

Chapter 5: Management Recommendations, Implementation Plan, and Monitoring Plan

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Chapter 4 discussed modeling and field data collection techniques, estimated pollutant load reductions for implementing the measurable action items, and identified sub-watershed units with more or fewer concentrations of opportunities for pollutant load reductions. This chapter utilizes the information learned from the modeling exercise to form recommendations for the watershed. It summarizes the pollutant load reduction and cost estimates of the recommendations by grouping them according to the Environmental Protection Agency (EPA) best management practices (BMP) categories. Then it creates implementation and monitoring plans for specific recommendations. The implementation plan outlines a schedule of measurable milestones that address the action items, and in turn address the goals and objectives of this Clear Creek Watershed Action Plan (Plan). It contains measurable milestones, budgets, timelines, and potential sources of funding and technical assistance to the extent possible at the time of this Plan. The monitoring plan offers sampling location, elements to be sampled, schedule, and cost estimates. Details not presented in this Plan will be developed by the Watershed Planning and Technical Advisory Committee (Committee) as the milestones are addressed. Changes to the milestones, schedules, budgets, and sources of funding and technical assistance are likely, and they will be reviewed by the Committee annually. The Committee will continue their commitment to the project as the focus shifts from watershed planning to education, monitoring, and coordination of project implementation.

Summary of Recommended Best Management Practices

Action Items with measurable pollutant load reduction outcomes are grouped and represented by BMP categories as recognized by the EPA. These categories are not inclusive of all Action Items recommended by the Committee, as many of the Action Items will likely have an indirect effect on water quality. For each BMP, estimates are summarized representing the amount of land involved, cost, pollutant load reduction, priority, and responsible entity. Summarized information is presented in Figure 5-1. To estimate the amount of land, the Committee assumes 100% participation by landowners. Cost estimates are based on current rates. Pollutant load reduction estimates are calculated using BASINS and EPA Pollutant Load Reduction Worksheets. Priority is assigned based on pollutant load reduction estimates and do not consider cost. High priority is given to any BMP that is a primary cause of reducing the loading of at least one of the measured pollutants, as highlighted in yellow in Figure 5-1. Medium priority is assigned to any BMP that provides the next highest level of pollutant load reduction for at least one of the measured pollutants, as highlighted in green in Figure 5-1. Low priority is assigned to the remaining BMPs that are not major contributors to reducing pollutant loads unless combined with other practices. The summary of these estimates suggest that implementation of all BMPs throughout the watershed will cost approximately \$6 million and will reduce over 2,600 tons/yr of sediment; 740,000 lbs/yr of total suspended solids (TSS); 5,100 lbs/yr of phosphorous (TP); and 41,300 lbs/yr of nitrogen (TN).

Figure 5-1: Watershed-wide Summary of BMPs Recommended for Implementation within 10 Years of Plan Adoption.

No.	Category	BMP	Unit	Amount	Cost	Estimated Load Reduction				Priority	Responsible Entity
						Sediment (tons/yr)	TSS (lbs/yr)	Phosphorus (lbs/yr)	Nitrogen (lbs/yr)		
1	AGRICULTURE	Conservation Tillage	acre	6,228	\$155,700	N/A	332,406	742	20,528	High	Landowner
2	AGRICULTURE	Filter Strip	acre	40	\$8,400	92	N/A	129	386	Low	Landowner
3	AGRICULTURE	Nutrient Management	acre	6,844	\$136,880	N/A	N/A	416	6,579	High	Landowner
4	AGRICULTURE	Sediment Basin	number	2	\$680,750	N/A	308,066	244	N/A	High	RCD
5	URBAN	Nutrient Management	acre	217	\$0	N/A	N/A	58	1,392	Med	Homeowner
6	URBAN	Filter Strip	acre	3	\$6,000	N/A	49,117	71	426	Med	Homeowner
7	URBAN	Rain Garden	number	351	\$175,500	N/A	50,463	102	639	Med	Homeowner
8	HYDROLOGIC	Streambank Stabilization (Severe Erosion)	feet	2,500	\$1,000,000	189	N/A	161	321	Med	Landowner
9	HYDROLOGIC	Streambank Stabilization (Moderate Erosion)	feet	6,860	\$1,715,000	131	N/A	111	223	Low	Landowner
10	HYDROLOGIC	Shoreline Stabilization	feet	6,165	\$493,200	251	N/A	213	427	Med	Homeowner/RCD
11	HYDROLOGIC	Wetland Restoration	acre	636	\$990,000	735	N/A	1,399	5,244	High	Landowner
12	LIVESTOCK	Livestock Exclusion	acre	250	\$132,000	332	N/A	504	1,624	High	Landowner
13	LIVESTOCK	Pasture and Hayland Management	acre	350	\$32,276	15	N/A	92	878	Low	Landowner
14	OTHER2	Wildlife Upland Habitat Management	acre	480	\$528,000	855	N/A	887	2,672	High	TNC
15	OTHER2	Septic system upgrade	number	1	\$8,990	N/A	N/A	N/A	N/A	Unknown	Homeowner
Total					\$6,062,696	2,600	740,052	5,129	41,339		

Key:	
	Primary load reduction per single BMP.
	Secondary load reduction per single BMP.

Estimates of costs and pollutant load reductions displayed in Figure 5-1 result from various sources as presented in Figure 5-2.

Figure 5-2: Information Sources for Figure 5-1.		
BMP No.	Cost. Estimate Source	Load Red. Est. Source
1	Cost est. based on U of I Ext. at \$25/ac. (Phillips). NRCS program provides incentive payments at \$14.86/ac. (Merriman).	PLOAD/BASINS
2	Cost. Est. based on NRCS program reimbursement, which reflects actual cost (Merriman) and costs to farmer (Bettner and Phillips) at \$210/ac.	PLOAD/BASINS
3	Cost est. based on costs to farmer (Bettner and Phillips) at \$20/ac. NRCS provides incentive of \$13/ac (Merriman).	PLOAD/BASINS
4	Cost est. from Wendler Engineering (Baumann).	Wendler Eng. (Baumann)
5	No anticipated change in cost for lawn care (Rush).	PLOAD/BASINS
6	Cost est. from OES at \$2000/ac. It can be accomplished for much less, but the likely piecemeal implementation increases the cost. This budget also allows for flexibility in plant material used.	EPA Load Red. Worksheet
7	Cost est. from Blue Thumb at \$5/sq. ft. and an average garden size of 100 sq. ft. (Brown)	EPA Load Red. Worksheet
8	Cost est. based on Babbling Brook stabilization bids at \$400/ft.	EPA Load Red. Worksheet
9	Cost est. based on Babbling Brook stabilization bids at \$250/ft.	EPA Load Red. Worksheet
10	Cost est. based on rip rap est for Lost Lake stabilization bids at \$80/ft.	EPA Load Red. Worksheet
11	Cost est. from AES at \$1,500/ac. for a "WRP style" wetland restoration (Campbell) for 636 - 40 acres on private property, plus 40 acres on TNC property at \$2,400/ac. for high quality restoration (Kleiman).	PLOAD/BASINS
12	Based on cost of fencing for the farmer at \$2.50/ft (Bettner and Phillips). Feet of fencing was estimated as 4 x the perimeter of a square 250 acres (13,200 ft.) to better reflect the need for fencing of multiple parcels.	PLOAD/BASINS
13	Cost est. from NRCS based on reimbursement payments of \$65.87 x 40% to reflect actual costs of \$92.12, which reflect actual costs to farmer (Merriman and Phillips). Actual cost was also estimated at \$80/ac. (Bettner), so the higher value was used.	PLOAD/BASINS
14	Cost est. from TNC (Kleiman).	PLOAD/BASINS
15	Cost est. from Fischer Excavating (Woodruff).	N/A

Action Item Management Recommendations

Pollutant loads can be reduced using a combination of best management practices (BMP) throughout the watershed and in concentrated areas. It is our recommendation to address the action items in areas that fit the descriptions of severe conditions throughout the watershed, with concentrated efforts in the sub-watershed units that show the greatest potential for pollutant load reductions. Highlights of these recommendations are described below, divided by planning and coordination, stream and shore, rural BMP, and urban BMP management recommendations.

Planning and Coordination Recommendations

1. Hire a watershed coordinator to be the face of the organization to work with local landowners, facilitate the implementation of the action items, and coordinate water quality monitoring.
2. Partner with other organizations with similar missions to create a more uniform and efficient approach to watershed management.

Stream and Shore Management Recommendations

3. Focus on streambank stabilization at sites with severe lateral recession rates throughout the watershed, as they contribute to over half of the sediment loading from inventoried sites. There are 92,750 feet of streams in the Clear Creek watershed. We were able to survey 16,100 feet on both Clear Creek and Babbling Brook, identifying a total of 2,290 feet (14.3%) of eroding streambanks. Of these eroding banks, 440 ft. (2.7%) were severe with a lateral recession rate (LRR) of 0.4 ft/yr; 1,195 feet (7.4%) were moderate at a LRR of 0.13 ft/yr; and 655 feet (4.1%) were slight at a LRR of 0.03 ft/yr. Since we were unable to survey the entire stream length due to lack of landowner permission, it is likely that there are other areas that qualify as eroding that should also be stabilized. If we assume that the remainder of the watershed is represented by the surveyed locations, then we would estimate 13,260 feet (14.3%) of eroding streambanks throughout the watershed. This includes 2,500 feet (2.7%) of severely eroding banks; 6,860 feet (7.4%) of moderately eroding banks; and 3,800 feet (4.1%) of slightly eroding banks. We recommend focusing restoration efforts on severely eroded sites, most of which will require a combination of bank reshaping, native plant seeding, riprap toe protection, and stream barb or weir installation. BMP implementation on all eroding stream banks would reduce total phosphorous (TP) by 78%, total nitrogen (TN) by 65%, and total suspended solids (TSS) by 76%. Once severe cases of erosion are addressed, we recommend focusing on areas of moderate erosion. We do not recommend addressing areas of slight erosion, as the pollutant load reduction estimates are minimal.
4. Stabilize severely eroding shoreline at Lost Lake as it has a direct impact on pollutant loads to the lake. Of the 21,800 feet of shoreline at Lost Lake, 12,495 feet have been identified as eroding, of which 6,165 feet are considered severely eroding with an average lateral recession

rate of 0.4. Other areas contribute less sediment to the lake and are less cost effective to stabilize due to their steep cliffs. Efforts to stabilize 1,981 feet of shoreline are already in progress as part of Section 319(h) EPA Grant No. 3191003 and are scheduled to be completed by July 15, 2012.

5. Monitor storm event water quality for at least TN, TP, TSS and Pathogens. Sample at several locations throughout the watershed in order to establish existing loads. The monitoring will give a more specific picture of the actual pollution loads throughout the entire watershed and provide a way to measure the success of BMP implementation over time.

6. Construct a sediment control basin at the confluence of Babbling Brook and Lost Lake and expand the basin at the confluence of Clear Creek and Lost Lake to capture nonpoint source pollutants that will remain after the full build-out is implemented to the extent possible. Currently, 377,995 lbs/yr of total suspended solids (TSS) and 474 lbs/yr of total phosphorous (TP) enter Lost Lake from the Babbling Brook tributary. A sediment basin in this strategic location is estimated to reduce the pollutant loads to the lake by 81.5% and 51.48%, respectively (Baumann, Pers. Comm.). The Lost Nation/New Landing River Conservancy District (RCD) plans to expand the basin at the confluence of Clear Creek and Lost Lake in conjunction with their normally scheduled dredging program. The basin will be expanded at the upstream end of the pool where most of the sediment is found. This will improve the capabilities of the basin to contain more silt and increase the time between necessary silt removals (Larry, Pers. Comm.).

Rural BMP Management Recommendations

7. Focus agricultural BMP implementation efforts in sub-watershed units #2 and #10, because they have the highest TN, TP, TSS, and Pathogen annual loading, due to the large size of the sub-watersheds and the dominance of row crop agriculture. Sub-watersheds #5, #7 and #9 are also dominated by row crops and should be secondary for the focus of agricultural BMPs. Action items that should be addressed are: wetland restoration, filter strips, nutrient management planning, pasture management, and conservation tillage. The BMP model build out for these action items showed significant reductions. TP would be reduced by 42 % or 164 lbs per year (from 393.7 lbs to 229.2 lbs) in sub-watershed #2, and 43 % or 198 lbs (456.8 lbs to 259.02lbs) in sub-watershed #10. TN would be reduced by 55% or 4,455 lbs per year (8,173 lbs to 3718 lbs) in sub-watershed #2 and 55% or 5363 lbs per year (9,669 lbs to 4,306lbs) in sub-watershed #10. TSS would be reduced by 58% or 70,328 lbs per year in sub-watershed #2 and 59% or 83,225 lbs per year in sub-watershed #10. In conjunction with these recommended BMPs, it would be prudent to explore alternative markets for agricultural products to offset the higher costs associated with production. Some of the BMPs included in the above build-out estimates can be analyzed separately. Converting farming techniques from conventional to no-till for planting soybeans into corn greatly reduces erosion. There are currently 6,844 acres in agricultural row

crop production. According to the Soil Erosion Inventory of the Ogle County Soil and Water Conservation District (SWCD), 9% or 616 acres already receive no-till farming techniques, leaving 6228 acres in conventional till. The current row crop TSS load is 533,053 lbs per year. Conservation tillage BMP implementation for all row crops would reduce TN by 50%, TP by 38%, and TSS by 64% (Evans & Corradini, 2001). Implementation of nutrient management on all row crops in the watersheds would reduce TN by 19% and TP by 28%. The conversion of row crops to wetlands would reduce TP by 84%, TN by 93%, TSS by 67%, and Pathogens by 87.5%. The implementation of pasture land management BMP on all 350 acres of pastures would reduce TN by 43%, TP by 34%, TSS by 13%, and Pathogens by 25%. This would require full implementation of pasture land management, including erecting livestock exclusion fencing from streams, providing alternative water sources, implementing pasture rotation, and planning better forage management.

8. Partner with Local SWCD/NRCS and American Farmland Trust to address agricultural BMPs emphasizing conservation programs that compensate producers to set aside lands in production for restoring wetlands and buffers and programs that provide insurance against potential loss of yield for practicing conservation farming techniques.
9. Work with local livestock producers to exclude livestock from the streams. This includes constructing fencing, filter strips, and designated stream crossings. Benefits include reduction in streambank erosion by trampling and surface runoff.
10. Work with the Nature Conservancy to facilitate prairie restoration and wildlife upland habitat on cropland nearest to the lake sooner than would otherwise be scheduled. Purchase seed, provide funds for TNC staff to collect seed on-site, and establish and create Lost Lake volunteer workdays at Nachusa. Currently the Nature Conservancy owns about 480 acres of land in row crop production within the watershed. Restoration of these areas would considerably increase the habitat size and reduce TN by 60%, TP by 66%, TSS by 93%, and Pathogens 88%.

Urban BMP Management Recommendations

11. Focus Urban BMP implementation efforts within sub-watershed unit #4 because it is the major sub-watershed unit that houses low density residential development situated around the lake. This sub-watershed unit has the highest rate of pollutant loading of TP, TN, and Pathogens when measured in pounds per counts per acre. The BMP model build out shows significant load reductions by implementing the following action items: wetland restoration, prairie restoration on TNC property, rain gardens, rain barrels, lake buffers, lawn nutrient management education, and the continuation of the zero phosphorous fertilizer campaign. In sub-watershed unit #4, TP would be reduced by 20% (from 0.398 lbs/ac to .318 lbs/ac), TN would be reduced by 25% (from 9.03 lbs/ac to 6.746 lbs / ac.), and Pathogens would be reduced by 25%.

Wisconsin research found residential lawns yielded the highest phosphorus (P) concentrations of twelve urban pollutant sources examined (Bannerman *et al*, 1993). Lawn runoff typically contains 0.5–2.0 mg P/L, compared with levels around 0.1 mg P/L that typically result in lake eutrophication. Hence, lawns are probably the major source of P to stormwater in residential areas (Baker et al. 2007b). A tailored education and soil sample campaign should be implemented to help home owners know the levels of nitrogen (N) and P being applied to their lawns to ensure that they fertilize within the needs of the turf and keep runoff and grass clippings out of stormwater.

12. Implement a septic system inspection program at Lost Lake Community. The National Environmental Service Center estimates that there are 155 septic systems within the watershed with a 0.58% failure rate, which equates to about one failure per 155 systems.
13. Focus Urban BMPs and educational aspects of this Plan closest to the lake, as these areas are most likely to provide pollution directly to the lake, including rain gardens, lawn care, shoreline stabilization, and buffers.
14. Many open lots remain around the lake, which have the potential to be developed and increase pollution loads directly to the lake. Use a covenant or other form of restriction to require the design of new construction to incorporate storm water treatment BMPs like rain gardens, bio-swales, vegetative filter strips, and pervious pavement.

Implementation Plan

The Plan recommendations for all action items are presented in the implementation plan in Figures 5-3, 5-4, and 5-5. The implementation plan is designed as a five-year plan. The first year is separated from the second through fifth years (Figures 5-3 and 5-4), offering measurable milestones traced to the Action Item(s) that they address. This five-year plan also categorizes each Action Item by management area, including stream or shore, rural BMP, urban BMP, and planning and coordination. It provides potential sources for funding and technical assistance and estimates of cost. The Committee can only identify perceived long-term needs for each action item at this time, as accuracy of long-term measurable milestones will be based on the status of each milestone at Year 5. Perceptions of needs after the fifth year are summarized in Figure 5-5.

The Committee will update this implementation plan annually, and they will provide details for the upcoming year separately from the remaining years. For example, after the completion of Year 1, the Committee will provide greater detail to the tasks that they plan to accomplish in Year 2. They will group Years 3 through 5 separately and edit the long-term perceived needs as necessary. After Year 5, they will address the next five years in an updated plan, or they will use an alternative length of time as deemed necessary.

Dates for the Plan are as follows: Year 1 runs from October 1, 2011 to October 1, 2012, and Years 2 through 5 run from October 1, 2012 to October 1, 2016. During the first year, the Committee will focus on stabilization of streambank and shoreline, wetland restoration, demonstration of urban BMP projects, wildlife upland habitat restoration, program development, and education. It will be necessary to educate watershed stakeholders about this Plan, the existing problems within the watershed, and potential benefits of implementing the suggested projects before asking them if they would like to implement any projects on their private properties. Most of the implementation of recommended action items will be initiated during Year 2 through 5. The details for these measurable milestones are less developed than for Year 1, because many of the details depend on actions that occur in Year 1 and cannot accurately be portrayed at this time. The Committee recognizes that many of the action items to be initiated during Years 2 through 5 will need to be continued long-term, until all possibilities are explored with voluntary landowners. It is their intention that their efforts will continue past this five-year plan.

Figure 5-3: Schedule for Year 1, October 2011 through October 2012 (1 of 3).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech.	Est. Cost (\$)	Notes
1,27,28: Streambank, Pilot, Demo	Edu, Demo	Hold 1 public event to showcase the stabilization of 1,575 feet along Babbling Br. & 1,981 ft. of shoreline at Lost L.	EPA	\$ 1,200	Already funded through Grant No. 3191003.
1: Streambank Stabilization	Imp	Complete the stabilization of 1,575 ft. of streambank along Babbling Br.	EPA	\$ 290,000	Already funded through Grant No. 3191003.
2: Shoreline Stabilization	Imp	Complete the stabilization of 1,981 ft. of shoreline at Lost L.	EPA	\$ 113,000	Already funded through Grant No. 3191003.
2: Shoreline Stabilization	Imp	Stabilize an additional 465 ft. of shoreline at Lost Lake with two voluntary property owners.	EPA, F&F	\$ 37,200	Estimated cost based on \$80/ft. for rip rap installation.
3,13: Conserv. Farming, Nutrient Mgt.	Edu	Hold 1 meeting to introduce landowners and farmers to the BMP Challenge for Reduced Tillage and the BMP Challenge for Nutrient Management offered by the American Farmland Trust. Sign up at least one farm (up to 160 acres) for each program.	AFT	\$ 1,000	Estimated cost to arrange, facilitate, and follow up for the event.
4,6,24,25,26: Wetlands, Filter Strips, Runoff, Land Mgt.	Edu	Provide an educational series to discuss with landowners the importance of restoring wetlands, creating filter strips, managing runoff, and managing soils, residues, and contours. Provide educational guidelines to landowners and farmers about the management of runoff. Integrate the effort with other local efforts when possible.	EPA, NRCS, BWP, F&F	\$ 4,000	Estimated cost to arrange, facilitate, and follow up for the 4 events.
4: Wetlands	Imp	Create a 25-acre wetland complex within Nachusa Grasslands by removing drain tile, creating wetland scrapes, and planting species for prairie, wet prairie, and wetland planting zones.	TNC	\$ 60,000	Estimated cost from TNC.

Figure 5-3: Schedule for Year 1, October 2011 through October 2012 (2 of 3).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech.	Est. Cost (\$)	Notes
5,7,29: Rain Gardens, Buffer Strips, Yard Care	Edu	Encourage working with orgs., such as Master Gardeners or Blue Thumb, to implement 4 or 5 rain gardens as demonstration areas. Work with 1 property owner to construct a demonstration area for a lake buffer strip with mowed diagonal path, and 1 property owner to demonstrate recommended home & yard maintenance. Hold an educational series about rain gardens, buffer strips, and BMPs for home and yard, including a tour of the demonstration areas.	Blue Thumb, BWP	\$ 2,500.00	Cost est. based on avg. garden size of 100 sq. ft. x \$5/sq. ft. for materials and labor.
9: Sediment Control - BB	App	Apply for an EPA Section 319 grant to construct a sediment control basin at the confluence of Babbling Brook and Lost Lake.	EPA Section 319	\$ 2,000.00	Estimated cost for drafting grant application.
10,28: Sediment Control, Demo	Imp, Demo	Expand the sediment control basin at the confluence of Clear Creek and Lost Lake.	RCD	\$ 2,500.00	Est. cost part of RCD regular dredging program.
12: Alt. Source	Imp	Initiate a program to plant shade trees for cattle.	EPA, NRCS, F&F	\$ -	Program costs unknown until implementation plan is drafted.
15: Septic Inspections	Edu	Explore the possibility of working with the POA for the inspection of septic systems within the Lost Lake Utility District, create an implementation plan (budget, schedule, rules and regulations, etc.), and initiate an education and awareness program for homeowners.	BWP	\$ -	Program costs unknown until implementation plan is drafted.
16: Zero phosphorous	Imp	Continue the campaign to use zero phosphorous fertilizers in the Lost Nation/New Landing community and draft a campaign plan.	BWP	\$ -	Program cost unknown until campaign plan is drafted.

Figure 5-3: Schedule for Year 1, October 2011 through October 2012 (3 of 3).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech.	Est. Cost (\$)	Notes
17: Land Preservation	Edu	Discuss preservation interest and options for funding and technical support with at least two voluntary landowners that have important natural features on their properties.	GVF, ICECF, IDNR	\$ 2,000	Estimated cost for outreach to 2 landowners.
19: Natural Area Buffer	Imp	Plant 15 acres of high diversity prairie within Nachusa Grasslands to buffer important natural areas.	TNC	\$ 36,000	Estimated cost of \$2,400/ac. from TNC.
30: Partners	Plan/Coord	Facilitate partnerships with organizations that have similar missions, including the milestones listed in this figure.	None	\$ -	Estimated cost is included in individual milestones.
Other	Plan/Coord	Hire a facilitator of the Clear Creek Watershed Planning and Technical Advisory Committee.	None	\$ 2,000	Estimated cost to facilitate 2 meetings per year. Other facilitation costs listed per milestone.

Figure 5-4: Schedule for Years 2-5, October 2012 through October 2016 (1 of 5).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech	Est. Cost (\$)	Notes
1: Streambank	Imp	Stabilize the known 440 ft. of severely eroding streambank, as allowed by landowners.	EPA Section 319, NRCS, F&F	\$ 176,000	Probable cost is based on \$400 per ft. for severely eroded sites.
1: Streambank	Edu	Implement an outreach program to identify new areas of severely eroding streambank and discuss stabilization options with all 18 private landowners located along the streams.	GVF, ICECF, F&F	\$ 9,000	Estimated cost is based on a complete outreach program for 18 landowners.
1: Streambank	Imp	Stabilize newly identified, severely eroding streambank, as allowed by landowners at a rate of approx. 700 ft./yr.	EPA Section 319, NRCS, F&F	\$ 824,000	Est. cost based on est. 2,060 remaining ac. of severely eroding banks at \$400/ac.
2: Shoreline	Imp	Stabilize an additional 2,000 ft. of severely eroding shoreline at Lost Lake.	EPA Section 319, BWP	\$ 160,000	Estimated cost is based on \$80/ft. for rip rap installation.
3: Conserv. Farming	Imp	Implement conservation farming or other stabilization practice on 200 acres per year of HEL that have not been no tilled or strip tilled in the past 5 years, or 800 of the 2,373 acres of HEL that is considered to be already eroded.	NRCS	\$ 20,000	Probable cost based on \$25/acre (Univ. of IL Ext.).
3: Conserv. Farming	Imp	Implement the BMP Challeng for Reduced Tillage from the American Farmland Trust on at least one farm (up to 160 acres) per year.	AFT	-	Probable cost is not calculated, because it is a reimbursement program for any lost yield.
4: Wetlands	Imp	Restore 25 acres of wetlands per year, or 100 acres of the 636 acres identified within years 2 through 5.	NRCS, EPA Section 319	\$ 150,000	Cost est. based on "WRP style" wetland restoration (AES).

Figure 5-4: Schedule for Years 2-5, October 2012 through October 2016 (2 of 5).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech	Est. Cost (\$)	Notes
5: Rain Gardens	Imp	Construct 10 to 15 rain gardens per year for a total of up to 60 rain gardens between years 2 through 5 within the Lost Nation/New Landing community.	Blue Thumb	\$ 30,000	Cost est. based on \$5/sf for an avg. size garden of 100 sf (Blue Thumb & Brown).
6: Filter Strips	Imp	Establish 20 acres of filter strips (120 ft. wide) of the total 40 acres identified.	NRCS, EPA Section 319, F&F	\$ 4,200	Estimated cost based on \$210/ac. (NRCS, Univ. of IL Ext., Bettner).
7: Buffer Strips	Imp	Establish buffer strips (10 ft. wide) with mowed diagonal paths along 100 ft. of shoreline per year, for a total of 400 ft. or 4,000 sq. ft. of shoreline in years 2 - 5.	EPA Section 319	\$ 184	Estimated cost based on \$2,000/ac.
8: Stormwater holding ponds	Edu	Explore opportunities for stormwater holding ponds within the watershed. This may be coupled with wetland restoration opportunities.	EPA Section 319, F&F	\$ -	Program costs unknown until initial exploration is conducted.
9: Sediment Containment	Imp	Construct a sediment containment area at the confluence of Babbling Br. & Lost Lake.	EPA Section 319, F&F	\$ 680,750	Est. cost based on initial estimates for submitted grant application, Aug. 1, 2011.
11&12: Limit Cattle Access, Alternatives	Edu	Continue the NRCS educational series for farmers & landowners that was initiated in Yr. 1. Discuss the importance of limiting the cattle access to the stream, & providing alternative water sources and shady areas for cattle away from the stream.	NRCS, F&F	\$ 2,000	Estimated cost to arrange, facilitate, and follow up for 2 meetings.
13: Nutrient Mgt.	Imp	Implement the BMP Challeng for Nutrient Management from the American Farmland Trust on at least one farm (up to 160 acres) per year, for a total of 4 farms (up to 640 acres) between years 2 and 5.	AFT	\$ -	Estimated cost is not calculated, because it is a reimbursement program for any lost yield.

Figure 5-4: Schedule for Years 2-5, October 2012 through October 2016 (3 of 5).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech	Est. Cost (\$)	Notes
13: Nutrient Mgt.	Imp	Implement a NRCS nutrient management plan following University of Illinois fertilizer recommendations on at least one farm per year (160 acres), for a total of at least 4 farms (640 acres) between years 2 and 5.	NRCS	\$ 8,320	Estimated cost is calculated on a payment rate of \$11 to \$13 per acre depending on the level of change in management.
14: Ag. Easements	Plan/ Coord	Join effort of American Farmland Trust to establish farmland protection opportunities and financial incentive programs in Illinois.	AFT, NRCS	\$ -	Estimated cost unknown until planning effort is defined.
15: Septic Inspect.	Imp	Implement septic inspections according to the implementation plan developed during Year 1. Upgrade failed systems.	None	\$ 900,000	Estimated cost based on upgrade of est. 90 failed systems (Nat'l Environ. Svc. Ctr.) at \$10,000 ea. (Fischer Excavating)
16,29: Zero Phosphorous, Yard Care	Imp	Continue the implementation of the zero phosphorous fertilizer campaign within the Lost Nation/New Landing community according to the implementation plan. Combine this with the implementation of home and yard BMPs.	None	\$ -	Estimated cost unknown until campaign is better defined.
17: Land Preserv.	Edu	Continue to build relationships with landowners in the watershed and identify opportunities. Reach out to at least 2 landowners per year (8 landowners in this 4-year period).	LTA	\$ 8,000	Estimated cost based on preparation, outreach, and follow up for 8 landowners.
17: Land Preserv.	Imp	Implement one voluntary, land preservation project in the watershed with a willing landowner.	GVF, ICECF	\$ 15,000	Est. cost based on easement & transaction costs.

Figure 5-4: Schedule for Years 2-5, October 2012 through October 2016 (4 of 5).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech	Est. Cost (\$)	Notes
18,19,20: Corridors, Buffers, Mgt.	Edu	Identify strategic wildlife corridors, natural areas management, and natural area buffer opportunities, and discuss partnership options with the individual landowners involved.	None	\$ 15,000	Cost est. based on planning & outreach.
19: Natural Area Buffers	Imp	Plant at least 5 acres annually in the watershed to high diversity prairie, for a total of over 20 acres between Years 2-5.	TNC	\$ 22,000	Cost est. based on \$1,100/ac (Kleiman).
21: Rec. Trails	Edu	Draft an implementation plan for creating recreation trails in the watershed according to the Ogle County Greenways Plan trail locations in partnership with the landowners involved.	None	\$ -	Estimated costs unknown.
22: Wildlife Control	Edu	Work with the appropriate authorities to manage nuisance wildlife that negatively affect water and natural area quality, such as deer, Canada goose, and beaver.	DNR	\$ -	Estimated costs unknown until plan is drafted.
23: Community Planning	Plan/ Coord	Continue to participate in long range planning efforts with the community.	Ogle Co. Planning & Zoning	\$ -	Continued, voluntary effort.
28: Demo	Demo	Hold at least one demonstration event per year (4 events) with voluntary landowners for each of the following: streambank stabilization, conservation farming, wetland restoration, rain garden construction, creation of filter strip/buffer strip along streams and lake, nutrient management, agricultural easement, land preservation.	NRCS, EPA, Blue Thumb, BWP, F&F	\$ 8,000	Estimated costs based on preparation, facilitation, and follow up of 4 demonstration events.

Figure 5-4: Schedule for Years 2-5, October 2012 through October 2016 (5 of 5).

Action Item Addressed	Category	Measurable Milestone	Potential Funding/Tech	Est. Cost (\$)	Notes
30: Partners	Plan/ Coord	Continue to partner with organization that have similar missions whenever possible, including the milestones listed in this figure.	None	\$ -	Estimated costs included with individual measurable milestones.
Other	Plan/ Coord	Continue to support a facilitator for the WPC/TAC, either hired or volunteer.	None	\$ 8,000	Estimated costs for prep., facilitation, and follow up of 2 meetings per year (8 meetings.) Other facilitation tasks listed under other measurable milestones.
Other	Monitor	Sample designated points during Year 2 within the streams and lake within 24-hours of storm events for TP, TN, TSS, and Pathogens as outlined in Figure 5-2.	EPA, IDNR	\$ 6,000	Estimated costs based on 6 sampling events.

Figure 5-5: Perceived Needs for Long-Term, October 2016 and beyond (1 of 3).

Action Item Addressed	Category	Perceived Long-Term Needs
1: Streambank Stabilization	Implementation	After all severely eroding shoreline has been either stabilized or addressed with the landowner, we recommend that the focus move to moderately eroding shoreline.
2: Shore Stabilization	Implementation	There are 6,165 feet of severely eroding shoreline along Lost Lake. We plan to stabilize 4,446 ft. during Years 2 - 5, after which time there will likely be opportunity to continue shoreline stabilization of the additional 1,719 ft. of severely eroding bank. Once the severely eroded shoreline stabilization opportunities have been explored with homeowners, it is our intention to begin exploring opportunities for stabilizing moderately eroding shoreline.
3: Conservation Farming	Implementation	Given the large quantity of farmland and HELs that are already considered eroded in the watershed (2,373 acres), it is likely that we will need to continue work in this area long-term to ensure that all areas are explored with the landowners.
3: Conservation Farming	Implementation	There will likely be continued opportunity to enroll farms in the BMP Challenge for Reduced Tillage offered by the American Farmland Trust, as there are 33 landowners in the watershed.
4: Wetlands	Implementation	After restoring 100 acres of wetlands during Years 2-5, there will still be 536 acres of hydric soils with restoration potential. It is our intent to explore wetland restoration potential with all landowners that possess hydric soils.
5: Rain Gardens	Implementation	After creating up to 65 rain gardens during Yr. 1 - 5, it is our intent to continue exploring the potential to create more rain gardens with all 351 homeowners in the Lost Nation/New Landing community.
6: Filter Strips	Implementation	After constructing 20 ac. of filter strips in Years 2 - 5, there will still be an additional 20 ac. along the streams that could potentially be converted to filter strips. It is our intent to explore these options with the landowners until all 40 acres of potential filter strip areas identified in this Plan have been explored.
7: Buffer Strips	Implementation	After establishing 400 ft. of buffer strips during Yr. 2 - 5, we intend to continue to explore opportunities to establish buffer strips along the shoreline of Lost Lake until all shoreline homeowners with lawn near the water's edge have been approached.
8: Stormwater holding ponds	Implementation	There may be opportunity to construct stormwater holding ponds within the watershed. It is best to determine the need for these ponding areas based on the implementation of wetland restoration opportunities and remaining needs for water storage.

Figure 5-5: Perceived Needs for Long-Term, October 2016 and beyond (2 of 3).

Action Item Addressed	Category	Perceived Long-Term Needs
11&12: Limit cattle access	Implementation	At this time, the NRCS does not have a grazing specialist to write grazing plans for farmers interested in limiting cattle access to the stream and providing alternative shade and water sources for cattle. Therefore, cattle operators are not eligible for funding assistance to provide these amenities for their cattle. The implementation of these programs should begin when a funding source is identified. Education only is recommended by this Plan.
13: Nutrient Management	Implementation	There will likely be continued opportunity to enroll farms in the nutrient management programs offered by the AFT and NRCS, as there are 33 landowners in the watershed. There may also be new programs discovered that apply to the watershed.
14: Agricultural Easement	Planning/ Coordination	Continue the effort with AFT to establish agricultural easement opportunities in Illinois. Assist landowners when agricultural easements become available.
15: Septic Inspections	Implementation	Long-term commitment to septic system monitoring and remediation of failed systems is expected.
16: Zero Phosphorous	Implementation	Long-term commitment to the implementation of a zero phosphorous campaign is expected.
17,18,19,20: Land Preservation, Wildlife Corridors, Natural Area Buffers, Management of Natural Areas	Education & Implementation	The preservation and management of natural resources and creation of corridors and buffers is a long-term effort. Since the immediate concern for the watershed is water quality, most of the activity related to wildlife habitat and natural areas will likely take place after the 5-year time frame of this Plan.
19: Natural Area Buffers	Implementation	After the 40 ac. are planted to high quality prairie during Yr. 1 - 5, there will likely be continued opportunity until all 480 ac. are converted at a low rate, such as 5 acres per year, especially at Nachusa Grasslands.
21: Recreation Trails	Implementation	There may be a long-term planning and implementation effort required based on the results of the implementation planning process in Years 2-5.
22: Nuisance Wildlife Control	Implementation	Controlling nuisance wildlife is an ongoing, long-term effort. We foresee the need to continue to work with the proper authorities to manage wildlife that negatively affect water and natural area quality.
23: Community Planning	Planning	Participating in long range planning efforts with the community is a long-term commitment.

Figure 5-5: Perceived Needs for Long-Term, October 2016 and beyond (3 of 3).		
Action Item Addressed	Category	Perceived Long-Term Needs
28: Demonstration	Demonstration	It is likely that projects with voluntary landowners can continue to be used for demonstration.
30: Partners	Planning/ Coordination	We recognize that partnerships with other organizations will continue to be an important component to the long-term success of this Plan.
Other	Planning/ Coordination	We recognize that a successful planning and technical advisory committee will need a facilitator, and suggest the long-term support of a facilitator, either hired or volunteer.
Other	Monitoring	We recognize that monitoring is a long-term commitment. A monitoring plan will need to be updated from time to time to address long-term monitoring needs.

Key to Figures 5-3, 5-4, & 5-5.	
Abbreviation	Name of Organization
AFT:	American Farmland Trust
BWP:	Blue Water Project
DNR:	Illinois Department of Natural Resources
EPA:	Environmental Protection Agency
EPA Section 319:	Section 319 of the Clean Water Act
F&F	Fishers and Farmers Partnership for the Upper Mississippi River Basin
GVF:	Grand Victoria Foundation
ICECF:	Illinois Clean Energy Community Foundation
LTA:	Land Trust Alliance
NRCS:	Natural Resources Conservation Service (U.S. Department of Agriculture)
POA:	Property Owner's Association
RCD:	Lost Nation/New Landing River Conservancy District
WPC/TAC:	Clear Creek Watershed Planning and Technical Advisory Committee

Monitoring Plan

The Committee recognizes the need to monitor physical and chemical factors of the surface and ground waters of the Clear Creek watershed in order to determine if the implementation of the Plan is having the desired effect of increasing water quality. Monitoring activities are suggested for each goal and objective in Figure 5-6.

Figure 5-6: Monitoring needs and schedule as related to goals and objectives.						
Goal	Obj.	Data Collection Methods		Monitoring Schedule	Est. Cost (\$)	Notes
		Sampling Location	Element Sampled			
1	a	Entire streams & lake	Length, ht., LRR, photos	Yr. 5 or extreme storm events	\$ 6,000	Est. cost based on one study
	b	Lake & designated in-stream sampling points	TN, TP, TSS, Pathogens	Yr. 2 & Yr. 5 remote sampling	\$ 40,000	Est. cost for 7 mo. remote sampling per yr. for 2 yrs.
	d	Varies	Project/ success	Per Project	\$ -	Est. cost to be included w/ea. project.
	e	Lake & Sediment Basin	Sediment	By Yr. 5	\$ -	Est. cost for dredging is not part of this program.
2	a	LLUD well water sampling points	TN, TP	Yr. 2 & Yr. 5	\$ -	Cost part of regular sampling & not included
	b	Drain tile outlets & Artesian wells	TN, TP	Yr. 2 & Yr. 5 after spring fert. app. & storm event	\$ -	Est. costs based on number of drain tile outlets, yet to be determined.
	c	Lake & designated in-stream sampling points	TN, TP, TSS, Pathogens	Yr. 2 & Yr. 5 remote sampling	\$ -	Included in 1b above.
3	a	GIS	Land use	Yr. 5	\$ 6,000	
4	a	GIS	Land cover & pers. comm.	Yr. 5	\$ -	Included in 3a above.
	b	GIS	Vegetation	Yr. 5	\$ -	Est. cost based on acreage & site locations. Cannot be accurately estimated at this time.
	c	GIS	Land cover	Yr. 5	\$ -	Included in 3a above.
	d	IDNR sites	Population counts	Yr. 5	\$ -	Cost assoc. w/ normally scheduled DNR work
	e	GIS	Land cover	Yr. 5	\$ -	Included in 3a above.
5	a	GIS	Land use	Yr. 5	\$ -	Included in 3a above.
	b	N/A	N/A	Yr. 5	\$ -	Included in 3a & 4 above.

Conclusion

As you can see, the Committee focused on water quality concerns within their moderately-sized watershed by identifying sources of pollutant loading; creating goals, objectives, and action items to address these sources; and estimating the quantities of possible pollutant load reductions and associated costs. Sources of pollutants are agricultural, urban, and hydrological in nature. The greatest pollutant load reductions will be achieved by converting farming practices to conservation tillage, implementing nutrient management, constructing a sediment basin, restoring wetlands, excluding livestock from the streams, and managing wildlife upland habitat. Additional reductions will be gained by stabilizing streambanks and shorelines, constructing rain gardens and filter strips, altering management of lawns and pastures, and upgrading septic systems when necessary. When fully implemented, this plan has the potential of reducing sediment by 2,600 tons/yr, TSS by 740,052 lbs/yr, TP by 5,129 lbs/yr, and TN by 41,339 lbs/yr. The cost of fully implementing this plan is estimated to be approximately \$6 million.

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*Note: For other citations, see Chapter 3.