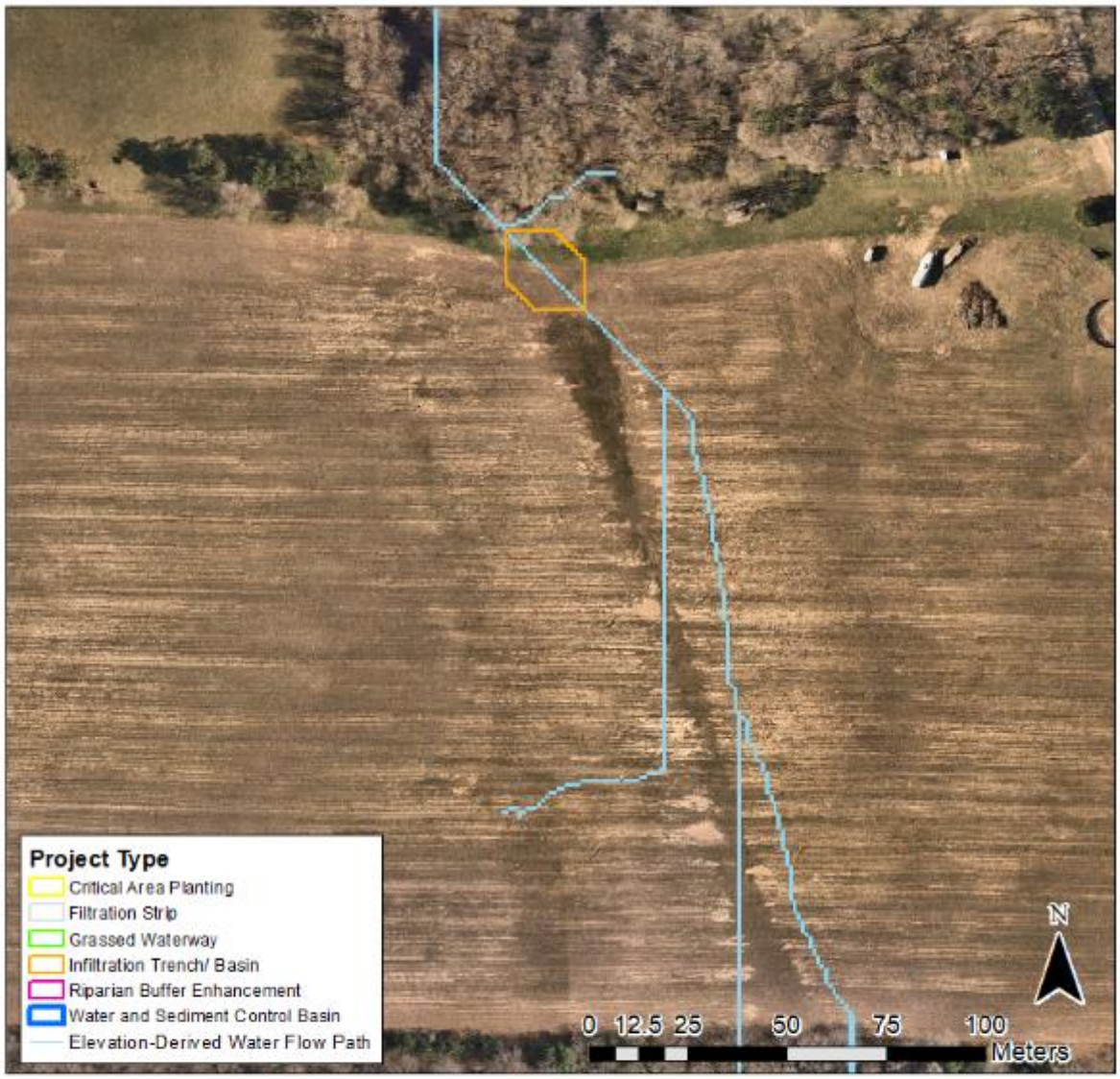
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

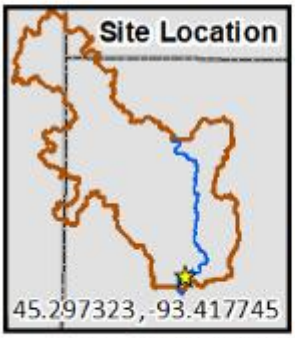




Site ID: FB-IT-03 | Field ID: F070102070705_217	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.56
TP Reduction (lbs/yr)	2.16
TSS Reduction (tons/yr)	2.92
TN Reduction (lbs/yr)	40.66
Useful Life (years)	20
Useful Life Total Cost Estimate	27,966
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**648.59**

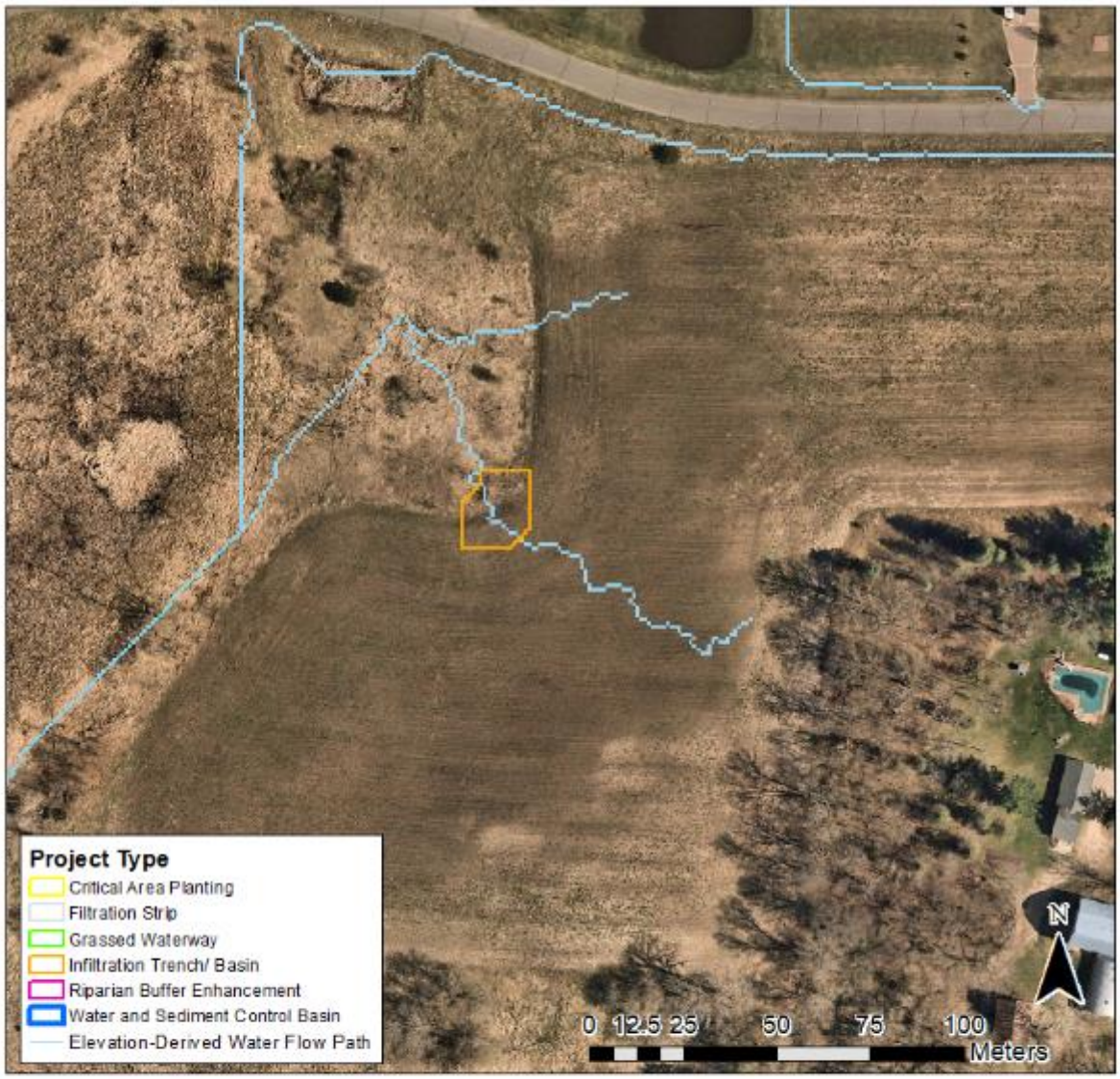
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

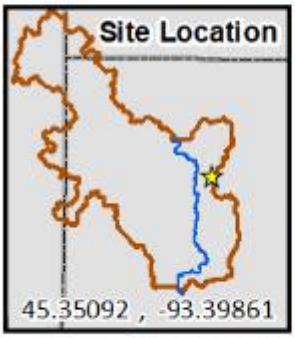




Site ID: FB-IT-04 | Field ID: F070102070705_289	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.09
TP Reduction (lbs/yr)	1.75
TSS Reduction (tons/yr)	4.36
TN Reduction (lbs/yr)	19.13
Useful Life (years)	20
Useful Life Total Cost Estimate	43,761
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,251.97**

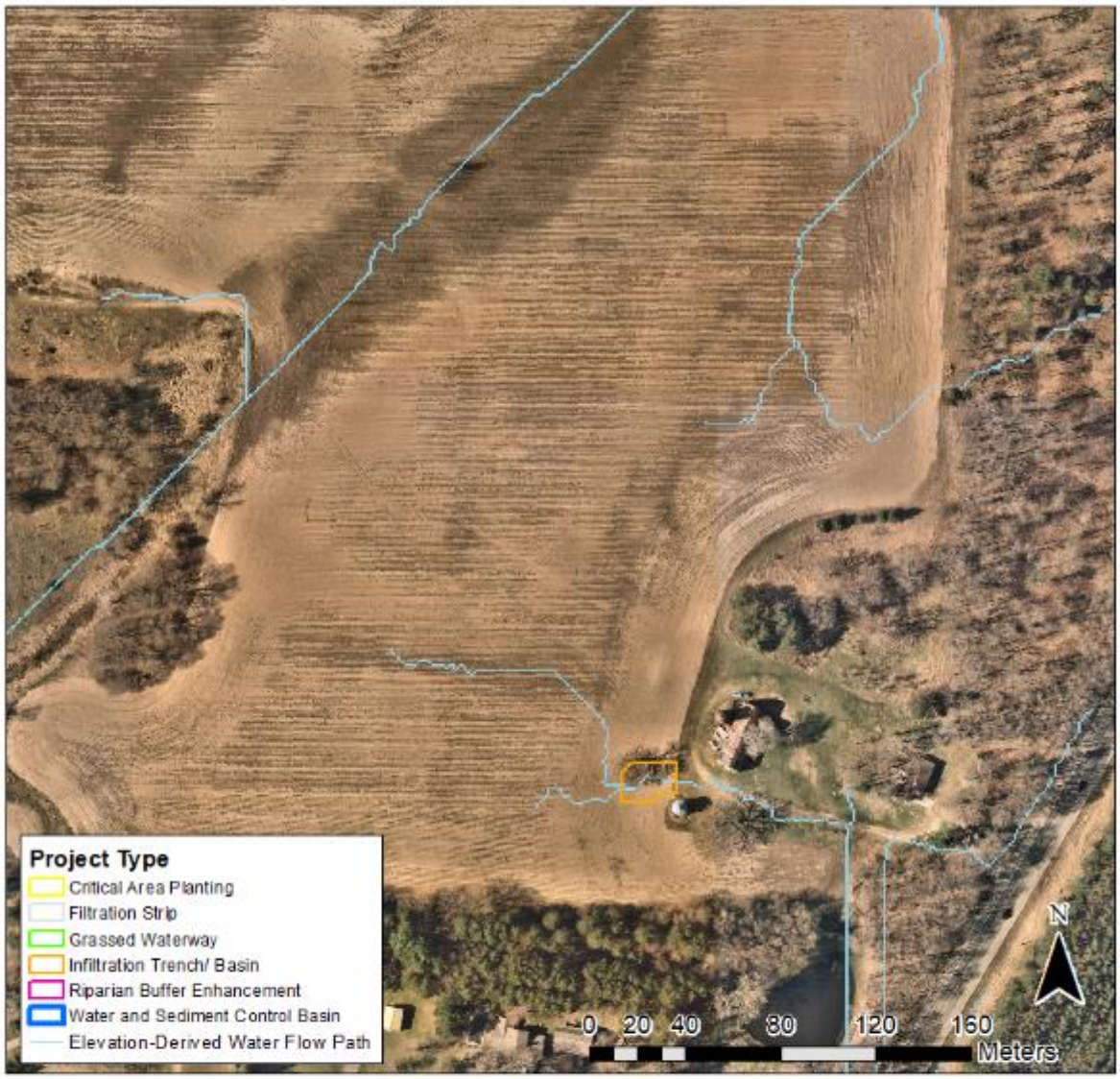
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

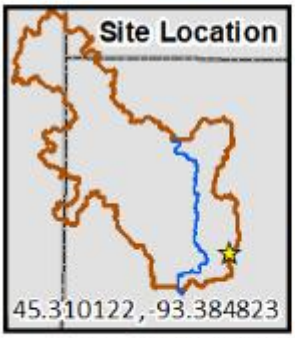




Site ID: FB-IT-05 | Field ID: F070102070705_888	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.08
TP Reduction (lbs/yr)	0.62
TSS Reduction (tons/yr)	1.89
TN Reduction (lbs/yr)	11.81
Useful Life (years)	20
Useful Life Total Cost Estimate	20,076
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**1,621.44**

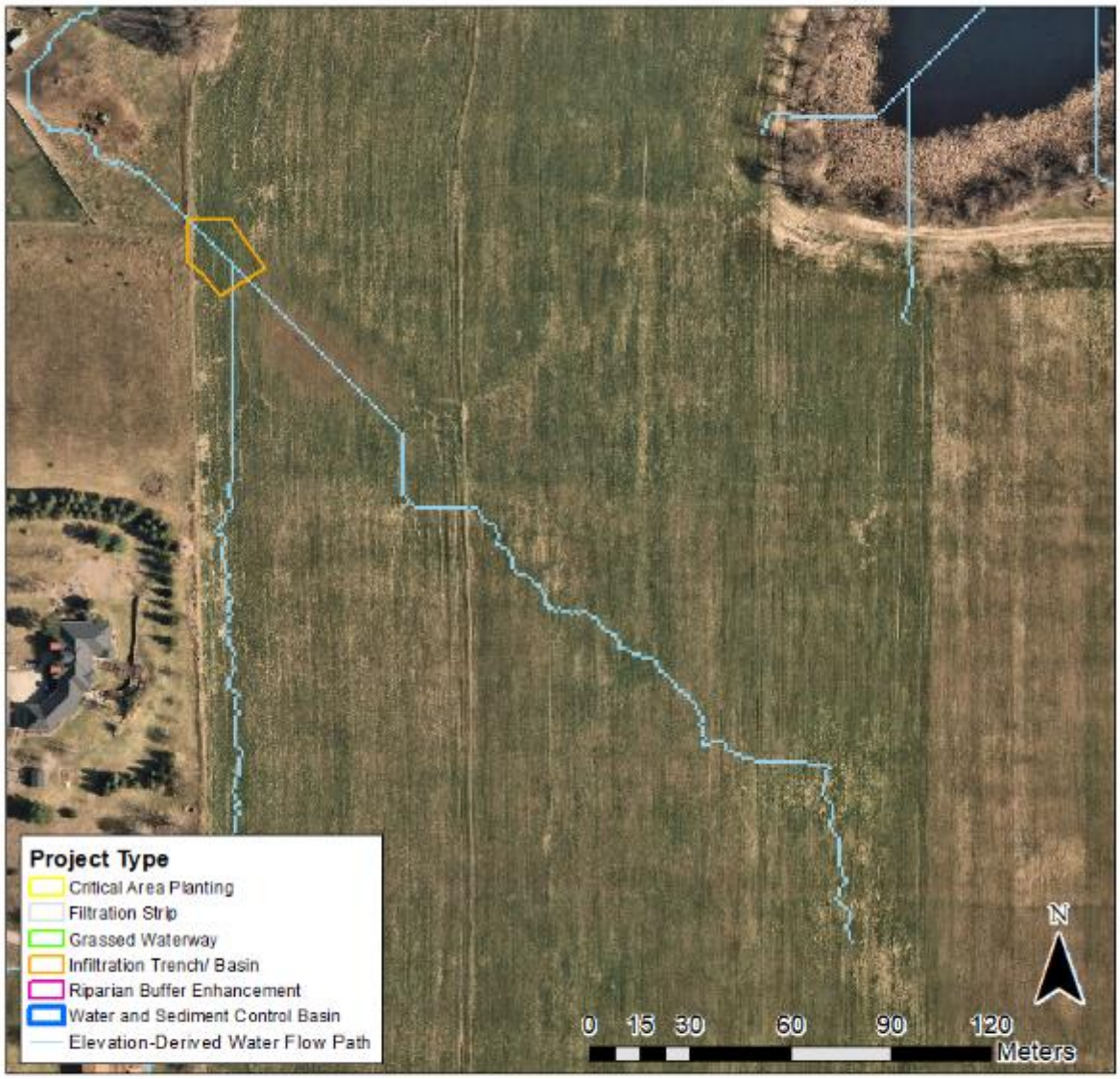
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

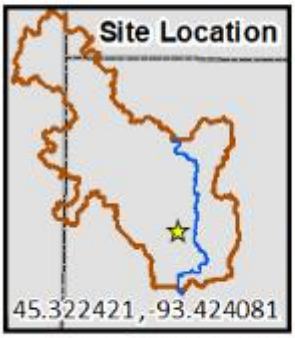




Site ID: FB-IT-06 | Field ID: F070102070705_217	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.18
TP Reduction (lbs/yr)	0.48
TSS Reduction (tons/yr)	1.18
TN Reduction (lbs/yr)	8.95
Useful Life (years)	20
Useful Life Total Cost Estimate	23,992
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,517.25**

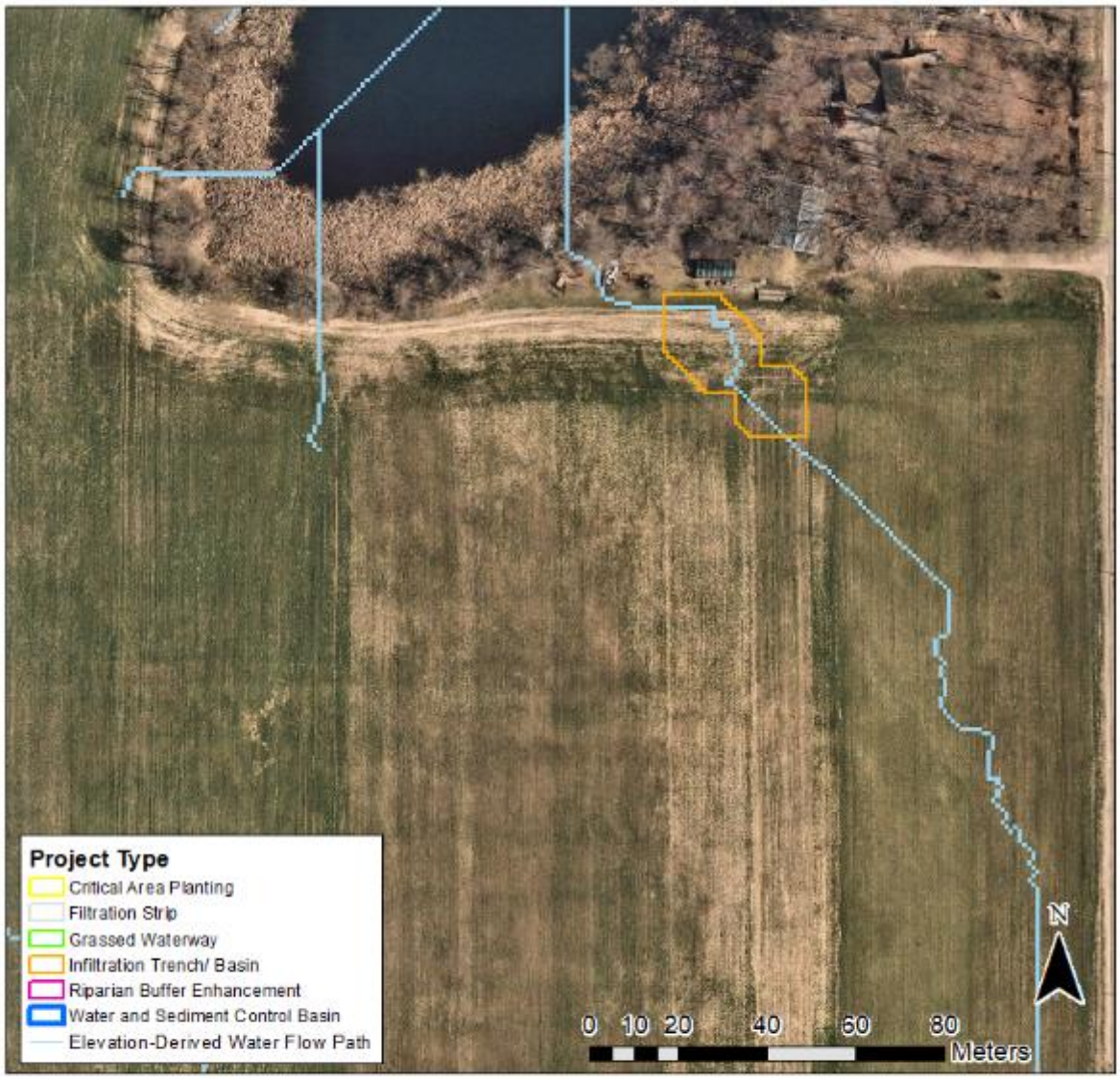
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

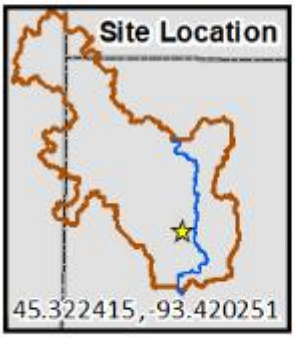




Site ID: FB-IT-07 | Field ID: F070102070705_478	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.26
TP Reduction (lbs/yr)	0.54
TSS Reduction (tons/yr)	1.14
TN Reduction (lbs/yr)	10.46
Useful Life (years)	20
Useful Life Total Cost Estimate	28,641
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,634.56**

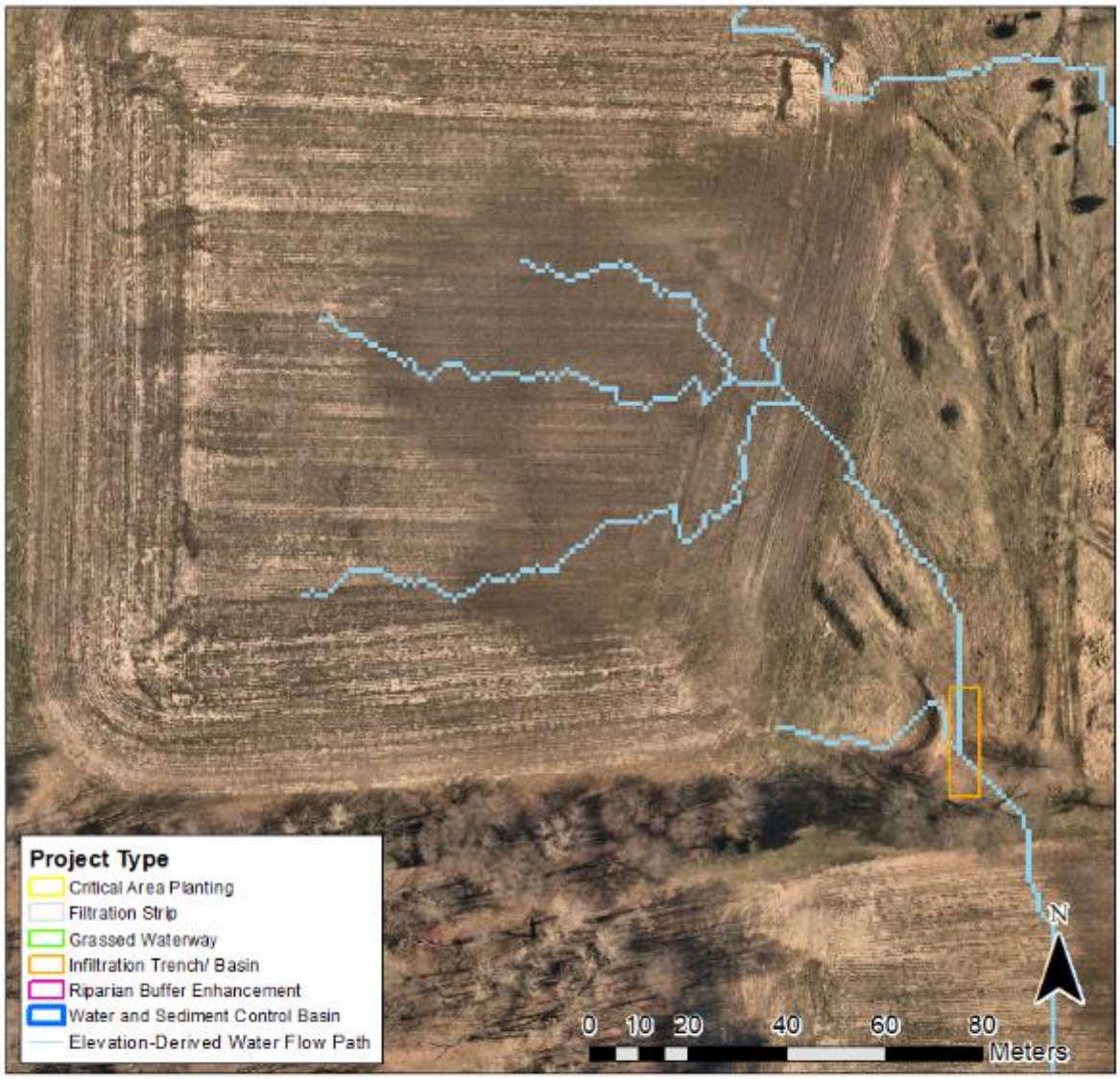
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

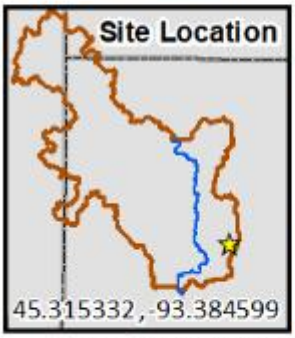




Site ID: FB-IT-08 | Field ID: F070102070705_478	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.15
TP Reduction (lbs/yr)	0.36
TSS Reduction (tons/yr)	0.62
TN Reduction (lbs/yr)	6.03
Useful Life (years)	20
Useful Life Total Cost Estimate	19,536
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,692.28**

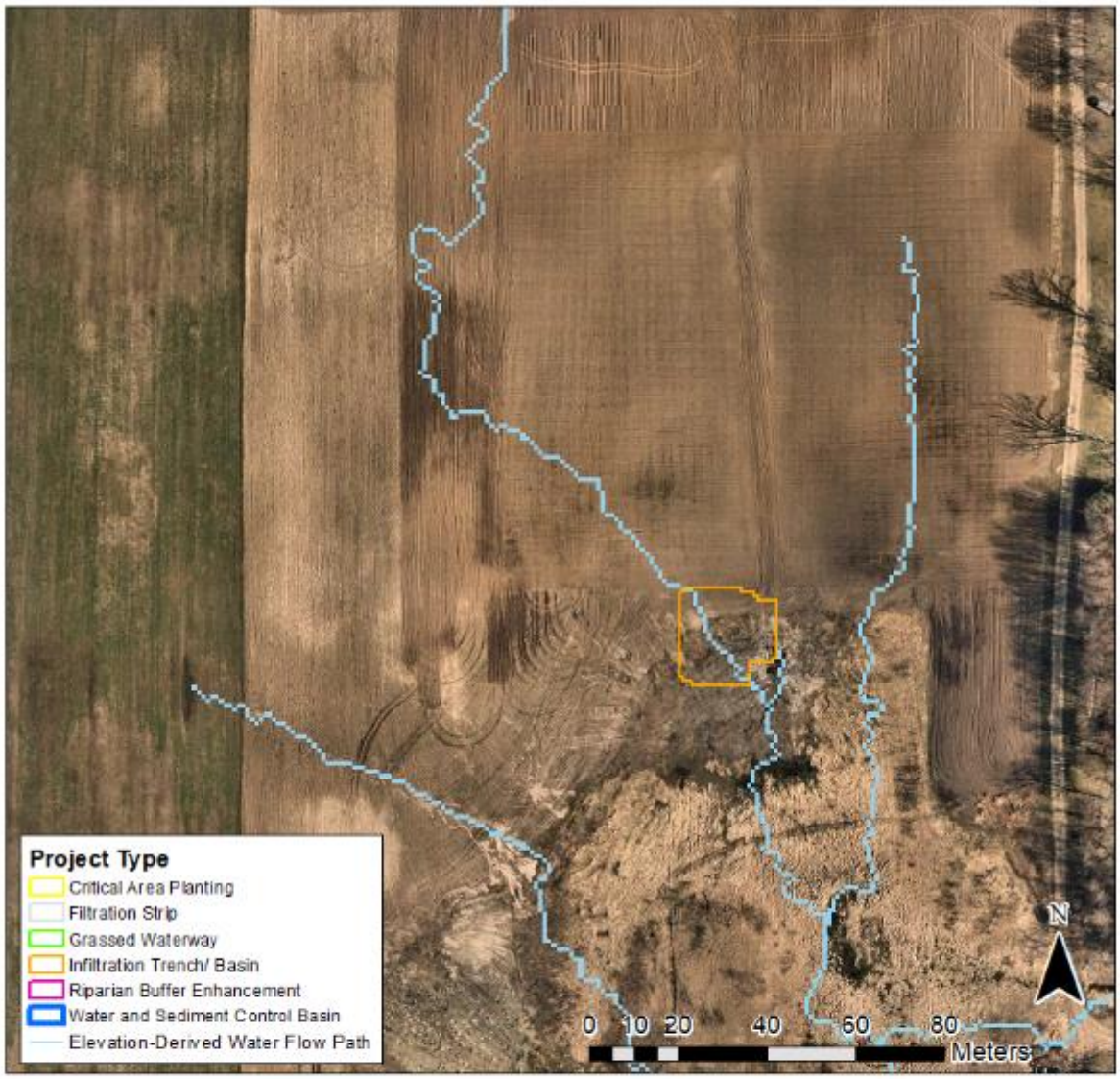
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

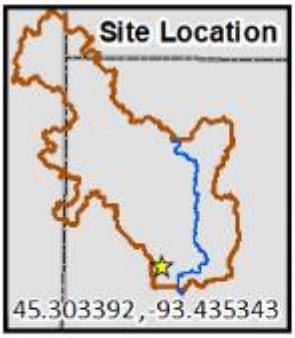




Site ID: FB-IT-09 | Field ID:	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.03
TP Reduction (lbs/yr)	0.14
TSS Reduction (tons/yr)	0.2
TN Reduction (lbs/yr)	1.92
Useful Life (years)	20
Useful Life Total Cost Estimate	8,504
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**2,970.40**

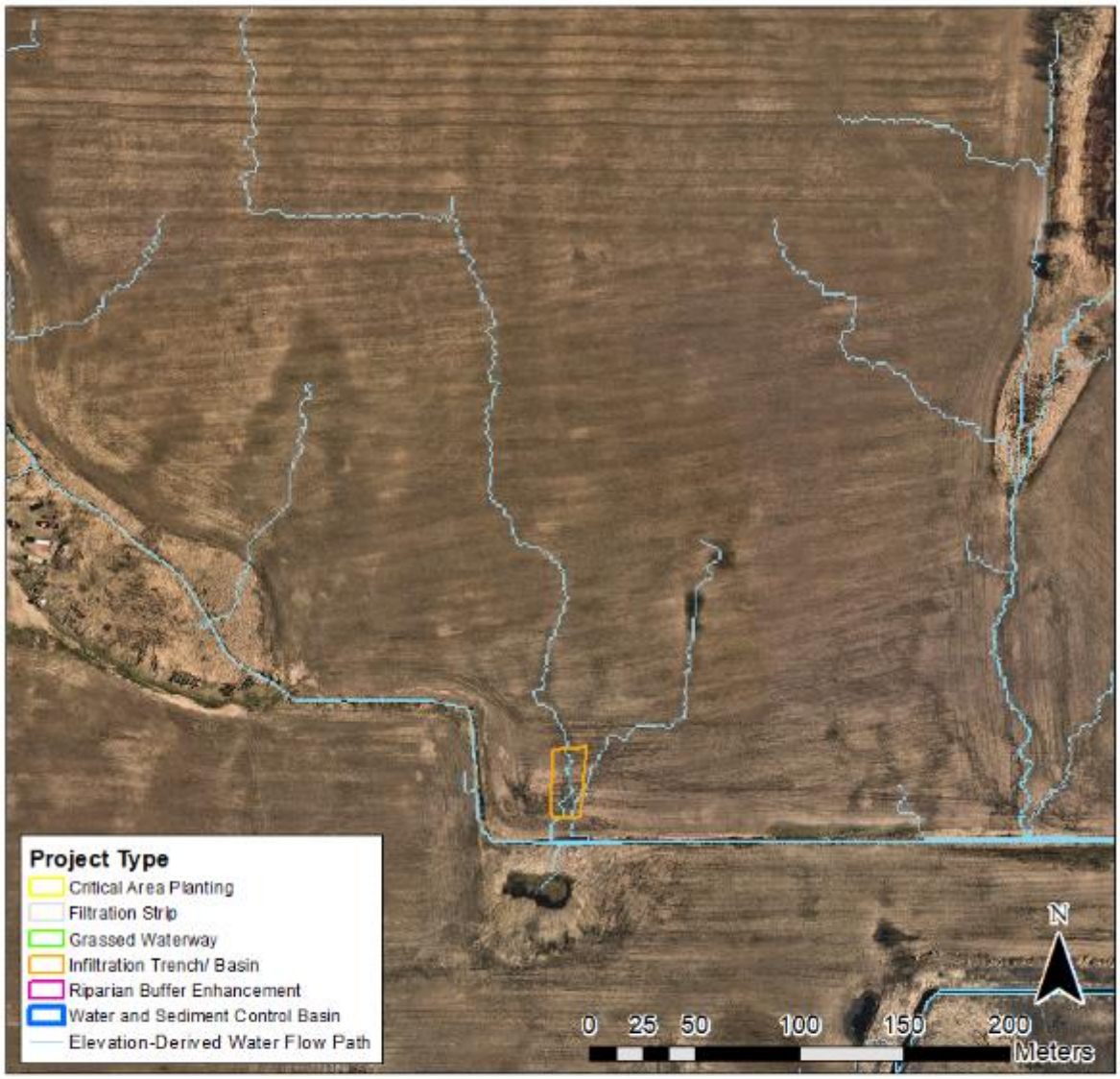
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.





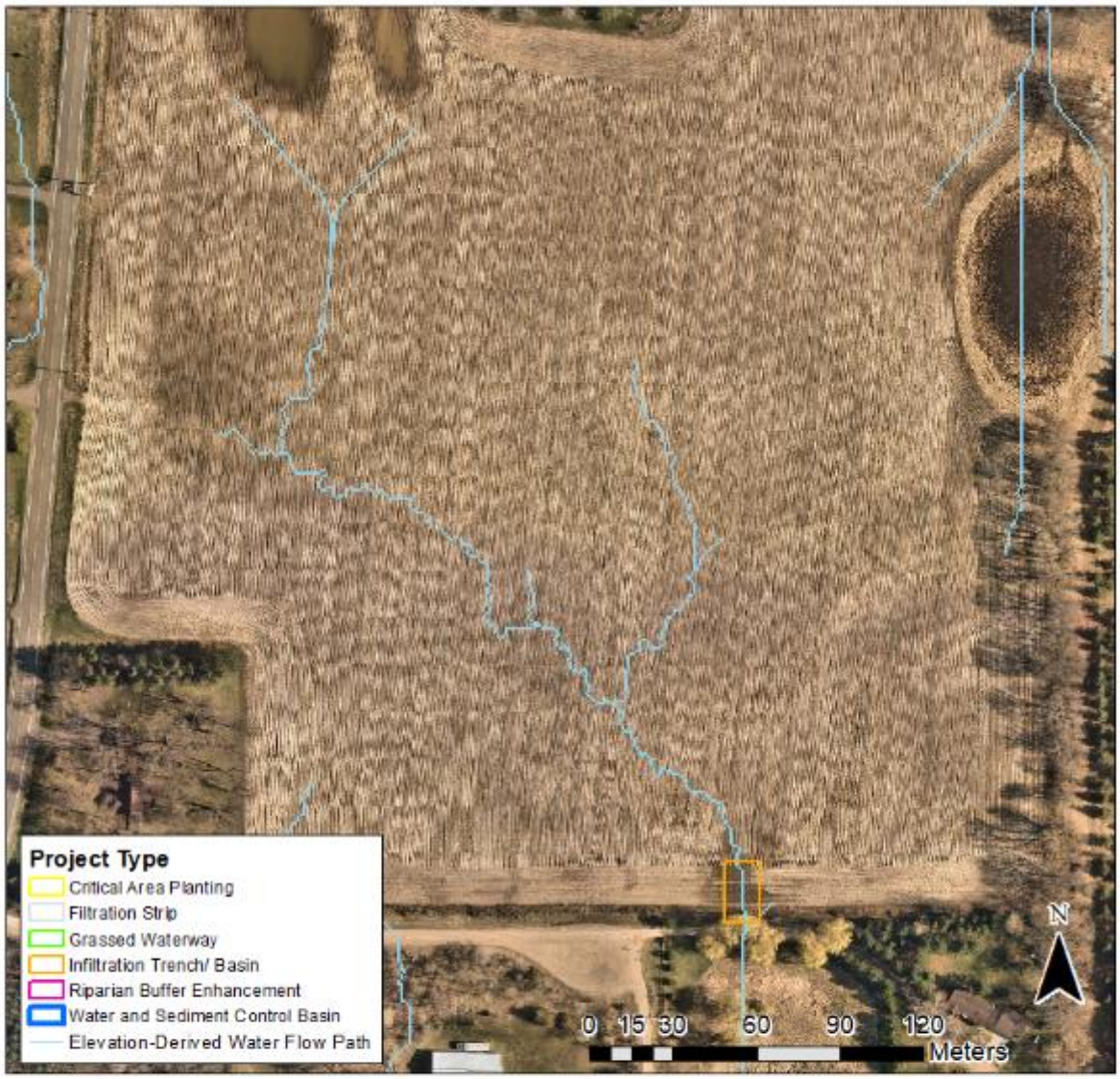
Site ID: FB-IT-10 | Field ID: F070102070705_499	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.11
TP Reduction (lbs/yr)	0.27
TSS Reduction (tons/yr)	2.04
TN Reduction (lbs/yr)	4.49
Useful Life (years)	20
Useful Life Total Cost Estimate	18,162
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**3,310.00**

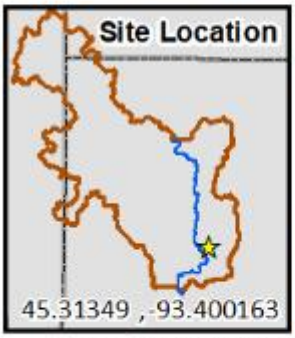
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID: FB-IT-11 | Field ID: F070102070705_132	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.15
TP Reduction (lbs/yr)	0.29
TSS Reduction (tons/yr)	1.8
TN Reduction (lbs/yr)	5.6
Useful Life (years)	20
Useful Life Total Cost Estimate	19,616
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**3,382.09**

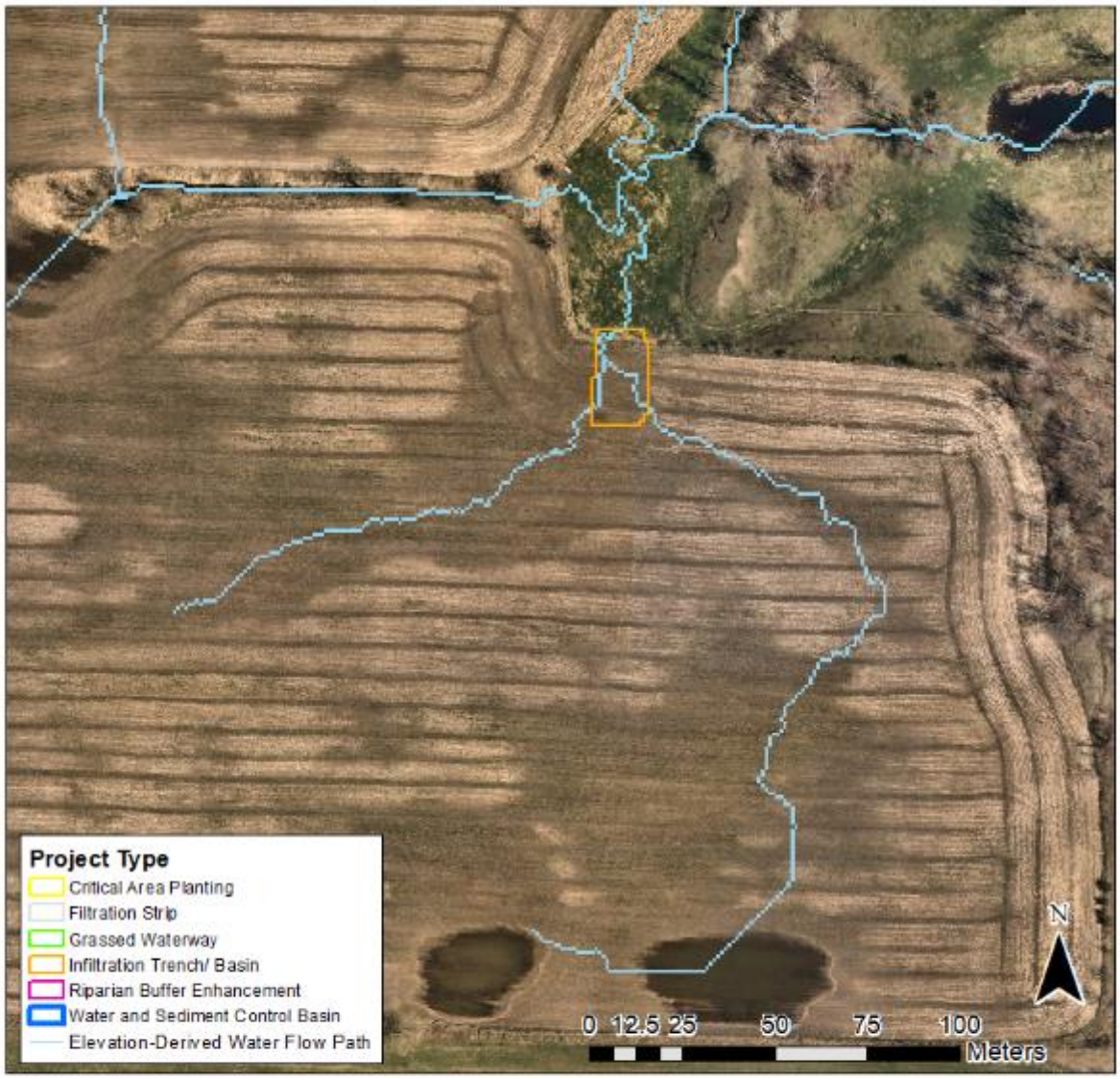
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

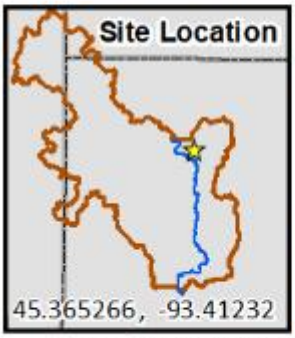




Site ID: FB-IT-12 | Field ID: F070102070705_485	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.14
TP Reduction (lbs/yr)	0.48
TSS Reduction (tons/yr)	5.73
TN Reduction (lbs/yr)	8.46
Useful Life (years)	20
Useful Life Total Cost Estimate	34,663
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**3,586.70**

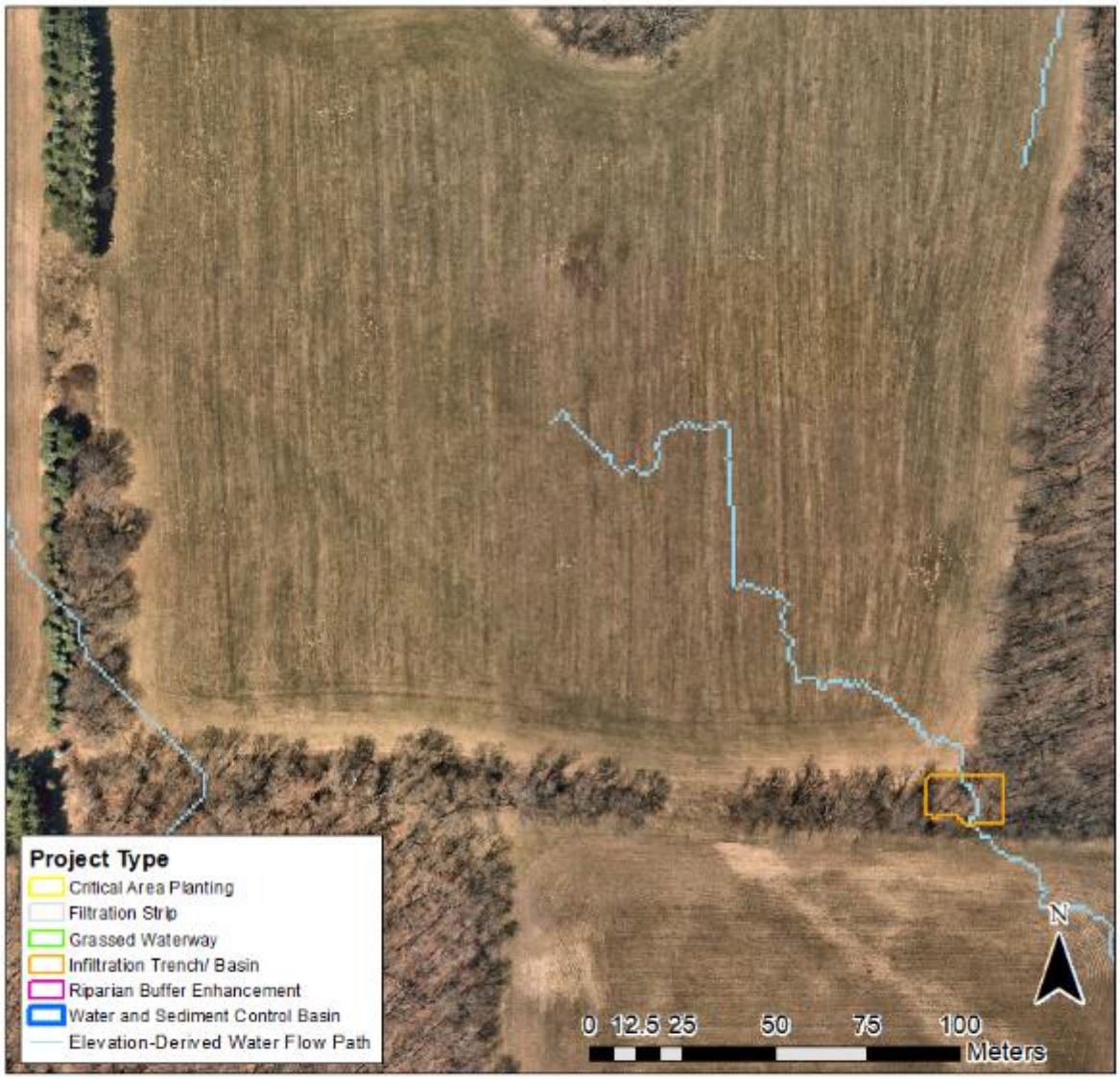
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

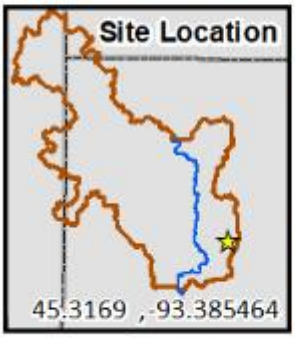




Site ID: FB-IT-13 | Field ID: F070102070705_547	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.17
TP Reduction (lbs/yr)	0.32
TSS Reduction (tons/yr)	2.23
TN Reduction (lbs/yr)	6.12
Useful Life (years)	20
Useful Life Total Cost Estimate	24,670
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**3,873.01**

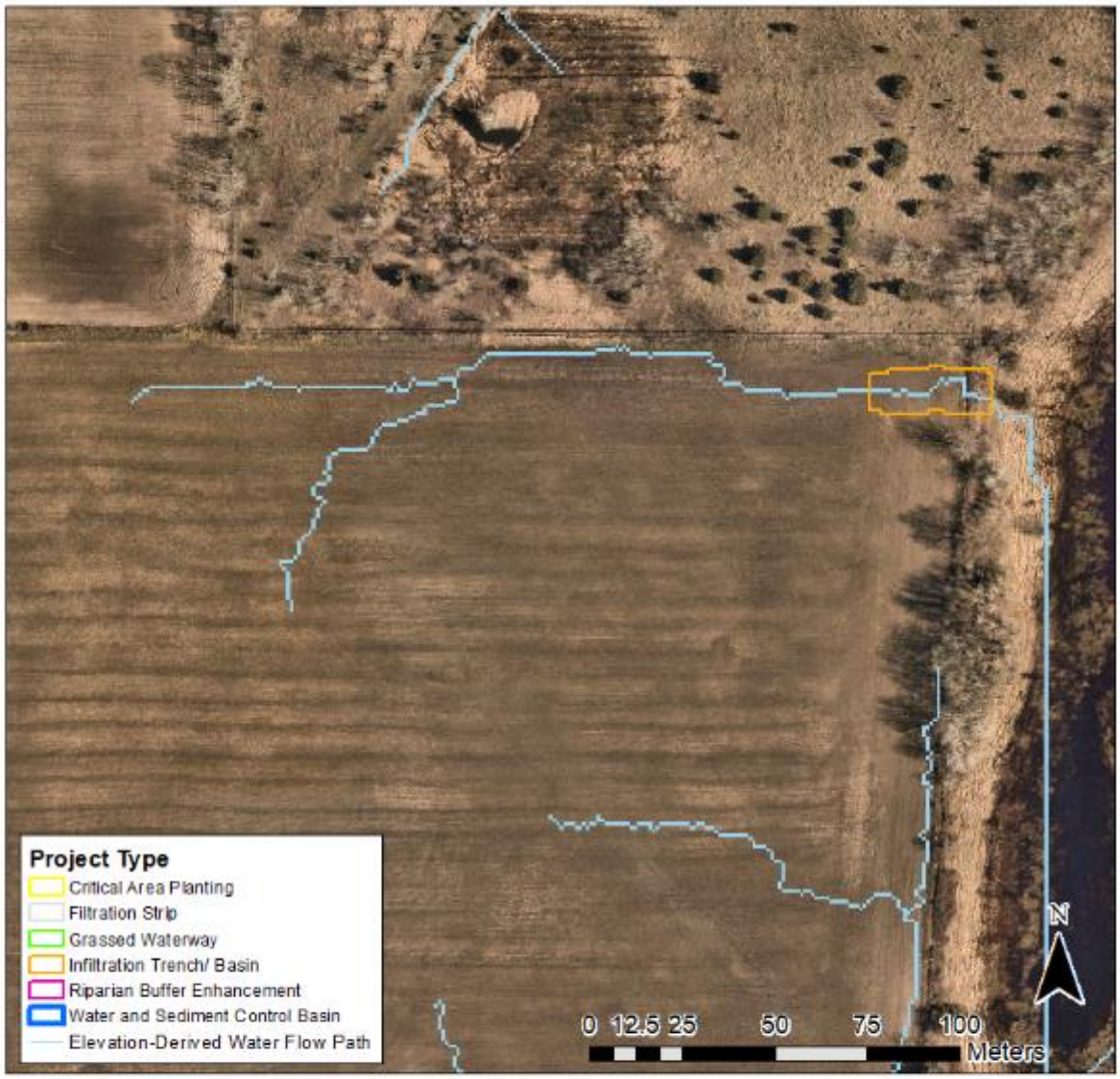
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

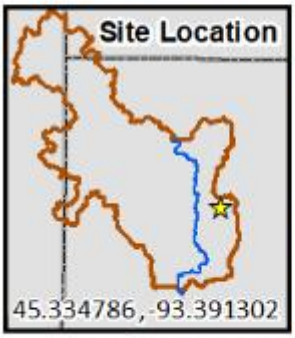




Site ID: FB-IT-14 | Field ID: F070102070704_255	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.06
TP Reduction (lbs/yr)	0.23
TSS Reduction (tons/yr)	0.52
TN Reduction (lbs/yr)	4.5
Useful Life (years)	20
Useful Life Total Cost Estimate	19,723
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**4,212.25**

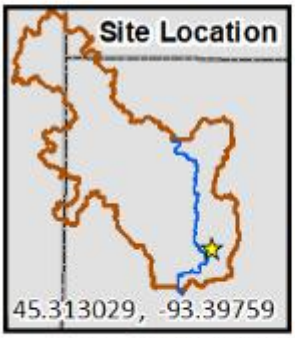
Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.





Site ID: FB-IT-15 | Field ID: F070102070705_132	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.1
TP Reduction (lbs/yr)	0.19
TSS Reduction (tons/yr)	1.42
TN Reduction (lbs/yr)	3.53
Useful Life (years)	20
Useful Life Total Cost Estimate	18,318
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**4,925.41**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.



Site ID: FB-IT-16 | Field ID: F070102070705_217	
Practice Type	Infiltration Trench/ Basin
Practice Area (acres)	0.09
TP Reduction (lbs/yr)	0.18
TSS Reduction (tons/yr)	2.38
TN Reduction (lbs/yr)	3.43
Useful Life (years)	20
Useful Life Total Cost Estimate	24,819
Cost Effectiveness ($/lb TP reduced at the Ford Brook Outlet/yr)	**6,933.90**

Practice boundaries mapped herein were approximated for watershed-level project siting and ranking purposes. If this project is pursued, additional site-specific information should be collected to refine these boundaries as needed.

Appendix O: All Candidate Agricultural BMPS Organized by Field Boundary

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
F070102070703_725					
FB_RT-11	11.8	1.64	387	235.64	1
FB-NT-28	11.8	1.57	488	311.45	1
FB-CC-25	11.8	2.00	1,223	611.36	1
F070102070704_255					
FB-NT-31	13.7	1.71	604	353.26	1
FB-CC-22	11.0	2.15	1,298	602.04	1
FB-IT-14	0.1	0.23	19,723	4,212.25	20
F070102070705_115					
FB_RT-02	19.0	2.86	474	166.11	1
FB-NT-05	19.2	2.77	636	230.04	1
FB-CC-03	19.0	3.48	1,423	409.16	1
FB-WR-16	10.8	5.41	47,774	588.70	15
FB-PC-07	11.4	1.83	32,654	1,784.55	10
FB-WR-44	1.5	0.60	19,255	2,138.42	15
F070102070705_116					
FB_RT-03	19.4	2.93	486	166.11	1
FB-NT-04	19.4	2.79	643	230.04	1
FB-CC-04	19.4	3.56	1,459	409.16	1
F070102070705_118					
FB-NT-09	22.0	3.69	933	252.60	1
FB_RT-17	22.0	3.87	744	385.31	1
FB-CC-11	22.0	4.71	2,365	501.76	1
FB-PC-02	7.4	1.41	22,605	1,608.76	10
F070102070705_132					
FB-RB-01	1.1	5.50	3,893	70.77	10

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB-WR-04	1.9	6.49	21,441	220.22	15
FB-NT-13	141.1	20.91	5,521	264.07	1
FB-RB-03	3.4	4.04	10,782	267.21	10
FB-FS-01	1.1	0.90	2,560	283.71	10
FB-GW-05	4.4	1.38	13,586	490.90	20
FB-CC-13	123.8	23.34	11,851	507.54	1
FB-FS-04	1.9	0.46	2,538	551.25	10
FB-FS-05	1.4	0.43	2,548	588.80	10
FB-GW-16	0.8	0.19	2,683	724.54	20
FB-GW-17	7.6	1.97	28,749	729.91	20
FB-GW-20	1.0	0.21	3,302	786.16	20
FB-FS-08	0.6	0.29	2,450	854.32	10
FB-GW-23	1.1	0.27	5,426	997.90	20
FB-CP-03	4.1	1.26	13,362	1,064.56	10
FB-CP-08	3.6	0.96	11,936	1,237.56	10
FB-CP-13	2.1	0.56	7,592	1,363.20	10
FB-FS-09	0.7	0.17	2,368	1,404.05	10
FB_RT-29	123.6	19.13	3,790	1,454.51	1
FB-CP-26	0.8	0.20	3,301	1,667.06	10
FB-PC-06	8.9	1.49	26,506	1,777.89	10
FB-CP-32	0.5	0.13	2,344	1,813.60	10
FB-CP-34	0.6	0.15	2,773	1,885.58	10
FB-WR-40	3.6	0.95	28,483	2,005.82	15
FB-WR-43	0.4	0.34	10,700	2,088.20	15
FB-IT-11	0.1	0.29	19,616	3,382.09	20
FB-IT-15	0.1	0.19	18,318	4,925.41	20
F070102070705_166					
FB-NT-25	17.3	2.53	784	309.79	1

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB-CC-29	17.3	3.23	2,048	634.11	1
FB_RT-28	16.9	2.59	621	718.56	1
FB-PC-09	5.5	0.91	17,594	1,930.78	10
F070102070705_207					
FB_RT-01	24.7	3.84	622	162.14	1
FB-NT-02	24.7	3.66	821	224.23	1
FB-WR-08	11.4	10.13	49,039	322.63	15
FB-CC-02	24.7	4.67	1,870	400.03	1
FB-GW-03	10.8	3.00	27,546	459.32	20
FB-CP-02	8.0	2.23	23,612	1,059.73	10
FB-WR-45	3.9	0.87	29,857	2,289.42	15
F070102070705_217					
FB-NT-15	97.5	14.35	3,848	268.03	1
FB-GW-04	2.7	0.83	7,997	480.63	20
FB-GW-13	2.4	0.65	8,235	631.43	20
FB-FS-06	2.2	0.39	2,521	645.32	10
FB-IT-03	0.6	2.16	27,966	648.59	20
FB-CC-32	97.5	18.32	9,478	801.56	1
FB-WR-22	5.8	2.82	35,752	844.86	15
FB-CP-05	3.6	1.09	11,975	1,097.50	10
FB-CP-11	1.9	0.53	6,943	1,304.44	10
FB-CP-17	1.0	0.29	4,118	1,433.81	10
FB-PC-05	22.5	3.96	68,459	1,726.68	10
FB-WR-37	3.0	0.99	26,408	1,770.67	15
FB-IT-06	0.2	0.48	23,992	2,517.25	20
FB-IT-16	0.1	0.18	24,819	6,933.90	20
F070102070705_261					

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB-NT-27	24.3	3.27	1,019	311.34	1
FB_RT-23	24.3	3.43	810	472.57	1
FB-IT-01	0.3	2.53	25,963	513.99	20
FB-IT-02	0.4	2.32	25,147	541.26	20
FB-CC-27	24.3	4.18	2,568	614.64	1
FB-GW-18	1.7	0.39	5,735	730.09	20
FB-CP-19	1.7	0.43	6,449	1,493.55	10
FB-CP-22	1.3	0.32	5,150	1,598.88	10
FB-WR-47	1.7	0.55	20,436	2,461.27	15
F070102070705_289					
FB-NT-06	26.5	4.59	1,102	239.96	1
FB_RT-16	26.5	4.81	875	363.61	1
FB-GW-01	2.6	0.89	6,916	386.48	20
FB-CC-08	26.5	5.86	2,768	472.46	1
FB-GW-08	0.8	0.26	2,827	545.02	20
FB-CP-04	1.8	0.61	6,558	1,083.08	10
FB-IT-04	0.1	1.75	43,761	1,251.97	20
FB-CP-14	0.7	0.21	2,882	1,380.98	10
FB-PC-01	22.3	4.33	64,112	1,482.02	10
F070102070705_297					
FB_RT-08	5.2	0.91	197	215.87	1
FB-NT-17	5.2	0.87	242	278.01	1
FB-CC-20	5.2	1.11	640	576.43	1
F070102070705_344					
FB_RT-05	6.6	1.19	244	204.25	1
FB-NT-14	6.6	1.14	302	264.72	1
FB-CC-17	6.6	1.45	787	541.58	1

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB-GW-15	0.5	0.14	1,977	719.21	20
FB-CP-23	0.4	0.12	1,849	1,608.14	10
F070102070705_37					
FB-NT-16	21.7	3.36	914	271.88	1
FB_RT-20	21.7	3.52	727	421.26	1
FB-CC-15	21.7	4.29	2,310	537.97	1
FB-WR-18	3.0	2.97	26,485	594.01	15
FB-PC-03	14.7	2.54	40,810	1,609.17	10
F070102070705_437					
FB-RB-02	5.3	8.08	16,034	198.49	10
FB-WR-08	11.4	10.13	49,039	322.63	15
FB-NT-32	156.2	15.65	5,741	366.76	1
FB-CC-06	101.7	19.43	8,821	453.35	1
FB-GW-06	3.4	0.96	9,542	495.34	20
FB-WB-01	0.1	2.01	11,397	567.16	10
FB-FS-07	1.2	0.33	2,561	765.86	10
FB-GW-22	0.6	0.14	2,821	973.32	20
FB-CP-06	4.2	1.18	13,718	1,158.72	10
FB-CP-24	0.6	0.16	2,602	1,633.72	10
FB-CP-30	0.5	0.12	2,180	1,788.76	10
F070102070705_441					
FB-NT-10	30.2	4.66	1,186	254.45	1
FB-FS-03	0.8	0.81	2,746	339.66	10
FB_RT-18	25.6	4.16	815	402.18	1
FB-CC-12	25.7	5.09	2,572	506.22	1
FB-WR-30	6.6	2.14	37,860	1,180.51	15
FB-PC-04	24.2	4.22	68,489	1,622.59	10

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB-WR-41	11.4	1.58	49,105	2,069.90	15
F070102070705_446					
FB-NT-26	14.3	1.93	599	309.88	1
FB_RT-22	14.3	2.03	477	470.94	1
FB-CC-26	14.3	2.47	1,513	613.42	1
F070102070705_462					
FB_RT-15	33.2	5.83	1,007	354.04	1
FB-CC-05	33.2	7.10	3,138	441.27	1
FB-CP-01	5.7	1.78	17,887	1,002.39	10
FB-CP-29	0.7	0.17	2,920	1,768.67	10
FB-FS-02	1.0	0.91	2,611	285.48	10
FB-GW-02	7.5	2.31	20,389	442.11	20
FB-NT-03	42.0	7.03	1,611	229.25	1
FB-WR-36	8.0	1.61	41,472	1,713.15	15
FB-WR-52	4.3	0.71	31,058	2,896.39	15
F070102070705_478					
FB_RT-25	38.0	6.34	1,247	594.95	1
FB-CC-14	38.0	7.73	3,944	511.86	1
FB-CP-09	1.5	0.45	5,657	1,245.23	10
FB-CP-15	0.7	0.21	2,950	1,412.22	10
FB-CP-20	1.0	0.26	4,044	1,552.57	10
FB-GW-07	2.0	0.61	6,239	512.53	20
FB-GW-21	0.8	0.18	3,064	861.56	20
FB-IT-07	0.3	0.54	28,641	2,634.56	20
FB-IT-08	0.1	0.36	19,536	2,692.28	20
FB-NT-12	38.0	6.05	1,573	259.75	1
F070102070705_485					

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB_RT-14	26.9	4.45	703	318.35	1
FB-CC-01	26.9	5.43	2,127	392.19	1
FB-CP-07	2.3	0.72	8,366	1,168.65	10
FB-GW-09	2.7	0.80	8,782	549.56	20
FB-IT-12	0.1	0.48	34,663	3,586.70	20
FB-NT-01	24.4	3.87	838	216.18	1
F070102070705_499					
FB_RT-04	13.5	2.39	445	186.63	1
FB-CC-09	13.5	2.91	1,408	484.50	1
FB-CP-10	1.2	0.38	4,733	1,261.29	10
FB-GW-10	1.5	0.47	5,190	554.11	20
FB-IT-10	0.1	0.27	18,162	3,310.00	20
FB-NT-08	13.5	2.28	561	246.52	1
F070102070705_547					
FB_RT-06	25.2	3.56	753	211.42	1
FB-CC-16	25.2	4.34	2,339	538.83	1
FB-CP-16	2.7	0.65	9,342	1,431.44	10
FB-GW-14	3.9	0.95	12,546	659.09	20
FB-IT-13	0.2	0.32	24,670	3,873.01	20
FB-NT-19	25.1	3.39	961	283.94	1
F070102070705_548					
FB_RT-24	15.5	2.15	549	512.73	1
FB-CC-31	15.5	2.61	1,762	674.04	1
FB-CP-33	0.5	0.12	2,242	1,879.26	10
FB-GW-19	0.7	0.17	2,486	734.39	20
FB-NT-30	15.5	2.05	684	333.93	1
F070102070705_60					

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB_RT-13	7.8	1.13	279	246.36	1
FB-CC-30	7.8	1.38	898	650.08	1
FB-CP-21	1.2	0.30	4,771	1,566.27	10
FB-CP-31	0.6	0.14	2,490	1,789.89	10
FB-GW-12	1.7	0.43	5,236	614.58	20
FB-NT-29	7.8	1.08	347	320.68	1
F070102070705_65					
FB_RT-26	46.9	7.56	1,468	607.03	1
FB-CC-10	46.9	9.21	4,602	499.06	1
FB-CP-28	0.6	0.16	2,802	1,726.08	10
FB-NT-11	46.9	7.22	1,866	258.48	1
FB-RB-04	5.2	2.08	15,783	757.30	10
FB-WR-23	12.8	3.80	51,652	906.52	15
FB-WR-50	1.3	0.43	17,891	2,779.71	15
F070102070705_72					
FB_RT-10	9.2	1.39	321	231.24	1
FB-CC-23	9.2	1.69	1,025	606.71	1
FB-NT-22	9.2	1.32	400	302.55	1
FB-WR-07	6.3	8.00	37,218	310.33	15
F070102070705_81					
FB_RT-21	14.2	2.03	477	462.66	1
FB-CC-24	14.2	2.48	1,513	610.38	1
FB-CP-18	2.6	0.64	9,180	1,440.68	10
FB-CP-27	0.9	0.23	3,867	1,682.09	10
FB-NT-24	14.6	1.99	613	307.98	1
FB-RB-05	5.9	2.15	17,751	826.19	10
F070102070705_881					

Field and Practice ID	Practice Area (acres)	Estimated TP Reductions per Year (lbs)	Estimated Total Useful Life Project Cost	Cost Effectiveness ($/ lb TP reduced/yr)	Effective Life
FB_RT-07	7.8	1.11	239	215.27	1
FB-CC-18	7.8	1.35	744	551.14	1
FB-NT-20	7.8	1.06	306	288.02	1
F070102070705_888					
FB_RT-09	7.9	1.20	274	227.74	1
FB-CC-21	7.9	1.47	877	597.63	1
FB-IT-05	0.1	0.62	20,076	1,621.44	20
FB-NT-21	7.9	1.15	343	297.93	1
FB-PC-08	9.6	1.56	28,129	1,802.85	10
F070102070705_889					
FB_RT-12	6.6	1.00	236	236.52	1
FB-CC-28	6.6	1.22	760	624.35	1
FB-CP-12	1.7	0.48	6,476	1,337.98	10
FB-GW-11	2.4	0.67	7,791	582.35	20
FB-NT-23	6.6	0.95	294	307.76	1
FB-WR-19	1.5	2.10	18,933	601.20	15
F070102070705_89					
FB_RT-27	28.4	4.38	936	661.52	1
FB-CC-19	28.4	5.34	2,962	555.32	1
FB-NT-18	28.4	4.18	1,179	282.12	1
F070102070705_92					
FB_RT-19	29.8	4.51	818	404.83	1
FB-CC-07	29.8	5.49	2,506	456.03	1
FB-CP-25	0.7	0.19	3,118	1,643.47	10
FB-NT-07	38.3	5.52	1,343	243.25	1
FB-WB-02	0.0	0.46	11,620	2,527.70	10