

## 6.0 PLAN IMPLEMENTATION AND EVALUATION TABLE OF CONTENTS

6.0 Plan Implementation and Evaluation.....	391
Introduction.....	391
6.1 Non-Point Source Pollution Load Reductions .....	391
Critical Area General Recommendations - Non-Point Source Load Reduction Estimates .....	391
Site Specific Non-Point Source Load Reduction Estimates.....	392
Comparison of Load Reductions vs. Total Pollutant Loading.....	399
6.2 Financial and Technical Resource Needs .....	400
Flood Mitigation Projects Implementation Cost Estimates.....	403
6.3 Action Plan Implementation .....	404
6.4 Watershed plan implementation .....	405
Implementation Partners .....	406
Corporate and Business Landowners (CBL).....	406
Developers & Homebuilders (DH) .....	406
Drainage Districts (DD).....	406
Homeowner and Lake Management Associations .....	406
Illinois Department of Natural Resources (IDNR).....	407
Illinois & Wisconsin Department of Transportation (IDOT & WisDOT) .....	407
Kenosha Racine Land Trust (K/RLT).....	407
Lake and Kenosha Counties .....	408
Lake County Forest Preserve District (FPD).....	408
Lake County Stormwater Management Commission (SMC).....	408
Lake County Health Department (LCHD) .....	408
Liberty Prairie Conservancy (LPC) .....	409
Municipalities (all departments) (M) .....	409
Natural Resources Conservation Service (NRCS).....	409
Parks and Recreation Districts (PD).....	409
Root-Pike Watershed Initiative Network (WIN).....	410
Plant Nurseries.....	410
Prairie Research Institute.....	410
Private Farmers.....	410

Private Equestrian Facilities (EQ).....	410
Private Residential Landowners (PRL).....	411
RiverWatch.....	411
Schools.....	411
Townships (T).....	411
Upper Des Plaines River Ecosystem Partnership (UDPREP).....	411
U.S. Department of Agriculture (USDA).....	412
Wisconsin DNR.....	412
Implementation Supporters.....	412
Chicago Metropolitan Agency for Planning (CMAP).....	412
Chicago Wilderness.....	412
College of Lake County.....	413
Federal Emergency Management Agency (FEMA).....	413
Illinois Environmental Protection Agency (IEPA) Bureau of Water.....	413
Illinois and Wisconsin Emergency Management Agency (IEMA/WEM).....	413
Lake County Audubon.....	413
Lake and Kenosha County Farm Bureau.....	414
Lake and Kenosha County Extension Service.....	414
Town and Country Resource Conservation & Development (RC&D).....	414
Lake County Public Works (LCPW).....	414
Lake/McHenry County Soil and Water Conservation District (SWCD).....	414
Sierra Club.....	415
Southeastern Wisconsin Regional Plan Commission (SEWRPC).....	415
U.S. Environmental Protection Agency (USEPA).....	415
U.S. Fish and Wildlife Service (USFWS).....	415
Solid Waste Management Agency (SWALCO).....	416
U.S. Army Corps of Engineers (USACE).....	416
6.5 Funding Resources and Opportunities.....	416
Water Quality Monitoring Plan.....	419
Water Quality and BMP Effectiveness Monitoring.....	422
Evaluating Performance of Plan Implementation.....	427
Milestones and Plan Performance.....	427
Monitoring Score Card and Milestones.....	428

Implementation Schedule .....	431
Table 6-1: Estimated Pollutant Load Reductions from General Critical Area (CA) Recommendations .....	392
Table 6-2a: Site Specific Best Management Practice (BMP) Project Details and Estimated Removal Efficiencies.....	394
Table 6-2b: Site Specific Best Management Practice (BMP) Projects Summary.....	394
Table 6-3: Expected Non-Point Source Pollutant Load Reductions from Site Specific Best Management Practice (BMP) Projects .....	395
Table 6-4: Expected Non-Point Source Load Reductions from Site Specific Best Management Practice (BMP) Projects by Catchment .....	397
Table 6-5: Load Reduction Targets for Site Specific Best Management Practices (BMP) Projects .	399
Table 6-6: Site Specific Best Management Practice BMP Project Implementation Costs .....	400
Table 6-7: General Critical Area (CA) Implementation Costs .....	402
Table 6-8: Site Specific Implementation Costs by Unit Load Reduction.....	403
Table 6-9: Available Funding Resources .....	417
Table 6-10: Indicators and targets to meet water quality goal & objectives.....	419
Table 6-11: General Implementation Schedule.....	431
Figure 6-1: Gully Erosion in the Watershed.....	396
Figure 6-2: Existing and Recommended Water Quality Sampling Sites .....	426
Figure 6-3: Score Card.....	429

## **6.0 PLAN IMPLEMENTATION AND EVALUATION**

### **INTRODUCTION**

This chapter identifies a strategy and details for transitioning from watershed planning to implementation. This chapter also presents important mechanisms to evaluate whether the goals and objectives of the watershed plan are being met with implementation of the plan. .

How readily this plan is used and implemented by watershed stakeholders is one indicator of its success. Improvement in watershed resources is another indicator. Successful plan implementation will require significant cooperation and coordination among watershed stakeholders to secure project funding and to efficiently and effectively move the action plan from paper to the watershed. This chapter relates some more technical details about the expected results of putting action recommendations in place and the cost of plan implementation. It presents a plan for monitoring and evaluating plan implementation as a way to determine progress towards watershed goals and objectives. Finally, it outlines a required schedule and provides a “score card” outlining time based milestones and corresponding measurement indicators. The watershed plan can be considered a living document and has the flexibility for stakeholders to make revisions over time that reflect shifts in local priorities or watershed conditions.

### **6.1 NON-POINT SOURCE POLLUTION LOAD REDUCTIONS**

North Mill Creek/Dutch Gap non point source pollution loading was modeled and detailed in Chapter 4 to estimate total pollution loading of sediment, nitrogen, phosphorus, chloride, and fecal coliform bacteria. Pollutant load reduction estimates were made for implementing the recommended actions included for the critical area recommendations and site-specific best management practice recommendations which are summarized in the action plan (Section 5.3)). Load reduction estimates can be used to quantify the benefits of project implementation and identify which practices result in the greatest benefits to water quality. The following section outlines watershed based and project specific non-point source load reductions.

#### **CRITICAL AREA GENERAL RECOMMENDATIONS - NON-POINT SOURCE LOAD REDUCTION ESTIMATES**

The critical area analysis and recommended action items are detailed in Sections 5.3. This section details the estimated pollutant load reductions that would result from implementing these recommendations. A limitation of the non-point source pollution load modeling effort undertaken in the North Mill Creek/Dutch Gap watershed is the relative accuracy of calculating load reductions for best management practices. If best management practices are known and are associated with a specific location on-the-ground, calculating load reductions can be made simply by delineating the drainage area to that location and calculating how much of a reduction that specific best management practice is expected to produce. In the case of the majority of critical areas, exact location information was not available at a scale and accuracy to reasonably produce project specific

load reductions. As a result, we provide general estimates of pollution load reductions for each critical area implementation category. Despite the benefits from the implementation of all critical area recommendations, estimates show that urban best management practices, if implemented will result in the most significant load reductions. The following table is a generalized estimation of expected load reductions by critical area; detailed load reductions, cost estimates and priorities by site-specific best management practice can be found in Appendix O, Expanded Action Plan.

**Table 6-1: Estimated Pollutant Load Reductions from General Critical Area (CA) Recommendations**

ID	Critical Area Type	Critical Catchment	Total Critical Area	unit	Initial Target %	Initial Target Action Quantity	Sediment Load Reduction (tons/yr)	Nitrogen Load Reduction (lbs/yr)	Phosphorus Load Reduction (lbs/yr)	Chloride Load Reduction (lbs/yr)	Bacteria Load Reduction (billion cfu/yr)
CA 1	Highly Erodible Soils	51, 36, 57	124	ac	50%	62	126	2,398	1,457	279	481
CA 2	Wells and Septic Density	8, 75, 19	180	ac	NA	NA	N/A	N/A	N/A	N/A	N/A
CA 3	Hydric Soils and Wetland Restoration	31, 16, 25	526	ac	15%	79	71	1,825	830	35,195	4,740
CA 4	Treatment Wetland Opportunities	31, 16, 43	582	ac	5%	29	26	670	305	12,920	174
CA 5	Equestrian Areas	43, 18, 29	60	ac	80%	48	14	559	70	120	208
CA 6	Pollution Loading Hotspots	64, 12, 6	867	ac	25%	217	39	1,003	456	326	260
CA 7	Impervious Surfaces	1, 71, 47	158	ac	20%	32	2	141	18	15,552	52
CA 8	Nutrient and Pesticide Management Areas	31, 28, 16	487	ac	95%	463	189	3,581	2,176	417	718
CA 9	High Runoff Zones	31, 33, 16	830	ac	25%	208	424	8,043	4,888	936	1,612
CA 10	Urban Area Infiltration Zones	21, 20, 32	321	ac	50%	161	11	710	88	78,246	264
CA 11	Detention Basin Retrofits	47, 46, 66	36	ct	20%	7	2	154	19	17,010	57
CA 12	Stream and Lake Bank Erosion Stabilization	30, 4, 71	108	ac	20%	22	250	300	1,200	0	0
CA 13	Aquatic Stream Habitat Improvements	8, 55, 35	25	ac	20%	5	250	300	1,200	0	0
CA 14	Lake and Stream Buffers	26, 69, 5	35,456	ft	80%	28,365	30	762	347	14,702	1,980
CA 15	Areas of Greatest Land Use Change	3, 33, 68	1,081	ac	50%	541	180	11,929	1,482	1,314,630	4,436
						<b>Total</b>	<b>1,614</b>	<b>32,375</b>	<b>14,534</b>	<b>1,490,331</b>	<b>14,982</b>

#### SITE SPECIFIC NON-POINT SOURCE LOAD REDUCTION ESTIMATES

The site specific best management practice project recommendations are described and summarized in Section 5.3 and further detailed in Appendix O. Load reduction estimates are provided for 175 specific Best Management Practice projects that were identified during a windshield survey, a GIS

analysis of watershed data and coordination with watershed stakeholders. The suite of projects would benefit over 9,800 acres if fully implemented.

#### NOTEWORTHY- Best Management Practices

**Equestrian BMP:** This include a variety of practices associated with Equestrian areas including manure management, gutter systems and water diversions around facilities to reduce runoff and the transport of pollutants, stream fencing, grassed swales and filter strips in drainage ways and along streams and nutrient management.

**Filter Strip:** A filter strip is an area of grass or other permanent vegetation used to reduce sediment, organic particulates, nutrients, pesticides, and other contaminants from runoff and to maintain or improve water quality.

**Nutrient Management Plan:** A detailed plan outlining the management, amount, source, placement, form and timing of the application of plant nutrients and soil amendments.

**Rain Garden:** A rain garden is a planted depression that allows rainwater runoff from impervious urban areas like roofs, driveways, walkways, parking lots, and compacted lawn areas the opportunity to be absorbed.

**Two-Stage Drainage Ditch:** The typical drainage ditch with a trapezoidal shape is chosen for hydraulic efficiency over a wide range of flow events. The two-stage ditch design more closely mimics natural stream channel function and maximizes potential contact area with the streambed and floodplain.

**Urban BMP:** This includes a variety of practices associated with urban areas to reduce runoff and filter pollutants such as bioswales, wetlands or detention areas, fertilizer and pesticide application education, pores pavement, rain gardens and rain barrels.

**Water and Sediment Control Basin (WASCB) or Dry Dam:** A small earthen ridge-and-channel or embankment built across a small watercourse within a field.

**Grass Waterway:** A type of conservation buffer, designed to prevent soil erosion while draining runoff water from adjacent cropland.

**Wetland:** Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

**Table 6-2a: Site Specific Best Management Practice (BMP) Project Details and Estimated Removal Efficiencies**

Type	Secondary Type	Quantities	Quantities Other	BMP Efficiency Nitrogen*	BMP Efficiency Phosphorus*	BMP Efficiency Bacteria	BMP Efficiency Chloride	BMP Efficiency Sediment*
Equestrian BMPs	Stream Buffer, Wetland, Manure Management	154 ac		50%	60%	50%	15%	65%
Filter Strip	Two-Stage Drainage Ditch	30	32,523ft	45%	60%	50%	20%	70%
Nutrient Management Plan		7,525 ac		80%	90%	85%	0%	60%
Rain Garden		2		55%	70%	90%	75%	75%
Two-Stage Drainage Ditch	Wetland	1	2,400ft	45%	60%	50%	20%	70%
Urban BMP	Filter Strips, Porous Pavement, Detention, Education	391		50%	50%	50%	45%	60%
WASCB/Dry Dam		54		30%	25%	35%	20%	60%
Grass Waterway		16	15,524ft	55%	45%	50%	30%	80%
Wetland		3	15ac	45%	50%	65%	25%	75%

**Note:** Best Management Practice removal efficiencies were derived from the Center for Watershed Protection, 2007, National Pollutant Removal Performance Database, Version 3.

\*Sediment reductions include gully erosion; gully stabilization results in a 100% pollutant removal rate

**Table 6-2b: Site Specific Best Management Practice (BMP) Projects Summary**

Site Specific BMP Type	# of Projects	Acres Benefited
Equestrian BMPs	31	152
Filter Strips/Buffers	34	1,012
Nutrient Management Plan	69	7,523
Rain Gardens	3	2
Two-Stage Drainage Ditch	4	56
Urban BMPs	16	391
Water and Sediment Control Basins/Dry Dams	6	227
Waterways	8	391
Wetland Creation/Restoration	4	77

**Table 6-3: Expected Non-Point Source Pollutant Load Reductions from Site Specific Best Management Practice (BMP) Projects**

The following table is a summary of expected load reductions; detailed load reductions, cost estimates and priorities by best management practice can be found in Appendix O, Expanded Action Plan

<b>Best Management Practice (BMP) Type</b>	<b>Sediment Load Reduction (tons/yr)</b>	<b>Nitrogen Load Reduction (lbs/yr)</b>	<b>Phosphorus Load Reduction (lbs/yr)</b>	<b>Chloride Load Reductions (lbs/yr)</b>	<b>Bacteria Load Reduction (billions-cfu)</b>
Equestrian BMPs	9.66	299.95	53.37	38.79	133.62
Filter Strip	604.96	5,349.44	17,023.29	18,776.16	1,530.03
Nutrient Management Plan	2,895.34	73,518.23	58,899.18	0.00	19,217.35
Rain Garden	0.07	6.89	1.24	1,953.41	11.76
Two-Stage Ditch	11.90	250.73	167.68	1,966.18	73.81
Urban BMP	12.72	1,196.49	173.23	264,511.04	1,078.72
Water and Sediment Control Basins/Dry Dams	1,756.01	6,515.72	2,034.90	8,775.30	207.29
Grass Waterway	3,451.58	13,697.84	10,846.91	4,627.84	622.68
Wetland	14.80	339.80	156.88	18,537.22	123.13
<b>Grand Total</b>	<b>8,757.06</b>	<b>101,175.09</b>	<b>89,356.67</b>	<b>319,185.93</b>	<b>22,998.40</b>

**Figure 6-1: Gully Erosion in the Watershed**



**Table 6-4: Expected Non-Point Source Load Reductions from Site Specific Best Management Practice (BMP) Projects by Catchment**

Catchment	Area Load Reduction	Sediment Load Reduction (lbs/yr)	Nitrogen Load Reduction (lbs/yr)	Phosphorus Load Reduction (lbs/yr)	Chloride Load Reductions (lbs/yr)	Bacteria Load Reduction billions-cfu
1	6.03	320.62	15.97	2.29	3,331.91	16.12
2	64.29	71,252.62	710.37	754.44	0.01	163.62
3	144.94	163,815.95	1,506.60	1,597.55	16.33	350.94
4	18.22	8,148.32	177.90	97.78	141.04	49.76
5	54.29	3,268.52	157.23	22.83	34,517.21	149.36
6	85.99	91,473.96	936.93	973.10	0.00	217.21
7	30.43	13,451.95	283.70	155.29	1,628.73	82.15
8	296.26	367,594.90	2,902.10	2,713.34	0.00	784.88
9	262.69	292,450.46	2,360.86	1,861.99	0.00	681.11
10	136.14	156,280.45	1,021.48	674.58	0.00	343.48
11	8.80	541.97	26.83	3.87	5,655.39	26.95
12	180.79	147,623.82	1,987.82	1,557.05	1,061.85	501.07
13	23.98	3,407.15	96.62	33.52	5,485.88	53.57
14	237.71	258,632.22	2,622.03	2,733.23	5,663.80	616.30
15	155.34	178,627.47	1,857.86	1,903.53	0.00	432.90
16	150.40	96,881.73	1,164.35	738.92	519.04	415.85
17	275.18	199,296.20	2,384.79	1,612.72	738.25	789.77
18	213.16	80,553.82	1,514.22	928.73	7.76	409.98
19	119.35	144,912.62	1,420.40	1,527.74	0.00	326.52
20	104.60	90,418.23	956.11	943.97	22,510.53	280.05
21	209.22	194,066.97	2,213.10	2,098.28	0.12	527.72
22	575.35	831,450.09	6,532.71	6,313.06	1,178.33	1,451.42
23	320.62	298,820.46	3,391.33	3,216.23	760.24	810.17
24	112.26	108,919.48	1,166.08	1,118.58	0.93	287.02
25	438.59	280,922.92	3,453.83	2,373.93	48.20	1,156.48
26	158.34	79,136.48	1,033.92	808.97	72,591.14	430.38
27	338.54	238,505.71	2,734.76	2,458.89	321.21	701.71
28	248.46	249,525.58	2,100.98	1,852.10	1,379.25	549.89
29	489.17	207,290.62	4,173.73	2,499.93	9.55	1,107.52
30	138.42	64,762.14	1,187.77	721.86	14.96	311.78
31	120.34	85,229.40	1,103.25	806.72	327.14	288.93
32	127.58	134,333.94	1,258.84	1,388.50	4.71	292.32
33	538.71	3,526,392.46	10,252.60	3,997.71	2,356.92	1,197.88
34	65.27	28,177.31	597.74	347.91	0.65	158.40
35	250.16	159,536.97	1,831.36	1,487.43	3,020.02	485.62
36	77.97	68,357.78	802.59	738.49	0.85	194.23
37	18.98	8,205.36	164.21	99.90	0.00	43.17
38	35.19	16,436.80	266.42	177.65	2.26	72.32

39	64.46	22,457.76	482.55	261.56	4.58	133.79
40	95.46	24,789.65	561.14	295.61	1.15	160.05
41	132.89	67,018.82	1,164.08	787.66	0.09	300.40
42	1.70	97.80	5.04	0.72	1,000.98	5.38
43	242.53	90,281.20	1,355.89	903.03	469.16	363.40
44	65.45	28,957.16	552.68	347.35	0.00	146.25
45	99.54	49,492.37	854.58	558.29	3.60	223.90
46	1.02	816.18	11.49	9.20	0.00	2.86
47	116.01	54,331.57	1,034.44	647.07	0.43	272.30
48	49.60	23,458.07	439.71	276.74	1.06	115.35
49	159.25	100,370.53	1,420.92	1,056.84	20.59	360.52
50	57.86	26,952.25	418.29	263.29	1,470.86	111.21
51	54.48	25,923.05	470.30	285.87	2,304.39	124.67
52	192.86	126,099.73	1,393.15	854.61	2,760.72	525.92
53	35.72	16,101.53	307.13	193.78	0.15	80.21
54	150.54	64,443.64	1,540.04	824.99	131.82	412.23
55	164.10	281,384.48	1,320.70	701.37	3,176.38	269.63
56	30.12	15,796.57	285.00	187.21	568.18	78.86
57	54.34	22,804.66	469.98	278.46	160.11	124.21
58	218.36	116,749.60	1,789.19	1,188.89	181.19	457.35
59	35.17	14,568.06	319.49	182.71	0.00	84.57
60	100.56	1,280,272.73	2,220.21	5,304.23	2,426.65	99.05
61	96.90	37,252.58	541.34	325.60	9,532.17	174.05
62	16.90	11,188.86	173.45	128.74	0.00	43.80
63	93.01	2,347,809.26	4,103.29	5,899.66	2,979.97	120.98
64	183.80	2,250,067.32	4,534.07	7,977.49	3,459.27	321.76
65	35.99	8,600.48	189.92	76.00	20,717.09	71.22
66	14.59	8,605.36	151.78	101.08	0.22	39.40
67	91.60	1,250,146.58	2,366.74	4,948.04	1,395.98	142.39
68	91.06	136,204.38	944.91	494.38	1,193.88	199.12
69	67.50	4,299.81	209.49	30.29	45,151.21	203.31
70	2.80	881.84	22.51	10.60	0.23	6.38
71	24.86	1,528.67	74.12	10.55	15,941.19	67.57
72	11.00	1,175.01	39.43	10.35	6,555.97	30.61
73	27.95	13,738.04	282.71	169.57	0.00	74.20
74	60.56	36,863.37	588.99	397.59	1.42	151.57
75	56.21	3,575.81	166.92	24.63	34,281.03	141.39
76	0.00	0.00	0.00	0.00	0.00	0.00

The information presented above describes the expected or modeled pollutant load reductions if all recommended site-specific best management practices are implemented. Considering current water quality impairments for nutrients and sediment, the greatest water quality benefits would occur if implementation was prioritized to catchments 33, 60, 63, and 64. Focusing on these four catchments

could result in reductions of up to 4,500 tons of sediment annually, over 20,000 pounds of Nitrogen and 25,000 pounds of Phosphorus annually. Reductions to address bacteria loading should be prioritized to catchment 22 (14,000 billions-cfu annually). Project implementation to address Chloride should be targeted to catchments 26 and 69 where load reductions could exceed 110,000 pounds of Chloride annually.

#### COMPARISON OF LOAD REDUCTIONS VS. TOTAL POLLUTANT LOADING

Installing recommended site specific best management practices will have numerous positive benefits on water quality. As previously noted in Table 6-2, expected non-point source pollutant load reductions from known project locations will result in significant load reductions. Comparing these results to the total modeled watershed pollution loading, a relatively high percentage reduction in pollution can be expected as shown in Table 6-5.

**Table 6-5: Load Reduction Targets for Site Specific Best Management Practices (BMP) Projects**

<b>Pollutant</b>	<b>Expected Annual Load Reductions</b>	<b>Total Modeled Pollution Loading</b>	<b>Percentage Reduction of Overall Loads</b>
Sediment (tons/yr)	8,757	15,539	<b>56%</b>
Nitrogen (lbs/yr)	101,175	201,784	<b>50%</b>
Phosphorus (lbs/yr)	89,357	104,543	<b>85%</b>
Chloride (lbs/yr)	319,186	6,982,860	<b>5%</b>
Bacteria (billion coliform forming units - cfu)	22,998	57,409	<b>40%</b>

Sediment and nutrient reductions, especially in phosphorus are at or greater than 50% of the total loading. The 85% reduction in phosphorus loads is realized primarily through the implementation of nutrient management on all eligible agricultural ground; nutrient management can reduce up to 90% of phosphorus and 80% of nitrogen loading to streams. Additionally, structural practices such as water and sediment control basins or grassed waterways will offer nutrient savings through reductions in sediment.

Low chloride and bacteria reductions represent a limitation of the modeling and watershed assessment effort to accurately pinpoint site-specific urban best management practices projects; the majority of the chloride and bacteria load is originating from urban areas and roadways. Further, best management practices typically have poor removal efficiencies for chloride; so the best practice to reduce chloride loading is to reduce the application rates which can best be achieved through policy and education and outreach efforts.

## 6.2 FINANCIAL AND TECHNICAL RESOURCE NEEDS

Implementation of this plan will require the development of partnerships with local, state, and federal organizations for implementation, technical assistance, and funding. These efforts require the investment of a significant amount of time and resources and, especially, funding. Tables 6.6 and 6.7 summarize the estimated amount of funding required for initial and ongoing implementation of the practices recommended in the action plan. Initial costs reflect the cost of installing and/or establishing the BMP; annual costs indicate the cost for ongoing management and maintenance. There are numerous sources of funds available to help support projects or provide cost-share to match other sources of funds. A list of numerous local, regional and state funding sources, and the types of projects funded under the various programs, is provided in Table 6-9. Most of the programs require a local match of funds or in-kind services. Although these funding sources can provide a good source of revenue, significant local investment of time and financial resources will be required to implement this plan. If fully implemented, however, the quality of the watershed lakes, stream reaches, and wetlands could be significantly improved.

Cost estimates are generated from a combination of technical experience, previous watershed plans, and the US Department of Agriculture’s average practice cost list. Cost estimates are generalized for watershed-scale planning purposes and these estimates should not be used to estimate costs for individual projects, as costs will range significantly. The estimates also do not account for pollutant load reductions from programmatic (non-site-specific) action items or Education and Outreach and Policy/Regulation best management practices since direct impacts are not easily determined. Therefore these costs could vary significantly if extensive education and policy changes are implemented. Tables 6-6 and 6-7 provide cost estimates by site-specific best management practice and by catchment; detailed load reductions, cost estimates and priorities by site-specific best management practice and catchment can be found in Appendix O, Expanded Action Plan.

**Table 6-6: Site Specific Best Management Practice BMP Project Implementation Costs**

Type	Secondary Type	Quantities	Quantities Other	Unit Cost	Total Cost
Equestrian BMPs	Stream Buffer, Wetland Buffer, Manure Management	154 ac	N/A	\$450	\$69,300
Filter Strip	Two-Stage Drainage Ditch	30	32,523ft	\$1.50/sq ft	\$2,439,255
Nutrient Management Plan	N/A	7,525 ac	N/A	\$25	\$118,125
Rain Garden	N/A	2		\$2000	\$4,000
Two-Stage Drainage Ditch	Wetland	1	2,400ft	\$150.00	\$360,000

Urban BMP	Filter Strips, Porous Pavement, Detention, Education	391ac	N/A	\$3000	\$1,173,000
Water and Sediment Control Basins/Dry Dams	N/A	54		\$3000	\$162,000
Grass Waterway	N/A	16	15,524ft	\$2.50	\$38,810
Wetland	N/A	3	15ac	\$4,000	\$60,000
Grand Total	N/A				<b>\$4,424,490</b>

**Table 6-7: General Critical Area (CA) Implementation Costs**

ID	Critical Area Type	Critical Catchments	Action Recommendation	Total Critical Area	Unit	Initial Target %	Unit Cost	Total Cost
CA 1	Highly Erodible Soils	51, 36, 57	Enroll in CRP, CREP; apply agricultural and pasture BMPs	124	acres	50%	\$3,000/2ac of drainage	\$186,000
CA 2	Wells and Septic Density	8, 75, 19	Implement in-stream monitoring program to evaluate potential water quality problems	180	areas	NA	\$100,000	\$100,000
CA 3	Hydric Soils and Wetland Restoration	31, 16, 25	Restore hydrology and wetlands to hydric soil areas in the watershed	526	acres	15%	\$3,000/ac	\$1,578,000
CA 4	Treatment Wetland Opportunities for Runoff and Tile Flow	31, 16, 43	Perform feasibility study to develop possible treatment wetland implementation	582	acres	5%	\$3,000/ac	\$1,746,000
CA 5	Equestrian Areas	43, 18, 29	Implement equestrian BMP projects	60	acres	80%	\$450/ac	\$27,000
CA 6	Pollution Loading Hotspots	64, 12, 6	Apply all types of BMP projects	867	acres	25%	\$3,000/2ac of drainage	\$1,300,500
CA 7	Impervious Surfaces	1, 71, 47	Implement urban stormwater BMPs	158	acres	20%	\$3,000/ac	\$474,000
CA 8	Nutrient and Pesticide Management	31, 28, 16	Implement nutrient management plans	487	acres	95%	\$25/ac	\$12,175
CA 9	High Runoff Zones	31, 33, 16	Implement agricultural BMPs; naturalized detention and wetlands to reduce runoff and scour	830	acres	25%	\$3,000/ac	\$2,490,000
CA 10	Urban Area Infiltration Zones	21, 20, 32	Implement regulatory and policy procedures; designate green infrastructure and open space areas	321	acres	50%	\$3,000/ac	\$963,000
CA 11	Detention Basin Retrofits	47, 46, 66	Retrofit detention basins; naturalize bottom and buffer	36	basins	20%	\$3,000	\$108,000

CA 12	Stream and Lake Bank Erosion	30, 4, 71	Stabilize stream and lake bank erosion	108	acres	20%	\$38/ft	\$10,260,000
CA 13	Aquatic Stream Habitat Improvements	8, 55, 35	Implement in-stream habitat improvement projects	25	acres	20%	\$3,000/ac	\$75,000
CA 14	Lake and Stream Buffers	26, 69, 5	Establish lake and stream buffers	35,456	feet	80%	\$1.50/sq ft	\$2,659,200
CA 15	Areas of Greatest Land Use Change	3, 33, 68	Implement regulatory and policy procedures; designate green infrastructure and open space lands	1,081	acres	50%	\$3,000/ac	\$3,243,000
						<b>Total</b>		<b>\$25,221,875</b>

As previously noted in Table 6.3, expected non-point source pollutant load reductions from identified project locations will result in the following: 8,757 tons/year of sediment, 101,175 pounds/year of nitrogen, 89,357 pounds/year of phosphorus, 319,186 pounds/year of chloride, and 22,998 billion cfu of bacteria. These values represent the potential if each and every project is implemented; in reality, only a percentage of these reductions will be realized due to financial and logistical limitations related to actual implementation.

**Table 6-8: Site Specific Implementation Costs by Unit Load Reduction**

	<b>Sediment (\$/tons)</b>	<b>Nitrogen (\$/lbs)</b>	<b>Phosphorus (\$/lbs)</b>	<b>Chloride (\$/lbs)</b>	<b>Bacteria (\$/billion cfu)</b>
<b>Cost/Unit load reduction</b>	192	44	50	13	192

#### FLOOD MITIGATION PROJECTS IMPLEMENTATION COST ESTIMATES

As detailed in Chapter 5, Section 5.3, eight flood mitigation measures have been identified for flood problem areas in Illinois. For conceptual planning purposes, the three high priority areas were evaluated to determine the upper range of anticipated costs assuming the worst-case scenario that the preferred mitigation measure was the buyout/acquisition approach. The upper end of the conceptual estimate cost for this measure is estimated to be in the neighborhood of \$1,000,000 depending on various factors including purchase costs, demolition costs, restoration costs, and legal costs.

Given the size of the tributary drainage areas and the number of structures impacted, a more reasonable anticipated implementation cost range is \$50,000 to \$350,000 per flood problem area. It is reasonable that the flood problem areas identified as having local drainage problems (10-02 and 2-03) will be at the lower end of the cost range since these types of problems are commonly resolved cost-effectively by constructing new and/or improving existing overland flow routes or other simple diversion techniques. For the depression storage flooding areas, the implementation of storage based measures are typically more expensive since the earthwork is more involved and can require some property acquisition combined with significant material haul off and utility relocation.

### **6.3 ACTION PLAN IMPLEMENTATION**

The North Mill Creek/Dutch Gap watershed includes many partners (see Table 5-1) that will have to coordinate efforts to implement many of the projects recommended in the action plan. Since no single municipality, district, resident, business, landowner, or organization has the financial or technical resources to accomplish the plan goals and objectives alone, working together will be essential to achieve meaningful results. Combining and coordinating resources, funding, effort and leadership will be the most efficient and effective means of creating real improvement of watershed resources. One important step in plan implementation will be the establishment of a multiple stakeholder watershed committee or organization to step forward as a project leader to help organize and coordinate plan implementation. Responsibilities of this organization would also include administration, coordination of stakeholders to support individual watershed projects and working with municipalities and other stakeholders to implement recommended policies and programs.

Throughout the watershed planning process, the Watershed Planning Committee has provided valuable input to the plan regarding watershed issues, resources, and priorities. The Planning Committee can continue to hold regular meetings, take the lead in implementing plan recommendations, organize watershed field trips, host educational workshops and forums, and bring watershed stakeholders and multiple units of government together to discuss watershed issues and opportunities. The Planning Committee may consider whether a formal staff position is needed to support the efforts of the Committee and to solicit volunteers or develop funding for the position. The Planning Committee or an established watershed organization is encouraged to work to generate additional stakeholder interest and involvement with watershed plan implementation and stewardship activities. As projects are initiated, and as the positive environmental, aesthetic, and community benefits come to light, projects and participation are expected to increase over time.

There are tangible benefits to stakeholder participation in watershed activities, from positive media attention to improved quality of life for community residents. Increased involvement also can yield significant local, state, and federal funding opportunities to help share the cost of project implementation. The watershed action plan contains a number of programmatic and site specific recommendations and an identification of the party responsible for leading the implementation of those recommendations. Some actions can be added to existing capital improvement and maintenance plans, budgets, and schedules or added to existing work programs. This is a fairly quick

and easy approach to implementing recommendations within the purview of specific jurisdictions. In other cases, however, the action recommendation will require the involvement of multiple stakeholders for implementation, such as residents, a municipality, and a county, state, or federal agency to provide financial and technical support. Some actions require cross jurisdictional coordination; the establishment of a green infrastructure corridor along the stream channel, or the preservation and restoration often require inter-jurisdictional cooperation and may require a longer time frame for implementation. Other actions will require the cooperation of individual or groups of landowners, whether they are residents, homeowners associations, businesses, or institutions.

These actions will often need a leader, or a single champion for the project, that can organize resources and keep the project moving forward. This champion may be the watershed organization, or a single entity such as a landowner or the municipality. Actions that involve preservation of areas of land or water may also require the involvement of a local land trust, or other conservation organization. These groups can often provide technical or financial assistance for preservation efforts. In some cases, actions recommend the adoption of new policies, plans, or standards that modify the form, intensity, or type of development or redevelopment in the watershed in a way that better protects watershed resources. These actions will require some effort on the part of municipalities to understand how plans and policies can be modified and to discuss and adopt new, or modify existing, policies, plans and standards. The first step in this effort is to understand current practices impact watershed resources and how they can be improved, followed by discussions and debate about possible modifications, and finally adopting policies and standards that have the desired outcome(s). A dedicated and determined effort will benefit all watershed stakeholders.

## **6.4 WATERSHED PLAN IMPLEMENTATION**

Parties who are key potential partners whose support will lead to the realization of identified goals for the North Mill Creek-Dutch Gap Canal watershed are identified below as “Implementation Partners”. The organizations below are listed as implementation partners because they are expected to fulfill one or more of the following functions: oversee or implement watershed protection, restoration and remediation strategies, acquire funding for watershed plan implementation, organize or participate in data collection, provide regulatory or technical guidance, issue permits, monitor the success of the watershed plan, acquire land for green infrastructure restoration or protection purposes, and develop education strategies.

Because implementation of the watershed plan will largely rest with local communities, it is critical that they be involved from the beginning. They usually have the most to gain by participating and the most up-to-date information on the structure, needs, and available resources of the community. In addition, some of the most powerful tools for watershed implementation, such as planning, controlling development standards, and zoning reside at the local level.

Several local and regional agencies/organizations along with a number of state and federal agencies are listed as “Implementation Supporters” below. While the state will be the lead party responsible for implementing action recommendations for the state-owned Redwing Slough, regional, state and

federal agencies are generally not identified as lead parties responsible for watershed plan implementation, but as resources that can assist with implementation or provide technical or funding support.

## IMPLEMENTATION PARTNERS

### *Corporate and Business Landowners (CBL)*

Although commercial and industrial land uses make up a relatively small percentage of the watershed, these land uses frequently generate significant nonpoint source pollutant loads. A considerable area of new commercial and industrial development is planned for the Route 173 corridor in Lake County.

The active participation of CBLs in the planning and watershed implementation process can lead to significant positive impacts on the quality of the North Mill Creek-Dutch Gap Canal watershed. Businesses can become involved by retrofitting existing facilities, managing their grounds, infiltrating or harvesting rooftop runoff, designing and retrofitting parking lots to reduce runoff volume and pollutant loadings, and by sponsoring watershed events. With an upfront commitment and support from the CBL community, new development can also be designed to minimize runoff and pollutant loadings.

### *Developers & Homebuilders (DH)*

The practices of developers can significantly impact a watershed. Developers should be encouraged or required to employ sustainable development techniques such as low impact and conservation development that focus on maintaining the natural hydrology of the development site. In addition to designing new developments with sustainable best management practices (BMPs), homebuilders should use BMPs during the construction process, especially those related to soil erosion and sedimentation control. Failure to use BMPs, or improper use, can lead to soil erosion and other pollutant discharges.

### *Drainage Districts (DD)*

The Grubb School Drainage District is responsible for addressing drainage problems within its district boundary, which includes a large percent of Hastings Creek. Thus, issues related to channel and stormwater management infrastructure along Hastings Creek should include the GSDD as an implementation partner. GSDD will also be a key partner in a collaboration that establishes stream maintenance standards for the watershed.

### *Homeowner and Lake Management Associations*

A number of subdivisions and lake areas in the watershed have established property owner associations that assess fees and have the responsibility of managing the common ownership/use areas including lakes, beaches, stormwater management facilities, wetlands, and neighborhood park and open spaces. Many associations struggle with collecting fees and employing best management practices of the natural (wetlands, creeks and lakes) and constructed elements (detention basins) of

the drainage system. These associations will be key implementers of the watershed management plan.

*Illinois Department of Natural Resources (IDNR)*

The office of Conservation within the IDNR will be a key local partner as the owner and manager of Redwing Slough a large wetland conservation area located in Antioch. The North Mill Creek watershed in Illinois is also designated as a Conservation Opportunity Area in the Illinois Wildlife Action Plan, therefore IDNR has a strong interest in working with local stakeholders to conserve wildlife and enhance wildlife habitat.

Several offices within the IDNR provide services that will be key to the implementation of the North Mill Creek-Dutch Gap Canal watershed plan for issues related to water resource management, habitat protection and management, wildlife management, invasive species control, wetland management, and hunting and fishing permitting.

- The Office of Water Resources (OWR) is the state's lead organization for the regulation of floodplain development as well as for the implementation and funding of structural flood control and mitigation.
- The Office of Realty and Environmental Planning (OREP) is responsible for natural resource and outdoor recreation planning.
- The Office of Resource Conservation (ORC) reviews Clean Water Act Section 404 wetland permits for impacts on fish and wildlife resources; it manages threatened and endangered species issues; it also protects fisheries and other aquatic resources through regulation, ecological management and public education.
- The Office of Capital Development (OCD) administers state and federal grants for open space programs.

*Illinois & Wisconsin Department of Transportation (IDOT & WisDOT)*

IDOT and WisDOT are responsible for the planning, construction, and maintenance of portions of the major roadways in the North Mill Creek-Dutch Gap Canal watershed. The Route 45 Milburn Bypass and Route 173 expansion are major road improvements currently being planned by IDOT and the Lake County Division of Transportation. Roadway improvements are also planned for Route 45 in Wisconsin. Incorporation of best management practices and sustainable design into transportation projects and using best practices to reduce road salt usage, can provide significant reduction in the volume of stormwater runoff and nonpoint source pollution generated by major roadways in the watershed.

*Kenosha Racine Land Trust (K/RLT)*

Kenosha/Racine Land Trust, Inc. (K/RLT) is a non-profit organization that aims to protect open space and natural areas in Kenosha and Racine counties for the benefit of current and future generations through identifying and prioritizing the most critical resources left in Southeastern Wisconsin. K/RLT owns one property but mainly holds private easements and monitors

conservation subdivisions. K/LRT holds easements on more than 519 acres on seven parcels and protects more than 500 acres as conservation areas associated with subdivisions.

<http://krlt.org/index.html>

### *Lake and Kenosha Counties*

North Mill Creek-Dutch Gap Canal flows through Lake and Kenosha Counties. The Village of Bristol recently incorporated almost all of the land area in the Kenosha County portion of the watershed. In Kenosha County, a majority of developmental projects are reviewed by several divisions within the Planning and Development Department. Other projects are reviewed by the Public Works Department. Unlike Lake County, the Kenosha Planning and Development Department also has a Conservation division that provides stormwater management, coordinated state and federal incentive and grant programs, a farmland preservation program and shoreline permitting.

Fifty-seven percent of the Lake County portion of the watershed is unincorporated indicating the county has a role in land use planning, development, natural resource protection, and drainage system management in a large part of the watershed. Working with the County departments of planning, building and development (PB&D), public works and health departments (LCHD), and division of transportation (LCDOT), can help ensure that North Mill Creek-Dutch Gap Canal enjoys responsible, sustainable land use planning, road and sewer maintenance, and public health policies.

### *Lake County Forest Preserve District (FPD)*

The Lake County Forest Preserve District is the largest single landowner in the watershed. FPD owns and manages over 3,000 acres of green infrastructure open space and agricultural lands within the North Mill Creek-Dutch Gap Canal watershed. The most recent land acquisitions in the watershed have centered on the north and south side of Edwards Road just south of the state line. Much of the FPD land is farmland. The District is beginning the process of developing long-term restoration and use plans for these preserves, which are scheduled to be completed in 2012-2013.

### *Lake County Stormwater Management Commission (SMC)*

SMC's mission is to coordinate the stormwater activities of over 90 jurisdictions throughout Lake County. SMC provides technical assistance, local knowledge and problem-solving skills to coordinate flood damage reduction, flood hazard mitigation, watershed planning, water quality enhancements and natural resource protection projects and programs. SMC organized and facilitated the North Mill Creek-Dutch Gap watershed planning effort.

### *Lake County Health Department (LCHD)*

The LCHD Lakes Management Unit provides technical expertise essential to the management and protection of Lake County surface waters. The goal of the LMU is to monitor the quality of the county's surface water in order to maintain or improve water quality and alleviate nuisance

conditions, promote healthy and safe lake conditions, and protect and improve ecological diversity. The LCHD is also responsible for septic system management programs and well testing and monitoring.

#### *Liberty Prairie Conservancy (LPC)*

The Liberty Prairie Conservancy is a non-profit conservation organization that provides services throughout Lake County to help private and public landowners preserve and steward land working on all types of natural areas as well as farmland and even landscaped properties. The Conservancy launched the Conservation@Home Program in 2011. A popular sustainable landscaping program, Conservation@Home will offer homeowners property consultations, landowner resources, and a property certification program to support and recognize eco-friendly lawn and garden practices. Additional information about the Conservancy can be accessed at the Conservancy's website ([www.libertyprairie.org](http://www.libertyprairie.org)).

#### *Municipalities (all departments) (M)*

Municipalities (elected officials and staff) have the principal responsibility for land use and development planning, policies, and standards. There are also opportunities to make others aware of the watershed management planning process through local government newsletters and presentations at board meetings, which are often televised on local cable television networks. Municipalities are therefore crucial to watershed protection efforts. By partnering with municipalities and encouraging the adoption of sustainable zoning and development practices, a watershed protection group can check the increase of water quality impairments. Municipalities are also a key part of any watershed protection strategy because they are responsible for the enforcement of local land use and development ordinances. Many are also responsible for enforcing the Lake County Watershed Development Ordinance.

#### *Natural Resources Conservation Service (NRCS)*

NRCS provides technical expertise and education on conservation, development, management, and wise use of natural resources to landowners and land managers. Areas of expertise include streambank stabilization and soil erosion/ sediment control, wetland and habitat restoration, agricultural conservation, water quality protection, conservation planning, and natural resource maps and reports. NRCS administers several cost-share programs targeted to water quality, wetland restoration, and other watershed priorities.

As part of its watershed protection effort, NRCS administers the USDA Watershed Program (under Public Law 83-566). The purpose of the program is to assist federal, state, and local agencies; local government sponsors; tribal governments; and other program participants in protecting watersheds from damage caused by erosion, floodwater, and sediment; restoring damaged watersheds; conserving and developing water and land resources; and solving natural resource and related economic problems on a watershed basis.

#### *Parks and Recreation Districts (PD)*

Park and recreation districts often control a large amount of open space in a watershed and maintain recreational facilities and parks. Parks also contain many recreational opportunities and trails, several bordering North Mill Creek-Dutch Gap Canal. Partnerships with local park districts can help ensure the preservation of open space while also facilitating recreational and other community opportunities that can help increase support for watershed protection efforts.

#### *Root-Pike Watershed Initiative Network (WIN)*

While the Root-Pike is a Lake Michigan watershed, the Root-Pike WIN provides services for Dutch Gap watershed communities. WIN is a grassroots collaborative engaged in several watershed-based programs including a rain garden initiative and coordinates the Keep Our Waters Clean program through the Southeast Wisconsin Clean Water Network partnering with seventeen municipalities (including Bristol in the Dutch Gap watershed) to reduce polluted stormwater runoff.

<http://www.rootpikewin.org/index.php/keep-our-waters-clean.html>

#### *Plant Nurseries*

Several commercial nursery operations are located in the watershed. As a subset of the agricultural stakeholders, the nursery operators manage relatively large tracts of land. Their land management and operation decisions have the potential to affect drainage and sediment and nutrient delivery to water resources. Due to their size, nursery operations may provide opportunities for the implementation of best management practices to improve water quality and habitat.

#### *Prairie Research Institute*

Prairie Research Institute is the home of the Illinois scientific surveys: Illinois Natural History Survey, Illinois State Archaeological Survey, Illinois State Geological Survey, Illinois State Water Survey and Illinois Sustainable Technology Center. (It was formerly the Institute of Natural Resource Sustainability.)

URL: <http://prairie.illinois.edu>

#### *Private Farmers*

Private farmers include anyone managing a crop or non-equestrian livestock operation within the watershed. This includes both tenant operators and landowners. Because cropland accounts for more than 30% of the watershed, farmers are an important implementation partner. Farmers can work independently or with other partners to preserve farmland in the watershed and implement best management practices for erosion control, soil conservation, and nutrient reduction to reduce nonpoint source pollution.

#### *Private Equestrian Facilities (EQ)*

There are a number of privately-owned and operated equestrian facilities in the watershed. Many of these facilities include paddock and pasture areas and large stables, barns, and other operational

buildings. Like any land use, equestrian facility operation can impact water quality and runoff. However, because these facilities encompass large areas of land managed as a unit, they also offer excellent opportunities for implementation of best management practices and restoration. Additionally, the large buildings offer opportunities for practices such as rainwater harvesting and reuse.

#### *Private Residential Landowners (PRL)*

The activities of residential landowners, often unknowingly, can have a significant impact on the quality of a watershed. Practices such as excess lawn fertilization, connection of downspouts to the sewer system, or destruction of riparian buffers can be significant sources of nonpoint pollution. Watershed protection efforts should educate residents on the consequences of their actions and present alternatives. More positively, political pressure from local residents on municipal or county officials can lead to increased emphasis on watershed protection. And many local residents play important roles in watershed planning and protection efforts.

#### *RiverWatch*

The RiverWatch program relies on a volunteer base to monitor, collect and record stream, lake, wetland, and coastal data for the state database. It is also a valuable educational resource that can be used to educate others about watershed issues and concerns. RiverWatch holds volunteer training for stream monitoring on an annual basis. <http://www.ngrrec.org/index.php/riverwatch>

#### *Schools*

Schools are venues for education and outreach related to watershed plan implementation. Schools reach a wide audience of both children and adults (parents) and provide opportunities for education through both curricula related to watershed issues, innovative projects, and even small demonstration sites that can serve as laboratories or provide “real-life” learning experiences.

#### *Townships (T)*

While unincorporated townships generally play a secondary role in watershed protection, they often have responsibility for road upkeep and occasionally sponsor drainage system improvement projects. The use of best management practices by townships, especially for road maintenance, and winter snow and ice removal can help improve water quality within the watershed.

#### *Upper Des Plaines River Ecosystem Partnership (UDPREP)*

A public–private cooperative of watershed stakeholders formed in 1996 to preserve, protect, and enhance the Upper Des Plaines River Watershed is a nonprofit organization that works to bring people together to share ideas and discover partnership opportunities. UDPREP covers 15 subwatersheds and the Des Plaines River mainstem from Salt Creek in Cook County, Illinois to the headwaters in Kenosha and Racine Counties in Wisconsin. The entire North Mill Creek/Dutch Gap Canal watershed is included in the area served by UDPREP.

### *U.S. Department of Agriculture (USDA)*

USDA's Farm Services Agency (FSA) has several programs that support watershed protection and restoration efforts. Under the Conservation Reserve Program (CRP), farmers receive annual rental payments, cost sharing, and technical assistance to plant vegetation for land they put into reserve for 10 to 15 years. The Conservation Reserve Enhancement Program (CREP) targets state and federal funds to achieve shared environmental goals of national and state significance. The program uses financial incentives to encourage farmers and ranchers to voluntarily protect soil, water, and wildlife resources. The Grassland Reserve Program (GRP) uses 30-year easements and rental agreements to improve management of, restore, or conserve up to 2 million acres of private grasslands. The Conservation Security Program (CSP) is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on tribal and private working lands.

### *Wisconsin DNR*

The Wisconsin Department of Natural Resources (WDNR) is a key partner for the stakeholders in Kenosha County. The WDNR oversees watershed planning, water quality programs, floodplain, stormwater and non-federal wetland permitting, shoreland management, and fishery and wildlife management in Wisconsin. The WDNR also controls allocation of Federal Clean Water Act ("Section 319") funding for nonpoint source pollution reduction projects. Due to its role in both permitting and funding, WDNR is a key partner for Wisconsin stakeholders interested in implementing projects in Kenosha County.

## **IMPLEMENTATION SUPPORTERS**

### *Chicago Metropolitan Agency for Planning (CMAP)*

CMAP provides technical and planning assistance to local communities, community organizations and watershed protection groups. CMAP has developed model ordinances tailored to the Chicago region for stormwater management, water conservation, sediment control, streams and wetlands, and floodplains. CMAP also offers technical assistance and training opportunities to local governments and watershed groups and helps local governments apply for state and federal funding programs.

### *Chicago Wilderness*

Chicago Wilderness (CW) is a regional alliance composed of more than 250 organizations that work together to restore local nature and improve the quality of life for all who live in the CW region by protecting land and water. The members of Chicago Wilderness include local, state and federal agencies, large conservation organizations, cultural and education institutions, volunteer groups, municipalities, corporations, and faith-based groups. CW has developed a "Green Infrastructure Vision" that maps key locations for green infrastructure of regional importance, into which the green infrastructure network outlined in this plan fits.

### *College of Lake County*

The College of Lake County (CLC) is a comprehensive community college accredited by the Higher Learning Commission. Each semester CLC serves approximately 18,000 credit students, with more than 80 percent enrolled in transfer or career preparation programs.

### *Federal Emergency Management Agency (FEMA)*

FEMA is the principal federal agency involved in flood mitigation and flood disaster response. Among its duties, FEMA is responsible for the National Flood Insurance program, helps municipalities develop and enforce floodplain ordinances, develops floodplain maps, and administers funding for flood mitigation plans and projects. FEMA is currently considering a grant application to purchase repetitively flooded homes in the Village of Lindenhurst.

### *Illinois Environmental Protection Agency (IEPA) Bureau of Water*

Under the federal Clean Water Act and state legislation, IEPA is responsible for ensuring that Illinois' rivers, streams, wetlands and lakes will support all uses for which they are designated including protection of aquatic life, recreation and drinking water supplies. IEPA was a key source of funding for the development of the watershed plan. In addition, several IEPA activities are important to this plan implementation:

- **Monitoring:** IEPA oversees data collection at various sites (rivers, streams, lakes, etc.) across the state, including Hastings Creek and North Mill Creek in the watershed. The Illinois Water Quality Report (305(b)) summarizes these monitoring efforts.
- **Funding:** IEPA administers several state and federal grant programs. Primary examples are the Section 319 funding under the Clean Water Act and the Illinois Green Infrastructure Grant (IGIG) program, which helps local governments, nonprofit entities, and numerous other state, federal, and local partners to reduce nonpoint source pollution and stormwater runoff through technical and financial support.
- **Regulation:** IEPA regulates point and nonpoint source pollution discharges into the state's waters through regulatory and non-regulatory programs.

### *Illinois and Wisconsin Emergency Management Agency (IEMA/WEM)*

IEMA and WEM are the state agencies responsible for flood and disaster planning, emergency response, and hazard mitigation. The state emergency management agencies work with local governments on flood mitigation plans and provide operational support during floods. IEMA and WEM also administer FEMA-funded programs in the state, including flood mitigation grant programs. <http://emergencymanagement.wi.gov/> <http://www.state.il.us/iema/>

### *Lake County Audubon*

The Mission of the Lake County Audubon Society is education, conservation and restoration of natural ecosystems, focusing on birds, and other wildlife and their habitats for the benefit of

humanity and the earth's biological diversity. The Audubon sponsors activities and educational programs holding monthly program meetings in Libertyville, IL. <http://lakecountyaudubon.org/>

#### *Lake and Kenosha County Farm Bureau*

Kenosha County Farm Bureau located at 1701 Main Street in Union Grove WI 53182 phone: 262-878-2418.

The Lake County Farm Bureau is a not-for-profit membership organization. Originally, the Bureau was formed to help farmers improve their production practices. Today, the Lake County Farm Bureau® serves both rural and urban people who are interested in the production of a plentiful and safe food supply. Lake County Farm Bureau provides educational programs and technical assistance including their Ag In The Classroom program. <http://www.lcfb.com/>

#### *Lake and Kenosha County Extension Service*

Lake County Extension (University of Illinois Champaign) offers educational programs in five broad areas: healthy society; food security and safety; environmental stewardship; sustainable and profitable food production and marketing systems; and enhancing youth, family and community well-being. <http://web.extension.illinois.edu/lake/>

The Kenosha County Extension (University of Wisconsin Madison) offers education services related to farming and livestock management, horticulture, nutrition and health, community planning and leadership, and youth development. <http://kenosha.uwex.edu/>

#### *Town and Country Resource Conservation & Development (RC&D)*

Town and Country RC&D works to enhance and improve the quality of life in the 13-county area of Southeast Wisconsin by promoting healthy communities, a healthy environment and sustainable economic growth. The mission of the RC& D is to optimize opportunities for sustainable economic growth, healthy communities, and a healthy environment in the Town and Country RC&D area through the support and coordination of regional agencies, municipalities and organizations.

Projects focus on economic development, food and farms, grazing, urban wood market, water and sustainability. <http://www.tacrkd.com/index.html>

#### *Lake County Public Works (LCPW)*

The primary responsibility of Lake County Public Works is to provide water and sanitary sewer service to widely distributed portions of Lake County. Public Works owns and operates 297 miles of water main and 354 miles of sanitary sewer main. They provide direct water service to over 20,000 customers within 12 water distribution systems totaling approximately 25 square miles. Four water reclamation sewage treatment facilities serve 25,000 direct customers as well as 100,000 indirect customers through contract agreements with 14 different Lake County municipalities.

#### *Lake/McHenry County Soil and Water Conservation District (SWCD)*

The Lake/McHenry County SWCDs were formed in the 1940s and 50s (a) for the conservation of soil, soil resources, water and water resources in the State, (b) for the control and prevention of soil erosion, (c) for the prevention of air and water pollution, and (d) for the prevention of erosion, floodwater and sediment damages. Services provided by the SWCD include soil erosion sediment control inspections, natural resource inventories, soil tests, soil borings, technical assistance and workshops and training opportunities. The SWCD also administers several small grant programs. <http://mchenryswcd.org/> <http://lakeswcd.org/>

#### *Sierra Club*

The national club is divided into State-based chapters, and each chapter is further divided into groups. The Illinois portion of the watershed falls into the “Woods and Wetlands” (Northeastern Illinois) group of the Illinois chapter while the Wisconsin portion falls into the “Southeast Gateway” (Southeastern Wisconsin) group of the Wisconsin chapter. Among their activities, the groups sponsor outings and other events related to the Club’s mission and goals.

#### *Southeastern Wisconsin Regional Plan Commission (SEWRPC)*

SEWRPC was established in 1960 as the official areawide planning agency for the southeastern region of Wisconsin. SEWRPC serves the seven counties of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha. SEWRPC was created to provide objective information and professional planning initiatives to help solve problems and to focus regional attention on key issues of regional consequence. SEWRPC provides planning and technical assistance for public works systems, such as highways, transit, sewerage, water supply, and park and open space facilities. SEWRPC also provides regional expertise in addressing environmental issues, including flooding, air and water pollution, natural resource base deterioration, and changing land use. Previous work by SEWRPC directly related to this watershed plan includes a watershed plan and floodplain study for the Des Plaines River Watershed in Wisconsin and current and projected land use mapping.

#### *U.S. Environmental Protection Agency (USEPA)*

The USEPA oversees the environmental protection efforts of the IEPA and is the ultimate source for Section 319 and other environmental improvement programs. Section 404 of the Clean Water Act, which regulates the dredging and filling of wetlands, is jointly administered by USEPA and the U.S. Army Corps of Engineers.

#### *U.S. Fish and Wildlife Service (USFWS)*

The USFWS provides technical assistance to local watershed protection groups. It also administers several grant and cost-share programs that fund wetland and aquatic habitat restoration. The USFWS also administers the federal Endangered Species Act and supports a program called Endangered Species Program Partners, which features formal or informal partnerships for protecting endangered and threatened species and helping them to recover. These partnerships

include federal partners as well as states, tribes, local governments, nonprofit organizations, and individual landowners.

#### *Solid Waste Management Agency (SWALCO)*

Many local governments have solid waste programs that address the disposal of solid waste and yard waste. They might also handle the recycling, illegal dumping, and household hazardous waste programs.

#### *U.S. Army Corps of Engineers (USACE)*

USACE plays a major role in wetland protection and regulation through Section 404 of the Clean Water Act, which requires USACE to administer permit applications for alterations to wetlands and waters of the United States. The USACE Chicago district has also established a Wetlands Restoration Fund, which may be available to North Mill Creek-Dutch Gap Canal watershed communities. The USACE office that is responsible for wetland protection and regulation in Kenosha County is located in Waukesha, Wisconsin.

## **6.5 FUNDING RESOURCES AND OPPORTUNITIES**

Many Federal, State, local and private programs are available to fund BMP implementation. The following table outlines the most common and available sources of funding for best management practices/recommendations outlined in this plan and the estimated cost-share rates (if applicable). This list, while not comprehensive, includes the most common funding resources, although other funding programs may be available. Applicants should research available programs ahead of time; information on grant programs is most readily available on-line at the listed agencies website or via grant search sites. Most best management practices identified in this plan **are** eligible for some form of funding. With many grant programs, those applications that “leverage” multiple funding sources also have the greatest probability of being funded. Although many grant programs and funding agencies will fund various types of practices, they tend to direct funds to those practices that address their agency or program goals.

**Table 6-9: Available Funding Resources**

Best Management Practice	Funding Sources	Notes/Cost Share Rates
<p>Filter strips, riparian buffers, dry dams or water and sediment control basins, grass waterways, terrace, diversion</p>	<p>Illinois Environmental Protection Agency – Section 319 program</p> <p>Natural Resource Conservation Service (NRCS) – Environmental Quality Incentive Program (EQIP)</p> <p>Farm Service Agency (FSA) – Conservation Reserve Program (CRP)</p> <p>Soil and Water Conservation District (SWCD) – Conservation Practice Program (CPP)</p> <p>Illinois Department of Natural Resources (IDNR)/SWCD – Conservation Reserve and Enhancement Program (CREP)</p> <p>IDNR – State Wildlife Grant (SWG) program</p> <p>NRCS – Wildlife Habitat Improvement Program (WHIP)</p>	<p>CRP and CREP are land set-aside programs that provide direct payments to landowners to take agricultural ground out of production and replace with native vegetation or some other type of conservation practice. Contracts for these programs are 10 years for CRP and up to permanent easements for CREP</p> <p>EQIP provides cost-share assistance on agricultural ground for implementing practices that limit soil erosion and nutrient transport.</p> <p>CPP is a state program that provides funding for certain practices: dry dams, grass waterways, filter strips, well sealing, and nutrient management.</p> <p>CREP eligible acres must be in the 100 year floodplain and/or have cropped ground with erodibility index of 8 or greater adjacent to riparian zones; must have cropping history of at least 4 years between 1995 and 2001.</p> <p>SWG program requires 50% state match and must address goals/species outlined in the State of Illinois Comprehensive Wildlife Plan. This program is primarily for habitat restoration projects.</p> <p>NRCS, FSA, and SWCD programs provide 60% cost-share, however, some special programs and practices can provide up to 90%. FSA, CREP, CRP and some NRCS programs such as EQIP also provide annual rental payments for taking ground out of production.</p>

Streambank stabilization and in-stream grade control or other grade control	IEPA – 319 Program SWCD – Streambank Stabilization and Restoration Program (SSRP) NRCS – EQIP program	IEPA 319 offers 60% cost share SSRP offers 75% cost share to install practices to reduce streambank erosion such as stone-toe protection, stream barbs, and riffles  EQIP offers 60% cost share.
Wetland restoration and other habitat practices	IEPA – 319 program NRCS – EQIP program NRCS – Wetland Reserve Program (WRP) FSA – CRP program US F&W – Landowner Incentive Program IDNR/SWCD – CREP program IDNR – SWG program IDNR – Special Wildlife Funds Grants	WRP provides funding to purchase easements on properties with wetland resources– multiple/stringent eligibility requirements.  NRCS, FSA, and SWCD programs provide a minimum of 60% cost-share, however, some special programs and practices can provide up to 90%. FSA, CREP and some NRCS programs also provide annual rental payments for taking ground out of production.
Livestock management, including fencing, stream crossings, pasture management, watering systems etc.	IEPA – 319 program NRCS – EQIP program IDNR – Forestry Development Act funding (FLEP)	FLEP is applicable to livestock fencing for woodlands only  EQIP typically provides 60% cost-share
Urban non-point pollution and runoff reduction BMPs; Stormwater detention and retention basin water quality retrofits; Stormwater green infrastructure	IEPA – 319 program Illinois Green Infrastructure Grant program (IGIG)	IEPA 319 - Competitive grant program requires 40% state/local match and offers 60% cost share  IGIG program is directed to Municipal Separate Storm Sewer System (MS4) or Combined Sewer Overflow (CSO) areas and provides up to 85% cost-share assistance for installing best management practices  In special circumstances EQIP may provide cost share for retention structures but often cost share rates are less than 60%

*IEPA 319 program is a competitive grant program with applications accepted annually (August 1<sup>st</sup> deadline); focus is water quality; funding prioritized to “impaired waters” and in those areas with watershed plans in place; multiple BMP applications desirable; 40% non-federal match required; Applicants are generally not-for-profit organizations/watershed groups or entities acting on behalf of private landowners*

*FSA/USDA/SWCD programs available on agricultural ground; require landowner cost-share (varies depending on program) and in most cases cropping history; continuous sign-up available for some programs; applicants must contact local FSA/NRCS/SWCD offices; applicants are individual landowners.*

## 6.6 WATERSHED MONITORING PLAN

The purpose of the monitoring plan for the North Mill Creek/Dutch Gap Watershed is to assess the overall implementation success of best management practices and other plan recommendations.

This can be accomplished by conducting the following actions:

1. Track implementation of management measures in the watershed
2. Estimate effectiveness of management measures
3. Continued periodic water quality monitoring from facilities, lakes and streams

Tracking the implementation of plan recommendations can be used to address the following monitoring goals:

- ✚ Determine the extent to which plan recommendations and practices have been implemented over time compared to action needed to meet water quality targets
- ✚ Establish a baseline from which decisions can be made regarding the need for additional incentives for implementation efforts
- ✚ Measure the extent of voluntary implementation efforts

The need for a consistent on-going water quality monitoring plan is identified in Chapter 4. This section includes a proposed monitoring plan and also focuses on organizational monitoring or monitoring of project implementation.

### WATER QUALITY MONITORING PLAN

Monitoring environmental criteria is the most effective way to measure progress toward meeting water quality goals. The watershed plan committee specifically developed a water quality goal with associated objectives during the development of goals and objectives for the plan (Chapter 2). Indicators are identified for each objective to ascertain whether the water quality objectives are being met. Specific values can be set as a target for each indicator to represent the desired conditions that will meet the water quality objective. Targets can be based on water quality criteria, on data analysis, reference conditions, literature values, or expert examination of water quality conditions to identify values representative of conditions that support “Designated Uses” (IEPA 2005) and biological integrity/quality. Evaluation of the progress towards meeting targets indicates whether implemented BMPs are effective. If implemented BMPs are determined to be ineffective, the implementation approach should be reconsidered or changed altogether. Table 6-10 includes specific indicator and target values that may be used to meet the objectives related to the water quality goal developed for this plan.

**Table 6-10: Indicators and targets to meet water quality goal & objectives.**

Goal 1	Water Quality Indicator and Target Value
Improve and protect water quality (physical, biological, and chemical health), eliminate impairments and non-point source pollution, and implement land development	Water bodies are not impaired (fully support designated uses) and future pollution is prevented, have healthy lakes, streams, and wetlands No watershed “waters” are listed as impaired.

and management practices to prevent pollution.	
<b>Objective</b>	<b>Water Quality Indicator and Target Value</b>
<p>1.A Reduce the quantity of road salt (sodium chloride) needed for safe and cost effective winter maintenance to reverse the current trend of rising chloride levels in lakes.</p> <p>Indicators: Salt tonnage/road mile Chloride trends in lakes Education results</p>	<p>Chloride (road salt): less than 500 mg/l (based on state standard) Macroinvertebrate Biotic Index (MBI): Less than 7.5 Index of Biotic Integrity: Greater than 31 Education: All communities in the watershed are aware of best management application timing, methods and rates and of de-icing alternatives to road salt.</p>
<p>1.B Retrofit single purpose detention basins and other stormwater management structures to provide water quality benefits.</p> <p>Indicator: Number of detention basins retrofitted.</p>	<p>Stormwater leaving stormwater management structures meets IEPA water quality standards (see IEPA water quality standards below) General Use standard: Temperature: Less than 90 degrees F (based on IEPA standards) pH: Between 6.5 and 9 (based on IEPA standards) Dissolved Oxygen: No less than 6.0 mg/L (based on IEPA standard) Macroinvertebrate Biotic Index (MBI): Less than 7.5 Index of Biotic Integrity: Greater than 31 Chemical Water Quality Standards: See IEPA water quality standards in Table 40. Qualitative Habitat Evaluation Index (QHEI): Greater than 60</p>
<p>1.C Reduce/eliminate the disposal of pharmaceuticals into toilets and drains by providing a feasible collection system.</p> <p>Indicators: Number of collection sites for pharmaceuticals Measured quantity of pharmaceuticals collected.</p>	<p>No detection of pharmaceuticals in water quality monitoring.</p>
<p>1.D Watershed municipalities and counties pass ordinances banning the use of fertilizers with phosphorus unless a soil test indicates it is needed.</p> <p>Indicator: Number of municipalities and counties that have adopted a phosphorus ban.</p>	<p>Meet the water quality standard established by the state for phosphorus. (Illinois standard is 0.05 mg/L for phosphorus in lakes.)</p>

<p>1.E Maintain, expand and restore high quality riparian buffers where needed along and around streams, lakes and wetlands to protect/improve water quality and biological health of waters.</p> <p>Indicator: Total linear feet or area of buffer.</p>	<p>Will meet the chemical, biological, and physical water quality standards established by the state.</p>
<p>1.F Reduce pollution caused by dissolved and suspended solids and sediment accumulation in surface waters and wetlands by:</p> <ul style="list-style-type: none"> <li>▪ reducing erosion by stabilizing and buffering erodible soils,</li> <li>▪ stabilizing eroding shorelines and streambanks, and</li> <li>▪ preventing land development-related erosion using construction and post-construction best management practices.</li> </ul> <p>Indicators:  Area of erodible soils stabilized and buffered.  Total linear feet of shoreline and streambanks stabilized.  Ordinance/development standards revised as needed.  Number of erosion/sediment control violations.</p>	<p>Total Suspended Solids: Maximum of 750 ppm (based on state water quality standards)  Turbidity: Less than 20 Nephelometric Turbidity Units (based on literature values)</p>
<p>1.G Keep manure storage and spreading out of streams, wetlands and floodplains.</p> <p>Indicator: Track reported violations</p>	<p>Stream meets state water quality standards</p>

<p>1.H Reform permitting requirements, provide incentives/cost share program, and promote pollution and stormwater runoff reduction programs (such as Conservation @Home) to result in retrofitting/implementing best management practices that reduce pollution and infiltrate stormwater.</p> <p>Indicators:  Number of program participants.  Money spent on incentives.  Number of communities that revise permitting requirements.</p>	<p>Policy/permit requirements prevent water quality from worsening.</p>
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## WATER QUALITY AND BMP EFFECTIVENESS MONITORING

Many local resources agencies and municipalities track program successes and implementation to satisfy internal requirements. For example, The US Department of Agriculture and local Soil and Water Conservation Districts monitor program successes and report at the county level. Tracking implementation at the watershed level is rarely conducted unless local agencies are 1) willing to provide the information and 2) a formal request is made from local stakeholders. This only occurs if a watershed group or interested entity is active in the area.

In the North Mill Creek/Dutch Gap Watershed, the local watershed committee could work with the appropriate parties to voluntarily establish a monitoring program to track plan implementation. This may include a periodic report that summarizes best management practices currently in place and the work stakeholders have completed to implement best practices. This report would form the baseline from which to measure success and monitor plan implementation.

The following sections provide specific direction for effective organizational monitoring, including a “score card” system that stakeholders can refer to when trying to determine next steps or actions and for tracking success or identifying areas of the plan that need to be re-visited.

As funding allows, actual environmental monitoring data should be collected on a 3-5 year cycle to assess the performance of BMPs for meeting water quality targets and ultimately milestones and project goals. (Note: Lakes will be monitored on a rotating cycle every 5 years by the LCHD LMU. This assessment can be used to determine the overall effectiveness of multiple BMPs on water quality). It is usually necessary to collect and analyze water quality, biological samples, or habitat quality data to determine a BMP’s effectiveness. This can be accomplished by either measuring the concentration of a particular parameter in the influent and effluent for the BMP or measuring baseline and post implementation values. BMP effectiveness monitoring can be performed using

several methods. BMP monitoring should be conducted by environmental consultants or community staff trained in various BMP monitoring methods. A desired outcome may be an:

- observed pollutant removal efficiency,
- increased infiltration capability,
- increase in other physical parameters such habitat value as measured by the ***Qualitative Habitat Evaluation Index (QHEI)***. QHEI is a quantitative assessment of physical characteristics of a sampled stream similar to Index of Biotic Integrity (IBI) biological data for fish. QHEI represents a measure of instream geography. By combining evaluations of QHEI and IBI, researchers can gain a well-rounded perspective of both the physical and biological conditions of a particular stream site. This comprehensive assessment is critical for evaluating disturbance and land use practices. positive changes in stream biological indexes such as ***Index of Biotic Integrity (IBI)*** and ***Macroinvertebrate Biotic Index (MBI)***.

**Qualitative Habitat Evaluation Index (QHEI)** The qualitative habitat evaluation index (QHEI) is a quantitative assessment of physical characteristics of a sampled stream. By combining evaluations of QHEI and IBI, scientists can gain a perspective of both the physical and biological conditions of a particular stream site. This comprehensive assessment is critical for evaluating disturbance and land use practices.

**Index of Biotic Integrity (IBI)** The IBI is based on fish surveys with the rating dependent of the abundance and the composition of fish species in a stream. Fish communities are useful for assessing stream quality because fish represent the upper level of the aquatic food chain and therefore reflect conditions in the lower levels.

**Macroinvertebrate Biotic Index (MBI)** The MBI is designed to evaluate water quality by measuring the types of benthic macroinvertebrates found in a stream. These bottom dwelling creatures can tolerate different levels of pollution and are therefore a good indicator of water quality.

In addition to defining the pollutant removal efficiency of BMPs, it is important to monitor the hydraulic performance and morphological changes resulting from implementation of the BMP. Urbanized areas typically increase the total volume and rate of stormwater runoff that enters receiving streams and storm sewer systems. This causes changes in both hydrology and morphology. A goal of BMPs is usually to attenuate these flow and morphological impacts. Supplemental morphological measurements of the stream channel such as bank height, channel width, and other parameters should be conducted prior to BMP implementation and evaluated yearly after implementation or after significant rain events.

One potential problem with in-stream indicators is the issue of isolating dependent variables. There are likely many variables influencing the quality of the habitat, so making conclusions with regard to one specific constituent should be done with caution. It should be noted however that the indicators mentioned are excellent for assessing overall changes in a watershed's condition due to BMP implementation and changes in management measures but don't necessarily identify which BMPs are most effective.

Water quality monitoring should also occur in different locations (not specific to individual BMPs) in the watershed to help document the sources of pollutants and reduction of pollutants following multiple BMP implementation. These locations include lakes and stream branches. Appendix N (Water Quality Monitoring and Stream Maintenance Methodology) contains specific recommended procedures by which physical, chemical, and biological monitoring indicators should be collected in the watershed. (Note: physical monitoring includes stream channel maintenance while monitoring. Recommendations related to stream channel maintenance are also included in Appendix N). The following section indicates where water quality monitoring should be implemented, by whom, and how often it should be conducted. Figure 6-2 and Table 6-11 depict existing and recommended locations within the North Mill Creek-Dutch Gap Canal watershed where water quality data should be collected and monitored in the future. Figure 6-2 does not depict recommended sampling locations related to specific BMPs. This monitoring will come later as projects are implemented.

The water quality monitoring recommendations include:

- Lake County Health Department (LCHD) continues to sample lakes in the watershed: Deer Lake, Redwing Slough, Waterford Lake, Potomac Lake, White Lake, Timber Lake, Crooked Lake, Hastings Lake, Lake Linden, and McDonald Lakes, on a 5 year cycle. Ideally, studies for each should be conducted in the same calendar year for comparison purposes.
- Stream water quality should be cooperatively monitored continuously on a cycle of every 5 years by the LCHD, Village of Lindenhurst, Grubb School Drainage District and WDNR. Monitoring should be coordinated to use the same protocol and schedule.
- WDNR or local/regional agency or lake association monitors Lakes in Wisconsin (George, Paasch, Benet, Mud and Shangri-La)
- School Environmental Programs or other local organization establish a stream monitoring program that includes chemical baseline/low flow and post rain event monitoring at 4 locations conducted annually. All four samples should be collected on the same day. Post rain event monitoring should follow the same major rain event (greater than 1.5 inches).
- IL EPA and IDNR Intensive Basin Survey Program continue to collect fish, macroinvertebrate, and water quality data every 5 years. WDNR should establish a similar schedule of monitoring for the Dutch Gap Canal.
- North Mill Creek-Dutch Gap Canal Planning Committee (NMCPC) review *NPDES* and *NPDES II* Permit records for watershed *MS4* communities and the wastewater treatment plant on Hastings Creek and at Rainbow Manor Mobile Home Park every year to see if any reports have been filed for exceeding effluent limits.

**NPDES** is an acronym for the National Pollutant Discharge Elimination System, which is a program for permitting wastewater, industrial and stormwater discharges to waterways.

**NPDES II** refers to the permit program that applies to stormwater discharges from communities in urban areas.

**MS4** is the abbreviation for communities with municipal separate storm sewer systems.

- The entities responsible for funding a best management practice (BMP) design and implementation provide funding/staff support to monitor pre and post water quality conditions. The watershed plan committee or council with assistance from IL EPA and WDNR should look for an efficient/cost-effective system to evaluate BMP effectiveness.

**Figure 6-2: Existing and Recommended Water Quality Sampling Sites**

## EVALUATING PERFORMANCE OF PLAN IMPLEMENTATION

This plan is meant to be a flexible tool to achieve water quality improvements within the North Mill Creek-Dutch Gap Watershed. Local stakeholders and professional staff should identify how they will implement the plan (watershed committee/council, subcommittees, reporting structure, meeting schedule, etc.). The Watershed Plan will be evaluated by assessing the progress made on each of the seven goals (Chapter 2). The following recommendations are included to help track progress and achieve the goals with plan implementation.

1. In the early stages of the plan implementation process, watershed stakeholders should establish a sustainable and active watershed committee that will meet at least quarterly to discuss watershed progress. During the monitoring process, the committee or council should discuss the results of monitoring, assess each milestone using grade classifications and adapt the watershed management plan and their actions accordingly.
2. The plan should be evaluated every five (5) years to assess the progress made as well as to revise the plan, if appropriate, based on the progress achieved. The plan should also have a comprehensive review every 15-20 years. Amendments and changes may be made more frequently as laws change or new information becomes available that will assist in providing a better outlook for the watershed. As goals are accomplished and additional information is gathered, efforts may need to be shifted to watershed issues of higher priority.
3. In addition to the official five (5) year evaluation and update, the local stakeholders and professional staff will have a key role in evaluating implementation progress on an annual basis. The watershed committee should ask each major project partner in the watershed to provide a brief annual update on project implementation. This report can be developed by using the “score card” system presented in section 6-3 and Appendix Q. They can review the status of milestones recommended in the monitoring plan annually and then identify the top priority concerns and actions for the following year’s focus.
4. Other opportunities for evaluating the status of plan implementation include the completion of quarterly project reports or group meeting minutes. Since this plan is a flexible tool tracking changes/modifications are anticipated based on usability and changes in priority throughout implementation.

## MILESTONES AND PLAN PERFORMANCE

Interim measurable milestones are directly tied to the watershed performance indicators. Milestones are essential when determining if management measures are being implemented and how effective they are at achieving plan goals and objectives over given time periods. This allows for periodic plan updates and changes that can be made if milestones are not being met.

Watersheds are complex systems with varying degrees of interaction and interconnection between physical, chemical, biological, hydrological, habitat and social characteristics. “Indicators” that reflect these characteristics may be used as a measure of watershed health. Goals and objectives in the watershed plan determine which indicators should be monitored to assess the success of the watershed plan. Physical indicators could include amount of sediment entering a stream reach or presence or lack of adequate stream buffers, whereas chemical and biological indicators could include nitrogen loads or macro-invertebrate health. Social indicators can be measured using demographic data or for example the number of landowners adopting conservation practices. North Mill Creek-Dutch Gap watershed score cards were developed for each of the seven (7) plan goals and are located in Appendix Q. Score card milestones are based on short term (1-5 years), medium term (6-10 years) and long term (10+ years) objectives. Terms were used to help evaluate progress toward meeting goals and objectives. The milestones and “score cards” can be used to identify and track plan implementation to ensure that progress is being made towards achieving the plan goals and to make corrections as necessary.

## MONITORING SCORE CARD AND MILESTONES

Detailed monitoring “score card” examples for each of the seven goals are presented in Appendix Q. The score cards are based on the objectives, recommendations and indicators of success for each goal, which are revisited in this section. This score card system will serve as the organizational monitoring plan and a tool for tracking progress toward meeting plan goals and specific recommendations/action items. Realistic short term (1-5 yr), medium (6-10 yr) and long term (10+ yr) milestones and indicators are included in the score cards (Appendix Q). Each milestone is a specific action recommendation and is intended to fulfill plan objectives if executed. Indicators are to be used as measurement tools when determining if each milestone has/has not been met. If the measurement of each indicator becomes problematic, the watershed committee should revisit and make adjustments where needed. It is up to local stakeholders to determine the priority of each milestone based on their ability to follow through with them; Chapter 5.0 provides additional direction on recommended action priorities.

Milestones in the score cards can be graded based on the following criteria:

- A = Met or exceeded milestone(s);
- B = Milestone(s) 75% achieved;
- C = Milestone(s) 50% achieved;
- D = Milestone(s) 25% achieved;
- F = Milestone(s) not achieved

**Figure 6-3: Score Card**

Objective ID	Indicator		Milestone	Grade
<b>Goal 1 Improve and Protect Water Quality:</b> <i>Improve and protect water quality (physical, biological, and chemical health), eliminate impairments and non-point source pollution, and implement land development and management practices to prevent pollution.</i>				
1b	Number of detention basins retrofitted	S	10 basins	
		M	15 basins	
		L	15 basins	
1e	Total linear feet of buffer installed	S	5,000 feet	
		M	5,000 feet	
		L	5,000 feet	
1f	Area of erodible soils stabilized and buffered	S	150 acres	
		M	150 acres	
		L	200 acres	
1f	Percent of highly erodible lake shoreline and streambanks stabilized	S	5%	
		M	10%	
		L	25%	
<b>Goal 2 Protect and Enhance Natural Resources:</b> <i>Protect, enhance and restore natural resources (soil, water, plant communities, and fish and wildlife) through the expansion of green infrastructure reserves and environmental corridors, maintaining hydrology and buffers for high quality areas, and employing good natural resource management practices.</i>				
2a	Acres of conservation easements	S	500 acres	
		M	800 acres	
		L	1,200 acres	
2b	Area or length of natural resource buffer provided on new development sites	S	2,000 feet	
		M	5,000 feet	
		L	8,000 feet	
2f	Acres managed for invasive species control	S	1,000 acres	
		M	1,500 acres	
		L	3,000 acres	
<b>Goal 3 Reduce Flooding:</b> <i>Prevent flood damage from worsening in the watershed and reduce existing flood damage to structures, infrastructure and the increasing crop loss due to flooding.</i>				
3a	Reduction in flooding reports from flood problem areas	S	5	
		M	5 to 10	
		L	No Reports	
3a	Acre-feet of new live storage	S	500 acre-feet	
		M	500 acre-feet	
		L	500 acre-feet	
3d	Acres of floodplain land acquired	S	100 acres	
		M	200 acres	
		L	400 acres	
<b>Goal 4 Green Infrastructure:</b> <i>Use a system of both site level stormwater green infrastructure practices and regional greenways and trails to protect and connect natural resource areas and to provide recreational opportunities.</i>				
4c	Length of roadway retrofitted or designed with BMPs	S	2,000 Feet	
		M	2,000 Feet	
		L	2,500 Feet	
4d	Number of urban stormwater BMP projects implemented on existing and new developments	S	5 Developments	
		M	8 Developments	
		L	80 % of all new and existing developments	
4d	Stormwater runoff volume reduction from implementing BMPs on existing and new developments	S	20%	
		M	35%	
		L	35%	

Objective ID	Indicator		Milestone	Grade
<b>Goal 5 Development and Design Guidance:</b> <i>Guide new development design and practices to protect or enhance existing water resources, natural resources and open space (working and natural lands).</i>				
5a	Number of new developments with applied green infrastructure standards	S	5 developments	
		M	8 developments	
		L	80 % of all new and existing developments	
5e	Number of rain gardens installed	S	100	
		M	300	
		L	500	
5e	New developments that reduce centralized detention and replace with decentralized wetlands and rain gardens (%)	S	2 developments	
		M	5 developments	
		L	50 % of all new developments	
<b>Goal 6 Education and Outreach:</b> <i>Provide watershed stakeholder participation with knowledge, skills and motivation needed to implement the watershed plan. Watershed stakeholders include (but are not limited to) residents, property owners, property owner associations, government agencies and jurisdictions, and developers.</i>				
6a	Number of workshops for proper maintenance of detention basins and stormwater features	S	10	
		M	2 annually	
		L	2 annually	
6f	Number of acres enrolled in USDA or NRCS program	S	1,500 acres (primarily nutrient management)	
		M	2,000 acres (primarily nutrient management)	
		L	2,000 acres (primarily nutrient management)	
6k	Road and parking lot de-icing BMPs; propose salt application rate standards and reach out to entities and companies that apply salt or pay to have salt applied	S	20 companies	
		M	20 companies	
		L	All companies and entities	
<b>Goal 7 Agriculture:</b> <i>Encourage watershed stakeholder participation in farmland preservation programs and implementation of sustainable agricultural practices that meet the watershed goals.</i>				
7c	Conserve soils with best farming practices; acres of no till or cover crop application	S	Minimum 2,000 acres	
		M	Minimum 2,000 acres	
		L	75% of all current agricultural ground	
7d	Farms and equestrian facilities establish manure and nutrient management programs; number of operations with plans; acres of land with plans; number of inspections	S	75 acres	
		M	75 acres	
		L	90% of all equestrian facilities	
7f	Length or area of agricultural waterways and buffers installed to reduce runoff and pollutant loading	S	5,000 feet	
		M	5,000 feet	
		L	5,000 feet	

## IMPLEMENTATION SCHEDULE

Implementing best management practices should occur immediately where willing landowners or other interested stakeholders have been identified. A general implementation schedule is presented below; however, more detailed implementation time frames are included in chapter 5 for each action item and in the score card systems in Appendix Q.

**Table 6-11: General Implementation Schedule**

General 10 Year Implementation Schedule										
Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Form watershed committee or council	X									
Research funding and technical assistance to implement a series of recommendations identified in the action plan	X	X	X	X						
Submit grant applications, secure additional funding sources for plan implementation	X	X	X	X	X	X	X	X		
Coordinate available programs; policy changes and other local initiatives and those programs where private landowners are responsible for signing up (CRP, EQIP, etc.)	X	X	X	X	X	X	X	X	X	
Project planning, site surveys and project design and budget development		X	X	X	X	X	X	X	X	
Prioritizing and incorporating the recommendations in the watershed plan into existing programs, activities and budgets	X	X	X	X	X	X	X	X	X	X
Implementation and construction of projects			X	X	X	X	X	X	X	X
Report and monitor progress	X	X	X	X	X	X	X	X	X	X
Communicate success stories		X	X	X	X	X	X	X	X	X
Evaluate accomplishments			X			X				X