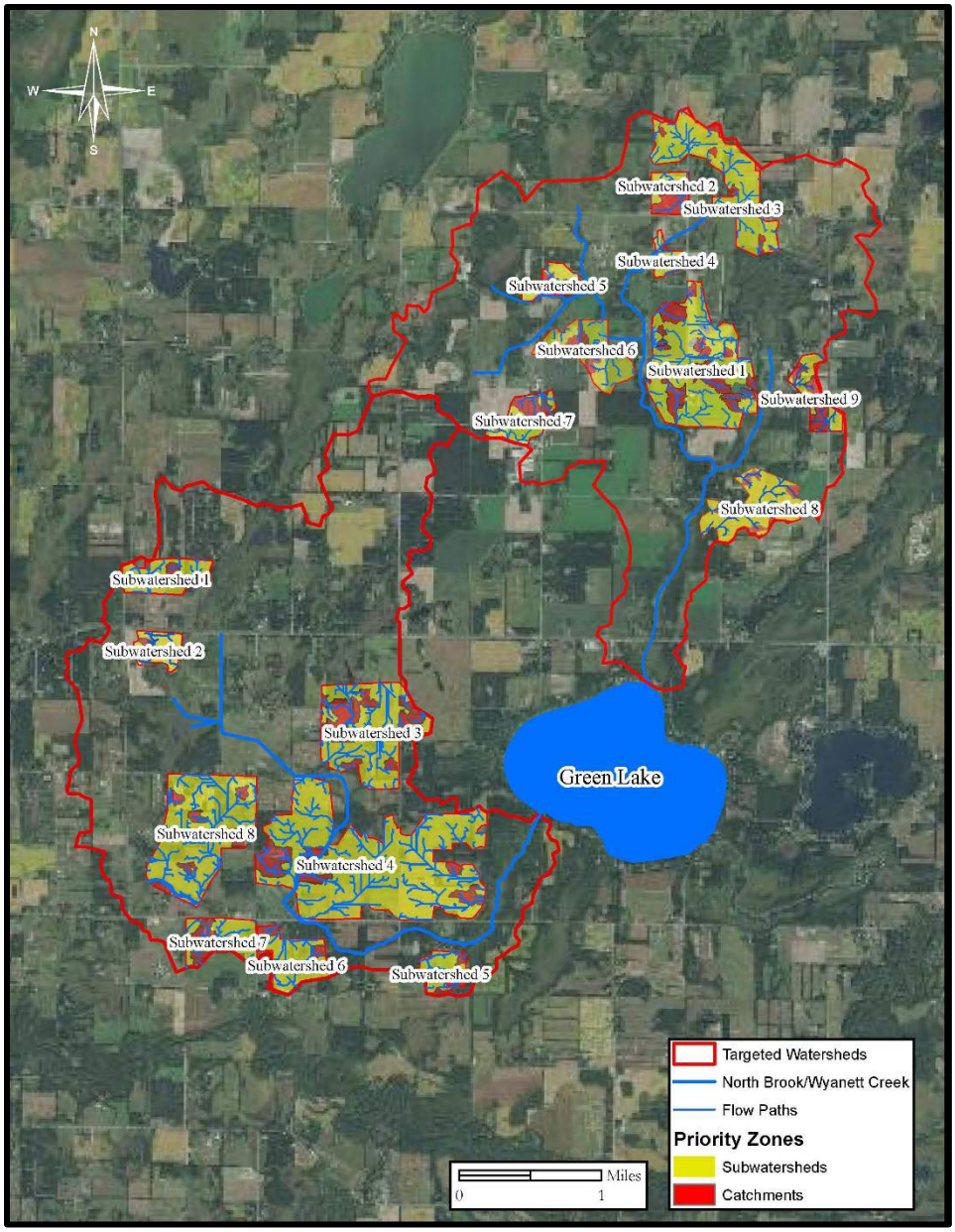

Green Lake Rural Stormwater Retrofit Analysis of North Brook and Wyanett Creek

Prepared by:

Isanti Soil and Water Conservation District

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

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Executive Summary

This study provides recommendations for cost effectively improving treatment of stormwater from areas outside of the direct drainage area (considered rural) of Green Lake; more specifically, the two major inlets: Wyanett Creek and North Brook. This report provides sufficient detail to identify projects, rank projects by cost effectiveness at removing phosphorus and begin project planning. It includes project concepts and relative cost estimates for project selection. Site specific planning, designs and refined cost estimates should be done after committed partnerships for project installation are in place. A study focusing on the direct drainage area—areas not first draining into a tributary—was completed in 2017 (Green Lake Direct Drainage SWA, 2015).

This stormwater analysis focuses on "stormwater retrofitting" and ranking projects on cost effectiveness. Stormwater retrofitting refers to adding stormwater treatment to an already developed area or areas being used for production. This process is investigative and creative. Stormwater retrofitting success is sometimes improperly judged by the number of projects installed or by comparing costs alone. Those approaches neglect to consider how much pollution is removed per dollar spent. In this stormwater analysis we estimated both costs and pollutant reductions and used them to calculate cost effectiveness of each possible project.

Green Lake has been designated as "impaired" for not meeting state water quality standards for nutrient eutrophication – excess phosphorus. The lakeshore is heavily developed and the watershed (the land area draining into the lake) is a mixture of rural residential, agricultural, wetlands and forested cover. The lakeshore homeowners formed a lake improvement district to organize and fund aquatic invasive species treatment and water quality improvement efforts to help understand lake trends. These efforts include surface water monitoring for total phosphorus and total suspended solids in the lake and four tributaries, including Wyanett Creek and North Brook. Other variables being monitored include PH, temperature, dissolved oxygen, conductivity, flow and water level. Tributary monitoring results will be used to select the drainage area to be targeted first (i.e. Wyanett Creek vs. North Brook).

Wyanett Creek, approximately 6.5 miles long, begins northwest of Green Lake, and flows into the lake on the southwest side. The majority of the 5,502 acre drainage area is located in Wyanett Township. A small portion of the drainage area also extends into Spencer Brook Township and Mille Lacs County. The majority of the land cover is row crop, hay and pasture (3,187 acres). 54 acres of the watershed is classified as low density residential. The remaining land cover consists of forests and wetlands which for the most part, border Wyanett Creek. Stream water quality monitoring efforts showed consistently high concentrations of total phosphorous (TP) during the 2016 sampling season. The average concentrations of TP for this location was 247 µg/L, significantly higher than the range of expected concentrations for this ecoregion and the TMDL Study TP goal of 100 µg/L. Furthermore, based on one season of data, Wyanett Creek is contributing more pounds of phosphorus to the lake than North Brook. These preliminary results suggest the Wyanett Creek watershed be high priority and efforts to minimize nutrient and sediment loading be taken as soon as possible.

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North Brook, just over eight miles long, flows into the lake on the north side. The entire 4,774 acres of drainage area is located in Wyanett Township. The drainage area is dominated by hay and row crops (3,018 acres). Similar to the Wyanett Creek drainage area, the land cover adjacent to North Brook is predominantly wetland and forest. Like Wyanett Creek, water quality monitoring results showed consistently high concentrations of total phosphorous (TP) during the 2016 sampling season. The average concentration of TP for this location was 181 µg/L, exceeding the range of expected concentrations for this ecoregion as well as the TMDL Study TP goal of 100 µg/L. Based on one season of data, it was determined North Brook may be contributing slightly less phosphorus to the lake than Wyanett Creek. These preliminary results suggest that conservation efforts should first focus on Wyanett Creek watershed; however, more data is needed to be certain.

The combine 10,276 acre rural watersheds were delineated through the use of NRCS Engineering Tools. Priority subwatersheds were determined using Chisago SWCD protocol (Rural Subwatershed Analysis Protocol Part 1 – Targeting). Once priority subwatersheds were established, they were focused on for Best Management Practice (BMP) implementation through a desktop search using various GIS tools and areal imagery. Field verifications were made when possible; however, limited access to private property lots hindered verification in most cases. The Chisago SWCD "Rural Subwatershed Analysis Protocol Part 2 - Prioritizing" was utilized to direct BMP site selection and modeling.

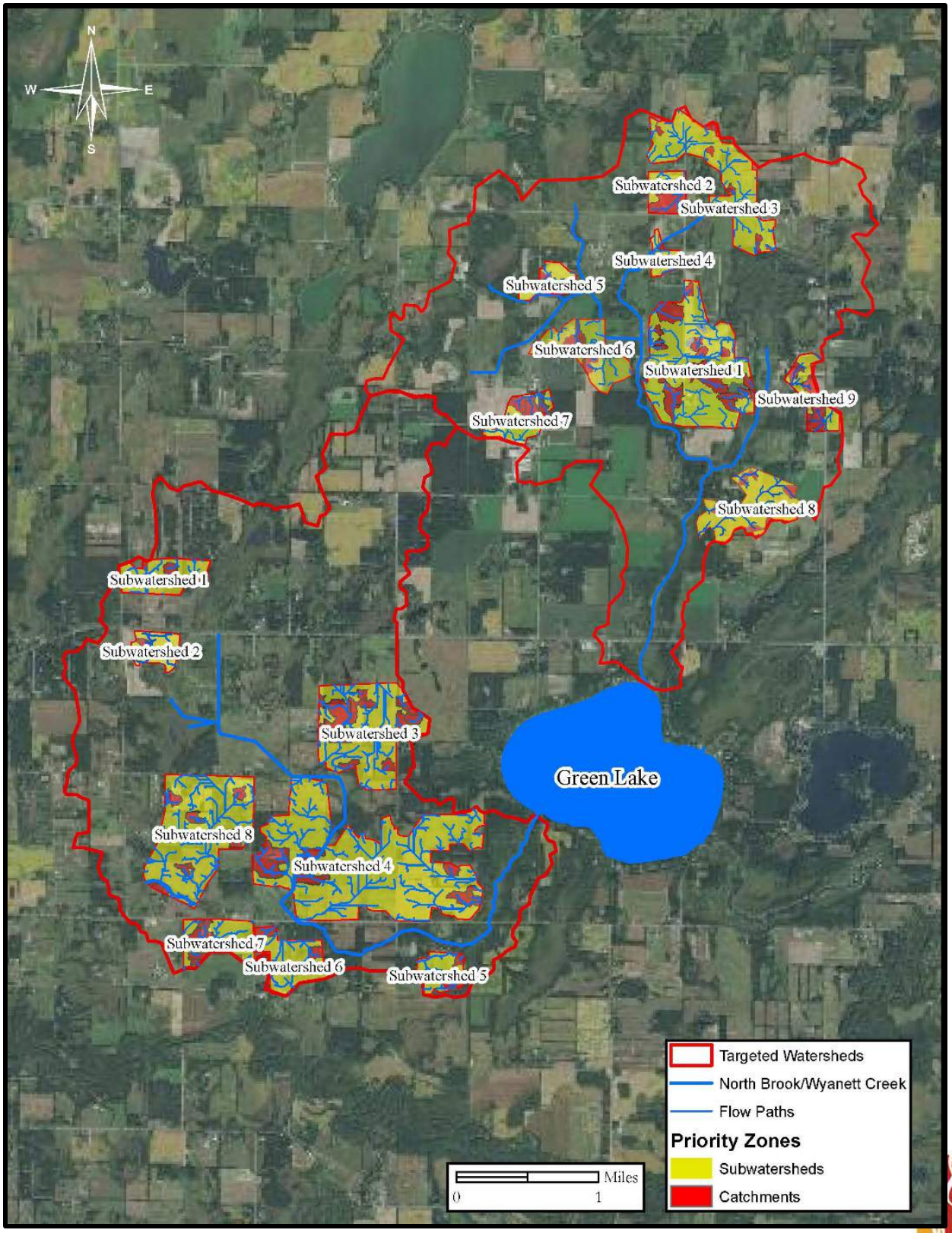
Potential stormwater retrofits identified during this analysis were then modeled to estimate reductions in total phosphorus and total suspended solids. Finally, cost estimates were developed for each retrofit project, including 10-30 years of operations and maintenance. Projects were ranked by cost effectiveness with respect to their reduction of total phosphorus.

A variety of stormwater retrofit approaches were identified. They included:

- Water and sediment control basins (WASCOB),
- Grassed waterways,
- Filter strips,
- Permanent vegetation,
- Wetland restorations.

If a project is selected, site-specific designs must be prepared. In addition, many of the proposed retrofits (e.g. water and sediment control basins) will require engineered plan sets if selected. This typically occurs after committed partnerships are formed to install the project. Committed partnerships must include willing landowners when installed on private property. Other factors, including a project's educational value/visibility, construction timing, total cost, or non-target pollutant reduction also affect project installation decisions and will need to be weighed by resource managers when selecting projects to pursue.

This document will be modified to include updates as needed.



North Brook and Wyanett Creek priority subwatersheds and catchments.

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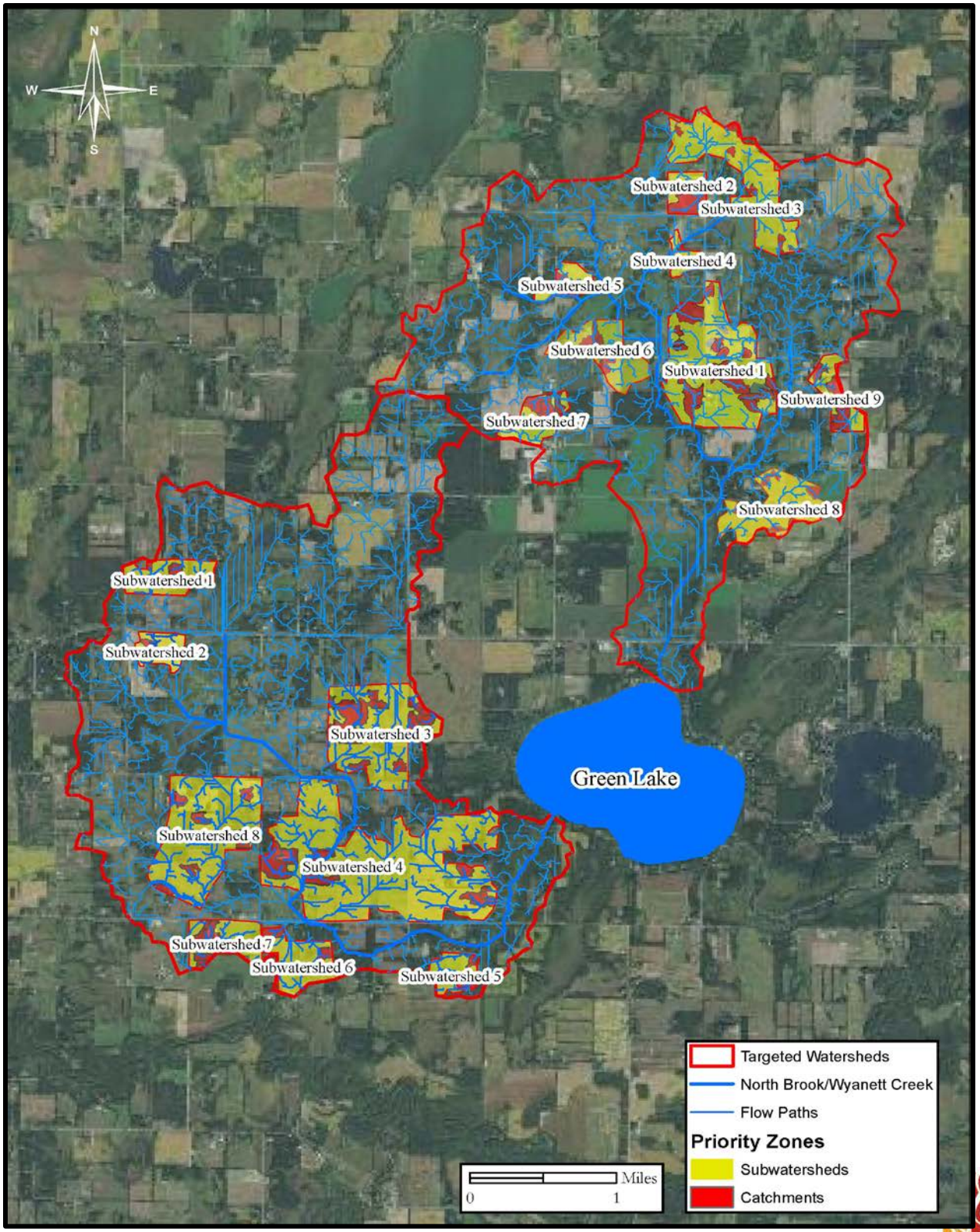

North Brook and Wyanett Creek watershed with concentrated flow paths.

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Retrofit Ranking

The tables on the next pages summarize potential projects organized from most cost effective to least, based on cost per pound of total phosphorus removed. Reported treatment levels are dependent upon optimal siting and sizing. More detail about each project can be found in the catchment profile pages of this report. Projects that were deemed unfeasible due to prohibitive size, number, or were too expensive to justify installation are not included in the tables on the next pages.

Installing all of these projects is unlikely due to funding limitation and landowner interest. Instead, it is recommended that projects be installed I order of cost-effectiveness (points of pollution reduced per dollar spent). Other factors, including a projects educational value, visibility, construction timing, total cost, focusing on upstream projects that benefit all lakes, or non-target pollutant reduction also affect project installation decisions and will need to be weighted by resource managers when selecting projects.

North Brook Watershed BMP ranking based on $ per lb of TP removed						
BMP Characteristics				Cost-Benefit		
Project Ranking	Priority Zone	Sub-Basin	Applicable Practice	Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
1	4	2	Filter Strip	173.55	2.71	$64.04
2	4	1	Filter Strip	224.91	1.99	$113.02
3	1	2	Grassed Waterway	3,148.83	24.84	$126.76
4	1	1	Grassed Waterway	1,666.33	13.14	$126.81
5	6	2	Grassed Waterway	895.43	3.51	$255.11
6	1	14	Grassed Waterway	539.63	1.54	$350.41
7	3	2	Grassed Waterway	978.45	2.74	$357.10
8	7	3	Grassed Waterway	1,476.57	3.98	$371.00
9	3	3	Grassed Waterway	806.48	2.02	$399.25
10	1	5	Grassed Waterway	824.27	1.86	$443.16
11	1	4	Grassed Waterway	1,197.86	2.69	$445.30
12	1	8	Grassed Waterway	1,891.67	4.12	$459.14
13	2	2	Grassed Waterway	2,223.75	4.79	$464.25
14	8	1	Grassed Waterway	1,043.68	2.23	$468.02
15	9	1	Grassed Waterway	1,043.68	2.23	$468.02
16	8	5	Grassed Waterway	1,191.93	2.51	$474.87
17	1	9	Grassed Waterway	1,553.66	3.19	$487.04
18	7	4	Grassed Waterway	1,571.45	2.58	$609.09
19	1	12	Grassed Waterway	1,476.57	2.42	$610.15
20	7	1	Grassed Waterway	646.37	1.05	$615.59
21	7	5	Grassed Waterway	2,496.53	4.02	$621.03

Table 1: North Brook Watershed Project Ranking

Table 1 Continued: North Brook Watershed Project Ranking

North Brook Watershed BMP ranking based on $ per lb of TP removed						
BMP Characteristics				Cost-Benefit		
22	9	3	Grassed Waterway	1,856.09	2.97	$624.95
23	9	2	Grassed Waterway	2,069.57	3.31	$625.25
24	8	6	Grassed Waterway	604.86	0.96	$630.06
25	7	2	Grassed Waterway	978.45	1.53	$639.51
26	9	4	Grassed Waterway	2,336.42	3.62	$645.42
27	3	1	Grassed Waterway	907.29	1.29	$703.33
28	3	6	Grassed Waterway	1,387.62	1.97	$704.38
29	3	5	Grassed Waterway	670.09	0.95	$705.36
30	3	4	Grassed Waterway	2,621.06	3.48	$753.18
31	8	4	WASCOB	17,548.62	7.69	$2,282.01
32	8	2	WASCOB	26,469.99	9.18	$2,883.44
33	4	3	Grassed Waterway	1,601.10	0.52	$3,079.04
34	1	13	WASCOB	17,058.44	4.92	$3,467.16
35	8	3	WASCOB	31,567.91	6.53	$4,834.29
36	6	3	WASCOB	35,097.25	3.86	$9,092.55
37	1	3	WASCOB	46,763.65	5	$9,352.73
38	9	5	WASCOB	50,391.02	3.8	$13,260.79
NA	1	6	Wetland Restoration	TBD	TBD	TBD
NA	1	7	Wetland Restoration	TBD	TBD	TBD
NA	1	10	Wetland Restoration	TBD	TBD	TBD
NA	1	11	Wetland Restoration	TBD	TBD	TBD
NA	2	1	Wetland Restoration	TBD	TBD	TBD
NA	4	4	Wetland Restoration	TBD	TBD	TBD
NA	6	1	Wetland Restoration	TBD	TBD	TBD
NA	5	1	Wetland Restoration	TBD	TBD	TBD

Table 2: Wyanett Creek Watershed Project Ranking

Wyanett Creek Watershed BMP ranking based on $ per lb of TP removed						
BMP Characteristics				Cost-Benefit		
Project Ranking	**Priority Zone**	**Sub-Basin**	**Applicable Practice**	**Practice Cost**	**P reduction (lb/yr)**	**$ per lb TP Removed**
24	4	6	Grassed Waterway	$2,217.82	10.86	$204.22
30	5	2	Grassed Waterway	$2,140.73	8.09	$264.61
37	7	3	Grassed Waterway	$1,310.53	4.46	$293.84
42	8	4	Grassed Waterway	$1,719.70	5.81	$295.99
20	4	3	Grassed Waterway	$990.31	3.16	$313.39
44	8	6	Grassed Waterway	$1,701.91	5.32	$319.91
41	8	3	Grassed Waterway	$2,057.71	6.08	$338.44
39	8	1	Grassed Waterway	$1,856.09	5.39	$344.36
11	3	6	Grassed Waterway	$1,061.47	2.81	$377.75
29	5	1	Grassed Waterway	$776.83	2.03	$382.67
45	8	7	Grassed Waterway	$2,158.52	5.45	$396.06
8	3	3	Grassed Waterway	$889.50	2.23	$398.88
40	8	2	Grassed Waterway	$2,235.61	5.45	$410.20
17	3	12	Grassed Waterway	$2,793.03	6.57	$425.12
18	4	1	Grassed Waterway	$2,567.69	5.95	$431.54
14	3	9	Filter Strip	$135.60	0.31	$437.42
13	3	8	Filter Strip	$447.48	1.02	$438.71
12	3	7	Filter Strip	$440.70	1	$440.70
36	7	2	Grassed Waterway	$2,235.61	4.96	$450.73
28	4	10	Grassed Waterway	$1,743.42	3.8	$458.79
26	4	8	Grassed Waterway	$1,950.97	4.25	$459.05

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Table 2 Continued: Wyanett Creek Watershed Project Ranking

Wyanett Creek Watershed BMP ranking based on $ per lb of TP removed						
BMP Characteristics				Cost-Benefit		
27	4	9	Grassed Waterway	$1,915.39	4.17	$459.33
31	6	1	Grassed Waterway	$1,197.86	2.51	$477.24
35	7	1	Grassed Waterway	$1,197.86	2.51	$477.24
15	3	10	Grassed Waterway	$1,802.72	3.48	$518.02
33	6	3	Grassed Waterway	$1,310.53	2.49	$526.32
10	3	5	Grassed Waterway	$1,014.03	1.76	$576.15
2	1	2	Grassed Waterway	$1,535.87	2.56	$599.95
1	1	1	Grassed Waterway	$1,862.02	3.1	$600.65
25	4	7	Grassed Waterway	$1,209.72	2	$604.86
4	2	1	Grassed Waterway	$2,318.63	3.66	$633.51
32	6	2	Grassed Waterway	$2,235.61	3.51	$636.93
3	1	3	Grassed Waterway	$1,470.64	2.28	$645.02
43	8	5	Filter Strip	$716.76	0.67	$1,069.79
9	3	4	Filter Strip	$484.06	0.45	$1,075.70
46	8	8	Filter Strip	$350.98	0.28	$1,253.52
21	4	3	Filter Strip	$207.79	0.16	$1,298.68
23	4	5	Filter Strip	$211.68	0.16	$1,323.00
22	4	4	Filter Strip	$174.33	0.13	$1,340.96
7	3	2	WASCOB	$12,646.77	8.99	$1,406.76
6	3	1	WASCOB	$37,254.06	7.93	$4,697.86
16	3	11	WASCOB	$57,743.79	4.75	$12,156.59
19	4	2	WASCOB	$68,625.90	4.69	$14,632.39
38	7	4	Wetland Restoration	TBD	TBD	TBD
5	2	2	Wetland Restoration	TBD	TBD	TBD
34	6	4	Wetland Restoration	TBD	TBD	TBD

About this Document

This Stormwater Retrofit Analysis is a watershed management tool to help prioritize stormwater retrofit projects by performance and cost effectiveness. This process helps maximize the value of each dollar spent.

This document presents the findings of both Wyanett Creek and Northbrook watershed study. Both waterbodies outlet to Green Lake. The watersheds were analyzed separately and the projects identified were compared to each other only if they were in the same watershed

Rural Subwatersheds:
This covers the areas (priority subwatersheds) within the major watershed draining to Wyanett Creek and Northbrook. The Chisago SWCD protocol "Rural Subwatershed Analysis Protocol Part 1-Targeting" was used to highlight the areas with the highest potential for contributing sediment and nutrients to Wyanett Creek and North Brook. Using computer analytic tools, catchments were identified within the subwatersheds that would likely benefit from a water quality project.

Document Organization

This document is organized into three major sections plus references. Each section is briefly described below.

Methods

The methods section outlines general procedures used when analyzing the watersheds. It overviews the processes of retrofit scoping, desktop analysis, retrofit reconnaissance investigation, cost/treatment analysis, and project ranking.

Catchment Profiles

Each catchment and priority subwatershed was given a unique ID number. For each catchment, the following information is detailed:

Catchment Description

Within each catchment profile is a table that summarizes basic catchment information including acres, and land cover. A brief description of the land cover, stormwater infrastructure, and any other important general information is also described.

Retrofit Recommendations

The recommendation section describes the conceptual retrofit(s) that were scrutinized. It includes tables outlining the estimated pollutant removals by each, as well as costs. A map provides promising locations for each retrofit approach.

Retrofit Ranking

This section ranks stormwater retrofit projects across all selected catchments to create a prioritized project list. The list is sorted by cost per pound of total phosphorus removed for each project. The final cost per pound treatment value includes installation and maintenance costs. Projects identified were ranked against each other if they shared the same watershed. There were wetland restorations identified that were not ranked. Further analysis is needed to determine the cost benefit for the wetland projects identified.

There are many possible ways to prioritize projects, and the list provided in this report is merely a starting point. Other considerations for prioritizing installation may include:

- Non-target pollutant reductions
- Timing projects to occur with other road or utility work
- Project visibility
- Availability of funding
- Total project costs
- Educational value
- Landowner willingness

References

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

Appendices

This section provides supplemental information and/or data used at various point along the assessment protocol

Methods:

Selection of Subwatershed

Many factors are considered when choosing which subwatershed to assess for stormwater retrofits, but always focus on the drainage to an important lake, river, or stream. Water quality monitoring data, non-degradation report modeling, and TMDL studies are just a few of the resources available to help determine which waterbodies are a priority. Assessments supported by a Local Government Unit with sufficient capacity (staff, funding, available GIS data, etc.) to greater facilitate the assessment also rank highly. The focus is always on a high priority waterbody.

Rural Subwatershed Selection

This assessment includes the area of land draining to Wyanett Creek and Northbrook that eventually drain into Green Lake. NRCS tools were used to identify subwatersheds and Chisago SWCD targeting protocol was utilized to identify subwatersheds that had the highest potential for pollutant loading.

Targeted pollutants for this study were total phosphorus and total suspended solids. Total phosphorus is a nutrient commonly associated with stormwater that causes excessive algae production and low oxygen levels in lakes and rivers. Total suspended solids was also chosen as a target pollutant because it is also commonly associated with stormwater and causes turbidity in lakes and rivers. Suspended solids are also important because many other pollutants, such as phosphorus or heavy metals, are attached to the particles.

Subwatershed Assessment Methods

Step 1: Retrofit Scoping

Retrofit scoping includes determining the objectives of the retrofits (volume reduction, target pollutant, etc.) and the level of treatment desired. It involves meeting with local land use managers and lake improvement district members to determine the issues in the subwatershed. This step also helps to define preferred retrofit treatment options and retrofit performance criteria. In order to create a manageable area to assess in large subwatersheds, a focus area may be determined.

Step 2: Desktop Retrofit Analysis

The desktop analysis involves computer-based scanning of the subwatershed for potential retrofit catchments and/or specific sites. This step also identifies areas that don't need to be assessed because of existing stormwater infrastructure or current land uses. Accurate GIS data is extremely valuable in conducting the desktop retrofit analysis. Some of the most important GIS layers include: 2-foot or finer topography, hydrology, soils, watershed/subwatershed boundaries, parcel boundaries and high-resolution aerial photography.

Step 3: Retrofit Reconnaissance Field Investigation

After identifying potential retrofit sites through the desktop search, a field investigation was conducted to evaluate each site and identify additional opportunities. Rural retrofit projects can be difficult to verify due to the location of the project. Many of the projects are located on private property and cannot be viewed from the street. Future landowner contact will be important but for now project installation success is assumed heavily on desktop analysis.

Step 4: Treatment Analysis/Cost Estimates

Sites most likely to be conducive to addressing the pollutant reduction goals and appearing to have feasible design, installation, and maintenance were chosen for a cost/benefit analysis. Estimated costs included design, installation, and maintenance annualized across the anticipated project lifespan (10-30 yrs). Estimated benefits included are pounds of phosphorus and total suspended solids removed, though projects were ranked only by cost per pound of phosphorus removed annually.

Treatment analysis

Rural Catchments:

Following watershed delineation, the Chisago Soil and Water Conservation Service Rural Targeting Protocol was utilized to determine high priority locations within the watershed (Chisago SWCD – Rural Subwatershed Analysis Protocol Part 1 – Targeting). This process uses numerous factors included in the Revised Universal Soil Loss Equation (rainfall erosivity, soil types, land use, topography) to determine which areas are more susceptible to soil loss. Catchments were delineated through the Natural Resource Conservation Service Engineering Tool. Spatial information was examined through ESRI's ArcGIS package, using the Targeting protocol as guidance. 17 priority zones were identified through this process, eight in Wyanett Creek and 9 in North Brook.

The Natural Resource Conservation Service (NRCS) Engineering Tool was utilized to determine catchments within each of the 17 priority subwatersheds. Additional information such as average slopes and concentrated flow paths were determined through the Tool as well. Following catchment determination, Chisago SWCD's Rural Priority Protocol (Part 2 – Prioritizing) was followed to determine potential rural BMP projects and to model potential pollutant reductions. Again, these projects would be located within the 17 Priority Subwatershed determined through the Targeting exercise as these areas hold the greatest potential for soil and nutrient export. A desktop analysis was completed using a variety of tools including aerial photography, topography, soils, etc. to determine potential BMP or management practice options within the 17 zones. These potential BMPs were spatially located on maps and field verified where possible.

Current conditions were determined using RUSLE2 software. All fields were assumed to utilize a corn / soybean rotation (RUSLE setting Corn FC Disk Fld Cult-Soybeans FC Disk Fld Cult) and contouring was assumed at a middle value for the absolute row grade. Board of Water and Soil Resources' (BWSR) Pollution Reduction Estimator spreadsheet was used to determine the level of phosphorus and sediment reduction achieved based on the BMP practice being utilized. Table 3 displays the most common BMPs selected for Priority Zone catchments and the modeling procedures that were utilized for each one.

Table 3. Rural catchment BMPS and modeling programs for Wyanett Creek and North Brook Subwatershed Assessment.

Parameter / BMP	*Model*
WASCOB / Grassed waterway	BWSR Spreadsheet - Gully
Filter Strip	BWSR Spreadsheet - Filter Strip; RUSLE2
Gully Stabilization	BWSR Spreadsheet - Gully
Wetland Restoration	TBD

Cost Estimates

Rural Catchments:

Cost estimates were annualized costs that incorporated installation costs, contracted annual maintenance, yearly operation and maintenance over a 10 year period, design costs and installation oversight. The cost of the project is largely dependent on the size and complexity, so these estimates were determined to be mid-range expectations for the associated project types. It should be understood that detailed site specific construction investigations were not done as part of this assessment and therefore cost estimates account for only general site consideration.

Table 4. Rural BMP practices and estimated costs.

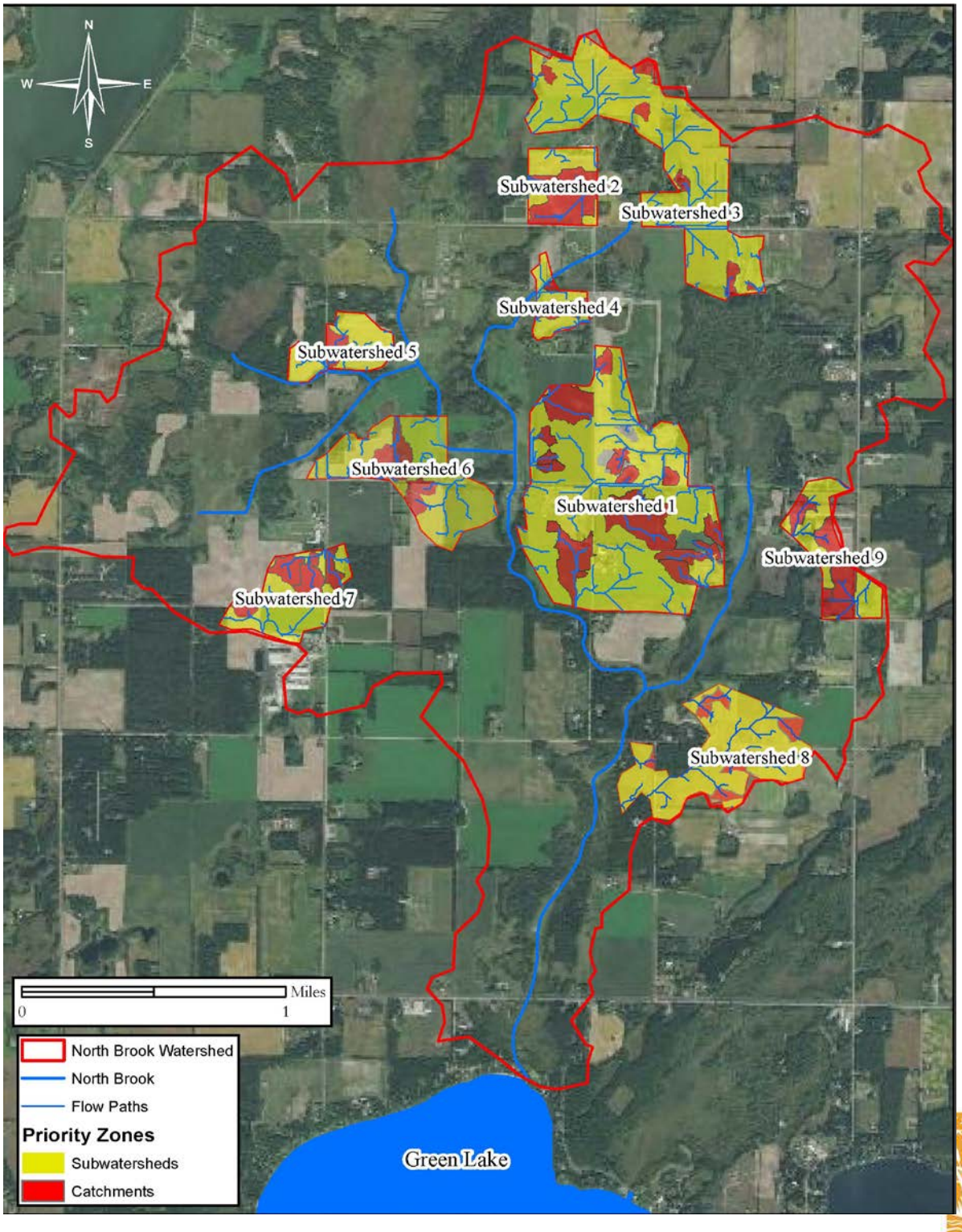
BMP	Initial Installation Cost ($/Unit)	Contracted annual maintenance cost ($/unit)	O & M Term (Years)	Design Cost ($70/hr)	Installation Oversight Cost ($70/hr)	Total Installation Cost (Including 1 year maintenance)
Grassed waterway (1,000 ft)	$4.00	$0.25	10	$1,120.00	$560.00	$5,930.00
WASCOB (0-10 acres drainage area)	$8,438.00	$100.00	10	$843.80	$421.90	$9,803.70
WASCOB (10-20 acres drainage area)	$11,250.00	$150.00	10	$1,125.00	$562.50	$13,087.50
WASCOB (20-40 acres drainage area)	$16,875.00	$200.00	10	$1,687.50	$843.75	$19,606.25
Filter strip (10 acres)	$500.00	$10.00	10	$1,120.00	$560.00	$6,780.00
Nutrient Mgmt (10 acres)	$11.00	$0.00	10	$560.00	$280.00	$950.00
Wetland Creation (10 acres)	$7,000.00	$45.00	10	$2,800.00	$1,400.00	$74,650.00
Wetland Restoration (10 acres)	$3,000.00	$45.00	10	$2,800.00	$1,400.00	$34,650.00
Permanent Vegetation (10 acre)	$400.00	$80.00	10	$1,120.00	$500.00	$6,110.00

**Cost estimates taken from Chisago SWCD report (Chisago Lakes Chain of Lakes Watershed SWA, North Center Lake Subwatershed report, 2014) except for Permanent Vegetation (Sherburne SWCD estimate).*

Evaluation and Ranking

The cost per pound of phosphorus treated was calculated for potential retrofit projects, and projects were ranked by this cost effectiveness measure. Only projects that seem realistic and feasible were considered. The recommended level was the level of treatment that would yield the greatest benefit per dollar spent while being considered feasible and not falling below a minimal amount needed to justify crew mobilization and outreach efforts. Local officials may wish to revise the recommended level based on water quality goals, finances or public opinion.

Catchment Profiles – North Brook Rural Catchments



North Brook Subwatershed and Catchments

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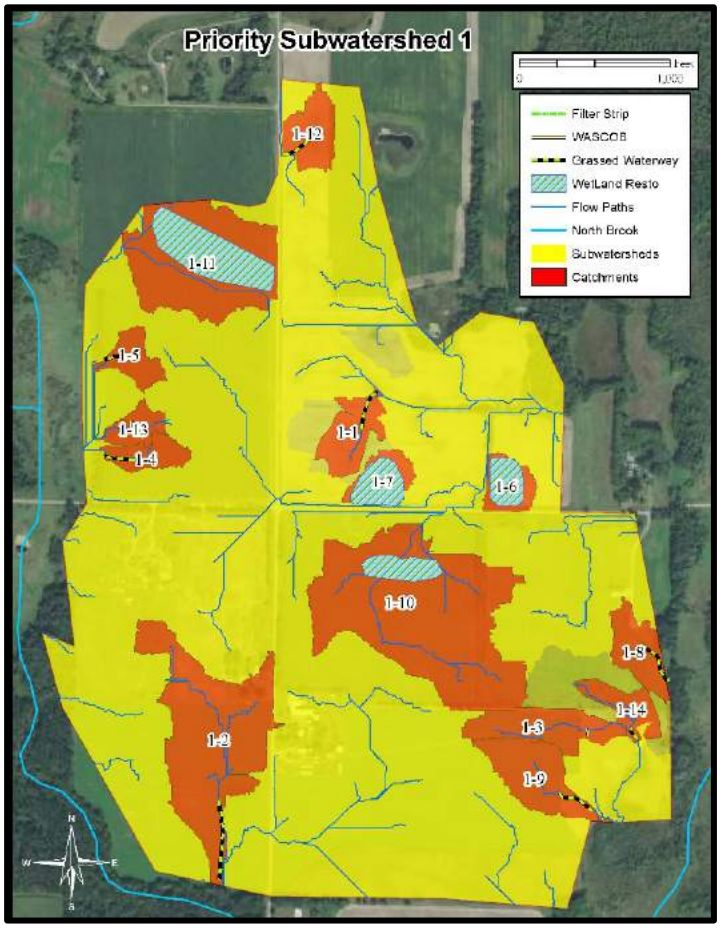
Priority Subwatershed 1

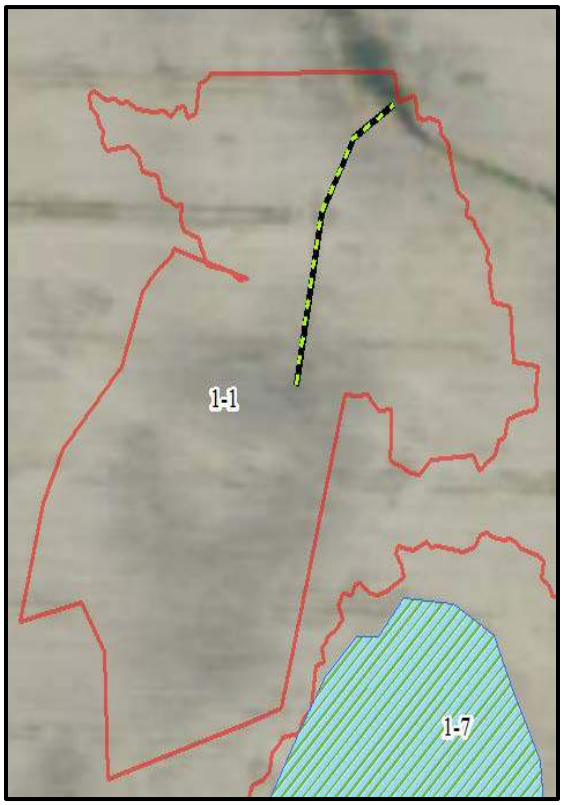
Priority subwatershed 1 is the largest identified subwatershed (351 acres). Due to the fact that North Brook flows along the east and west boarder of drainage area, it was selected area as a high priority. The majority of land use is agricultural with wetlands and forests bordering North Brook. A total of 14 catchments were identified within the area as being high priority for implementing successful water quality projects. Among the 14 identified projects, four are wetland restorations. These projects were not modeled and will need further analysis to calculate pollution reductions. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake.



Priority Subwatershed 1 Summary	
Acres addressed	65.1
Dominant Land Cover	Agricultural
Total Catchments	14
Potential BMPs	14
Potential TP reduction (lb/yr)	63.72
Potential TSS reduction (tons/yr)	74.95

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

Project ID – Grassed Waterway
Subwatershed 1
Catchment 1



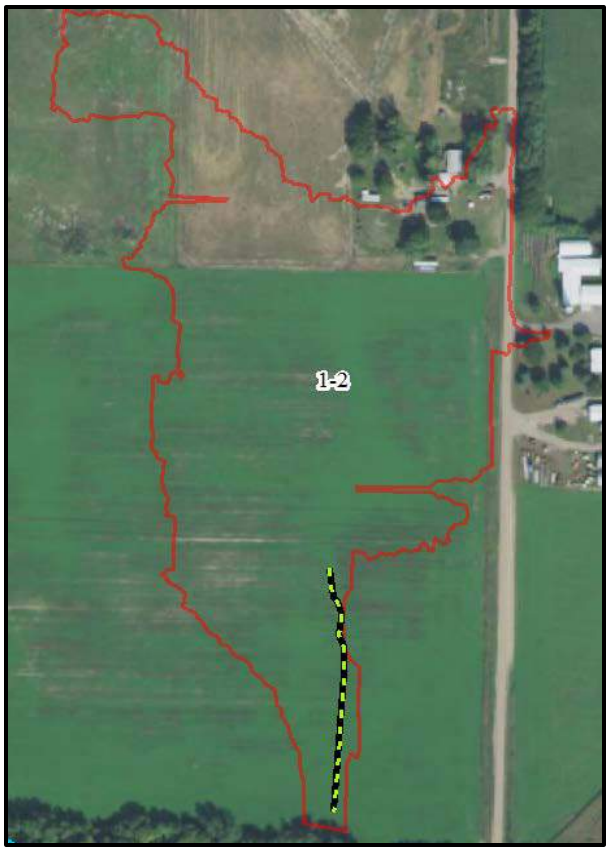
Drainage Area – 2.11 acres
Property Ownership – Private
Site Specific Information – A grassed waterway is recommended as a water quality project for this catchment. Among other criteria, topography indicated a potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. It was assumed based on aerial photography, the concentrated flow path outlets directly to an open water ditch, in turn increasing the amount of nutrient loading to North Brook and eventually Green Lake.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,666.33	**13.14**	**$126.81**

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	15.46
Acres	2.11			Soil Loss reduction (t/yr)	15.46
Soil	Blomford loamy fine sand	Vol Voided (ft^3)	281	Phosphorus reduction (lb/yr)	13.14
Average slope	2	Length (ft)	281		
		Years	1		
		Distance to SW (ft)	0		

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 2



Drainage Area – 16.5 acres
Property Ownership – Private
Site Specific Information – A grassed waterway, located on the southern portion of the catchment, is recommended as a water quality project for this catchment. Among other criteria, topography indicated a potential for gully formation, especially at rivers edge. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. It was assumed based on aerial photography, the concentrated flow path outlets directly to an open water ditch, in turn increasing the amount of nutrient loading to North Brook and eventually Green Lake.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$3,148.83	**24.84**	**$126.76**

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	29.21
Acres	16.65			**Soil Loss reduction (t/yr)**	29.21
Soil	Zimmerman fine sand and fine sand 7to 12 percent slopes	**Vol Voided (ft^3)**	531	**Phosphorus reduction (lb/yr)**	24.84
Slope length (ft)		**Length (ft)**	531		
Average slope	4.7	**Years**	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 1
Catchment 3

Drainage Area – 4.77 acres
Property Ownership – Private
Site Specific Information – Catchment 3 is 100% agricultural land use. The east section of the catchment shows steep slopes with an obvious linear depression corresponding with the elevation data. Implementing a WASCOB in this area would greatly reduce overland flow through the gullied area. Topography also indicates the practice would allow farming alteration to be kept to a minimum.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$46,763.65	**5.00**	**$9,352.73**

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	**Type**	WASCOB	**Sediment reduction (t/yr)**	5.88
Acres	4.77			**Soil Loss reduction (t/yr)**	22
Soil	Lino Loamy Fine Sand	**Vol Voided (ft^3)**	4.77	**Phosphorus reduction (lb/yr)**	5
		Length (ft)	400		
Average slope	3.41	**Years**	1		
		Distance to SW (ft)	586		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 4

Drainage Area – 2.18 acres
Property Ownership – Private
Site Specific Information – A grassed waterway, located on the western portion of the catchment, is recommended as a water quality project for this catchment. Among other criteria, topography indicated a potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. Slopes in this area are moderately steep and could benefit from establishing permanent vegetation to help stabilize soils and reduce runoff into the adjacent wetland

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,197.86	**2.69**	**$445.30**

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Grassed Waterway	Sediment reduction (t/yr)	3.16
Acres	2.18			Soil Loss reduction (t/yr)	11.11
Soil	Braham Loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	202	Phosphorus reduction (lb/yr)	2.69
		Length (ft)	202		
Average slope	3.07	Years	1		
		Distance to SW (ft)	434		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 5

Drainage Area – 2.3 acres
Property Ownership – Private
Site Specific Information – A Grassed Waterway, located on the western portion of the catchment, is recommended as a water quality project for this catchment. Among other criteria, topography indicated a potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. Slopes in this area are moderately steep and could benefit from establishing permanent vegetation to help stabilize soils and reduce runoff into the adjacent wetland.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$824.27	**1.86**	**$443.16**

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	2.19
Acres	2.33			**Soil Loss reduction (t/yr)**	7.65
Soil	Braham Loamy fine sand, 2 to 7 percent slopes	**Vol Voided (ft^3)**	139	**Phosphorus reduction (lb/yr)**	1.86
		Length (ft)	139		
Average slope	4.18	**Years**	1		
		Distance to SW (ft)	425		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Resto
Subwatershed 1
Catchment 6

Drainage Area – 2.44 acres
Property Ownership – Private
Site Specific Information – Located at the southwestern section of the agricultural field is a low depression in the landscape that would has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

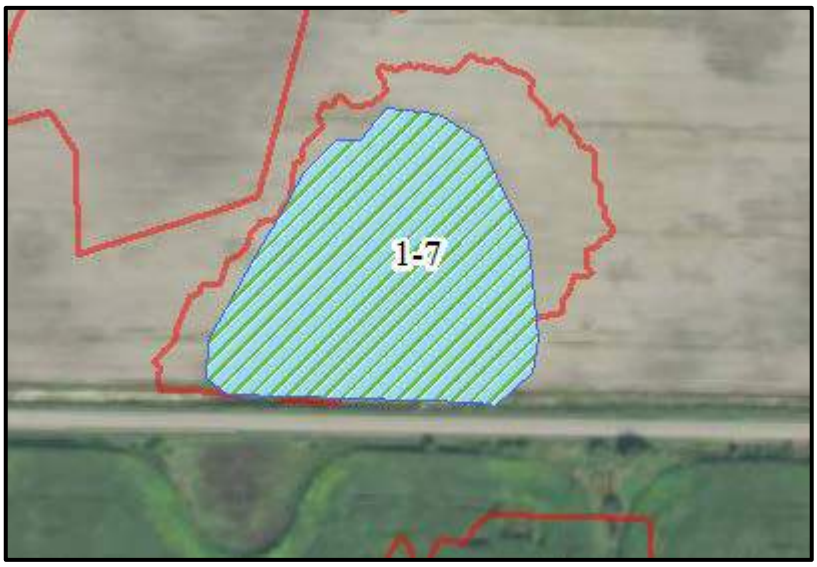
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	**Unknown**	**Unknown**

Current Conditions		Added Practice		Reduction	
Sub-Basin	6	**Type**	Wetland Resto	**Sediment reduction (t/yr)**	0
Acres	2.44			**Soil Loss reduction (t/yr)**	0
Soil	Isanti mucky loamy fine sand	**Vol Voided (ft^3)**	0	**Phosphorus reduction (lb/yr)**	0
		Length (ft)	0		
Average slope	3.79	**Years**	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 1
Catchment 7



Drainage Area – 2.7 acres.
Property Ownership – Private
Site Specific Information – Located at the southern section of the agricultural field is a low depression in the landscape that would has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

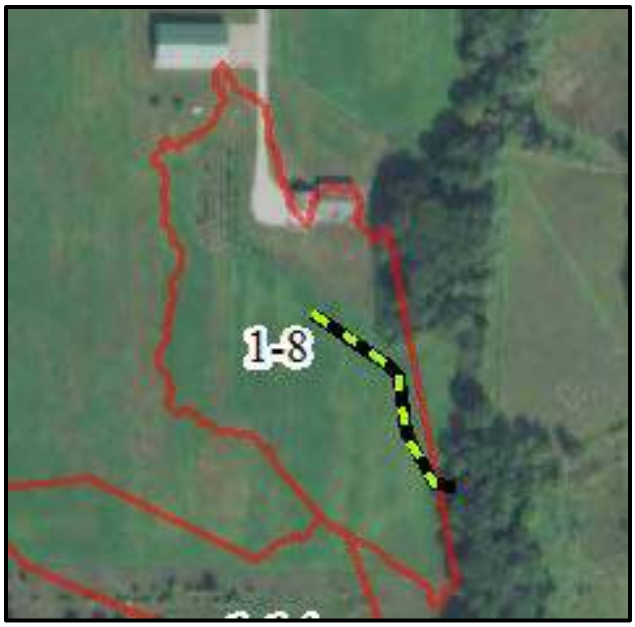
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	**Unknown**	**Unknown**

Current Conditions		Added Practice		Reduction	
Sub-Basin	7	Type	Wetland Resto	Sediment reduction (t/yr)	0
Acres	2.7			Soil Loss reduction (t/yr)	0
Soil	Isanti mucky loamy fine sand	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	0
		Length (ft)	0		
Average slope	2.86	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID –Grassed Waterway
Subwatershed 1
Catchment 8



Drainage Area – 3.28 acres
Property Ownership – Private
Site Specific Information – A Grassed Waterway, located on the eastern portion of the catchment, is recommended as a water quality project for this catchment. Among other criteria, topography indicated potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. Slopes in this area are moderately steep and could benefit from establishing permanent vegetation to help stabilize soils and reduce runoff into the adjacent wetland.

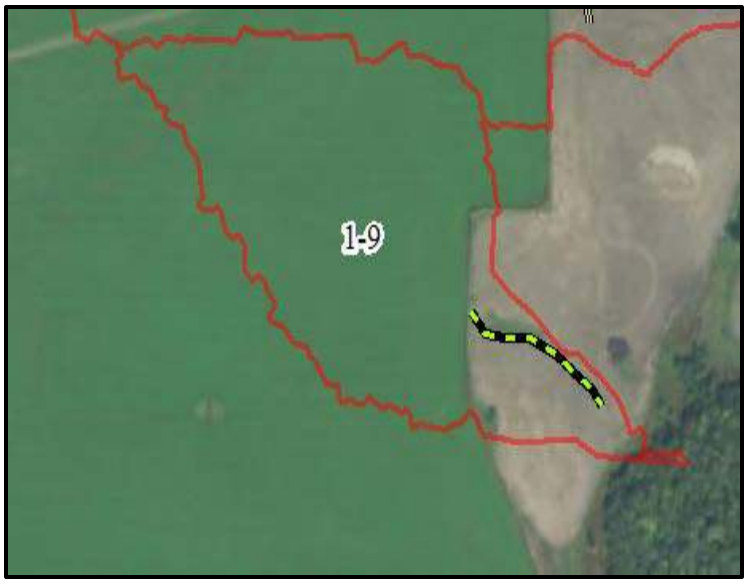
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,891.67	**4.12**	**$459.14**

Current Conditions		Added Practice		Reduction	
Sub-Basin	8	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	4.85
Acres	3.28			**Soil Loss reduction (t/yr)**	17.55
Soil	Zimmerman fine sand and fine sand 7to 12 percent slopes	**Vol Voided (ft^3)**	319	**Phosphorus reduction (lb/yr)**	4.12
		Length (ft)	319		
Average slope	8.1	**Years**	1		
		Distance to SW (ft)	500		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 9



Drainage Area – 5.3 acres
Property Ownership – Private
Site Specific Information – A filter strip, located on the eastern portion of the catchment, is recommended as a water quality project for this catchment. Among other criteria, topography indicated potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. Slopes in this area are moderately steep and could benefit from establishing permanent vegetation to help stabilize soils and reduce runoff into the adjacent wetland.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,553.66	**3.19**	**$487.04**

Current Conditions		Added Practice		Reduction	
Sub-Basin	9	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	3.76
Acres	5.38			**Soil Loss reduction (t/yr)**	14.41
Soil	Zimmerman fine sand, 1 to 6 percent slopes	**Vol Voided (ft^3)**	262	**Phosphorus reduction (lb/yr)**	3.19
		Length (ft)	730		
Average slope	5.06	**Years**	1		
		Distance to SW (ft)	665		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 1
Catchment 10

Drainage Area – 25.6 acres
Property Ownership – Private
Site Specific Information – Located at the northern section of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

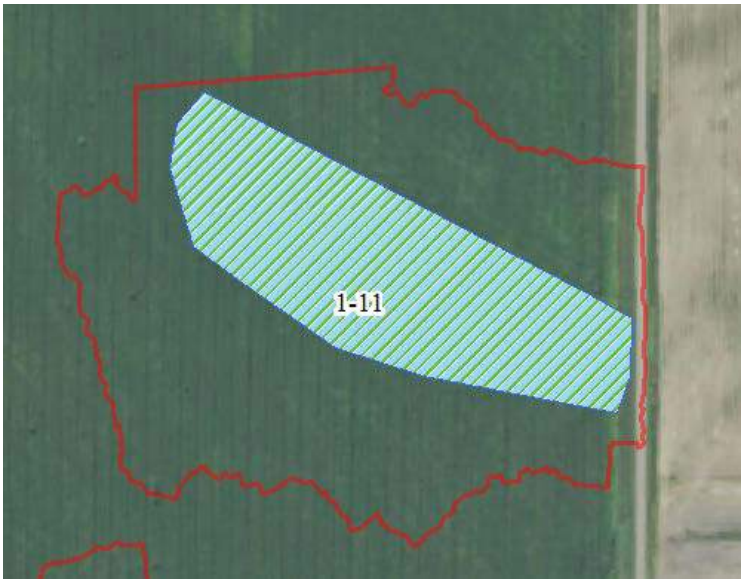
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	**Unknown**	**Unknown**

Current Conditions		Added Practice		Reduction	
Sub-Basin	10	Type	Wetland Resto	Sediment reduction (t/yr)	0
Acres	25.6			Soil Loss reduction (t/yr)	0
Soil	Isanti mucky loamy fine sand	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	0
		Length (ft)	0		
Average slope	2.46	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Resto
Subwatershed 1
Catchment 11



Drainage Area – 14.77 acres
Property Ownership – Private
Site Specific Information – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos, it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

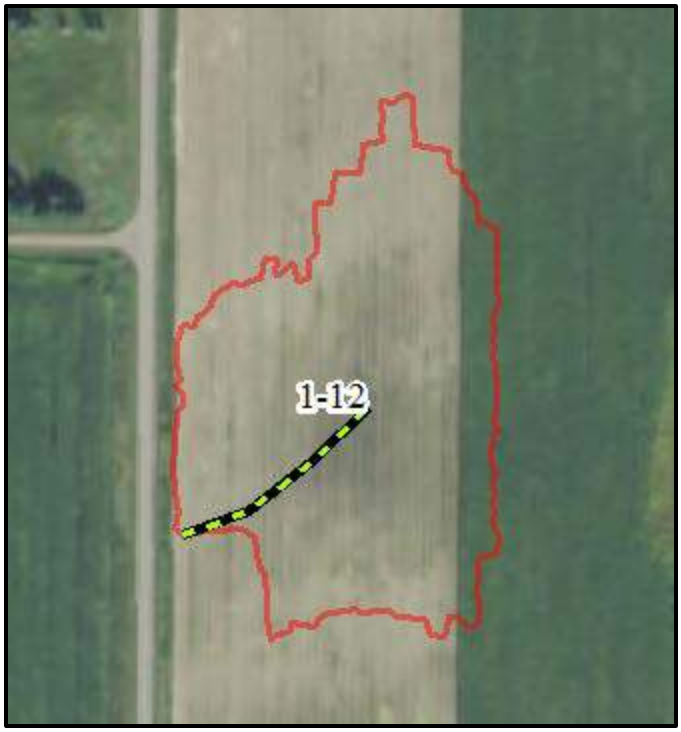
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	**Unknown**	**Unknown**

Current Conditions		Added Practice		Reduction	
Sub-Basin	11	**Type**	Wetland Resto	**Sediment reduction (t/yr)**	0
Acres	14.77			**Soil Loss reduction (t/yr)**	0
Soil	Isanti mucky loamy fine sand	**Vol Voided (ft^3)**	0	**Phosphorus reduction (lb/yr)**	0
		Length (ft)	0		
Average slope	3.38	**Years**	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 12



Drainage Area – 3.2 acres
Property Ownership – Private
Site Specific Information – A grassed waterway located on the western portion of the catchment is recommended as a water quality project for this catchment. Among other criteria, aerial photography indicated potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. The flow path could be assumed to outlet into an open water roadside ditch which would increase the potential of nutrient loading to North Brook and eventually Green Lake.

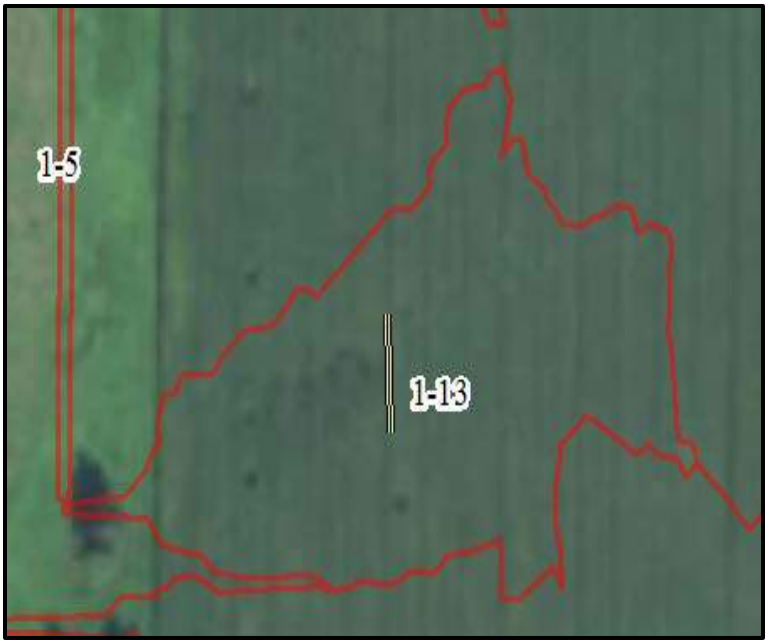
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,476.57	**2.42**	**$610.15**

Current Conditions		Added Practice		Reduction	
Sub-Basin	12	Type	Grassed Waterway	Sediment reduction (t/yr)	2.84
Acres	3.2			Soil Loss reduction (t/yr)	13.7
Soil	Blomford loamy fine sand	Vol Voided (ft^3)	249	Phosphorus reduction (lb/yr)	2.42
		Length (ft)	249		
Average slope	2.05	Years	1		
		Distance to SW (ft)	2000		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 1
Catchment 13



Drainage Area – 1.74 acres
Property Ownership – Private
Site Specific Information – Catchment 13 is 100% agricultural land use. Starting in the middle of the catchment running west shows steep slopes with an obvious linear depression corresponding with the elevation data. Implementing a WASCOB in this area would greatly reduce overland flow through the gullied area. Topography also indicates the practice would allow farming alteration to be kept to a minimum.

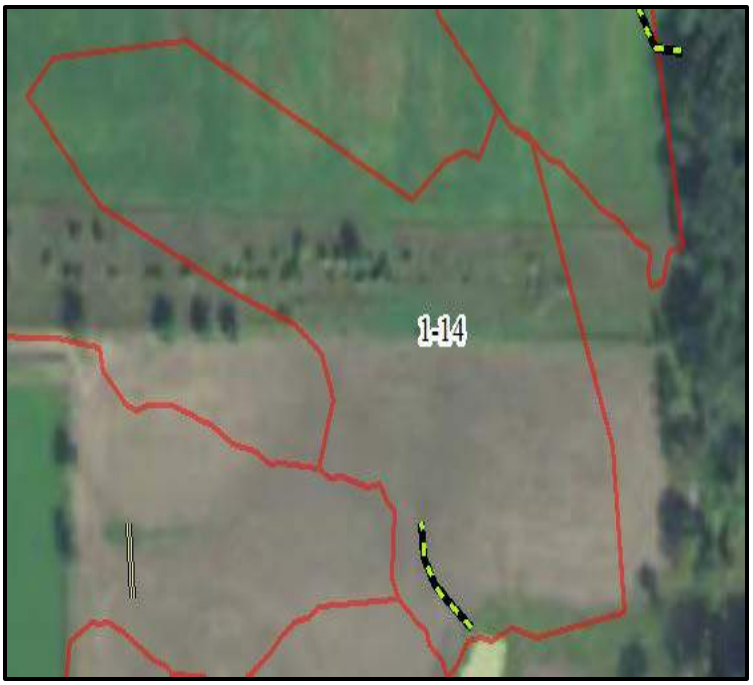
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$17,058.44	**4.92**	**$3,467.16**

Current Conditions		Added Practice		Reduction	
Sub-Basin	13	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	5.79
Acres	1.74			**Soil Loss reduction (t/yr)**	19.75
Soil	Braham Loamy fine sand, 2 to 7 percent slopes	**Vol Voided (ft^3)**	1.74	**Phosphorus reduction (lb/yr)**	4.92
		Length (ft)	359		
Average slope	4.46	**Years**	1		
		Distance to SW (ft)	377		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 14



Drainage Area – 2.57 acres
Property Ownership – Private
Site Specific Information – A grassed waterway, located on the south west portion of the catchment is recommended as a water quality project for this catchment. Among other criteria, topography indicated potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss. Slopes in this area are moderately steep and could benefit from establishing permanent vegetation to help stabilize soils and reduce runoff into the adjacent wetland.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$539.63	**1.54**	**$350.41**

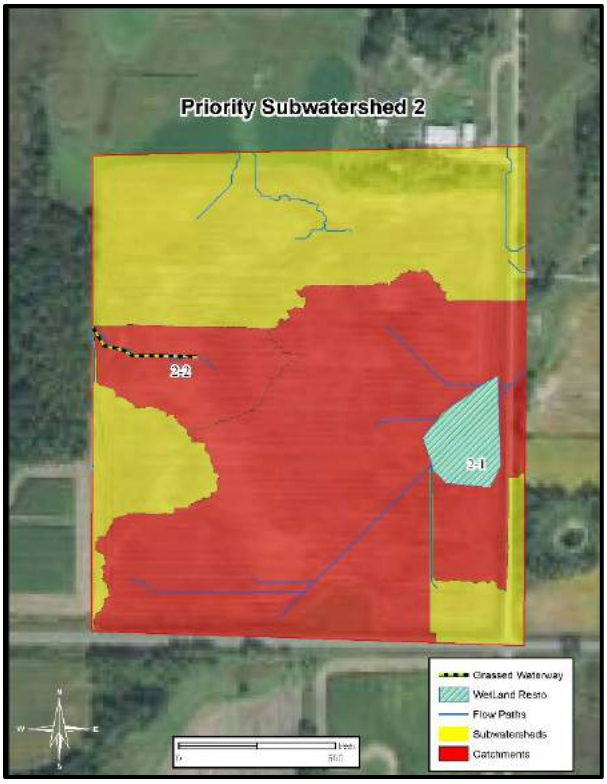
Current Conditions		Added Practice		Reduction	
Sub-Basin	14	**Type**	Grassed Waterway	**Sediment reduction (t/yr)**	1.81
Acres	2.57			**Soil Loss reduction (t/yr)**	5.01
Soil	Zimmerman fine sand and fine sand 7to 12 percent slopes	**Vol Voided (ft^3)**	91	**Phosphorus reduction (lb/yr)**	1.54
		Length (ft)	144		
Average slope	9.19	**Years**	1		
		Distance to SW (ft)	135		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 2

Priority subwatershed 2 is 49 acres of 100% agricultural land. It is located 650 feet of North Brook at the northern most tip. While the slopes in this area are moderate, they do show indications of erosion. The area is surrounded, for the most part, by agricultural land use but there are small sections of forest and wetlands on the west side. This priority subwatershed has two proposed projects; however, like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake.



Priority Subwatershed 2 Summary	
Acres addressed	49
Dominant Land Cover	Agricultural
Total Catchments	2
Potential BMPs	2
Potential TP reduction (lb/yr)	4.79
Potential TSS reduction (tons/yr)	5.63

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 2
Catchment 1

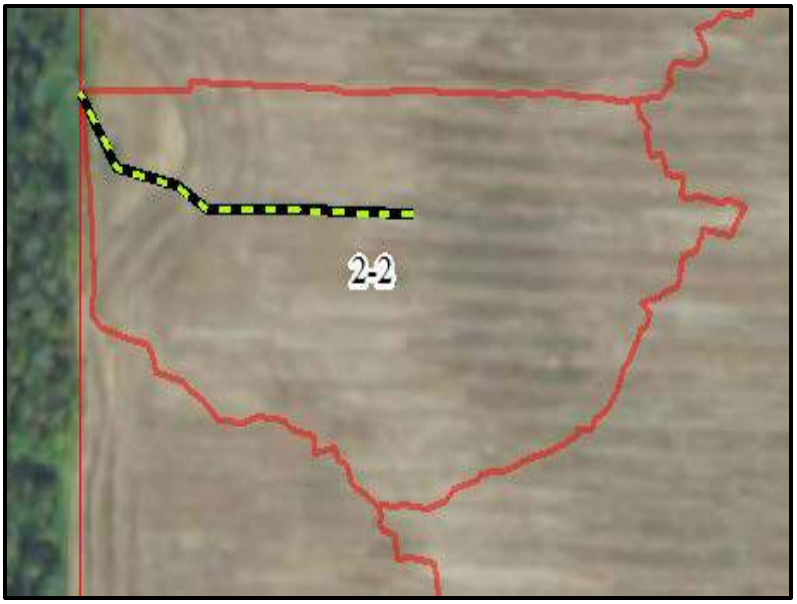
Drainage Area – 4.03 acres
Property Ownership – Private
Site Specific Information – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	Unknown	Unknown

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	**Type**	Wetland Resto	**Sediment reduction (t/yr)**	NA
Acres	4.03	**Area (acres)**	1.38	**Soil Loss reduction (t/yr)**	NA
Soil	Lino Loamy Fine Sand	**Vol Voided (ft^3)**	0	**Phosphorus reduction (lb/yr)**	NA
		Length (ft)	0		
Average slope	5	**Years**	1		
		Distance to SW (ft)			

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 2
Catchment 2



Drainage Area – 3.56 acres
Property Ownership – Private
Site Specific Information – A grassed waterway is being proposed at the north west section of the catchment. The entire catchment is agricultural land with moderate slope. Among other desk top analysis, aerial photography indicated potential for gully formation. Implementing this practice would vegetate the concentrated flow path, reduce overland flow and prevent soil loss.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,223.75	4.79	464.25

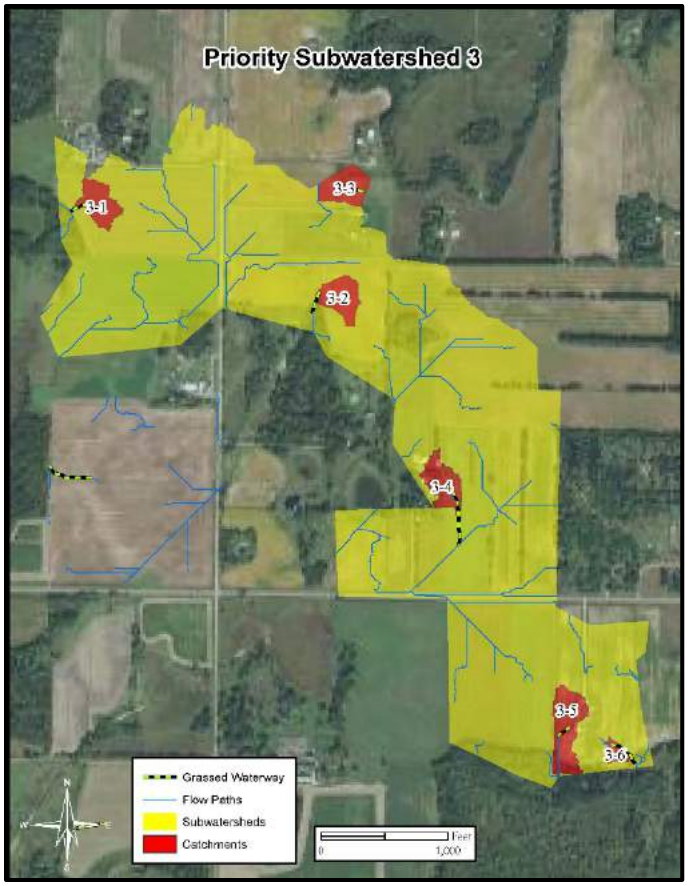
Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	5.63
Acres	3.56	Area (acres)		Soil Loss reduction (t/yr)	20.63
Soil	ly fine sand, 2 to 7 pe	Vol Voided (ft^3)	375	Phosphorus reduction (lb/yr)	4.79
		Length (ft)	375		
Average slope	2.43	Years	1		
		Distance to SW (ft)	531		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 3

Priority subwatershed 3 is 209 acres. The majority of land use is agriculture and there and are three small farmsteads located in the drainage area. A minimal amount of the area is forested. Subwatershed three is the farthest north priority area and comes within 200 feet of North Brook near the southern section. The slopes in this area are moderate to severe with sandy soils. Six priority catchments were identified during desktop analysis where water quality projects are recommended. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation.

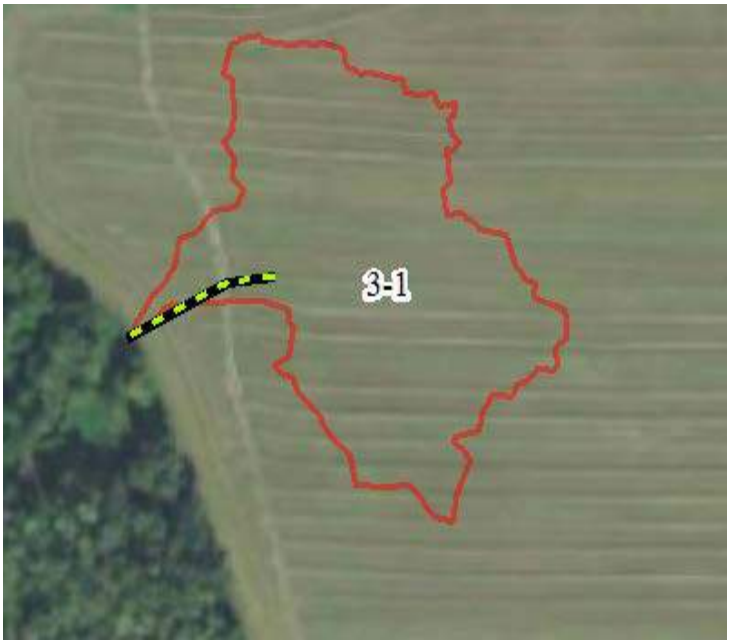


Priority Subwatershed 3 Summary	
Acres addressed	209
Dominant Land Cover	Agricultural
Total Catchments	6
Potential BMPs	6
Potential TP reduction (lb/yr)	12.45
Potential TSS reduction (tons/yr)	14.63

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 1



Drainage Area – 1.9 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the west side of the catchment and outlets into adjacent forest land.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$907.29	1.29	$703.33

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	1.51
Acres	1.9	Area (acres)		Soil Loss reduction (t/yr)	8.42
Soil	Hayden fine sandy loam, 2 to 7 percent slopes	Vol Voided (ft^3)	153	Phosphorus reduction (lb/yr)	1.29
		Length (ft)	153		
Average slope	2.5	Years	1		
		Distance to SW (ft)	4000		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 2

Drainage Area – 2 acres
Property Ownership – Private
Site Specific Information - The Catchment is estimated 98% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the west side of the catchment and outlets into adjacent forest wetland area.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$978.45	2.74	$357.10

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	3.22
Acres	2	Area (acres)		Soil Loss reduction (t/yr)	9.08
Soil	anoka loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	165	Phosphorus reduction (lb/yr)	2.74
		Length (ft)	165		
Average slope	165	Years	1		
		Distance to SW (ft)	150		

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 3

Drainage Area – 2.1 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 60% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the east side of the catchment and outlets into adjacent grass field.

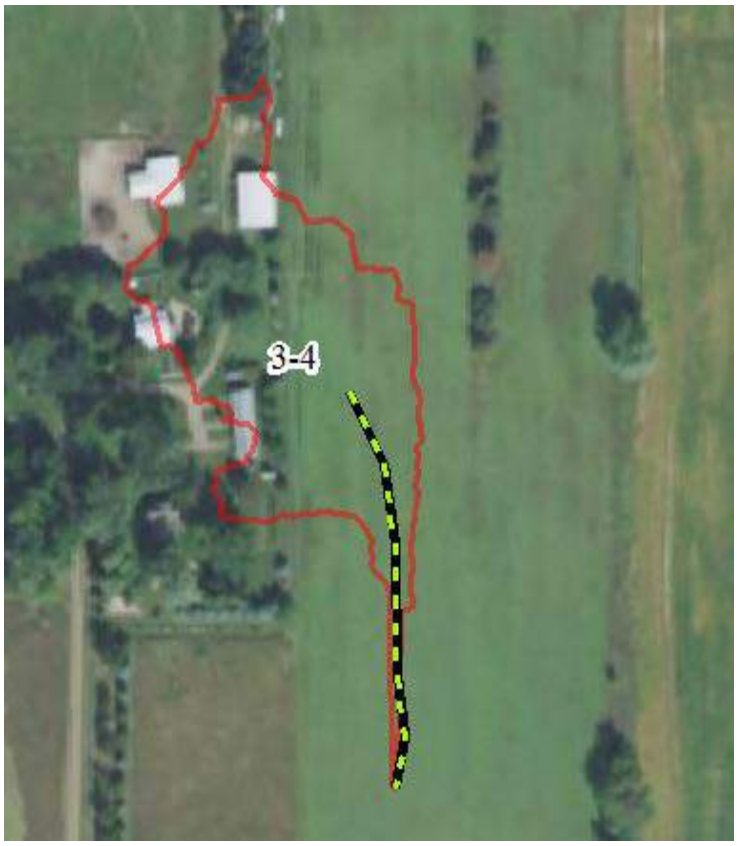
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$806.48	2.02	$399.25

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	2.38
Acres	2.1	Area (acres)		Soil Loss reduction (t/yr)	7.48
Soil	anoka loamy fine sand, 7 to 12 percent slopes	Vol Voided (ft^3)	136	Phosphorus reduction (lb/yr)	2.02
		Length (ft)	136		
Average slope	136	Years	1		
		Distance to SW (ft)	254		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 4



Drainage Area – 2.24 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 50% agricultural land use and 50% low density residential. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the south end of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,621.06	3.48	$753.18

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Grassed Waterway	Sediment reduction (t/yr)	4.09
Acres	2.24	Area (acres)		Soil Loss reduction (t/yr)	24.31
Soil	anoka loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	442	Phosphorus reduction (lb/yr)	3.48
		Length (ft)	442		
Average slope	3.5	Years	1		
		Distance to SW (ft)	5500		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 5

Drainage Area – 3.13 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use with a small portion of low density residential and forest. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

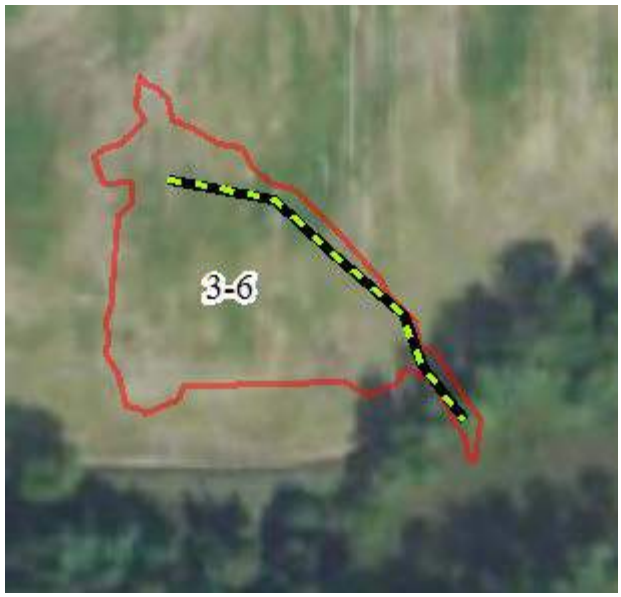
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$670.09	0.95	$705.36

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Grassed Waterway	Sediment reduction (t/yr)	1.12
Acres	3.13	Area (acres)		Soil Loss reduction (t/yr)	6.22
Soil	anoka loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	113	Phosphorus reduction (lb/yr)	0.95
		Length (ft)	113		
Average slope	3.8	Years	1		
		Distance to SW (ft)	4000		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 6



Drainage Area – .62 acres
Property Ownership – The Catchment is estimated 99% agricultural land use with a small portion of wetland. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on northern edge of the catchment and outlets into adjacent wetland.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,387.62	1.97	$704.38

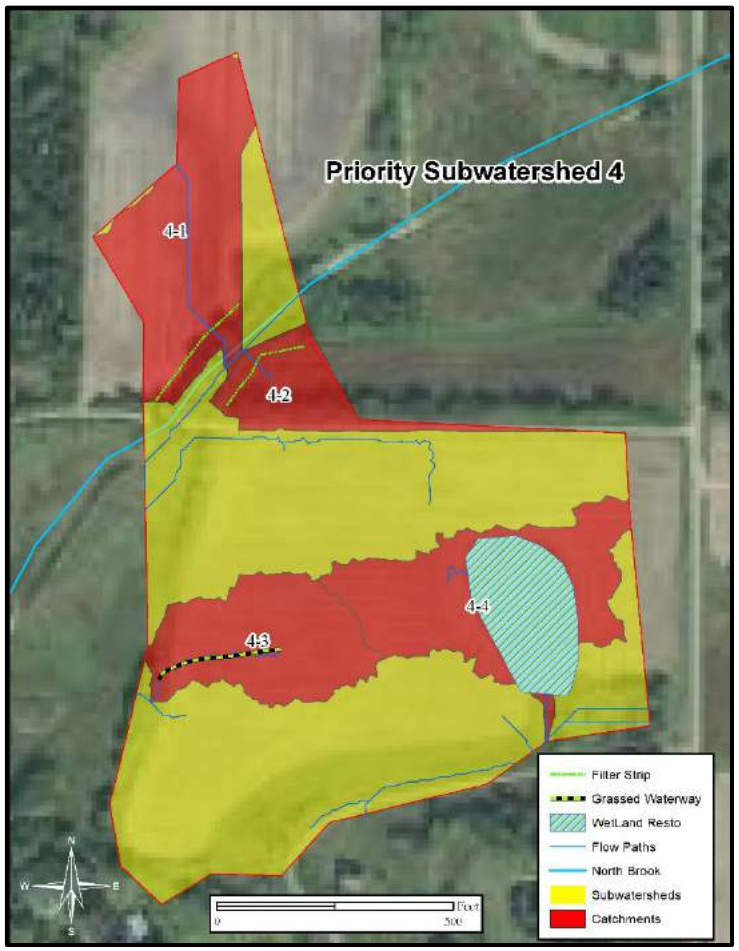
Current Conditions		Added Practice		Reduction	
Sub-Basin	6	Type	Grassed Waterway	Sediment reduction (t/yr)	2.31
Acres	0.62	Area (acres)		Soil Loss reduction (t/yr)	12.87
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	234	Phosphorus reduction (lb/yr)	1.97
		Length (ft)	234		
Average slope	4.8	Years	1		
		Distance to SW (ft)	4000		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 4

Priority subwatershed 4 is 25.31 acres of mainly agricultural land with some forested land use. In addition to the sandy soils, moderate slopes and agricultural land use, the area was prioritized because North Brook runs through the north section of the subwatershed. Four priority catchments were identified during desktop analysis where water quality projects are recommended. One BMP recommendation includes a wetland restoration. Pollution reduction was not calculated for the wetland however based on desktop analysis, a wet land restoration has potential to positively impact the watershed. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake.



Priority Subwatershed 4 Summary	
Acres addressed	25.31
Dominant Land Cover	Agricultural
Total Catchments	4
Potential BMPs	4
Potential TP reduction (lb/yr)	5.22
Potential TSS reduction (tons/yr)	8.27

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 4
Catchment 1

Drainage Area – 2.8 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use with a portion of forested land. Using aerial photography and GIS tools this area was identified to have a potential for pollution loading directly into the adjacent North Brook. Planting a buffer of permanent vegetation between the surface water and the field will combat soil and nutrient loading. The project is located on southern edge of the catchment on the northern fringe of North Brook.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$224.91	1.99	$113.02

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Filter Strip	Sediment reduction (t/yr)	1.64
Acres	2.8	Area (acres)		Soil Loss reduction (t/yr)	0.03
Soil	Braham loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	289	Phosphorus reduction (lb/yr)	1.99
		Length (ft)	289		
Average slope	3.2	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 4
Catchment 2

Drainage Area – 3.83 acres
Property Ownership – The small Catchment is estimated 50% agricultural land use with a portion of forested land. Using aerial photography and GIS tools this area was identified to have a potential for pollution loading directly into the adjacent North Brook. Planting a buffer of permanent vegetation between the surface water and the field will combat soil and nutrient loading. The project is located on northern edge of the catchment on the southern fringe of North Brook.

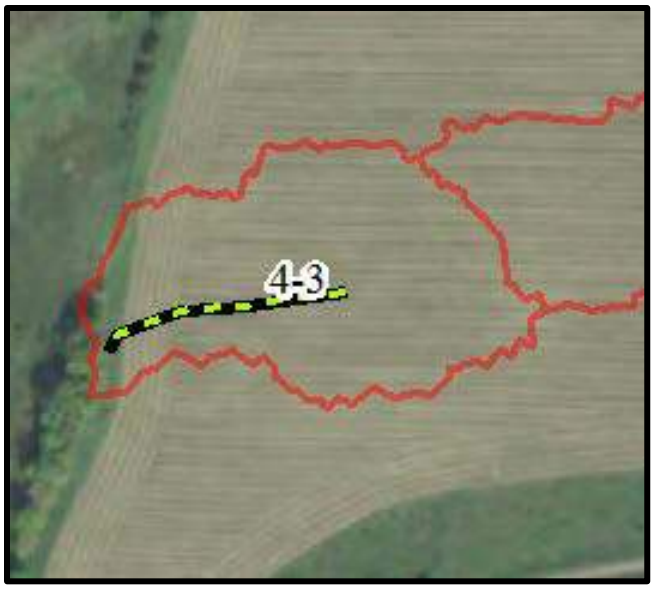
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$173.55	2.71	$64.04

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Filter Strip	Sediment reduction (t/yr)	2.23
Acres	3.83	Area (acres)	0.255968779	Soil Loss reduction (t/yr)	0.02
Soil	Blomford loamy find sand	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	2.71
		Length (ft)			
Average slope	4.4	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 3



Drainage Area – 2.25 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 98% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the west side of the catchment and outlets into adjacent forest wetland area. The wetland area drains directly to North Brook.

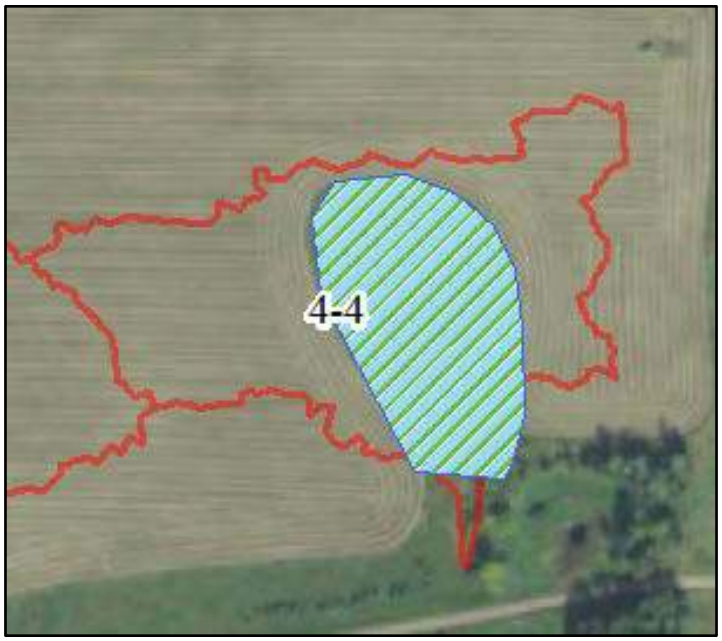
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,601.10	0.52	$3,079.04

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	2.23
Acres	2.25	Area (acres)	0	Soil Loss reduction (t/yr)	14.85
Soil	Bluffton loam and sitly clay loam	Vol Voided (ft^3)	270	Phosphorus reduction (lb/yr)	0.52
		Length (ft)	270		
Average slope	2.25	Years	1		
		Distance to SW (ft)	479		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 4
Catchment 4



Drainage Area – 3.65 acres
Property Ownership – Private
Site Specific Information – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
Unknown	Unknown	Unknown

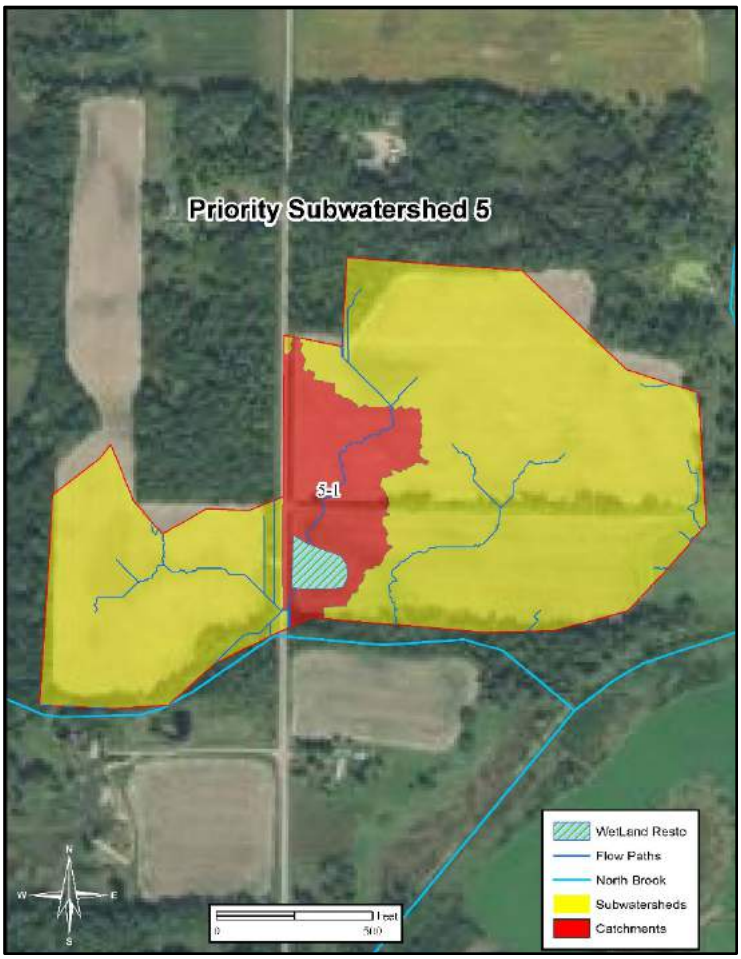
Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Wetland Resto	Sediment reduction (t/yr)	NA
Acres	3.65	Area (acres)	1.34	Soil Loss reduction (t/yr)	NA
Soil	Braham loamy fine sand, 2 to 7 percent slopes	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	NA
		Length (ft)	0		
Average slope	3.6	Years	1		
		Distance to SW (ft)			

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 5

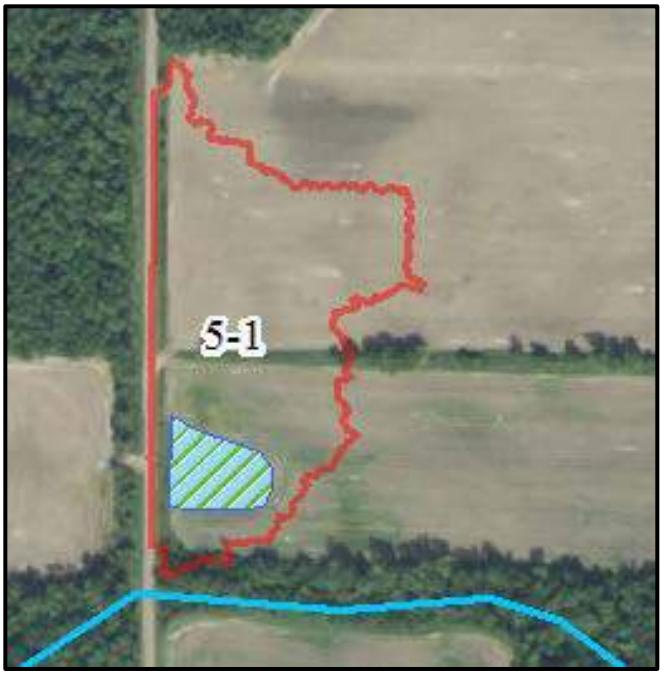
Priority subwatershed 5 is 40 acres of mainly agricultural land with some forested land use. In addition to the sandy soils, moderate slopes and agricultural land use, the area was prioritized because North Brook borders the southern section of the subwatershed. One priority catchment was identified during desktop analysis where a wetland restoration is recommended. Pollution reduction was not calculated; however, based on desktop analysis, a wet land restoration has potential to positively impact the watershed. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake. Those practices have the potential to be more effective given the location of the subwatershed in relation to North Brook.



Priority Subwatershed 5 Summary	
Acres addressed	40
Dominant Land Cover	Agricultural
Total Catchments	1
Potential BMPs	1
Potential TP reduction (lb/yr)	NA
Potential TSS reduction (tons/yr)	NA

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

Project ID – Wetland Restoration
Subwatershed 5
Catchment 1



Drainage Area – 5.81 acres
Property Ownership – Private
Site Specific Information – Located on the south side of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
NA	NA	NA

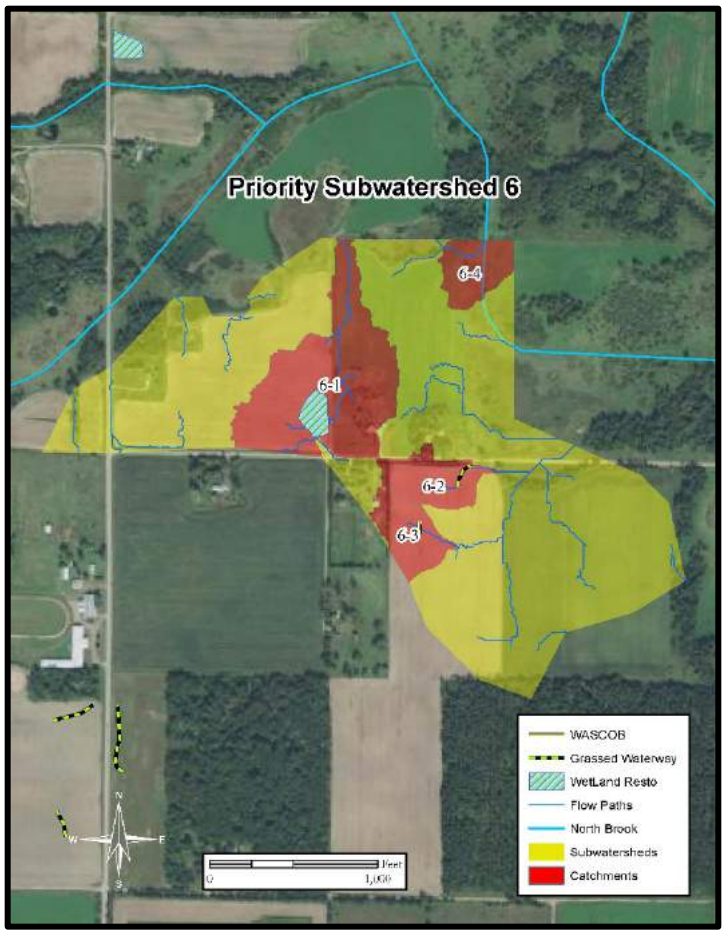
Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	wetland resto	Sediment reduction (t/yr)	TBD
Acres	5.81	Area (acres)	0.51	Soil Loss reduction (t/yr)	TBD
Soil	Isanti mucky loamy fine sand	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	TBD
		Length (ft)	0		
Average slope	2.8	Years	1		
		Distance to SW (ft)			

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 6

Priority subwatershed 6 is 108 acres of mainly agricultural land with some forested land and several homesteads. In addition to the sandy soils, moderate to severe slopes and agricultural land use, the area was prioritized because North Brook borders the northern section of the subwatershed and overlaps the corner in the northeast. Three priority catchments were identified during desktop analysis where a variety of BMPs are recommended. Pollution reduction was not calculated for the wetland restoration; however, based on desktop analysis, a wetland restoration has the potential to positively impact the watershed. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake. Those practices have the potential to be more effective given the location of the subwatershed in relation to North Brook.

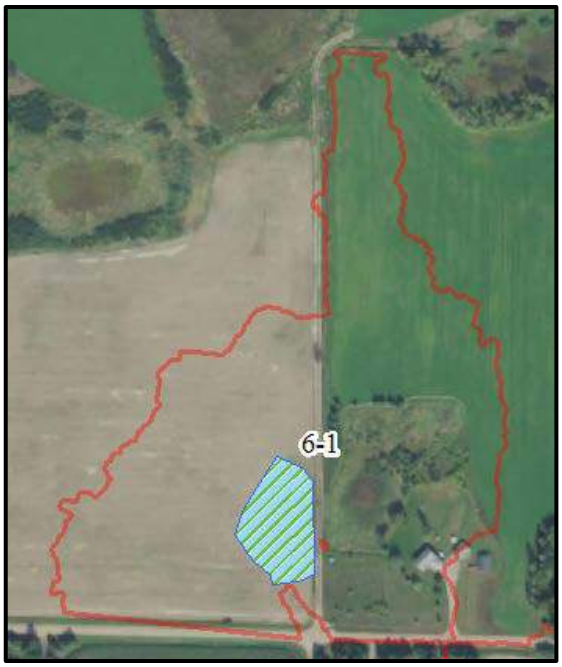


Priority Subwatershed 6 Summary	
Acres addressed	108
Dominant Land Cover	Agricultural
Total Catchments	1
Potential BMPs	1
Potential TP reduction (lb/yr)	7.37
Potential TSS reduction (tons/yr)	8.67

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 6
Catchment 1



Drainage Area – 2.1 acres
Property Ownership – Private
Site Specific Information – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos it was determined this location is marginal land, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

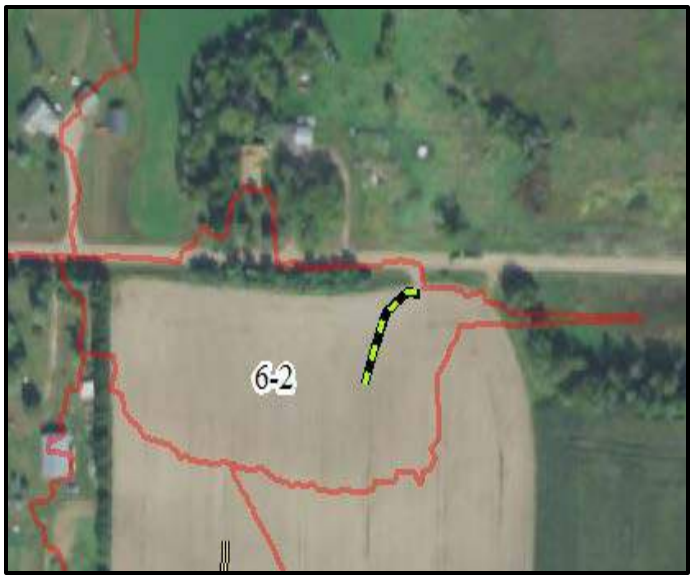
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
TBD	TBD	TBD

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Wetland Resto	Sediment reduction (t/yr)	TBD
Acres	2.1	Area (acres)	0.81	Soil Loss reduction (t/yr)	TBD
Soil	Isanti Mucky Loamy Fine Sand	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	TBD
Slope length (ft)		Length (ft)	0		
Average slope	2.1	Years	1		
		Distance to SW (ft)			

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 6
Catchment 2



Drainage Area – 3.6 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located north east side of the catchment and outlets into adjacent roadside ditch.

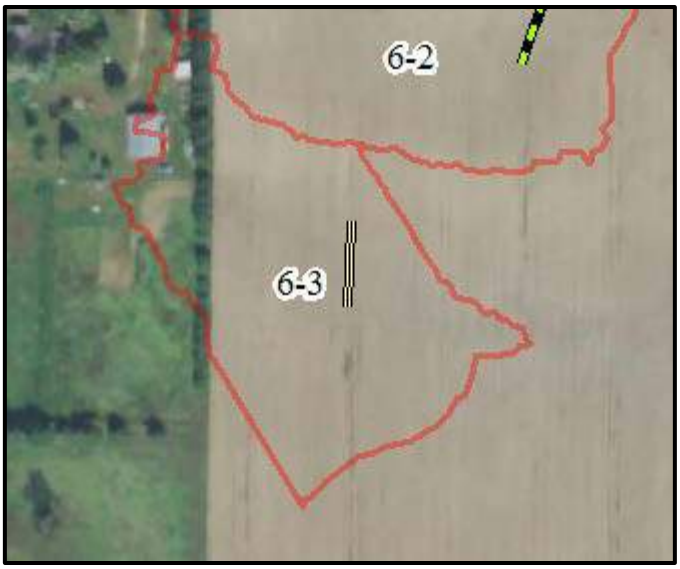
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
895.43	3.51	$255.11

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	4.13
Acres	3.6	Area (acres)		Soil Loss reduction (t/yr)	20.74
Soil	zimmerman loamy fine sand and fine sand 7 to 12 percent slopes	Vol Voided (ft^3)	151	Phosphorus reduction (lb/yr)	3.51
Slope length (ft)		Length (ft)	151		
Average slope	8	Years	1		
		Distance to SW (ft)	2451		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 6
Catchment 3



Drainage Area – 3.58 acres
Property Ownership – Private
Site Specific Information – Catchment 3 is 95% agricultural land use. Starting in the middle of the catchment running east shows moderate slopes with potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would greatly reduce overland flow through the concentrated flow path area. Topography also indicates the practice would allow farming alteration to be kept to a minimum.

Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
$ 35,097	3.86	$9,092.55

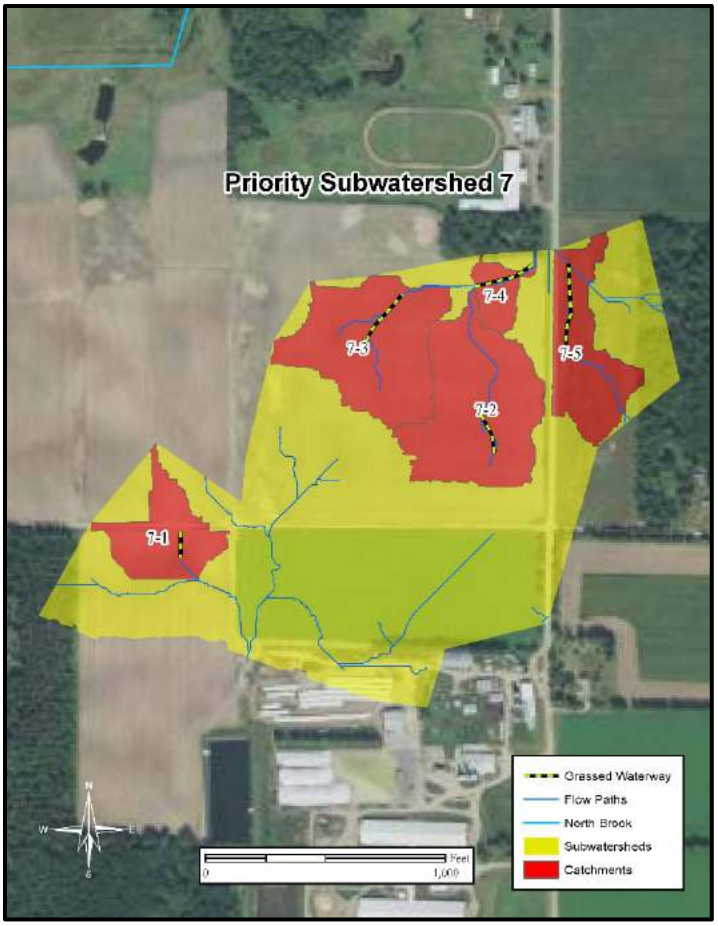
Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	WASCOB	Sediment reduction (t/yr)	4.54
Acres	3.58	Area (acres)	3.58	Soil Loss reduction (t/yr)	18.87
Soil	lino loamy fine sand	Vol Voided (ft^3)	343	Phosphorus reduction (lb/yr)	3.86
Slope length (ft)		Length (ft)	343		
Average slope	4.88	Years	1		
		Distance to SW (ft)	975		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 7

Priority subwatershed 7 is 69 acres of mainly agricultural land with forested land and a small section of a dairy operation. In addition to the sandy soils, moderate to severe slopes and agricultural land use, the area was prioritized because of its close proximity to North Brook. Five priority catchments were identified during desktop analysis where a variety of BMPs are recommended. The concentrated flow paths combined with elevation data suggest these areas could benefit from grass waterways. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake. Those practices have the potential to be more effective given the location of the subwatershed in relation to North Brook.

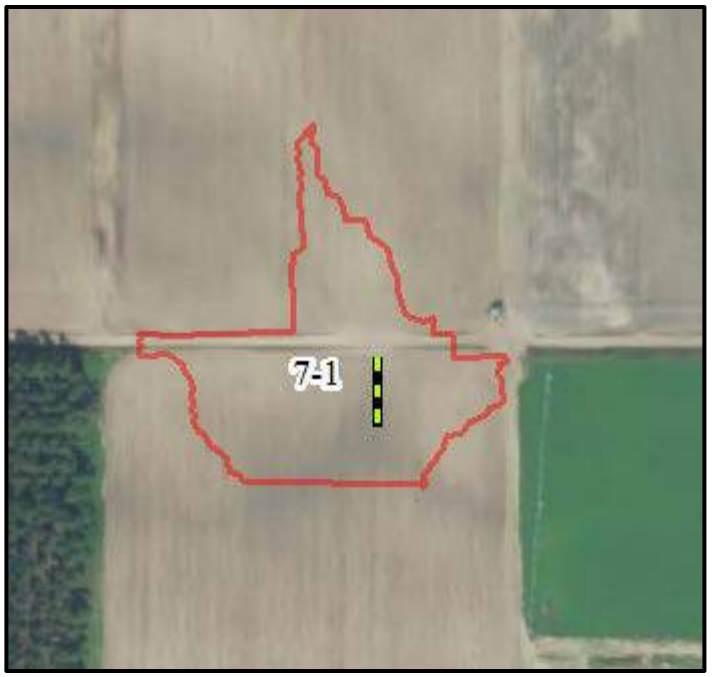


Priority Subwatershed 7 Summary	
Acres addressed	69
Dominant Land Cover	Agricultural
Total Catchments	5
Potential BMPs	5
Potential TP reduction (lb/yr)	13.16
Potential TSS reduction (tons/yr)	15.5

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 1



Drainage Area – 3.1 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use. Using aerial photography and GIS tools, this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets into an assumed roadside ditch.

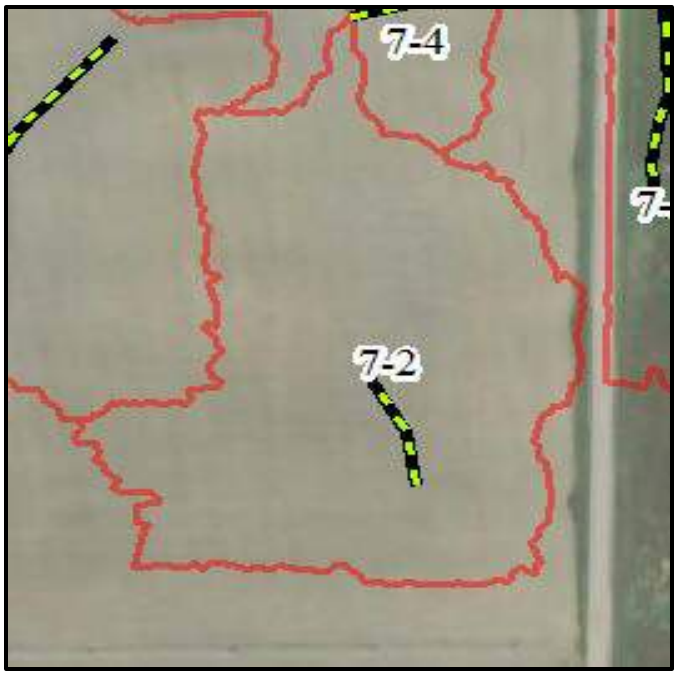
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$646.37	1.05	$615.59

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	1.24
Acres	3.1	Area (acres)	NA	Soil Loss reduction (t/yr)	6
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	109	Phosphorus reduction (lb/yr)	1.05
		Length (ft)	109		
Average slope	3.8	Years	1		
		Distance to SW (ft)	2000		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 2



Drainage Area – 7.23 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools, this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

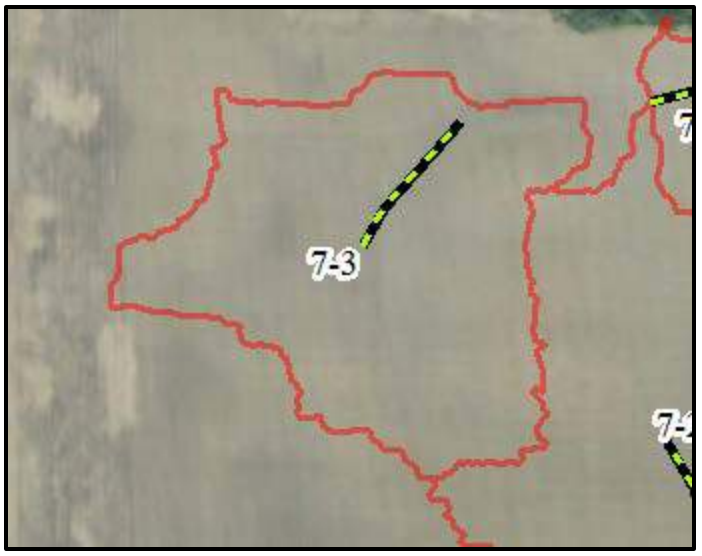
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$978.45	1.53	$639.51

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	1.8
Acres	7.23	Area (acres)	NA	Soil Loss reduction (t/yr)	9.08
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	165	Phosphorus reduction (lb/yr)	1.53
Slope length (ft)		Length (ft)	165		
Average slope	2.3	Years	1		
		Distance to SW (ft)	2500		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 3



Drainage Area – 1.98 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,476.57	3.98	$371.00

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	4.69
Acres	1.98	Area (acres)	NA	Soil Loss reduction (t/yr)	12.16
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	249	Phosphorus reduction (lb/yr)	3.98
		Length (ft)	249		
Average slope	3.22	Years	1		
		Distance to SW (ft)	2059		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 4

Drainage Area – 1.4 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the north section of the catchment and outlets into an adjacent roadside ditch.

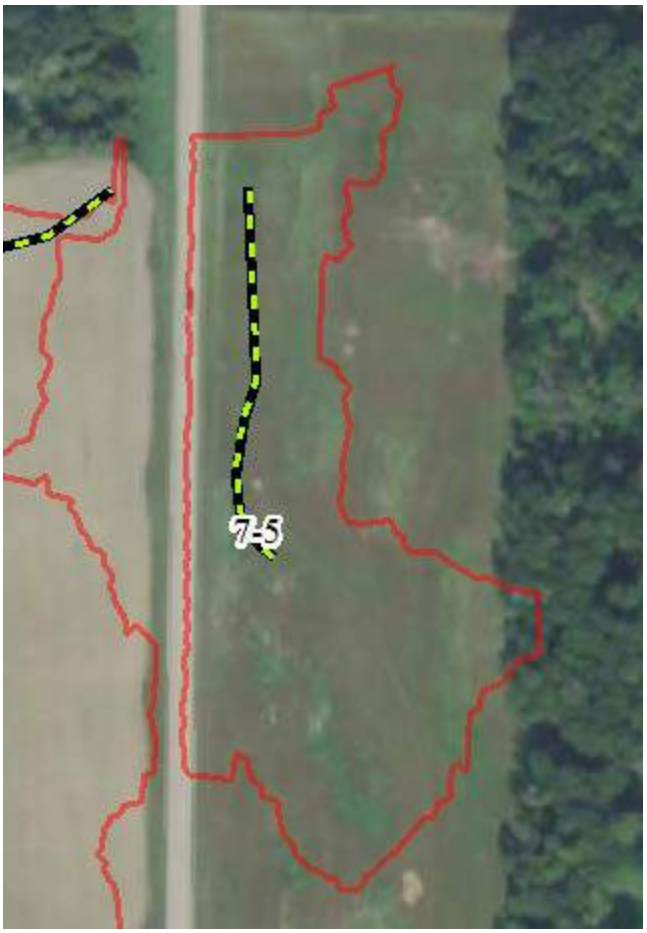
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,571.45	2.58	$609.09

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Grassed Waterway	Sediment reduction (t/yr)	3.04
Acres	1.4	Area (acres)	NA	Soil Loss reduction (t/yr)	14.58
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	265	Phosphorus reduction (lb/yr)	2.58
		Length (ft)	265		
Average slope	3.74	Years	1		
		Distance to SW (ft)	1962		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 7
Catchment 5



Drainage Area – 2.7 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the North section of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,496.53	4.02	$621.03

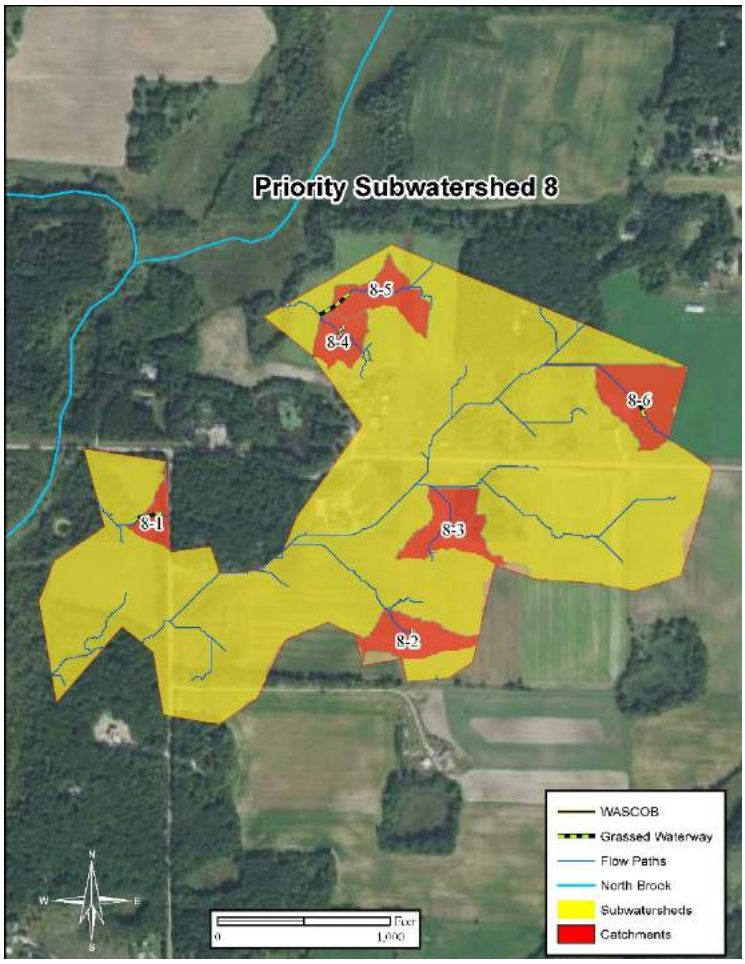
Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Grassed Waterway	Sediment reduction (t/yr)	4.73
Acres	2.7	Area (acres)	NA	Soil Loss reduction (t/yr)	23.16
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	421	Phosphorus reduction (lb/yr)	4.02
		Length (ft)	421		
Average slope	3.18	Years	1		
		Distance to SW (ft)	2167		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 8

Priority subwatershed 8 is 122 acres of mainly agricultural land with small amounts of forest, wetlands and low density residential areas. In addition to the sandy soils, moderate slopes and agricultural land use, the area was prioritized because North Brook runs closely along the west of the subwatershed. Six priority catchments were identified during desktop analysis where water quality projects are recommended. WASCOBs and grassed waterways were the identified as projects for this area because of elevations, soils and concentrated flow paths. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake



Priority Subwatershed 8 Summary	
Acres addressed	122
Dominant Land Cover	Agricultural
Total Catchments	6
Potential BMPs	6
Potential TP reduction (lb/yr)	29.1
Potential TSS reduction (tons/yr)	34.25

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

Project ID – Grassed Waterway
Subwatershed 8
Catchment 1

Drainage Area – 4.04 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 50% agricultural land use and 50% forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets into the adjacent woodland.

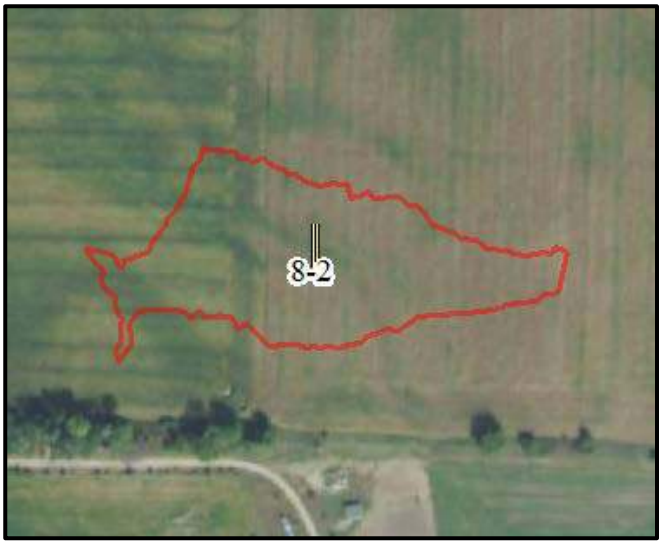
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,043.68	2.23	$468.02

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	2.62
Acres	4.04	Area (acres)	NA	Soil Loss reduction (t/yr)	9.68
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	176	Phosphorus reduction (lb/yr)	2.23
Slope length (ft)		Length (ft)	176		
Average slope	9.46	Years	1		
		Distance to SW (ft)	553		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 8
Catchment 2



Drainage Area – 2.7 acres
Property Ownership – Private
Site Specific Information – Catchment 2 is 100% agricultural land use. Starting in the middle of the catchment running east shows moderate slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area. Topography also indicates the practice would allow farming alteration to be kept to a minimum.

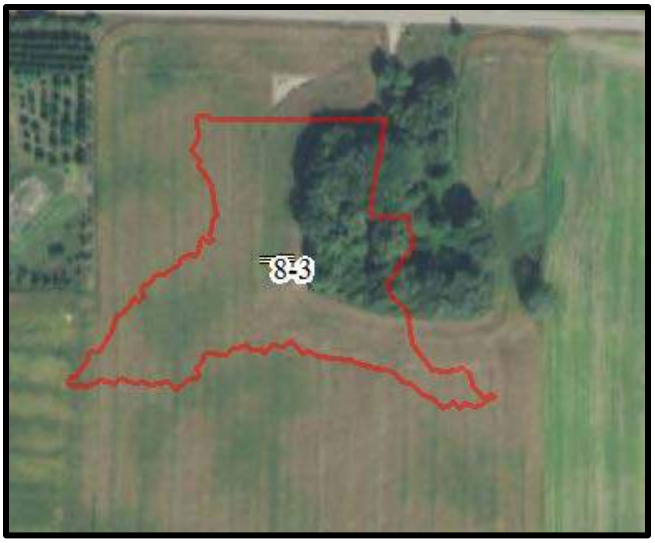
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$26,469.99	9.18	$2,883.44

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	WASCOB	Sediment reduction (t/yr)	10.8
Acres	2.7	Area (acres)	2.7	Soil Loss reduction (t/yr)	53.19
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	967	Phosphorus reduction (lb/yr)	9.18
Slope length (ft)		Length (ft)	967		
Average slope	5.26	Years	1		
		Distance to SW (ft)	2225		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 8
Catchment 3



Drainage Area – 3.22 acres
Property Ownership – Private
Site Specific Information – Catchment 3 is estimated 75% agricultural land use with the remaining 25% forested. Starting in the middle of the catchment running north shows moderate slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area.

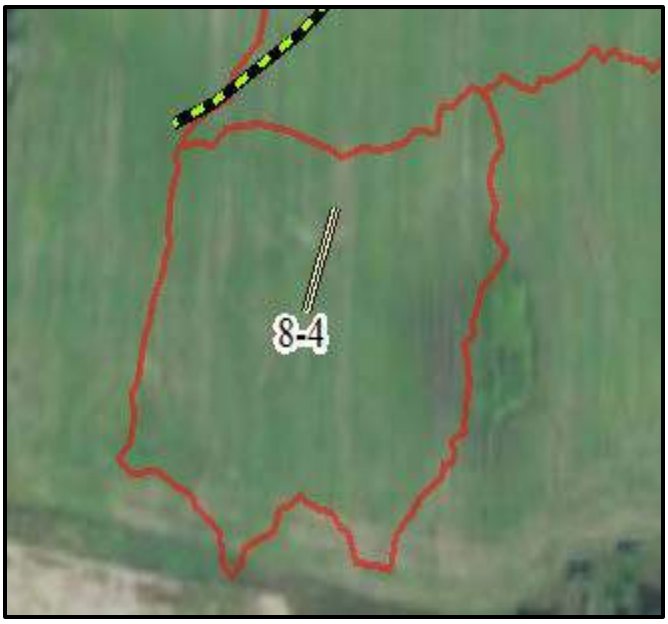
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$31,567.91	6.53	$4,834.29

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	WASCOB	Sediment reduction (t/yr)	7.69
Acres	3.22	Area (acres)	3.22	Soil Loss reduction (t/yr)	38.34
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	697	Phosphorus reduction (lb/yr)	6.53
Slope length (ft)		Length (ft)	697		
Average slope	4.35	Years	1		
		Distance to SW (ft)	2358		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 8
Catchment 4



Drainage Area – 1.79 acres
Property Ownership – Private
Site Specific Information – Catchment 4 is estimated 100% agricultural land use. Starting in the middle of the catchment running South shows moderate to severe slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area. There is a depression located on the east side of the catchment that may benefit from a wetland restoration if crop production is marginal each year.

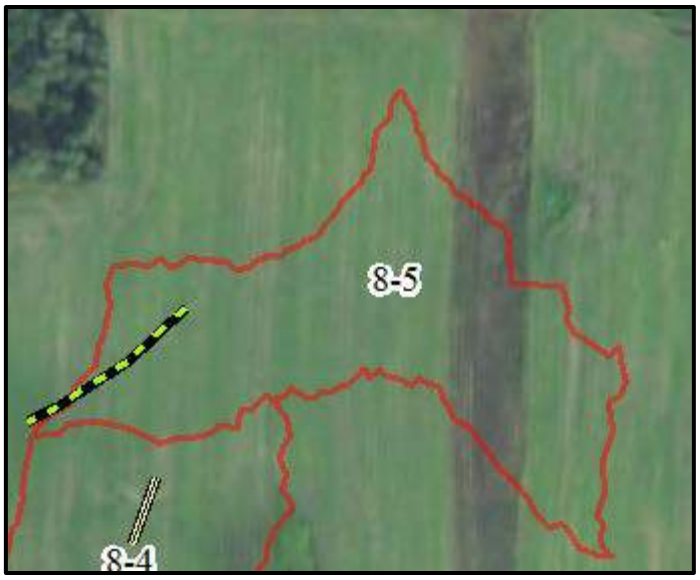
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$17,548.62	7.69	$2,282.01

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	WASCOB	Sediment reduction (t/yr)	9.05
Acres	1.79	Area (acres)	1.79	Soil Loss reduction (t/yr)	34.21
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	622	Phosphorus reduction (lb/yr)	7.69
Slope length (ft)		Length (ft)	622		
Average slope	5.08	Years	1		
		Distance to SW (ft)	618		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 5



Drainage Area – 2.73 acres
Property Ownership – Private
Site Specific Information – The Catchment is 100% agricultural land use. Using aerial photography and GIS tools, this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the west section of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,191.93	2.51	$474.87

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Grassed Waterway	Sediment reduction (t/yr)	2.96
Acres	2.73	Area (acres)	0	Soil Loss reduction (t/yr)	11.06
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	102	Phosphorus reduction (lb/yr)	2.51
Slope length (ft)		Length (ft)	102		
Average slope	4.3	Years	1		
		Distance to SW (ft)	2298		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grass Waterway
Subwatershed 8
Catchment 6

Drainage Area – 4.36 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 85% agricultural land use and 25% wetland. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$604.86	0.96	$630.06

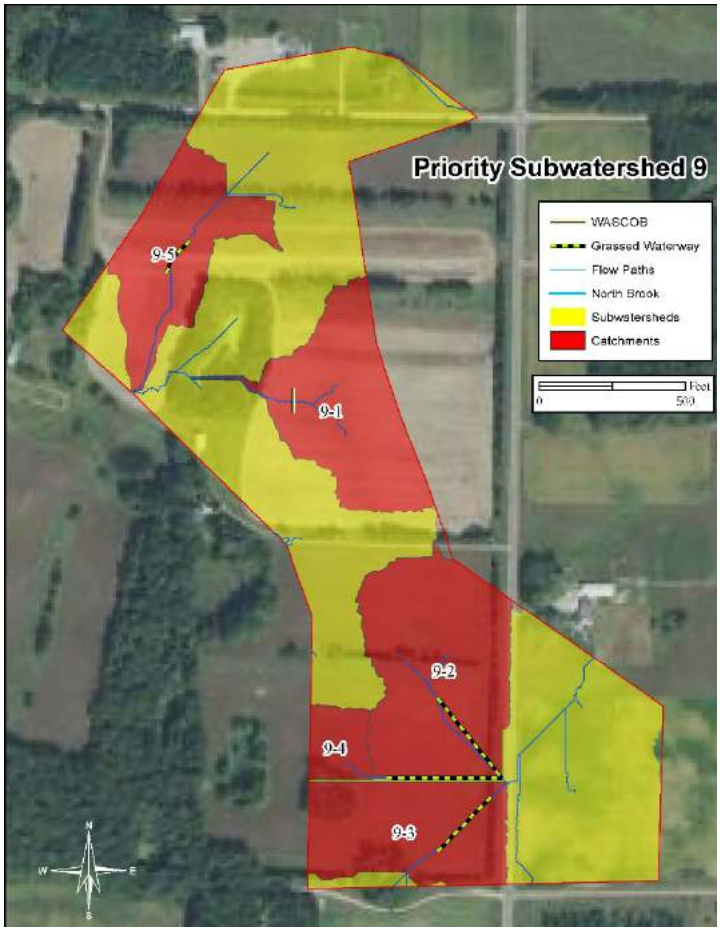
Current Conditions		Added Practice		Reduction	
Sub-Basin	6	Type	Grassed Waterway	Sediment reduction (t/yr)	1.13
Acres	4.36	Area (acres)	0	Soil Loss reduction (t/yr)	5.61
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	102	Phosphorus reduction (lb/yr)	0.96
Slope length (ft)		Length (ft)	102		
Average slope	6.82	Years	1		
		Distance to SW (ft)	2298		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 9

Priority subwatershed 9 is 58 acres of mainly agricultural land with some forested and low density residential areas. In addition to the sandy soils, moderate to severe slopes and agricultural land use, the area was prioritized because North Brook runs closely along the west side of the subwatershed. Five priority catchments were identified during desktop analysis where water quality projects are recommended. WASCOBs and grassed waterways were the identified projects for this area because of elevations, soils and concentrated flow paths. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to North Brook and Green Lake.



Priority Subwatershed 9 Summary	
Acres addressed	58
Dominant Land Cover	Agricultural
Total Catchments	5
Potential BMPs	5
Potential TP reduction (lb/yr)	15.93
Potential TSS reduction (tons/yr)	18.73

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 9
Catchment 1

Drainage Area – 2.22 acres
Property Ownership – Private
Site Specific Information – Catchment 1 is estimated 98% agricultural land use. Starting in the middle of the catchment running west shows moderate to severe slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area. The outlet of the project would be adjacent to a type 3 wetland with a forested fringe.

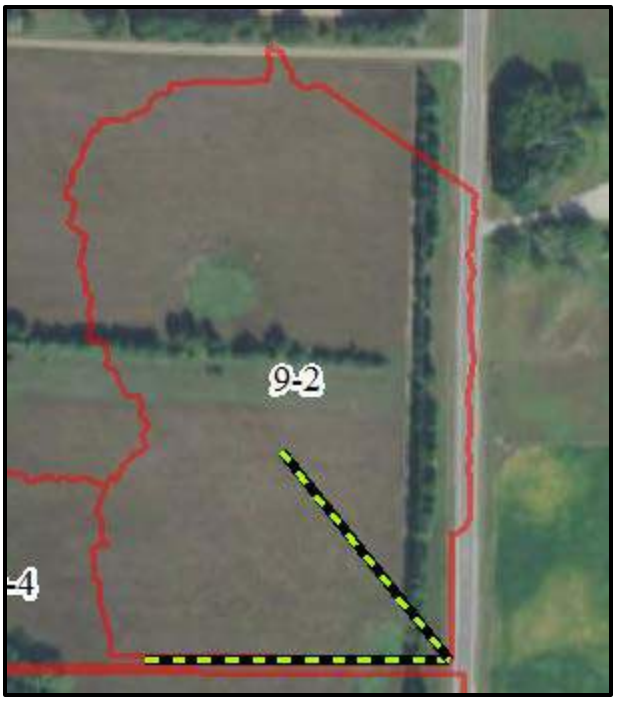
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,043.68	2.23	$468.02

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	2.62
Acres	2.22	Area (acres)	NA	Soil Loss reduction (t/yr)	9.68
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	176	Phosphorus reduction (lb/yr)	2.23
Average slope	4.44	Length (ft)	176		
		Years	1		
		Distance to SW (ft)	553		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 9
Catchment 2



Drainage Area – 3.86 acres
Property Ownership – Private
Site Specific Information- The Catchment is estimated 85% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the east side of the catchment and outlets into adjacent roadside ditch.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,069.57	3.31	$625.25

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	3.9
Acres	3.86	Area (acres)	NA	Soil Loss reduction (t/yr)	19.2
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	349	Phosphorus reduction (lb/yr)	3.31
Average slope	6.55	Length (ft)	349		
		Years	1		
		Distance to SW (ft)	2225		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 9
Catchment 3

Drainage Area – 5.71 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use and 20% forested. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the east side of the catchment and outlets into adjacent roadside ditch.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,856.09	2.97	$624.95

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	3.49
Acres	5.71	Area (acres)	NA	Soil Loss reduction (t/yr)	17.22
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	313	Phosphorus reduction (lb/yr)	2.97
Average slope	6.66	Length (ft)	313		
		Years	1		
		Distance to SW (ft)	2229		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 9
Catchment 4

Drainage Area – 1.51 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located on the east side of the catchment and outlets into adjacent roadside ditch.

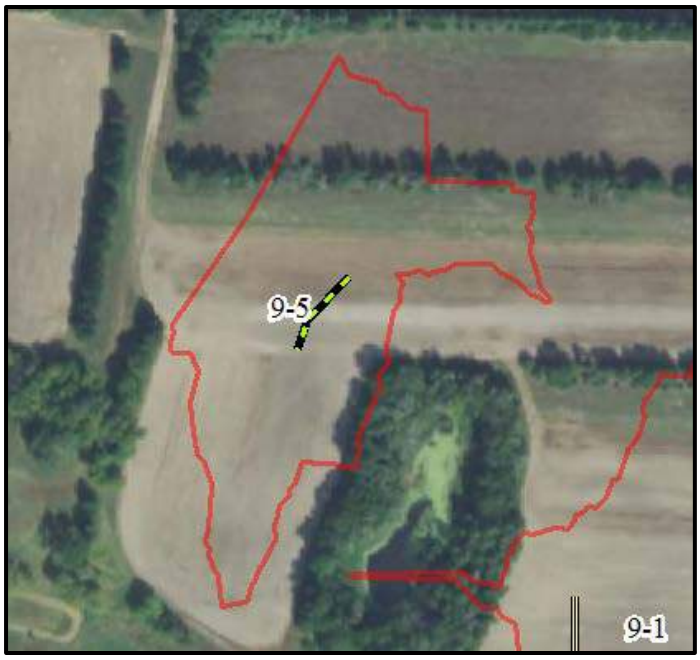
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,336.42	3.62	$645.42

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Grassed Waterway	Sediment reduction (t/yr)	4.25
Acres	1.51	Area (acres)	NA	Soil Loss reduction (t/yr)	21.67
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	394	Phosphorus reduction (lb/yr)	3.62
Average slope	4.84	Length (ft)	394		
		Years	1		
		Distance to SW (ft)	2613		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 9
Catchment 5



Drainage Area – 5.14 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

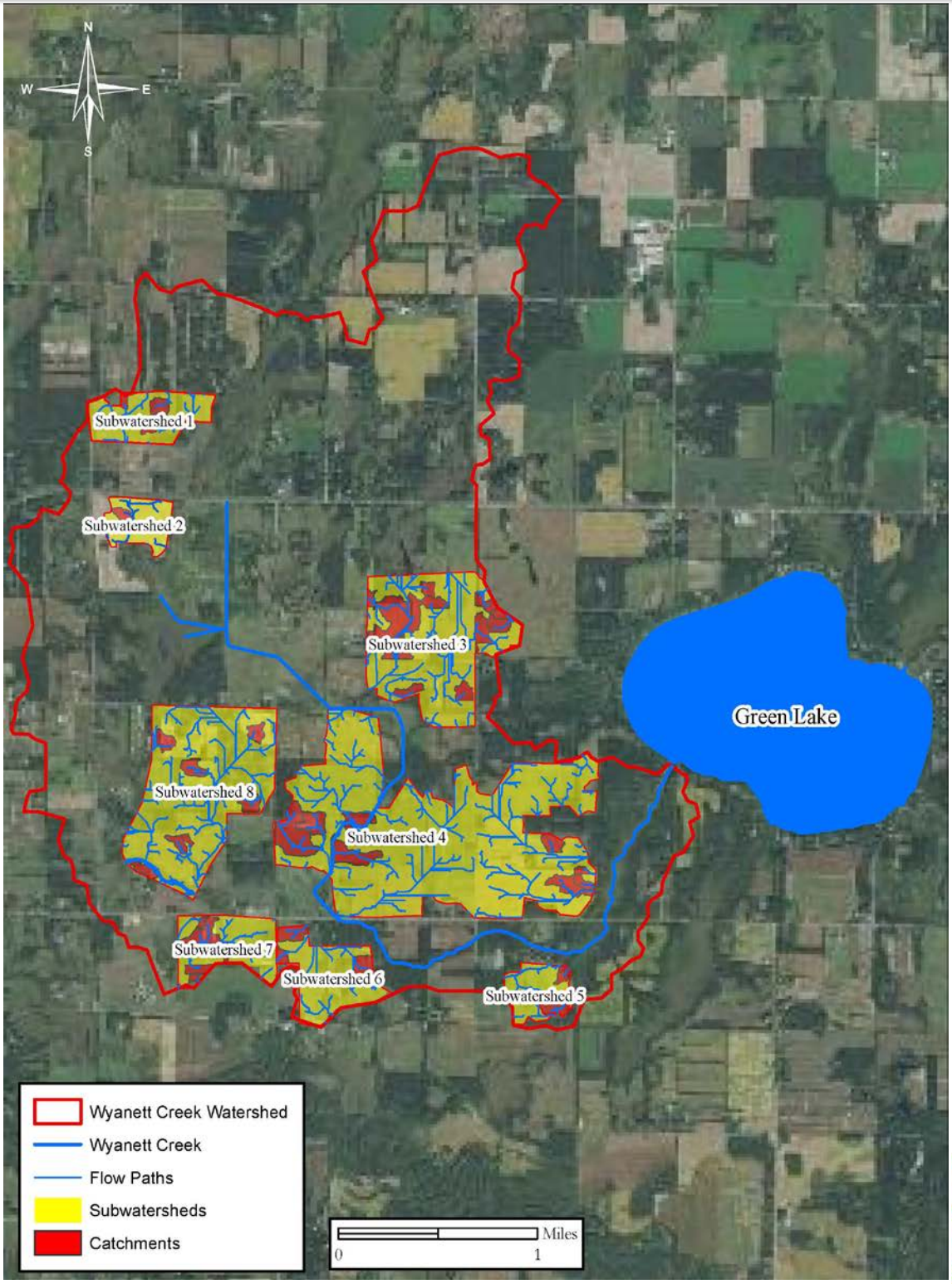
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$50,391.02	3.8	$13,260.79

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	WASCOB	Sediment reduction (t/yr)	4.47
Acres	5.14	Area (acres)	5.14	Soil Loss reduction (t/yr)	20.02
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	364	Phosphorus reduction (lb/yr)	3.8
Average slope	4.84	Length (ft)	364		
		Years	1		
		Distance to SW (ft)	1401		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Catchment Profiles – Wyanett Creek Rural Catchments



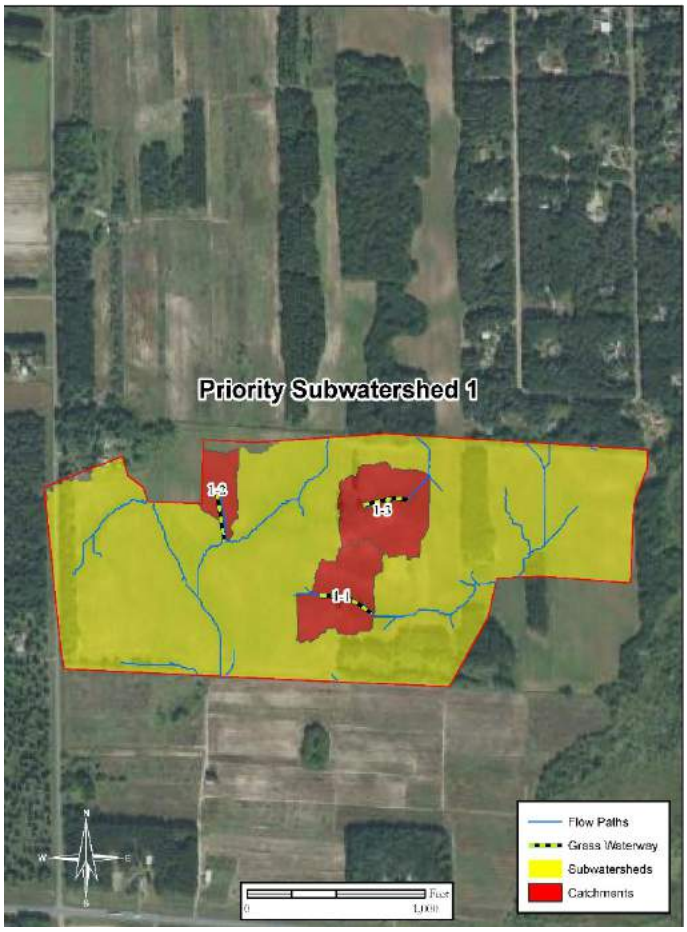
Wyanett Creek Subwatershed and Catchments

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 1

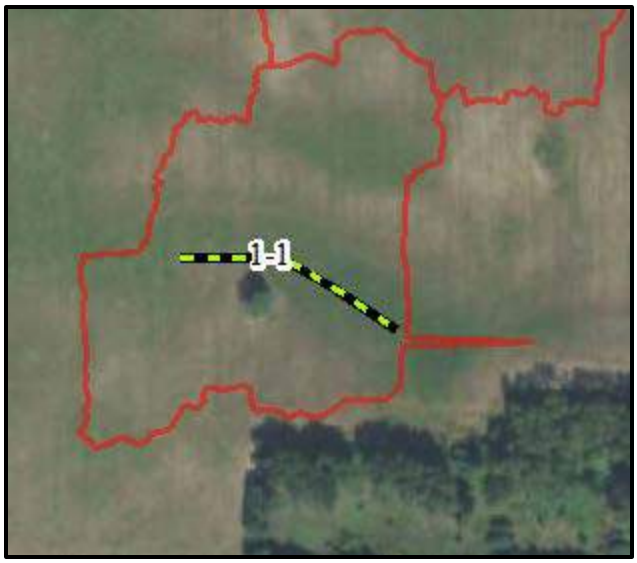
Priority subwatershed 1 is 80 acres of mainly agricultural land with some forested and low density residential areas. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this northern most subwatershed was prioritized because Wyanett Creek runs near the south border of the subwatershed. Three priority catchments were identified during desktop analysis where water quality projects are recommended. Grassed waterways were the identified projects for this area because of the elevations, soils and concentrated flow paths. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.



Priority Subwatershed 1 Summary	
Acres addressed	80
Dominant Land Cover	Agricultural
Total Catchments	3
Potential BMPs	3
Potential TP reduction (lb/yr)	7.94
Potential TSS reduction (tons/yr)	9.34

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

Project ID – Grassed Waterway
Subwatershed 1
Catchment 1



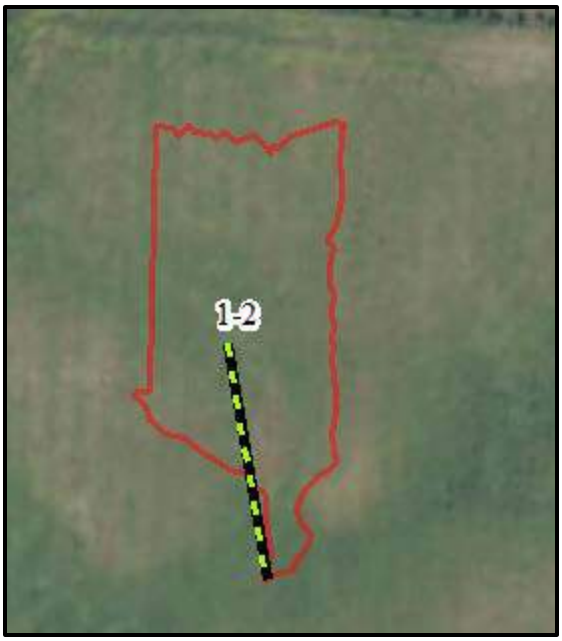
Drainage Area – 4.03 acres.
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,862.02	3.10	$600.65

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	3.65
Acres	4.03	Area (acres)	NA	Soil Loss reduction (t/yr)	17.27
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	314	Phosphorus reduction (lb/yr)	3.1
		Length (ft)	314		
Average slope	2.27	Years	1		
		Distance to SW (ft)	1841		

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 2



Drainage Area – 1.87 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project outlets on the south side of the catchment.

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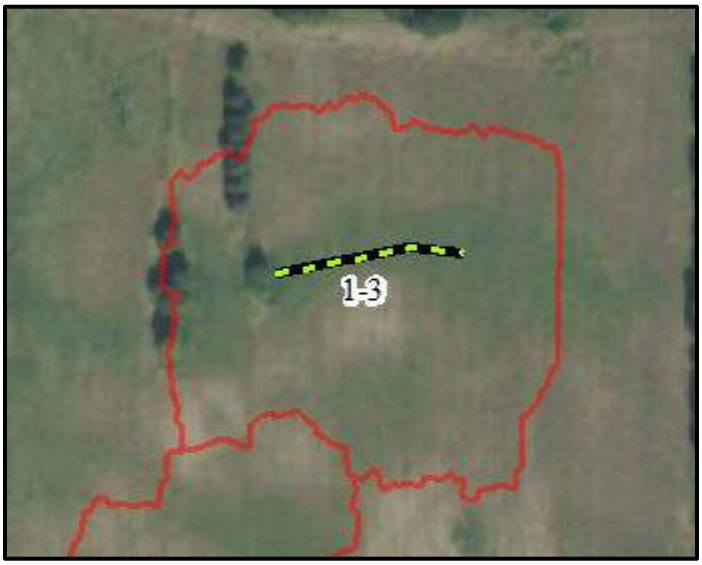
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,535.87	2.56	$599.95

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	3.01
Acres	1.87	Area (acres)	NA	Soil Loss reduction (t/yr)	14.25
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	259	Phosphorus reduction (lb/yr)	2.56
		Length (ft)	259		
Average slope	3.06	Years	1		
		Distance to SW (ft)	1798		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 1
Catchment 3



Drainage Area – 4.85 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,470.64	2.28	$645.02

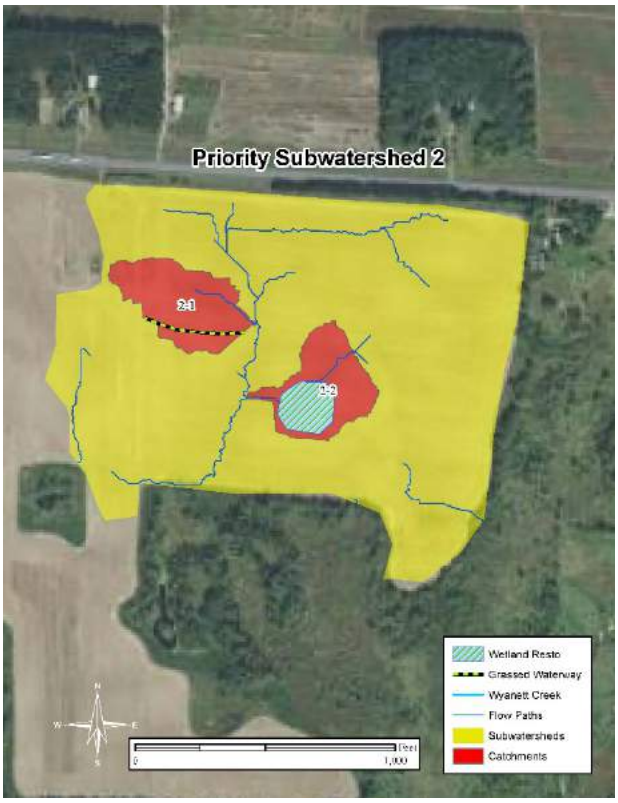
Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	2.68
Acres	4.85	Area (acres)	NA	Soil Loss reduction (t/yr)	13.64
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	248	Phosphorus reduction (lb/yr)	2.28
		Length (ft)	248		
Average slope	3.41	Years	1		
		Distance to SW (ft)	2600		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 2

Priority subwatershed 2 is 46 acres of mainly agricultural land surrounded by forests and lowlands. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek runs .28 miles east of the subwatershed. Two priority catchments were identified during desktop analysis where water quality projects are recommended. A grassed waterway was identified for this area because of the elevation, soils and concentrated flow path data. A small depression was identified in the middle of the field that is assumed marginal cropland. While not modeled during this assessment it is assumed a wetland restoration would be a viable project option for this area. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.

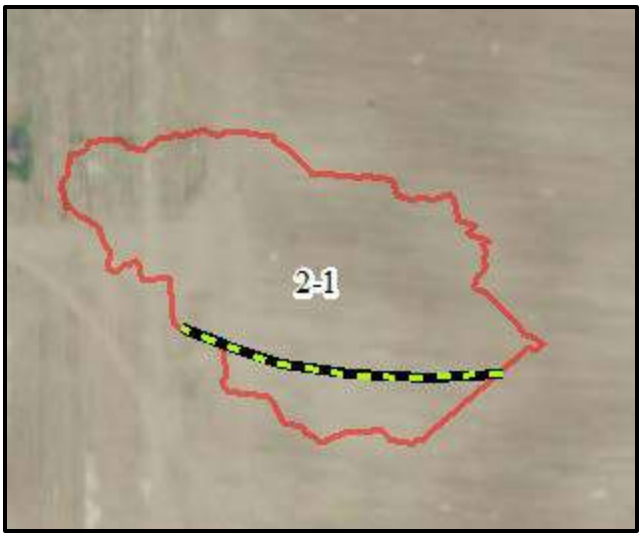


Priority Subwatershed 2 Summary	
Acres addressed	46
Dominant Land Cover	Agricultural
Total Catchments	2
Potential BMPs	2
Potential TP reduction (lb/yr)	3.66
Potential TSS reduction (tons/yr)	4.30

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 2
Catchment 1



Drainage Area – 4.03 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading.

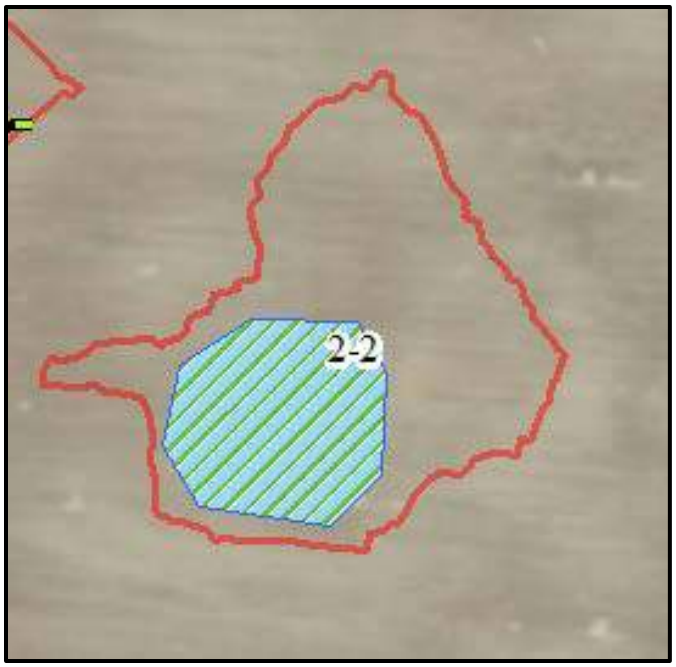
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,318.63	3.66	$633.51

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	4.3
Acres	4.03	Area (acres)	NA	Soil Loss reduction (t/yr)	21.51
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	391	Phosphorus reduction (lb/yr)	3.66
		Length (ft)	391		
Average slope	4.33	Years	1		
		Distance to SW (ft)	2391		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 2
Catchment 2



Drainage Area – 2.74 acres
Property Ownership – Private
Site Specific Information – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos, it was determined this location is marginal cropland, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and improve wildlife habitat.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,806.65	TBD	TBD

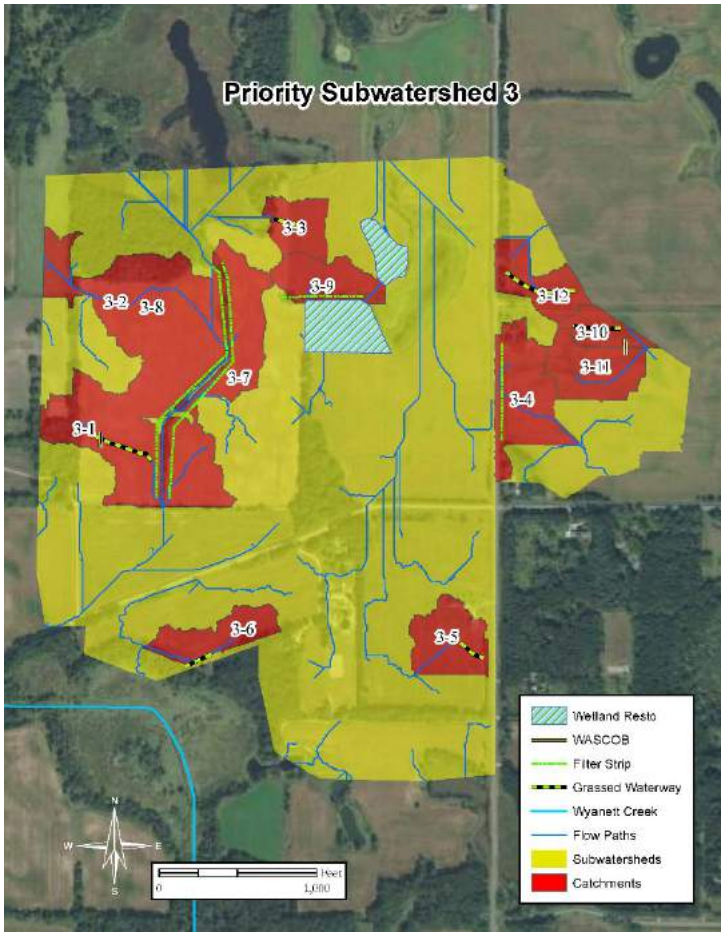
Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Wetland Resto	Sediment reduction (t/yr)	TBD
Acres	2.74	Area (acres)	0.81	Soil Loss reduction (t/yr)	TBD
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	TBD
		Length (ft)	NA		
Average slope	5.08	Years	NA		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 3

Priority subwatershed 3 is 265 acres of mainly agricultural land but also includes areas of low density residential, wetlands and forests. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Creek that runs only 200 feet to the southwest. 12 priority catchments were identified during desktop analysis where water quality projects are recommended. Edge of field filter strips, grass waterways, and WASCOBs were all identified as improvement projects. Areas of small depression were identified in the north end of the subwatershed that are assumed marginal cropland. While not modeled during this assessment it is assumed a wetland restoration would be a viable project option for this area. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.



Priority Subwatershed 3 Summary	
Acres addressed	265
Dominant Land Cover	Agricultural
Total Sub-Basins	12
Potential BMPs	12
Potential TP reduction (lb/yr)	41.30
Potential TSS reduction (tons/yr)	47.06

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 3
Catchment 1

Drainage Area – 8.11 acres
Property Ownership – Private
Site Specific Information – Catchment 1 is estimated 80% Agricultural land use and 20% forested. Starting in the middle of the catchment running west shows moderate to severe slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area. The outlet of the project would be an adjacent field ditch.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$37,254.06	7.93	$4,697.86

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	WASCOB	Sediment reduction (t/yr)	9.33
Acres	8.11	Area (acres)	3.8	Soil Loss reduction (t/yr)	24.09
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	3.8	Phosphorus reduction (lb/yr)	7.93
		Length (ft)	NA		
Average slope	4.01	Years	1		
		Distance to SW (ft)	1296		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 3
Catchment 2

Drainage Area – 9.01 acres
Property Ownership – Private
Site Specific Information – Catchment 2 is estimated 80% Agricultural landuse and 20% forested. Starting in the middle of the catchment running west shows moderate to severe slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCB in this area would reduce overland flow through the concentrated flow path area. A second project option could be a grassed waterway.

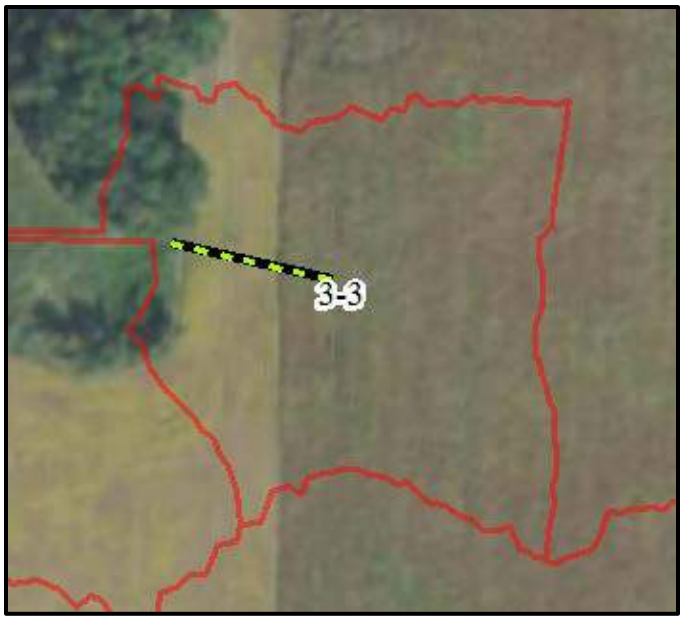
Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
$12,646.77	8.99	$1,406.76

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	WASCOB	Sediment reduction (t/yr)	10.58
Acres	9.01	Area (acres)	1.29	Soil Loss reduction (t/yr)	53.57
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	1.29	Phosphorus reduction (lb/yr)	8.99
		Length (ft)	NA		
Average slope	4.58	Years	1		
		Distance to SW (ft)	2539		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 3



Drainage Area – 3.02 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 95% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located west side of the catchment and outlets into adjacent forested and wetland area.

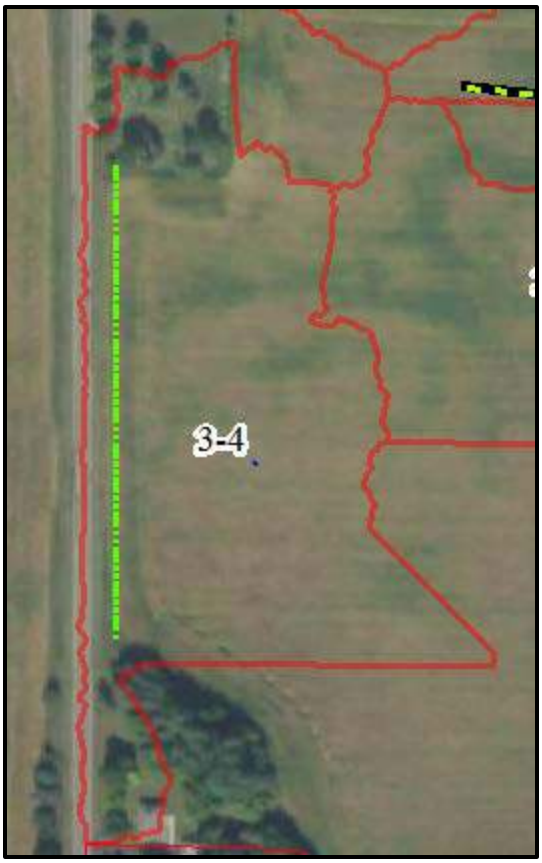
Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
$889.50	2.23	$398.88

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	2.62
Acres	3.02	Area (acres)	NA	Soil Loss reduction (t/yr)	8.25
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	150	Phosphorus reduction (lb/yr)	2.23
		Length (ft)	150		
Average slope	3.27	Years	1		
		Distance to SW (ft)	254		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 3
Catchment 4



Drainage Area – 6.69 acres.
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between the roadside ditch. The buffer is intended to catch sediment and utilize nutrients prior to entering the surface water ditch. The new projected is located on the west side of the catchment.

Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
$484.06	0.45	$1,075.70

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Filter Strip	Sediment reduction (t/yr)	0.24
Acres	6.69	Area (acres)	0.71	Soil Loss reduction (t/yr)	0.47
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.45
		Length (ft)	622		
Average slope	3.68	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 5

Drainage Area – 4.61 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 85% agricultural land use with small areas of low density residential. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located east side of the catchment and outlets into adjacent forested area.

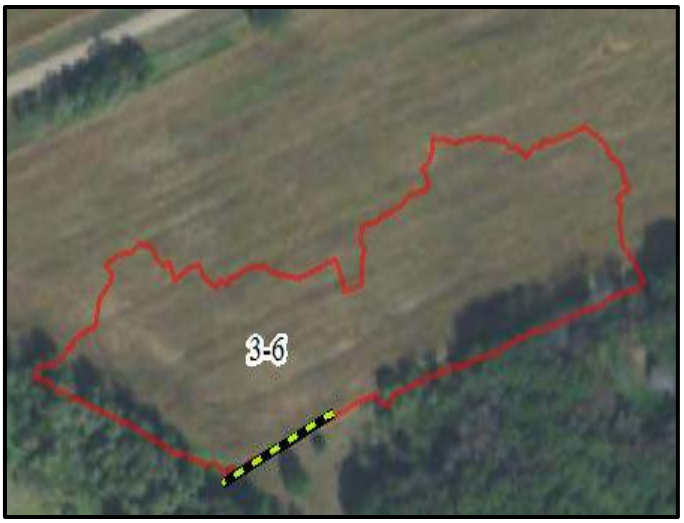
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,014.03	1.76	$576.15

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Grassed Waterway	Sediment reduction (t/yr)	2.07
Acres	4.61	Area (acres)	NA	Soil Loss reduction (t/yr)	9.41
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	171	Phosphorus reduction (lb/yr)	1.76
		Length (ft)	171		
Average slope	4.64	Years	1		
		Distance to SW (ft)	1503		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 6



Drainage Area – 3.66 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 98% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located south side of the catchment and outlets into adjacent forested area.

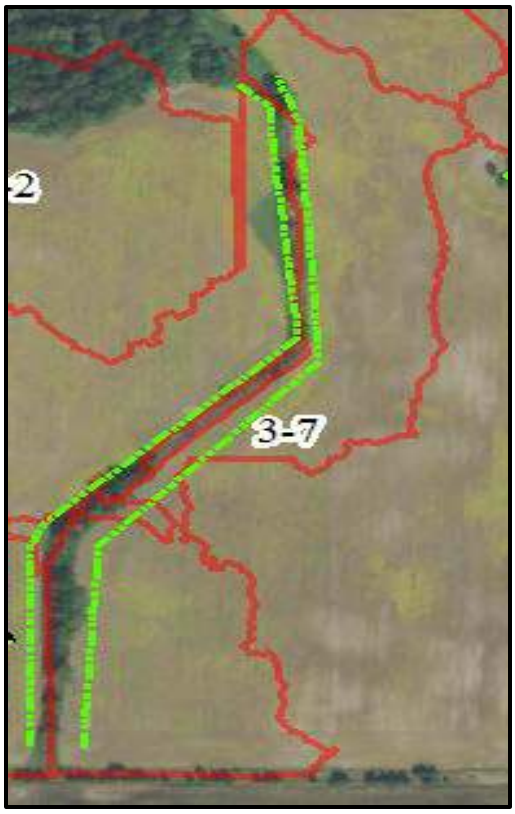
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,061.47	2.81	$377.75

Current Conditions		Added Practice		Reduction	
Sub-Basin	6	Type	Grassed Waterway	Sediment reduction (t/yr)	3.31
Acres	3.66	Area (acres)	NA	Soil Loss reduction (t/yr)	9.85
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	179	Phosphorus reduction (lb/yr)	2.81
		Length (ft)	179		
Average slope	2.9	Years	1		
		Distance to SW (ft)	195		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 3
Catchment 7



Drainage Area – 10.13 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between the field ditch. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering the surface water ditch. The new projected is located on the west side of the catchment.

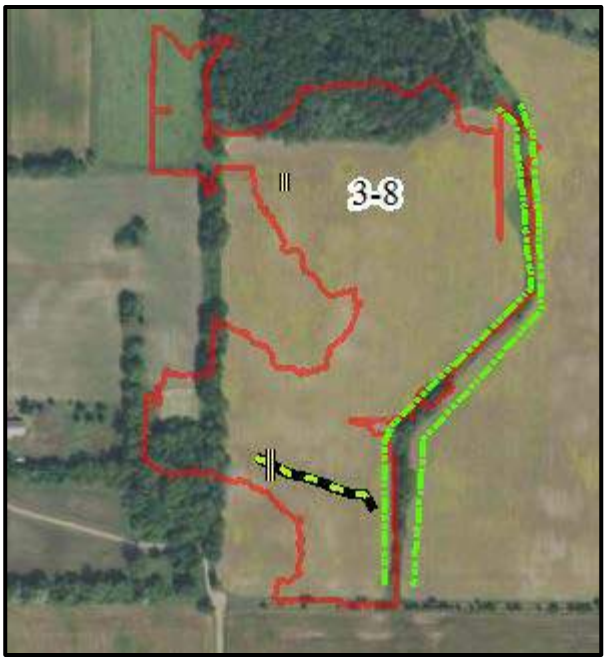
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$440.70	1	$440.70

Current Conditions		Added Practice		Reduction	
Sub-Basin	7	Type	Filter Strip	Sediment reduction (t/yr)	0.65
Acres	10.13	Area (acres)	1.89	Soil Loss reduction (t/yr)	1.26
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	1
		Length (ft)	1644		
Average slope	3.99	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 3
Catchment 8



Drainage Area – 24.45 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use and small areas of forested land. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between the field ditch. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering the surface water ditch. The new projected is located on the east side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$447.48	1.02	$438.71

Current Conditions		Added Practice		Reduction	
Sub-Basin	8	Type	Filter Strip	Sediment reduction (t/yr)	0.66
Acres	24.45	Area (acres)	1.93	Soil Loss reduction (t/yr)	1.28
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	1.02
		Length (ft)	1685		
Average slope	5.1	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 3
Catchment 9

Drainage Area – 4.08 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between the field ditch. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering the surface water ditch. The new projected is located on the south side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$135.60	0.31	$437.42

Current Conditions		Added Practice		Reduction	
Sub-Basin	9	Type	Filter Strip	Sediment reduction (t/yr)	0.2
Acres	4.08	Area (acres)	0.59	Soil Loss reduction (t/yr)	0.39
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.31
		Length (ft)	518		
Average slope	4.06	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 10

Drainage Area – 2.2 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located south side of the catchment.

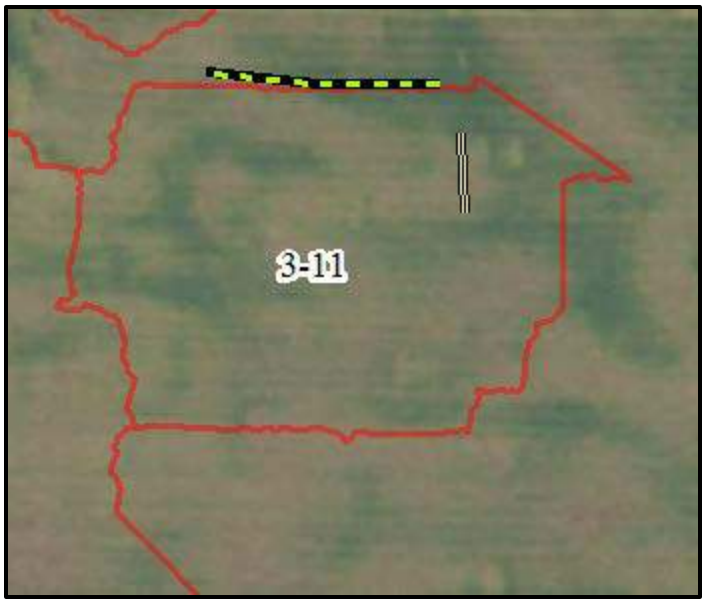
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,802.72	3.48	$518.02

Current Conditions		Added Practice		Reduction	
Sub-Basin	10	Type	Grassed Waterway	Sediment reduction (t/yr)	4.09
Acres	2.2	Area (acres)	NA	Soil Loss reduction (t/yr)	16.72
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	304	Phosphorus reduction (lb/yr)	3.48
		Length (ft)	304		
Average slope	3.5	Years	1		
		Distance to SW (ft)	900		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 3
Catchment 11



Drainage Area – 5.89 acres
Property Ownership – Private
Site Specific Information – Catchment 11 is estimated 100% Agricultural land use. Located on the east side of the catchment running west shows moderate slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow on the field. This area could also benefit from a grass waterway project.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$57,743.79	4.75	$12,156.59

Current Conditions		Added Practice		Reduction	
Sub-Basin	11	Type	WASCOB	Sediment reduction (t/yr)	5.58
Acres	5.89	Area (acres)	5.89	Soil Loss reduction (t/yr)	29.7
Soil	Zimmerman fine Sand, 1 to 6 % slope	Vol Voided (ft^3)	540	Phosphorus reduction (lb/yr)	4.75
		Length (ft)	0		
Average slope	2.71	Years	1		
		Distance to SW (ft)	3219		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 3
Catchment 12

Drainage Area – 3.81 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets into the adjacent forest.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,793.03	6.57	$425.12

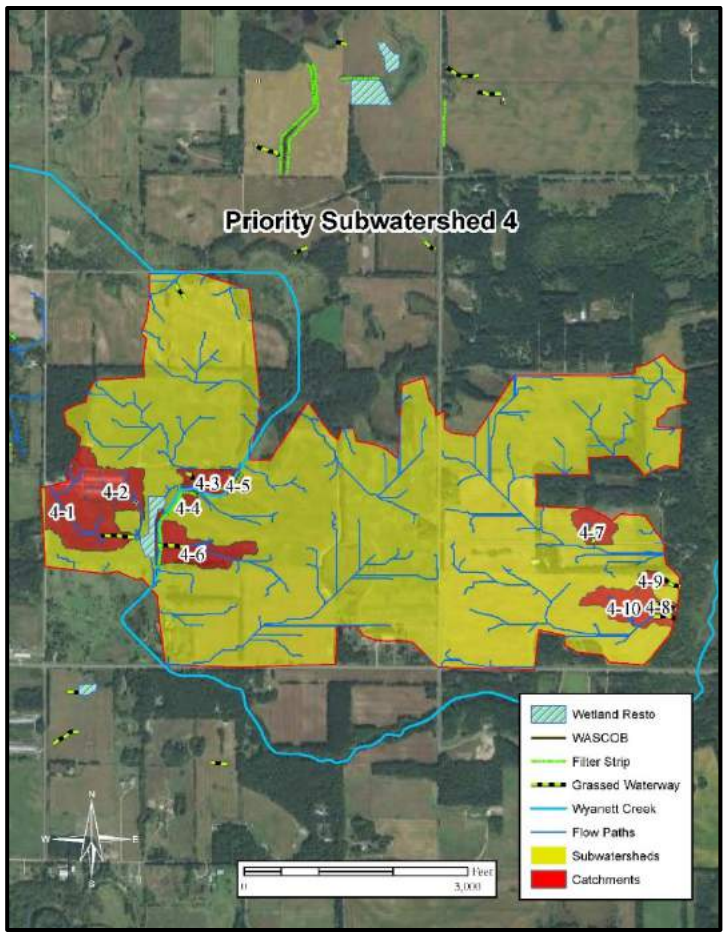
Current Conditions		Added Practice		Reduction	
Sub-Basin	12	Type	Grassed Waterway	Sediment reduction (t/yr)	7.73
Acres	3.81	Area (acres)	NA	Soil Loss reduction (t/yr)	25.91
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	471	Phosphorus reduction (lb/yr)	6.57
		Length (ft)	471		
Average slope	5.07	Years	1		
		Distance to SW (ft)	346		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 4

Priority subwatershed 4 is 646 acres and the largest of all priority subwatersheds. The 646 acres is primarily agricultural land but area also includes areas of low density residential, wetlands and forest. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek meanders through the prioritized zone 10 priority catchments were identified during desktop analysis where water quality projects are recommended. Edge of field filter strips, grass waterways, and WASCOBs were all identified as improvement projects. Areas of small depression were identified in the west end of the subwatershed that are assumed marginal cropland. While not modeled during this assessment it is assumed a wetland restoration would be a viable project option for this area. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.

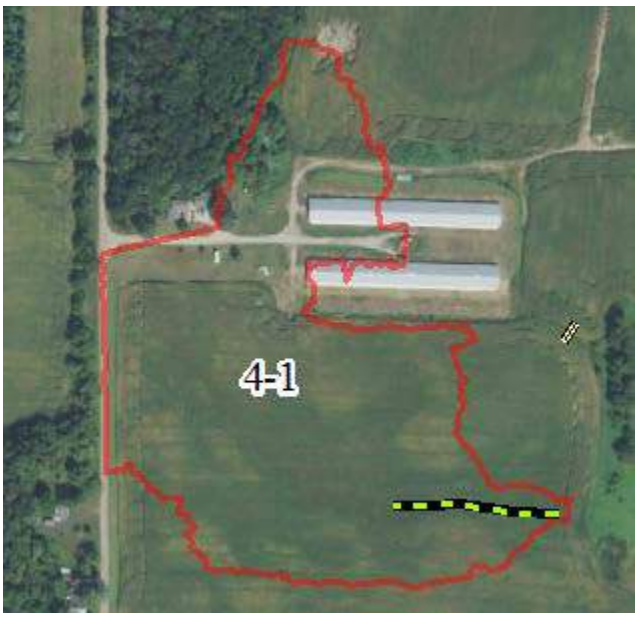


Priority Subwatershed 3 Summary	
Acres addressed	646
Dominant Land Cover	Agricultural
Total Sub-Basins	10
Potential BMPs	10
Potential TP reduction (lb/yr)	39.33
Potential TSS reduction (tons/yr)	46.03

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 1



Drainage Area – 20.66 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 75% agricultural land use and 25% low density residential. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located south west side of the catchment and outlets into adjacent wetland.

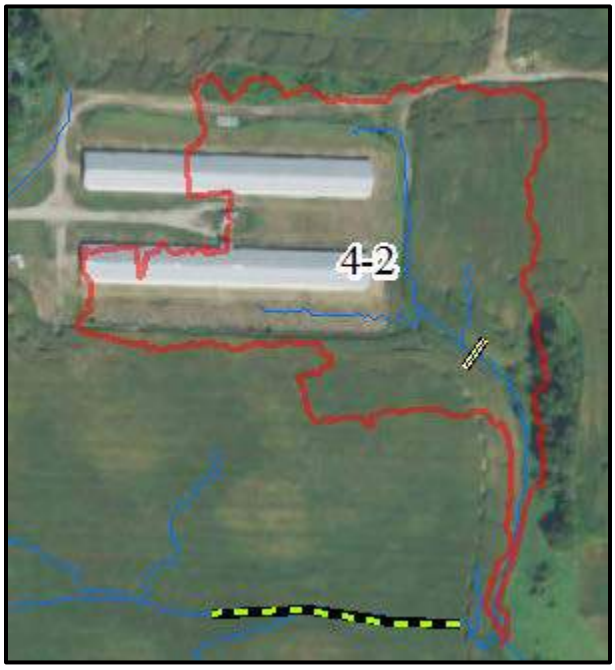
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,567.69	5.95	$431.54

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	7
Acres	20.66	Area (acres)	433	Soil Loss reduction (t/yr)	23.87
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	433	Phosphorus reduction (lb/yr)	5.95
		Length (ft)	NA		
Average slope	4.07	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – WASCOB
Subwatershed 4
Catchment 2



Drainage Area – 7.95 acres
Property Ownership – Private
Site Specific Information – Catchment 2 is estimated 40% Agricultural land use and 60% low density residential. Starting in the middle of the catchment running west shows moderate to severe slopes with a potential linear depression corresponding with the elevation data. Implementing a WASCOB in this area would reduce overland flow through the concentrated flow path area. The outlet of the project would be an adjacent wetland.

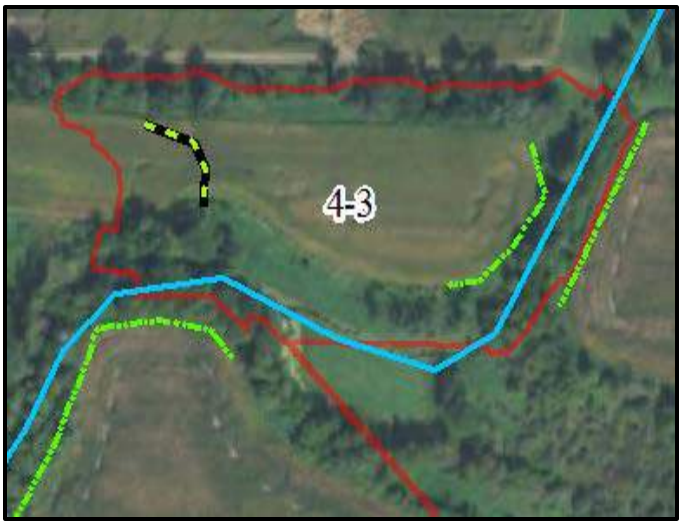
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$68,625.90	4.69	$14,632.39

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	WASCOB	Sediment reduction (t/yr)	5.51
Acres	7.95	Area (acres)	7	Soil Loss reduction (t/yr)	14.3
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	764	Phosphorus reduction (lb/yr)	4.69
		Length (ft)	764		
Average slope	3	Years	1		
		Distance to SW (ft)	100		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 3



Drainage Area – 5.42 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use and small portions of wetland and forest. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located north west side of the catchment and outlets into adjacent forested area.

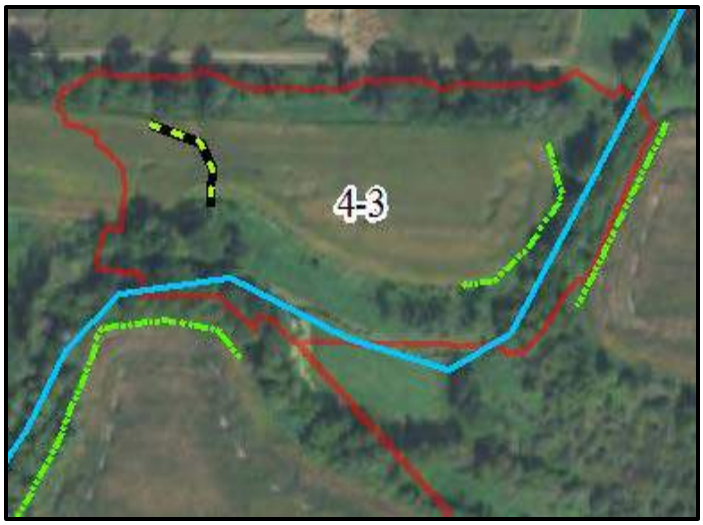
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$990.31	3.16	$313.39

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	3.72
Acres	5.42	Area (acres)	NA	Soil Loss reduction (t/yr)	9.19
Soil	Zimmerman loamy fine sand and fine sand, 7 to 12 percent slopes	Vol Voided (ft^3)	167	Phosphorus reduction (lb/yr)	3.16
		Length (ft)	167		
Average slope	7.37	Years	1		
		Distance to SW (ft)	79		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 4
Catchment 3



Drainage Area – 5.42 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use with small areas of wetland and forest. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between Wyanett Creek. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering the creek. The new projected is located on the east side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$207.79	0.16	$1,298.68

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Filter Strip	Sediment reduction (t/yr)	0.1
Acres	5.42	Area (acres)	0.306473829	Soil Loss reduction (t/yr)	0.2
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.16
		Length (ft)	267		
Average slope	7.37	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 4
Catchment 4

Drainage Area – .77 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 95% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between Wyanett Creek. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering surface water. The new projected is located on the west side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$174.33	0.13	$1,340.96

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Filter Strip	Sediment reduction (t/yr)	0.09
Acres	0.77	Area (acres)	0.257116621	Soil Loss reduction (t/yr)	0.17
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.13
		Length (ft)	224		
Average slope	5.19	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 4
Catchment 5

Drainage Area – .45 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between Wyanett Creek. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering surface water. The new projected is located on the west side of the catchment.

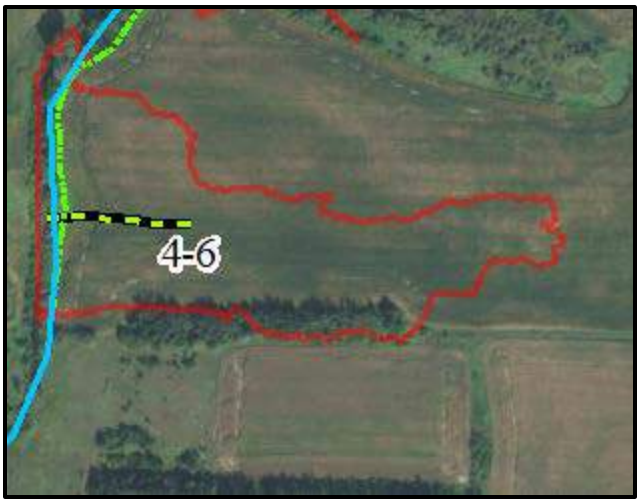
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$211.68	0.16	$1,323.00

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Filter Strip	Sediment reduction (t/yr)	0.11
Acres	0.45	Area (acres)	0.312213039	Soil Loss reduction (t/yr)	0.21
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.16
		Length (ft)	272		
Average slope	7.37	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 6



Drainage Area – 11.4 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 98% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located west side of the catchment and outlets into adjacent forested area.

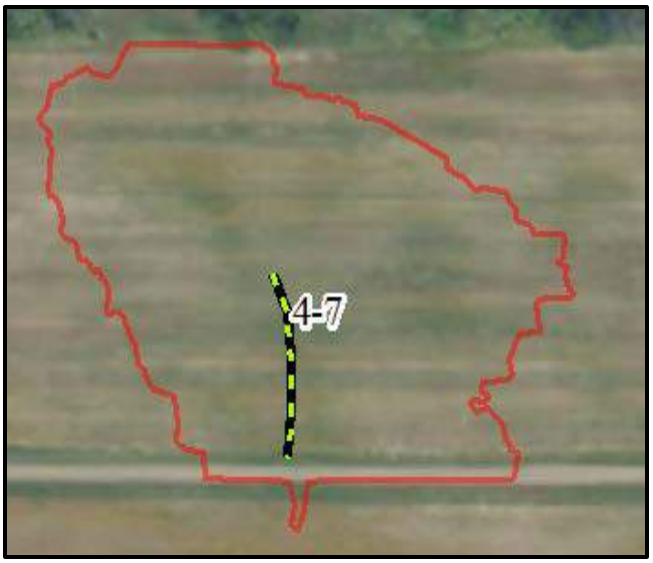
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,217.82	10.86	$204.22

Current Conditions		Added Practice		Reduction	
Sub-Basin	6	Type	Grassed Waterway	Sediment reduction (t/yr)	12.77
Acres	11.44	Area (acres)	NA	Soil Loss reduction (t/yr)	20.57
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	374	Phosphorus reduction (lb/yr)	10.86
		Length (ft)	374		
Average slope	3.37	Years	1		
		Distance to SW (ft)	10		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 7



Drainage Area – 4.7 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 98% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located south side of the catchment and outlets into adjacent roadside ditch.

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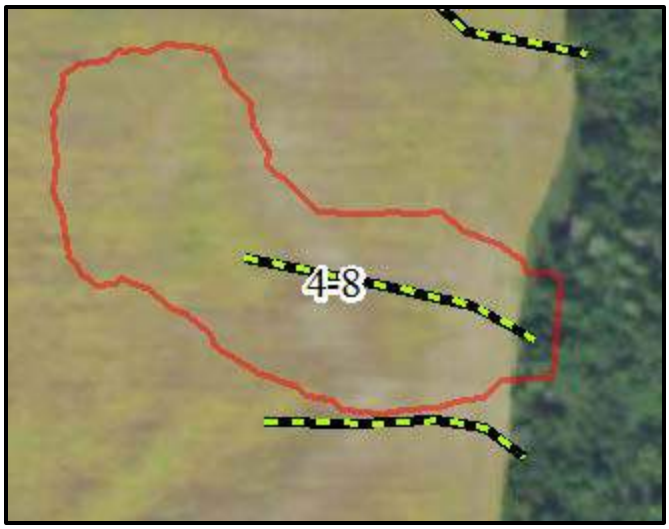
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,209.72	2	$604.86

Current Conditions		Added Practice		Reduction	
Sub-Basin	7	Type	Grassed Waterway	Sediment reduction (t/yr)	2.35
Acres	4.7	Area (acres)	NA	Soil Loss reduction (t/yr)	11.22
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	204	Phosphorus reduction (lb/yr)	2
		Length (ft)	204		
Average slope	3.49	Years	1		
		Distance to SW (ft)	1646		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 8



Drainage Area – 2.75 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located east side of the catchment and outlets into adjacent forested area.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,950.97	4.25	$459.05

Current Conditions		Added Practice		Reduction	
Sub-Basin	8	Type	Grassed Waterway	Sediment reduction (t/yr)	5
Acres	2.75	Area (acres)	10.86	Soil Loss reduction (t/yr)	18.1
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	329	Phosphorus reduction (lb/yr)	4.25
		Length (ft)	329		
Average slope	5.48	Years	1		
		Distance to SW (ft)	468		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 9

Drainage Area – 1.73 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located east south side of the catchment and outlets into adjacent forested area.

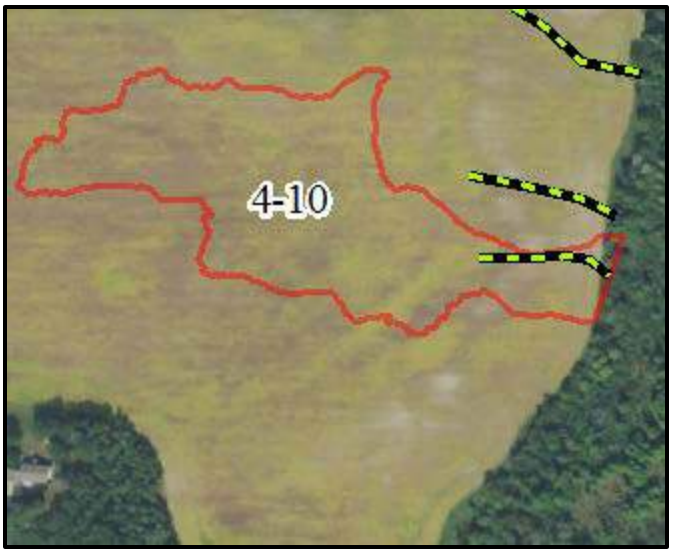
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,915.39	4.17	$459.33

Current Conditions		Added Practice		Reduction	
Sub-Basin	9	Type	Grassed Waterway	Sediment reduction (t/yr)	4.91
Acres	1.73	Area (acres)	0	Soil Loss reduction (t/yr)	17.77
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	323	Phosphorus reduction (lb/yr)	4.17
		Length (ft)	323		
Average slope	6.19	Years	1		
		Distance to SW (ft)	517		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 4
Catchment 10



Drainage Area – 7.78 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located east side of the catchment and outlets into adjacent forested area.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,743.42	3.8	$458.79

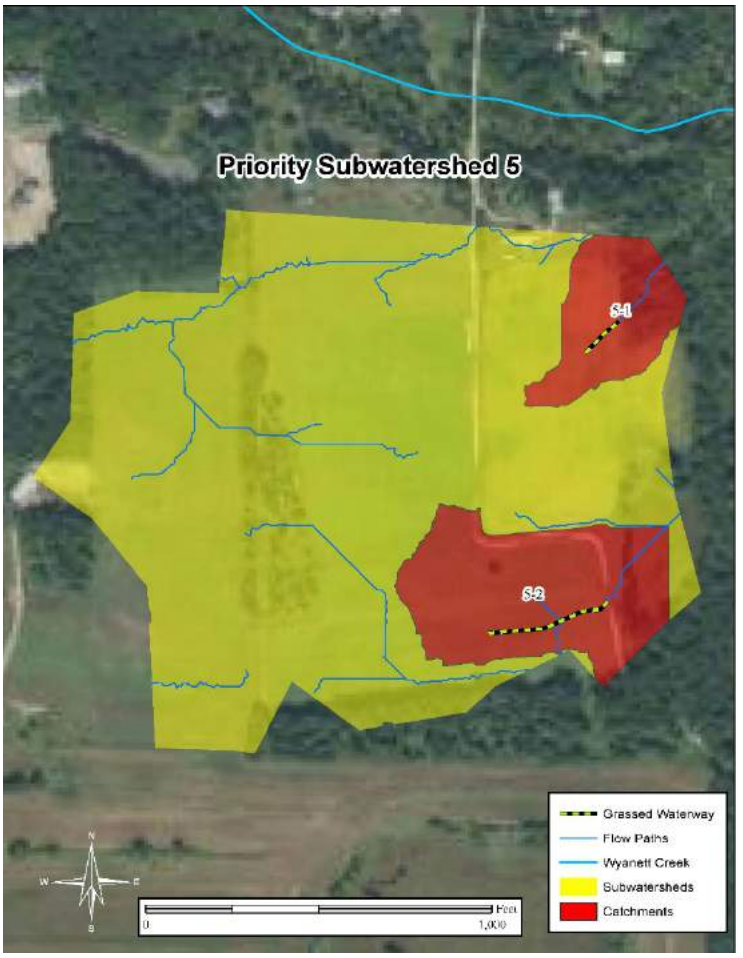
Current Conditions		Added Practice		Reduction	
Sub-Basin	10	Type	Grassed Waterway	Sediment reduction (t/yr)	4.47
Acres	7.78	Area (acres)	0	Soil Loss reduction (t/yr)	16.17
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	294	Phosphorus reduction (lb/yr)	3.8
		Length (ft)	294		
Average slope	3.17	Years	1		
		Distance to SW (ft)	487		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 5

Priority subwatershed 5 is 51 acres of mainly agricultural land with small areas of low density residential, wetlands and forests. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek runs only 300 feet to the north. Two priority catchments were identified during desktop analysis where water quality projects are recommended. A grass waterway is recommended for each of the catchments to reduce sediment and nutrient loading. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.



Priority Subwatershed 5 Summary	
Acres addressed	51
Dominant Land Cover	Agricultural
Total Sub-Basins	2
Potential BMPs	2
Potential TP reduction (lb/yr)	10.12
Potential TSS reduction (tons/yr)	11.91

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 5
Catchment 1

Drainage Area – 3.34 acres.
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use and 20% forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets into adjacent forested area.

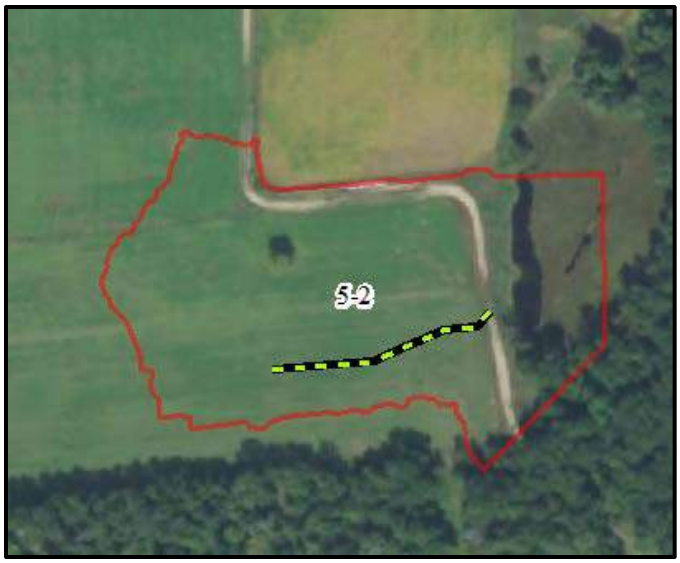
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$776.83	2.03	$382.67

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	2.39
Acres	3.34	Area (acres)	NA	Soil Loss reduction (t/yr)	7.21
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	131	Phosphorus reduction (lb/yr)	2.03
		Length (ft)	131		
Average slope	8.37	Years	1		
		Distance to SW (ft)	209		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 5
Catchment 2



Drainage Area – 7.4 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 85% agricultural land use and a small percentage of wetland. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets into the wetland on the east.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,140.73	8.09	$264.61

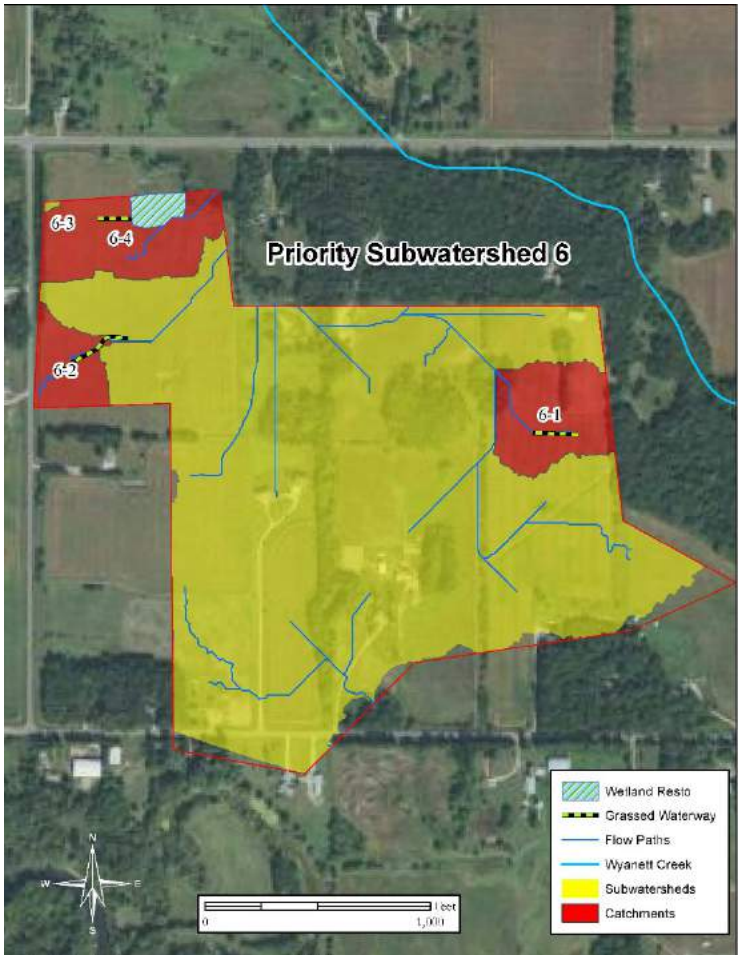
Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	9.52
Acres	7.4	Area (acres)	NA	Soil Loss reduction (t/yr)	23.87
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	361	Phosphorus reduction (lb/yr)	8.09
		Length (ft)	361		
Average slope	5.06	Years	1		
		Distance to SW (ft)	85		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 6

Priority subwatershed 6 is 97 acres of composed mainly of agricultural land with small areas of low density residential, wetlands and forests. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek runs only 300 feet to the north. Four priority catchments were identified during desktop analysis where water quality projects are recommended. A grass waterway is recommended for three of the four catchments to reduce sediment and nutrient loading. An area of small depression was identified in the north end of the subwatershed that is assumed marginal cropland. While not modeled during this assessment it is assumed a wetland restoration would be a viable project option for this area. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.



Priority Subwatershed 6 Summary	
Acres addressed	97
Dominant Land Cover	Agricultural
Total Sub-Basins	4
Potential BMPs	4
Potential TP reduction (lb/yr)	8.51
Potential TSS reduction (tons/yr)	10.01

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

Project ID – Grassed Waterway
Subwatershed 6
Catchment 1

Drainage Area – 5.37 acres.
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use and a small percentage of forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,197.86	2.51	$477.24

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	2.95
Acres	5.37	Area (acres)	NA	Soil Loss reduction (t/yr)	11.11
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	202	Phosphorus reduction (lb/yr)	2.51
		Length (ft)	202		
Average slope	4.87	Years	1		
		Distance to SW (ft)	604		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 6
Catchment 2

Drainage Area – 4.7 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use and a small percentage of forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

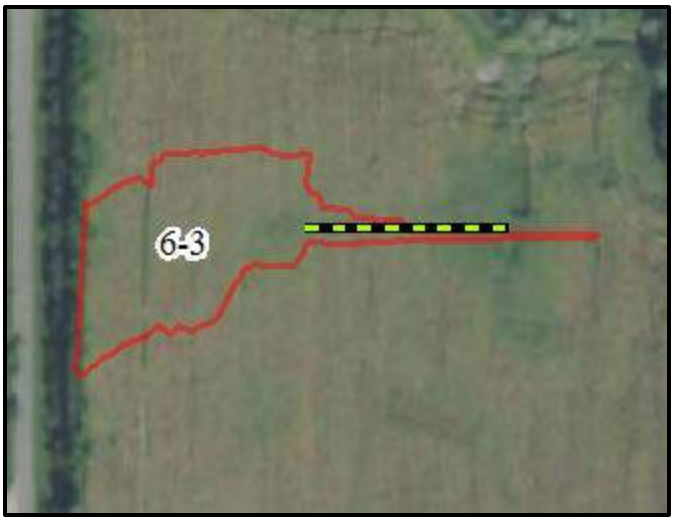
Cost-Benefit		
Practice Cost	P reduction (lb/yr)	$ per lb TP Removed
$2,235.61	3.51	$636.93

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	4.13
Acres	4.7	Area (acres)	NA	Soil Loss reduction (t/yr)	20.74
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	377	Phosphorus reduction (lb/yr)	3.51
		Length (ft)	377		
Average slope	5.5	Years	1		
		Distance to SW (ft)	2451		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 6
Catchment 3



Drainage Area – 1.12 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the east side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,310.53	2.49	$526.32

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	2.93
Acres	1.12	Area (acres)	NA	Soil Loss reduction (t/yr)	12.16
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	221	Phosphorus reduction (lb/yr)	2.49
		Length (ft)	221		
Average slope	4.22	Years	1		
		Distance to SW (ft)	975		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 6
Catchment 4

Drainage Area – 6.17 acres
Property Ownership – Private
Site Specific Information – Located on the north end of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos, it was determined this location is marginal cropland, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore an area to a more diverse environment that would improve water quality and wildlife habitat.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,425.50	TBD	TBD

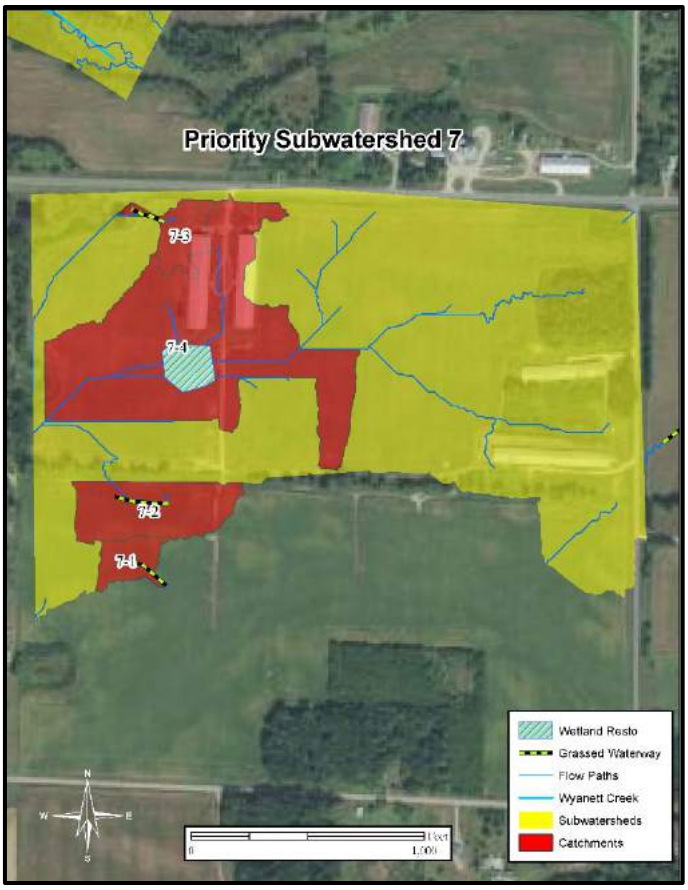
Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Wetland Resto	Sediment reduction (t/yr)	TBA
Acres	6.17	Area (acres)	0.7	Soil Loss reduction (t/yr)	TBA
Soil	Isanti Mucky Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	TBA
		Length (ft)	NA		
Average slope	3.79	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 7

Priority subwatershed 7 is 89 acres of mainly agricultural land with small areas of low density residential and forested land. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek that runs only 700 feet to the north. Four priority catchments were identified during desktop analysis where water quality projects are recommended. A grass waterway is recommended for three of the four catchments to reduce sediment and nutrient loading. An area of small depression was identified in the middle of the subwatershed that is assumed marginal cropland. While not modeled during this assessment it is assumed a wetland restoration would be a viable project option for this area. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.



Priority Subwatershed 5 Summary	
Acres addressed	89
Dominant Land Cover	Agricultural
Total Sub-Basins	4
Potential BMPs	4
Potential TP reduction (lb/yr)	11.93
Potential TSS reduction (tons/yr)	14.03

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 1

Drainage Area – 1.12 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the east side of the catchment.

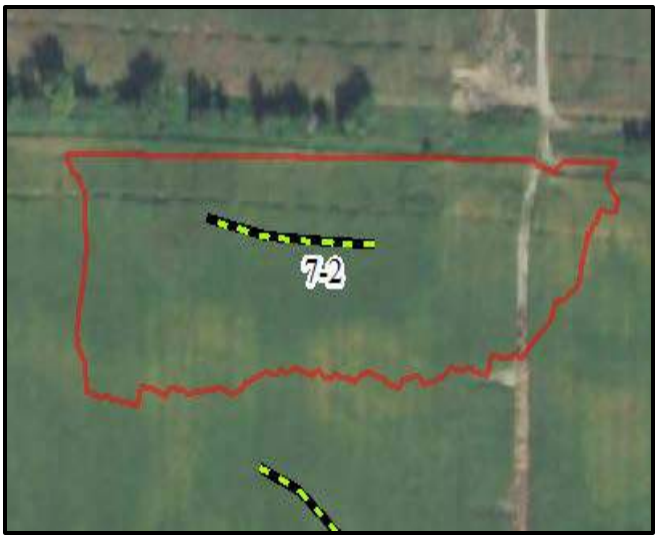
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
1197.86	2.51	$477.24

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	2.95
Acres	1.12	Area (acres)	NA	Soil Loss reduction (t/yr)	11.11
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	202	Phosphorus reduction (lb/yr)	2.51
		Length (ft)	202		
Average slope	3.48	Years	1		
		Distance to SW (ft)	608		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 2



Drainage Area – 7.23 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment.

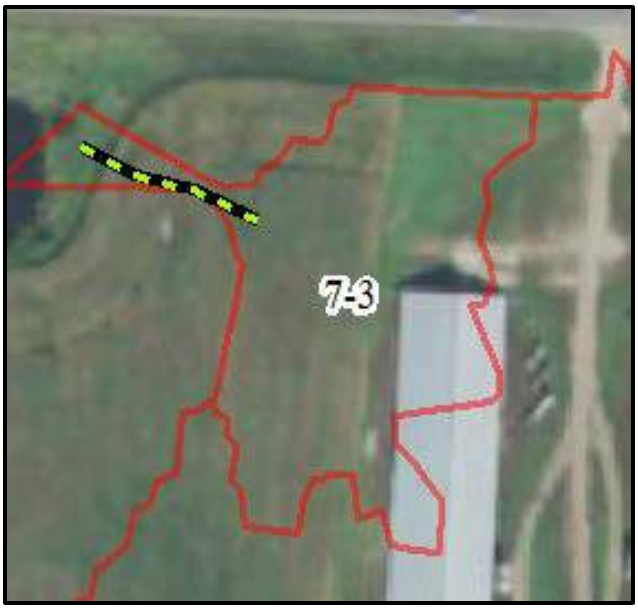
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
2235.61	4.96	$450.73

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	5.83
Acres	7.23	Area (acres)	NA	Soil Loss reduction (t/yr)	20.74
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	377	Phosphorus reduction (lb/yr)	4.96
		Length (ft)	377		
Average slope	4.41	Years	1		
		Distance to SW (ft)	460		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 7
Catchment 3



Drainage Area – 1.33 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 75% agricultural land use and a small percentage wetland and low density residential. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the north west side of the catchment and outlets into the adjacent wetland.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
1310.53	4.46	$293.84

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	5.25
Acres	1.33	Area (acres)	NA	Soil Loss reduction (t/yr)	12.16
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	221	Phosphorus reduction (lb/yr)	4.46
		Length (ft)	221		
Average slope	2.36	Years	1		
		Distance to SW (ft)	58		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Wetland Restoration
Subwatershed 7
Catchment 4

Drainage Area – 15.95 acres
Property Ownership – Private
Site Specific Information – – Located in the middle of the agricultural field is a low depression in the landscape that has the potential to be restored to wetland. Using historical aerial photos, it was determined this location is marginal cropland, showing hydrologic indicators in the majority of the photos. Wetland Restorations were not modeled during this assessment however the opportunity is there to restore the area to a more diverse environment that would improve water quality and wildlife habitat.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
2979.9	TBD	TBD

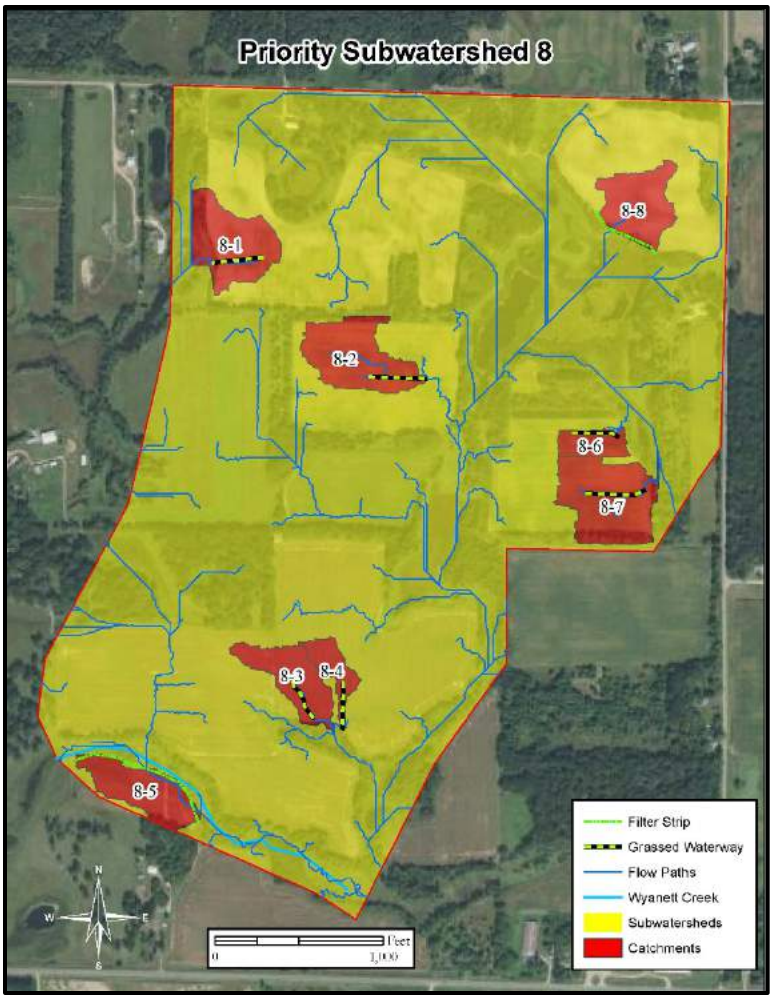
Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Wetland Resto	Sediment reduction (t/yr)	TBD
Acres	15.95	Area (acres)	0.86	Soil Loss reduction (t/yr)	TBD
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	TBD
		Length (ft)	NA		
Average slope	3.67	Years	1		
		Distance to SW (ft)	NA		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Priority Subwatershed 8

Priority subwatershed 8 is 306 acres of mainly agricultural land but also includes areas of forest and large wetlands. In addition to the sandy soils, moderate to severe slopes and agricultural land use, this subwatershed was prioritized because Wyanett Creek runs through the south section of the subwatershed. Eight priority catchments were identified during desktop analysis where water quality projects are recommended. Grass waterways and filter strips were the two projects chosen to combat sediment and nutrient loading. Like every subwatershed identified in this assessment, the area could benefit from cover crops, conservation tillage or permanent vegetation establishments to improve soil health, increase biodiversity and reduce nutrient loading to Wyanett Creek and Green Lake.

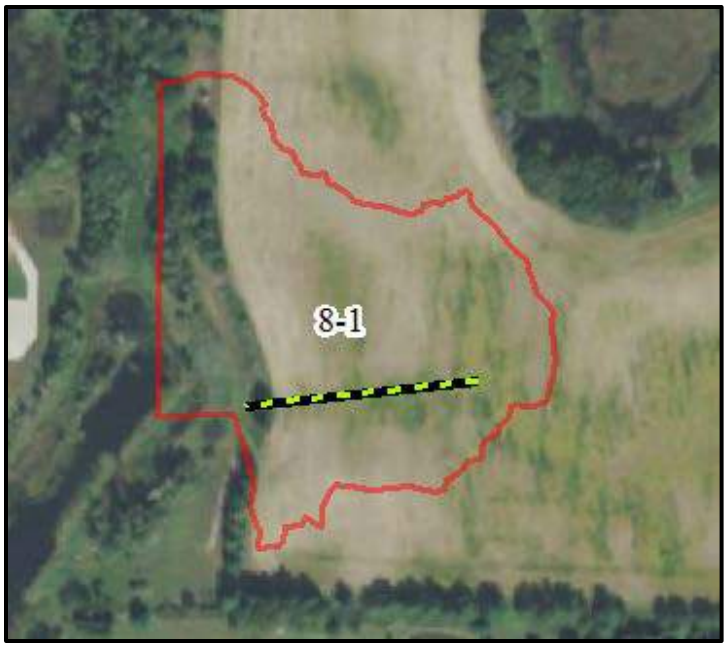


Priority Subwatershed 8 Summary	
Acres addressed	89
Dominant Land Cover	Agricultural
Total Sub-Basins	8
Potential BMPs	8
Potential TP reduction (lb/yr)	34.45
Potential TSS reduction (tons/yr)	40.00

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 1



Drainage Area – 4.73 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 80% agricultural land use and a small percentage of forested land and wetland. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the south side of the catchment and outlets into the adjacent wetland to the west.

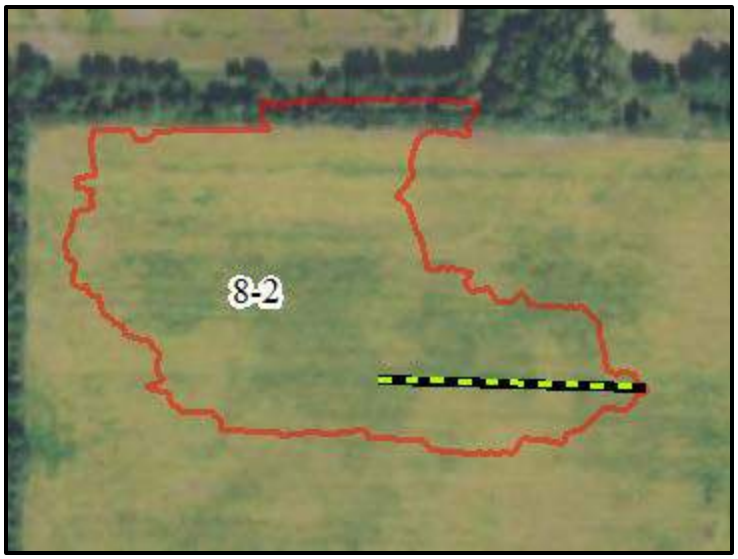
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,856.09	5.39	$344.36

Current Conditions		Added Practice		Reduction	
Sub-Basin	1	Type	Grassed Waterway	Sediment reduction (t/yr)	6.34
Acres	4.73	Area (acres)	NA	Soil Loss reduction (t/yr)	17.22
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	313	Phosphorus reduction (lb/yr)	5.39
		Length (ft)	313		
Average slope	5.58	Years	1		
		Distance to SW (ft)	125		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 2



Drainage Area – 4.92 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use and a small percentage of forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the east side of the catchment.

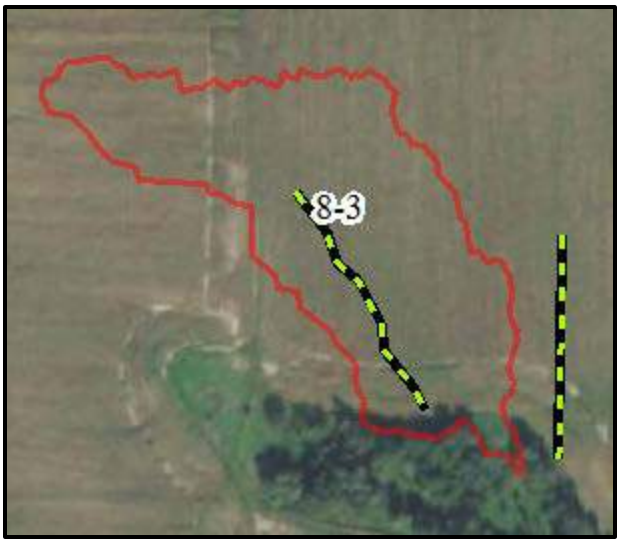
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,235.61	5.45	$410.20

Current Conditions		Added Practice		Reduction	
Sub-Basin	2	Type	Grassed Waterway	Sediment reduction (t/yr)	6.41
Acres	4.92	Area (acres)	NA	Soil Loss reduction (t/yr)	20.74
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	377	Phosphorus reduction (lb/yr)	5.45
		Length (ft)	347		
Average slope	2.38	Years	1		
		Distance to SW (ft)	291		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed
Catchment



Drainage Area – 3.28 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 99% agricultural land use and a small percentage of forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project in the middle of the catchment and outlets into the forest bordering a wetland.

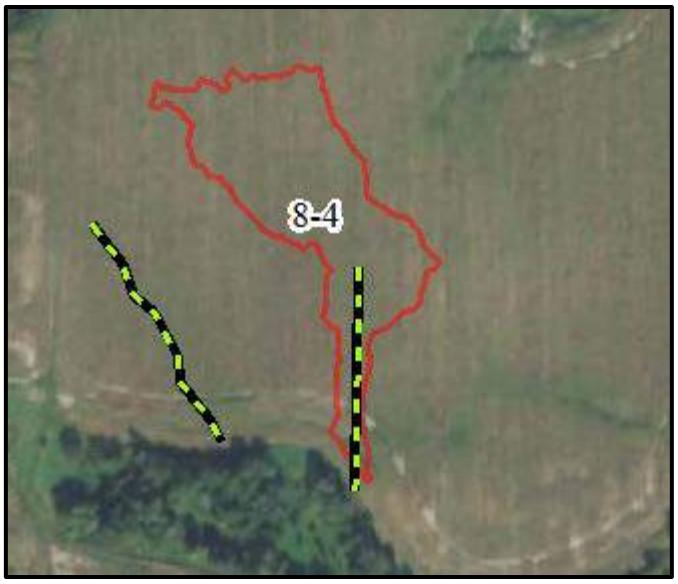
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,057.71	6.08	$338.44

Current Conditions		Added Practice		Reduction	
Sub-Basin	3	Type	Grassed Waterway	Sediment reduction (t/yr)	7.31
Acres	3.28	Area (acres)	NA	Soil Loss reduction (t/yr)	19.09
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	347	Phosphorus reduction (lb/yr)	6.08
		Length (ft)	347		
Average slope	3.32	Years	1		
		Distance to SW (ft)	347		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 4



Drainage Area – 1.4 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the south side of the catchment and outlets into a forested area bordering a wetland.

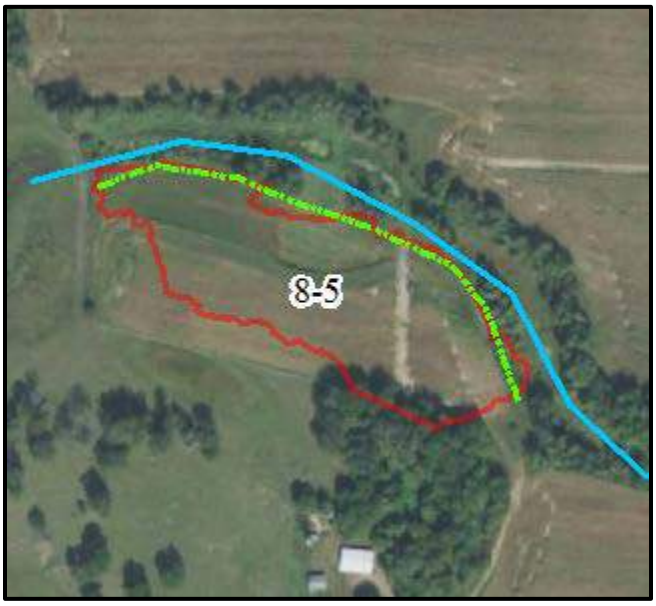
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,719.70	5.81	$295.99

Current Conditions		Added Practice		Reduction	
Sub-Basin	4	Type	Grassed Waterway	Sediment reduction (t/yr)	6.84
Acres	1.14	Area (acres)	0	Soil Loss reduction (t/yr)	15.95
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	290	Phosphorus reduction (lb/yr)	5.81
		Length (ft)	290		
Average slope	2.88	Years	1		
		Distance to SW (ft)	60		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed 8
Catchment 5



Drainage Area – 3.66 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 98% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between Wyanett Creek. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering surface water. The new projected is located on the north side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$716.76	0.67	$1,069.79

Current Conditions		Added Practice		Reduction	
Sub-Basin	5	Type	Filter Strip	Sediment reduction (t/yr)	0.36
Acres	3.66	Area (acres)	1.057162534	Soil Loss reduction (t/yr)	0.7
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	NA	Phosphorus reduction (lb/yr)	0.67
		Length (ft)	921		
Average slope	3.58	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 6

Drainage Area – 1.48 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in on the north side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$1,701.91	5.32	$319.91

Current Conditions		Added Practice		Reduction	
Sub-Basin	6	Type	Grassed Waterway	Sediment reduction (t/yr)	6.15
Acres	1.48	Area (acres)	0	Soil Loss reduction (t/yr)	15.79
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	287	Phosphorus reduction (lb/yr)	5.32
		Length (ft)	287		
Average slope	3.25	Years	1		
		Distance to SW (ft)	95		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Grassed Waterway
Subwatershed 8
Catchment 7

Drainage Area – 5.82 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 90% agricultural land use and a small percentage of forested land. Using aerial photography and GIS tools this area was identified to have a potential for forming a gully. Planting a strip of permanent vegetation in the concentrated flow path would reduce soil loss and prevent nutrient loading. The project is located in the middle of the catchment and outlets in a forested area to the east.

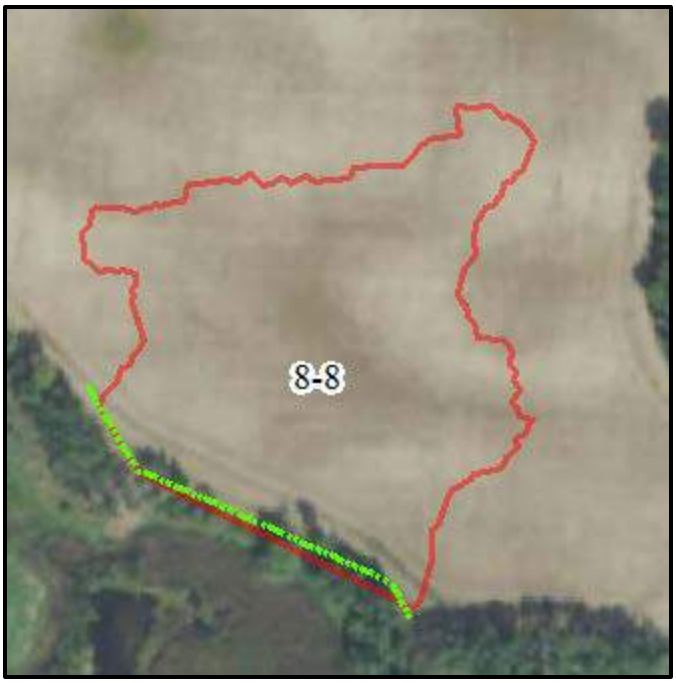
Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$2,158.52	5.45	$396.06

Current Conditions		Added Practice		Reduction	
Sub-Basin	7	Type	Grassed Waterway	Sediment reduction (t/yr)	6.41
Acres	5.82	Area (acres)	0	Soil Loss reduction (t/yr)	20.02
Soil	Lino Loamy Fine Sand	Vol Voided (ft^3)	364	Phosphorus reduction (lb/yr)	5.45
		Length (ft)	364		
Average slope	2.82	Years	1		
		Distance to SW (ft)	245		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Project ID – Filter Strip
Subwatershed - 8
Catchment - 8



Drainage Area – 3.71 acres
Property Ownership – Private
Site Specific Information – The Catchment is estimated 100% agricultural land use. The proposed project is a perennial vegetative filter strip to be planted along the field's edge creating a buffer between the open water wetland. The buffer is intended to catch sediment and utilize nutrients from runoff, prior to entering surface water. The new projected is located on the south west side of the catchment.

Cost-Benefit		
Practice Cost	**P reduction (lb/yr)**	**$ per lb TP Removed**
$350.98	0.28	$1,253.52

Current Conditions		Added Practice		Reduction	
Sub-Basin	8	Type	Filter Strip	Sediment reduction (t/yr)	0.18
Acres	3.71	Area (acres)	0.517676768	Soil Loss reduction (t/yr)	0.35
Soil	Zimmerman fine Sand,, 1 to 6 % slope	Vol Voided (ft^3)	0	Phosphorus reduction (lb/yr)	0.28
		Length (ft)	451		
Average slope	2.81	Years	1		
		Distance to SW (ft)	0		

Funding provided in part by the Clean Water Fund of the Clean Water, Land, and Legacy Amendment

CLEAN WATER LAND & LEGACY AMENDMENT

Appendices:

References:

Isanti SWCD in partnership with the Metro CD, Green Lake Subwatershed Retrofit Analysis; For Areas Draining Directly to the Lake.

The Natural Resource Conservation Service (NRCS) Engineering Tool

Chisago SWCD, 2015. Rural Subwatershed Analysis Protocol, Part 1 – Targeting. Version 1.0. http://chisagoswcd.org/

Chisago SWCD, 2015. Rural Subwatershed Analysis Protocol, Part 2 – Prioritizing. Version 1.0. http://chisagoswcd.org/

Chisago SWCD, 2014. Chisago Lakes Chain of Lakes Watershed Rural Subwatershed Analysis. http://chisagoswcd.org/

BWSR Water Erosion Pollution Reduction Estimator. Available for download at http://www.bwsr.state.mn.us/outreach/eLINK/index.html

Revised Universal Soil Loss Equation 2 (RUSLE2). United States Department of Agriculture Natural Resource Conservation Service.

Definitions:

Water and sediment control basins: An earthen embankment that traps water and sediment running off cropland upslope from the structure, and reduces gully erosion by controlling flow within the drainage area.

Grassed waterways: Are broad, shallow channels designed to move surface water across farmland without causing soil erosion. The vegetative cover in the waterway slows the water flow and protects the channel surface from rill and gully erosion. (NRCS)

Permanent vegetation: An area permanently vegetated with a variety of grasses in order to stabilize the soil, filter runoff, utilize nutrients and increase the biodiversity.

Wetland restoration: Improving or creating an area of land with the characteristics of a wetland; hydrology, vegetation and soils.