

plan implementation and evaluation

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## 6 - plan implementation and evaluation

This chapter identifies a strategy for moving from planning to implementation of the action plan recommendations. 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 also relates some more technical details about the expected results of putting action recommendations in place and the cost of plan implementation. It also presents a plan for monitoring and evaluating plan implementation as a way to determine progress towards watershed goals and objectives.

### 6.1 PLAN IMPLEMENTATION STRATEGY

The Dead River watershed includes many stakeholders (see Table 6.1) 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 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. This Planning Committee is encouraged to function as

the stakeholder forum for the watershed until a separate organization or committee can be created. The Planning Committee can continue to hold regular meetings, 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 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, such as the repair or stabilization of a municipal stormwater discharge point, can be added to municipal or drainage district capital improvement and maintenance plans, budgets, and schedules. 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 for issues, such as streambank stabilization, that span multiple jurisdictions or properties. The establishment of a green infrastructure corridor along the stream channel, or the preservation and restoration of

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a large wetland complex are examples of projects that may 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, such as the Lake County 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 how current development practices impact watershed resources and how they can be improved, followed by discussion and debate about possible modifications, and finally adopting policies and standards that will have the desired outcome.

Clearly there is much to be done and there are many parties to coordinate. However, a dedicated and determined effort will benefit all watershed stakeholders and future generations of residents and visitors.

### 6.2 IMPAIRMENT REDUCTION TARGETS AND PROJECTIONS

In order to meet the requirements for a watershed-based plan, the plan must pay particular attention to water quality pollutants and impairments and measures for reducing the impairment. The high priority water quality pollutants for the Dead River Watershed include low dissolved oxygen, Total Suspended Solids / sedimentation, nutrients (phosphorous), aquatic life toxicity (total dissolved solids, chlorides, and salinity), and bacterial contamination (fecal coliform). Additional impairments addressed by the plan include degraded watershed aquatic habitat, loss and degradation of wetlands, natural area invasion by exotic species, impacted or lack of stream buffers and riparian zones, and food flows and damages. These are the most important impairments needing to be addressed, for the reasons provided below.

Low dissolved oxygen is problematic because it creates aquatic habitat conditions that only some fish and aquatic organisms can tolerate, causing the diversity of species to be reduced, which is an indicator of an impaired system. Restoring dissolved oxygen levels to levels that are consistently above 5.0 mg/L (the Illinois standard) will help recreate high quality aquatic habitat conditions.

Total Suspended Solids / sedimentation impair watershed resources when they settle out in streambeds, wetlands, and natural areas making them uninhabitable by some sensitive plant and animal species. The primary impact of high suspended solids concentrations in streams occurs when these solids settle in depositional areas of the stream system and cover the more desirable gravel substrates. Excessive levels of particulate material also create difficult conditions for gill breathing fish and some of their food sources, including macroinvertebrate organisms. In Illinois Beach State Park, sediment is obstructing flow and settling out in the park and degrading the quality of habitat. Reducing the flow of sediment into the stream channel, wetlands, and natural areas will help to repair these degraded systems by preventing further sedimentation and beginning the process of natural recovery.

Nutrient loads (phosphorous) cause algae blooms that impair the habitat quality of water resources and block light from reaching desirable aquatic plants. When the algae dies, the decomposition process can deplete dissolved

**Table 6.1 Implementation Partners**

Acronym	Responsible Party	General Responsibility
BPDD	Beach Park Drainage District	Drainage system management and maintenance.
CMAA	Chicago Metropolitan Agency for Planning	Technical and planning assistance, training, and funding assistance.
CBL	Corporate and Business Landowners	Grounds management and maintenance.
DH	Developers & Homebuilders	Land development, stormwater management system design and construction.
FEMA	Federal Emergency Management Agency	National Flood Insurance Program, floodplain mapping and enforcement, and mitigation funding.
GC	Golf Courses	Grounds management and maintenance.
IDNR	Illinois Department of Natural Resources	Natural area preservation and management, research, technical and financial assistance.
CMP	IDNR Coastal Management Program	Preserve and manage Lake Michigan coastal resources (if established).
IDOT	Illinois Department of Transportation	Road and highway planning, construction, and maintenance.
IEMA	Illinois Emergency Management Agency	Flood and disaster planning, emergency response, and hazard mitigation.
IEPA	Illinois Environmental Protection Agency	Water resource monitoring, pollution regulation and control, project funding.
LC	Lake County	Land use planning for unincorporated areas, natural resources, drainage system management.
LCPD	Lake County Forest Preserve District	Manage and maintain green infrastructure, natural areas, and open space.
LCHD	Lake County Health Department	Monitor, manage, and provide technical support for water resources.
LCSMC	Lake County Stormwater Management Commission	Technical and financial assistance for flooding, watershed planning, and water quality.
LMEP	Lake Michigan Ecosystem Partnership	Watershed advocacy and education, technical and financial assistance.
LMGLO	Lake Michigan / Great Lakes Organizations	Great Lakes and Lake Michigan water resource management, education, and outreach.
M	Municipalities (all departments)	Land use and development, technical and financial support, and drainage system management.
NGRREC	National Great Rivers Research & Education Center	Stream, lake, wetland, and coastal data collection, watershed education and outreach.
NRCS / SWCD	Natural Resources Conservation Service / Soil and Water Conservation Districts	Provide natural resource management technical and financial assistance.
PD	Parks and Recreation Districts	Management and maintenance of parks and open space.
PRL / RL	Private Residential / Riparian Landowners	Land management and maintenance including stream channels and riparian corridors.
NSSD	North Shore Sanitary District	Maintain sanitary sewer system infrastructure, stream monitoring.
T	Townships	Road maintenance and support for watershed improvement projects.
USACE	U.S. Army Corps of Engineers	Wetland protection and regulation, wetland restoration funding.
USDA	U.S. Department of Agriculture	Farmland and natural resource technical and financial assistance.
USEPA	U.S. Environmental Protection Agency	Lake Michigan and Great Lakes management and restoration.
USFWS	U.S. Fish and Wildlife Service	Threatened and endangered species, technical and funding assistance for habitat restoration.
CAG	Waukegan Harbor Citizens Advisory Group	Organize and coordinate activities related to Waukegan Harbor contamination and cleanup.
WPC	Watershed Planning Committee	Coordinate watershed plan implementation, education and outreach.

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oxygen levels in the water, impairing the habitat quality for aquatic wildlife. Reducing the flow of phosphorous to watershed water resources can help to restore high quality aquatic habitat conditions necessary for a healthy diversity of species.

Total Dissolved Solids (TDS) include salt (sodium chloride) used as road deicing material. Road salt can occur at toxic levels in the water column at intermittent times when the weather conditions demand its use. Chlorides are not removed by best management practices, does not decompose or readily change form, and can cause spikes in the water column, typically detected as increased conductivity, making the water uninhabitable by certain aquatic plants and animals. Reducing chloride loading to the stream will help maintain a consistent quality of water that supports healthy aquatic habitat.

Lake Michigan beaches high fecal contamination / pathogens that causes beach closures due to the potential threat to human health that pathogens present. Reducing this contamination will reduce beach closures and help protect human health.

Watershed habitat has been degraded and altered due to a number of causes. The lack of aquatic habitat characteristics, including pools and riffles and healthy substrates, means that aquatic species do not have sufficient cover and sources of food. Other habitat alterations that degrade conditions for aquatic organisms include streambank erosion and barriers to the movement of fish upstream and downstream, such as debris buildup or inconsistent connections to Lake Michigan. Alterations to watershed hydrology creating flashy conditions, also impairs habitat because low flow conditions can mean that there is not enough water for aquatic species to live, and that dissolved oxygen levels fall below healthy levels due to the lack of flow and aeration. Restoring natural watershed hydrology, habitat characteristics, and streambank stability are important for recreating habitat conditions that support a healthy diversity of aquatic organisms.

Watershed wetlands have been drained / filled, and degraded, which impairs their ability to absorb and filter stormwater, to improve water quality, and to support wildlife that depend on high quality wetlands. Restoring the remaining wetlands and recreating some former wetlands, is important to replace water storage and retention areas and to improve water quality by restoring their water filtering capacity.

Watershed wetlands and natural areas have been invaded by exotic and invasive species, which crowd out native species and degrade habitat necessary to support threatened and endangered species. Removal and control of exotic and invasive species, including the reintroduction of natural management mechanisms such as prescribed fire, is important to restore the quality and function of watershed wetlands and natural areas.

Natural stream buffers and riparian zones have been removed, converted to turf grass or other uses, or otherwise degraded to a state that does not help filter runoff and improve water quality, stabilize streambanks, nor support a healthy stream system habitat.

Increased flood flows and flood damages are the result of increased rate and volume of stormwater runoff, the loss of natural drainage and water retention areas such as wetlands and depressional storage, and development within or adjacent to the floodplain. Restoring watershed hydrology, reducing the rate and volume of stormwater runoff, and restoration of depressional and wetland storage can help reduce the risk of flooding of structures in the future.

For these impairments, the intent of the action plan recommendations is to reduce the impairment to an acceptable level. The 'acceptable level' for some pollutants is set by the Illinois Pollution Control Board and Illinois Environmental Protection Agency. However, Illinois standards only exist for one of these impairments, dissolved oxygen, which is set at a concentration of 5.0 mg/L for most conditions. For other impairments, reduction targets are set according to professional opinion.

Setting impairment reduction targets and estimating the improvement expected by implementing plan recommendations are important for assessing the effectiveness of watershed plan recommendations for determining whether watershed impairments are being addressed. Targets and reduction estimates also satisfy one of the nine required watershed-based plan elements established by the US Environmental Protection Agency.

## USEPA watershed-based plan element #2: water quality improvement expected from implementing plan recommendations (also see Appendix K).

**Table 6.2 Three Point Scale for Estimating the Ability of a Best Management Practice to Meet a Reduction Target**

Rank	Description of Potential Effectiveness	Range of Effectiveness
3	Fully achieves target	67-100%
2	Partially achieves target	34-66%
1	Minimally achieves target	0-33%

**Table 6.3 Watershed Impairment Reduction Targets and Projections**

Impairment	Cause	Degree / Basis of Impairment	Reduction Target	Reduction Projection	Is the target being met?
Water Quality	Total suspended solids / sedimentation	3,208,000 lb/yr of TSS loading (based on non-point source pollution loading model)	75%	7,040,928 lb/yr reduction in TSS loading	Yes
Water Quality	Low dissolved oxygen	8% of dissolved oxygen samples below 5.0 mg/L	50%	30-90% reduction in samples below 5.0 mg/L	Yes
Water Quality	Nutrients (phosphorous)	Observed and reported algae blooms	50%	112,300 lb/yr phosphorous	Unknown
Water Quality	Aquatic life toxicity (salinity / chlorides / total dissolved solids)	188 mg/L median chloride concentrations in water quality samples	25%	Estimate unavailable	Unknown
Water Quality	Fecal coliform (Lake Michigan beaches)	72 beach closures per year on average	50%	0-33% reduction in fecal coliform load	No
Habitat degradation and alteration	Lack of habitat characteristics	39% of stream reaches with fair or poor habitat conditions	25%	0-100% reduction in # of reaches with fair or poor instream habitat	Yes
Habitat degradation and alteration	Hydrologic disturbance / flow alterations / creek obstructions	Velocity variability of 0.0 - 4.06 f/s and flow variability of 0.2 - 688 cfs (2006-2007 data)	50%	0-66% reduction in flow variability	Yes
Habitat degradation and alteration	Draining, filling, and degradation of wetlands	1077 wetland acres needing restoration	90%	66-100% of wetlands restored	Yes
Habitat degradation and alteration	Exotic and invasive species	Observed and reported	25%	0-100%	Yes
Habitat degradation and alteration	Loss / reduction / degradation of natural buffer	43% of stream reaches with fair or poor riparian habitat	75%	0-100% reduction in # of reaches with fair or poor riparian habitat	Yes
Habitat degradation and alteration	Streamside alterations	43% of stream reaches with fair or poor riparian habitat	75%	0-66% reduction in # of reaches with fair or poor riparian habitat	No
Increased flood flows	Increased rate and volume of runoff	Velocity variability of 0.0 - 4.06 f/s and flow variability of 0.2 - 688 cfs (2006-2007 data)	75%	0-66% reduction in flow variability	No
Increased flood flows	Loss / drainage of depressional storage	Loss of 754 acres (70%) of wetlands	90%	0-100% wetlands restored / depressional areas preserved	Yes
Flood damages	Past encroachments on floodplain	292 structures in the floodplain	100%	0-66% of structures protected from flood damage	No

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### 6.2.1 IMPAIRMENT REDUCTION TARGETS

Impairment Reduction Targets are indicated in two ways and are based on professional opinion of feasibility. First, Impairment Reduction Targets (shown in Table 6.3) indicate the potential reduction of the indicated impairment based on full (100%) implementation of the recommended action. For example, if all of the recommended actions intended to address sediment / Total Suspended Solids were to be fully implemented, then 75% of the sediment / Total Suspended Solids impairment, or problem, can reasonably be expected to be addressed. In other words, even under the best conditions, the entire sediment / Total Suspended Solids problem could not be addressed because there will always be some erosion and runoff of sediment from the urban landscape into the stream. Nonetheless, a 75% reduction in Total Suspended Solids / sediment loading would be a successful achievement for watershed improvement.

The second way that impairment reduction targets are indicated is displayed in the table included in Appendix K. Area Improvement Targets indicate the area that can reasonably be expected to be addressed by each of the recommended actions. For example, many of the wetland restoration recommendations have an Area Improvement Target of 75%, indicating that 75% of the wetland can reasonably be expected to be restored to a healthy condition. For wetlands, an improvement of 100% is considered unattainable given the hydrologic and stormwater issues of the watershed.

### 6.2.2 IMPAIRMENT REDUCTION PROJECTIONS

Impairment Reduction Projections are best estimates and/or ranges of impairment reduction that can be achieved for recommended actions for the quantities (e.g., acres, linear feet of stream) indicated in Appendix K. Impairment reduction estimates, whether indicated as quantities, as ranges of percentages, or as an estimated ability to meet reduction targets, are based on a variety of studies examining the potential effectiveness of different actions and best management practices. Tables of results from the various studies are also included in Appendix K.

As shown in Table 6.3, impairment reduction projections are expected to meet or exceed eight of the 14 impairment reduction targets. Four of the impairment reduction targets

are not expected to be adequately addressed by the recommendations. And, due to the lack of quantitative data, it is unknown whether the remaining two of the impairments will meet their reduction targets. Though the reduction targets may be difficult to meet for a number of the impairments, any and all reductions in impairment will improve watershed resources. In other words, every small effort and accomplishment helps.

### 6.3 PLAN IMPLEMENTATION COST ESTIMATE AND SCHEDULE

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. Table 6.4 summarizes the estimated amount of funding required for initial and ongoing implementation of the practices recommended in the action plan. Initial costs indicate cost for installation and/or establishment; annual costs indicate 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 Appendix L of the plan. 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.

Table 6.5 presents a summary of the plan implementation schedule. The number of short, medium, and long term actions are shown to give watershed plan implementors an idea of how many actions are recommended to be implemented in each of these time frames.

More detailed plan implementation cost and scheduling can be found in Appendix H Expanded Site Specific Action Plan and Appendix J Plan Implementation Cost Estimate. Potential funding sources for implementing plan recommendations are found in Appendix L.



USEPA watershed-based plan elements #4 and #6:  
technical and financial assistance needed to implement this plan, and plan  
implementation schedule  
(also see Appendices G, H and J).

**Table 6.4 Plan Implementation Cost Estimate**

SMU	Initial Cost	Ongoing Cost
1	\$21,718,055	\$3,455,321
2	\$3,040,925	\$167,575
3a	\$4,142,400	\$294,465
3b	\$9,657,725	\$708,730
3c	\$9,515,812	\$622,253
4	\$3,659,800	\$586,062
5	\$4,567,025	\$482,812
6	\$275,575	\$56,513
Total	\$56,577,317	\$6,373,732

**Table 6.5 Plan Implementation Schedule Summary**

Implementation Term	Number of Actions
Short	150
Short to Medium	103
Medium	9
Medium to Long	45
Short to Long	0
Long	18



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### 6.4 PLAN MONITORING AND EVALUATION

#### 6.4.1 MONITORING PLAN IMPLEMENTATION

Continued monitoring and analysis is critical for providing feedback on the progress of implementation of this watershed-based Plan. The implementation and effectiveness of the watershed plan and recommendations, and an assessment of whether plan goals are being achieved, can be measured through a process called 'monitoring'. Simply, monitoring is observing and tracking watershed conditions and indicators for positive or negative changes that may be attributed to the implementation of the plan. These indicators can then be compared with water quality monitoring data to determine whether there is a correlation between them. If no discernible correlation can be made, and if satisfactory progress is not being made towards watershed goals, the watershed implementation team should consider whether recommended strategies are having the desired effect or should be modified accordingly.

Recommendations that are physical or structural in nature, such as streambank stabilization or riparian buffers, can be assessed in terms of reduced pollutant loads discharged into the watershed, improved biological and habitat health, and the degree of change in stormwater runoff volume and flow. The effectiveness of non-structural recommendations, however, such as education, policies and regulations, and coordination, can be difficult to measure due to long feedback time. Changes in behavior following the implementation of non-structural recommendations can be assessed by gathering feedback through meetings with implementation partners and tools such as surveys and focus groups, as suggested in Table 6.6.

This monitoring strategy is intended to help track and measure the implementation of recommendations made in this plan using a variety of indicators that are monitored regularly, typically on an annual basis or every three years. Progress on overall plan implementation should be reviewed using the milestones and indicators every 5 years and the plan should be updated as needed.

The following monitoring plan includes a monitoring baseline, frequency of monitoring, short, medium, and long term milestones, responsible party, and mode of collection. There are also empty columns for implementers to track the number

of actions taken, location of implementation, and percentage complete. The empty cells of the table (number of actions, and location of implementation) are to be filled in by the parties responsible for monitoring as identified in the table. *Number of actions* is the actual data collected, for example, the concentration of phosphorous or the # of floodproofed structures in the floodplain. *Location of implementation* refers to geographical location, such as where streambanks or wetlands were restored. *Percent complete* is a measure of progress toward the goal itself, where 100% would indicate the complete achievement of a goal.

Since water quality is one of the primary goals of this plan, stream and lake water quality impairments should be monitored by regularly collecting and testing water samples, either manually or using constant monitoring equipment. A regular sampling strategy should be initiated and new data should be added to existing data so that trends can be tracked. An expanded water quality monitoring protocol is essential to better locate and identify the causes and sources of impairment that have been identified in this plan.

Some of the impairments also can be monitored visually and anecdotally by those living along the stream and those involved in stream monitoring activities such as RiverWatch (National Great Rivers Research & Education Center). Visual and anecdotal monitoring should be done regularly (weekly in summer months and monthly in winter months is recommended) by trained volunteers. Specifically, increases in nutrient loading may be identified by the increase or presence of algal blooms. Acute aquatic life toxicity may be identified visually by watching for fish kills or other kills of aquatic species such as insects or plant species. Strange smells, slicks, or sheens on the water may also indicate the discharge of a problem pollutant.

#### 6.4.2 EVALUATING PLAN PERFORMANCE

Watershed issues, opportunities, and conditions will change over time. This watershed plan should be evaluated and updated every five years to account for these changes. At each evaluation and update, completed projects can be removed from the plan and new projects should be added.

In addition to this 5-year update, plan implementation should be monitored annually by the Watershed Planning Committee or, if established, the watershed organization.

At the time of the annual evaluation, the committee should assess the list of priorities and identify the top priority actions for the following year.

As projects are implemented, they should be recorded using Table 6.6, which tracks the implementation of actions against the watershed plan goals and objectives as a means of monitoring watershed plan implementation.

### **6.4.3 QUALITY ASSURANCE PROJECT PLANS**

Watershed partners can apply for water quality monitoring funding through the Illinois Environmental Protection Agency's Clean Water Act Section 319 program. Monitoring that is funded by the IEPA requires the submission of a Quality Assurance Project Plan (QAPP), which describes the proposed monitoring strategy in detail. The QAPP helps to assure the IEPA that the data collected under its guidance and using its funding will be credible and of sufficient quality to be used in its reporting to the USEPA. Regardless of whether the watershed partners decide to apply for Section 319 funds to implement its monitoring component, the QAPP process is a valuable aid in the development of a sound water quality monitoring program. Quality monitoring guidance and information needed to produce a QAPP can be found at [www.epa.gov/quality](http://www.epa.gov/quality).

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Table 6.6 Monitoring Plan

Issue	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management
Goal	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.
Objective	1. Remediate detrimental stream channel conditions such as armoring, channelization, siltation, and lack of habitat characteristics with in-stream and channel-specific restoration enhancements such as re-meandering, regrading, bioengineering approaches to stabilization, and habitat structures (pools and riffles, boulders, root wads, etc.)	2. Remove or retrofit problem impoundments, dams, and weirs to support fish passage and migration and natural base flow.	3. Stabilize all moderately and severely eroded streambanks using BMPs.	4. Reduce the erosive capacity of storm sewer outfalls, drain tiles, and sump pump, roof, and footing drains being discharged into the stream channel through on-site infiltration practices and outfall retrofit and stabilization projects.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality
Indicators	Number / linear feet of reaches with detrimental channel conditions that have been addressed by restoration efforts.	Number of fish found in upstream reaches; seasonally consistent base flow.	Linear feet of streambanks with moderate or severe erosion that have been stabilized.	Number of problem point discharges that have been repaired or remediated.
Frequency of Monitoring	Every 3 years	Annual; daily (using LCHD sondes)	Every 3 years	Every 3 years
Baseline (2007)	0 lf / 0 reaches out of 69,200 lf / 27 reaches needing restoration	Baseline needs to be established by fish sampling in upstream reaches and identifying a current base flow.	0 linear feet out of 44,600 lf total with moderate or severe erosion	0 point discharges out of 49 total point discharges needing attention
Short Term Milestones (2008-2013) (1-5 years)	10% restored (7,000lf / 3 reaches)	10% increase in fish count; 10% greater stability in base flow over previous 5 year period	10% (4,500lf) of streambanks addressed	10% (5) of point discharges addressed
Mid Term Milestones (2013-2018) (5-10 years)	25% restored (17,300lf / 6 reaches)	25% increase in fish count; 10% greater stability in base flow over previous 5 year period	25% (11,000lf) of streambanks addressed	25% (12) of point discharges addressed
Long Term Milestones (2018+) (10+ years)	100% restored (69,200 lf / 27 reaches)	100% increase in fish count; 10% greater stability in base flow over previous 5 year period	100% (44,600lf) of streambanks addressed	100% (49) of point discharges addressed
Party Responsible for Monitoring	Municipality / Drainage District, LCSMC/ Watershed Planning Committee	IDNR, LCHD	Municipality / Drainage District, LCSMC/ Watershed Planning Committee	Municipality / Drainage District, LCSMC/ Watershed Planning Committee
Priority				
Mode of Collection	Visual / stream survey; homeowner / landowner contact and anecdotal reporting	Physical sampling using accepted protocols, e.g., IDNR Riverwatch program; stream flow monitoring data	Visual / stream survey; homeowner / landowner contact and anecdotal reporting	Visual / stream survey; homeowner / landowner contact and anecdotal reporting
Number of Actions				
Location of Implementation				
Percent Complete				

Table 6.6 Monitoring Plan (continued)

Issue	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management
Goal	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.
Objective	5. Expand and restore a native riparian buffer to protect the stream corridor from impacts of adjacent land uses and to support wildlife habitat.	6. Protect steep slopes and stream corridors with minimum setback requirements for land disturbance activities including new development, structures, and redevelopment of previously developed land.	7. Reduce sedimentation and channelization of stream reaches within Illinois Beach State Park to enhance instream habitat quality and support Lake Michigan aquatic species.	8. Beginning with downstream reaches, develop a stream restoration plan for each reach that suffers moderate to severe stream bank erosion
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration
Indicators	Linear feet / acres of riparian buffer undergoing restoration efforts; average buffer width and condition.zv	Number of municipalities adopting setback requirements.	Improved in-stream habitat quality as reflected by IBI and MBI scores.	Number of reaches with moderate or severe erosion with restoration plans.
Frequency of Monitoring	Every 3 years	Every 3 years	Every 3 years	Every 3 years
Baseline (2007)	0 lf of riparian buffer out of 69,900 lf total stream length	Baseline needs to be established by surveying the three municipalities	Baseline needs to be established through biological survey	0 reaches / 18 reaches needing plans
Short Term Milestones (2008-2013) (1-5 years)	10% (7000 lf) of riparian buffer restored	1 municipality	Baseline biological indices established	10% (2) of reaches
Mid Term Milestones (2013-2018) (5-10 years)	25% (17,500lf) of riparian buffer restored	3 municipalities	Improvement trend established	25% (5) reaches
Long Term Milestones (2018+) (10+ years)	100% (69,900lf) of riparian buffer restored	3 municipalities	Improvement trend continued	100% (18) reaches
Party Responsible for Monitoring	Landowners, Municipalities	Municipalities, LCSMC	IDNR	Municipality / Drainage District, LCSMC/ Watershed Planning Committee
Priority				
Mode of Collection	Visual / stream survey; homeowner / landowner contact and anecdotal reporting	Contact municipal off cials and staff and review policies and regulations	Physical sampling using accepted protocols, e.g., IDNR Riverwatch program	Internal audit / recordkeeping
Number of Actions				
Location of Implementation				
Percent Complete				

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Table 6.6 Monitoring Plan (continued)

Issue	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management	Issue 1: Stream Restoration and Management
Goal	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.	Goal A: Restore and manage the stream system to protect and enhance stream and riparian health, function, and conveyance as part of a watershed green infrastructure system.
Objective	9. Develop a stream management and maintenance plan.	10. Develop a program with authority and funding to implement the stream management and maintenance plan.	11. Clear, repair, or replace blocked, damaged, eroding, and failing culverts, outfall pipes, discharge channels, and other stormwater infrastructure to maintain conveyance and reduce erosion and other impacts of an impaired or blocked stormwater system.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality; Flood Damages
Indicators	Development of stream maintenance plan that includes a schedule, proposed funding source, and implementation partner.	Number of stream reaches being addressed by a management and maintenance program.	Number of structures (culverts, outfalls, and headwalls) cleared, repaired, and replaced; number of blockages / debris jams removed
Frequency of Monitoring	Every 3 years	Every 3 years	Every 3 years
Baseline (2007)	No plan exists	No program exists	0 structures addressed out of 60 total; 0 debris obstructions cleared out of 28 total
Short Term Milestones (2008-2013) (1-5 years)	Plan underway	Program under development	10% (6) of structures; 10% (3) of debris obstructions addressed
Mid Term Milestones (2013-2018) (5-10 years)	Plan complete	Program in place	25% (15) of structures; 25% (7) of debris obstructions addressed
Long Term Milestones (2018+) (10+ years)	Plan complete	Program in place	100% (60) of structures; 100% (28) of debris obstructions addressed
Party Responsible for Monitoring	Municipality / Drainage District, LCSMC/ Watershed Planning Committee	Municipality / Drainage District, LCSMC/ Watershed Planning Committee	Municipality / Drainage District, LCSMC/ Watershed Planning Committee
Priority			
Mode of Collection	Internal audit / recordkeeping; contact public officials and staff	Internal audit / recordkeeping; contact public officials and staff; homeowner / landowner contact and anecdotal reporting	Visual / stream survey; homeowner / landowner contact and anecdotal reporting; internal audit / recordkeeping
Number of Actions			
Location of Implementation			
Percent Complete			

Table 6.6 Monitoring Plan (continued)

Issue	Issue 2: Flood Risk & Flood Damage	Issue 2: Flood Risk & Flood Damage	Issue 2: Flood Risk & Flood Damage	Issue 2: Flood Risk & Flood Damage
Goal	Goal B: Reduce flood damage and prevent increased flooding to protect public health & safety, and public and private property and infrastructure investments.	Goal B: Reduce flood damage and prevent increased flooding to protect public health & safety, and public and private property and infrastructure investments.	Goal B: Reduce flood damage and prevent increased flooding to protect public health & safety, and public and private property and infrastructure investments.	Goal B: Reduce flood damage and prevent increased flooding to protect public health & safety, and public and private property and infrastructure investments.
Objective	1. Maintain riparian and depressional floodplain and wetlands as open and undeveloped to maximize flood storage and conveyance.	2. Mitigate flood damages through floodproofing of at-risk structures.	3. Mitigate sanitary sewer backup flood damages through remediation / correction of infiltration and cross connections with sanitary sewer system.	4. Mitigate local drainage capacity flood damage by providing additional flood storage and or maintaining / improving local drainage system.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Flood Damages	Flood Damages	Increased Flood Flows; Flood Damages
Indicators	Number of new structures in the floodplain &/or number of floodplain or wetlands permits issued.	Number of flood damage reports; # of structures removed or floodproofed.	Number of flood damage reports; removal of FPA from inventory.	Number of flood damage reports; removal of FPA from inventory.
Frequency of Monitoring	Annual	Annual	Annual	Annual
Baseline (2007)	Baseline # of floodplain or wetland permits needs established	Baseline # of flood damage reports needs established; unknown # (10-year), 270 (100-year), and 682 (500-year) at-risk structures	1 FPAI site (20-06)	6 FPAI sites exist (20-13, 20-07, 20-02, 20-04, 20-05, 21-04)
Short Term Milestones (2008-2013) (1-5 years)	0 new structures and 10% fewer permits	10% fewer flood damage reports; 10% of structures removed or floodproofed.	1 FPAI site (20-06) removed from inventory; 0 additional FPAI sites	2 FPA sites removed from inventory
Mid Term Milestones (2013-2018) (5-10 years)	0 new structures and 50% fewer permits	50% fewer flood damage reports; 10% of structures removed or floodproofed.	0 additional FPAI sites	4 FPA site removed from inventory
Long Term Milestones (2018+) (10+ years)	0 new structures and 0 permits	75% fewer flood damage reports; 10% of structures removed or floodproofed.	0 additional FPAI sites	6 FPA sites removed from inventory
Party Responsible for Monitoring	LCSMC, Municipality	LCSMC, Municipality	LCSMC, Municipality, NSSD	LCSMC, Municipality / Drainage District
Priority				
Mode of Collection	Contact municipal officials and staff; internal audit / recordkeeping; review public land records; damage reporting	Damage reporting; homeowner / landowner contact and anecdotal reporting	Contact municipal officials and staff; damage reporting; homeowner / landowner contact and anecdotal reporting; agency contact	Contact municipal officials and staff; damage reporting; homeowner / landowner contact and anecdotal reporting; agency contact
Number of Actions				
Location of Implementation				
Percent Complete				

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Table 6.6 Monitoring Plan (continued)

Issue	Issue 3: Natural Resources and Habitat	Issue 3: Natural Resources and Habitat	Issue 3: Natural Resources and Habitat	Issue 3: Natural Resources and Habitat
Goal	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.
Objective	1. Adopt and prioritize Green Infrastructure Plan elements and recommendations in local land use plans, policies, and maps to establish the community vision, direction, and intent.	2. Implement the Green Infrastructure Plan to guide prioritization, preservation, restoration, and management of important core and connecting green infrastructure elements and buffers.	3. Improve ecological and biological quality of aquatic and terrestrial natural resources by improving habitat characteristics, stabilizing watershed hydrology, improving water quality, and reducing coverage of exotic and invasive species.	4. Reduce shoreline / beach erosion in Illinois Beach State Park to protect rare community types and habitat for resident and migratory species.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows	Water Quality; Habitat Degradation and Alteration	Habitat Degradation and Alteration
Indicators	Number of municipalities adopting Green Infrastructure Plan elements into local land use plans, policies, and maps.	Acres of Category 1 or 2 Green Infrastructure parcels / linear feet of stream channel and buffer protected.	Biological survey data (MBI, IBI, and FQI scores).	Linear feet of shoreline lost or gained.
Frequency of Monitoring	Annual	Every 3 years	Annual	Annual
Baseline (2007)	0 municipalities	0 acres of prioritized parcels preserved.	Baseline needs to be established through biological survey	Baseline shoreline location to be established by IBSP / IDNR.
Short Term Milestones (2008-2013) (1-5 years)	1 municipality	10% of prioritized acres preserved	Baseline biological indices established	Less than 50% of historically eroding shoreline currently exhibiting erosion.
Mid Term Milestones (2013-2018) (5-10 years)	3 municipalities	25% of prioritized acres preserved	Improvement trend established	Less than 25% of historically eroding shoreline currently exhibiting erosion.
Long Term Milestones (2018+) (10+ years)	3 municipalities	100% of prioritized acres preserved	Improvement trend continued	Less than 10% of historically eroding shoreline currently exhibiting erosion.
Party Responsible for Monitoring	Municipality	Municipality, LCFPD, IDNR	LCFPD, IDNR	IDNR
Priority				
Mode of Collection	Contact municipal officials and staff; internal audit / recordkeeping	Contact municipal officials and staff; internal audit / recordkeeping; review public land records	Physical sampling using accepted protocols, e.g., IDNR Riverwatch program; wetland / natural area survey and monitoring	Embedded stakes to monitor Lateral Recession Rate; landowner / resource manager contact and anecdotal reporting;
Number of Actions				
Location of Implementation				
Percent Complete				



Table 6.6 Monitoring Plan (continued)

Issue	Issue 3: Natural Resources and Habitat	Issue 3: Natural Resources and Habitat	Issue 4: Watershed Education and Communication	Issue 4: Watershed Education and Communication
Goal	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.	Goal C: Protect, restore, and enhance a green infrastructure network of terrestrial and aquatic resources including streams, riparian corridors, wetlands, and upland resources.	Goal D: Watershed residents, students, and communities have adequate knowledge, skills, resources, assistance, and stewardship opportunities to implement the watershed plan.	Goal D: Watershed residents, students, and communities have adequate knowledge, skills, resources, assistance, and stewardship opportunities to implement the watershed plan.
Objective	5. Reduce the potential for contamination of Illinois Beach State Park, the Dead River, and Lake Michigan from the impacts of adjacent industrial land uses.	6. Remove barriers to fish and other species migration by restoring and enhancing hydrologic connections of streams to Lake Michigan.	1. Increase watershed stewardship (management, monitoring, and restoration) opportunities and participation by residents.	2. Increase public awareness and understanding of watershed issues by distributing watershed-related messages through public relations, outreach, and media vehicles.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages
Indicators	Sampling data, studies, and reports showing presence of contamination.	Number of hydrologic connections restored and maintained; number of fish found in upstream reaches.	Number of watershed stewardship opportunities and participants; number of stream reaches covered by a stewardship group.	Number of placements and mentions in local and regional media.
Frequency of Monitoring	Every 5 years	Annual	Annual	Annual
Baseline (2007)	Contaminated material exists on IBSP property	0 hydrologic connections restored out of X; baseline needs to be established by fish sampling in upstream reaches.	Baseline # of stewardship opportunities and participants needs established; 0 stream reaches covered by stewardship group	Baseline # of mentions needs to be established.
Short Term Milestones (2008-2013) (1-5 years)	On average, 25% less contaminated material exists, by weight	1 hydrologic connection restored; 10% increase in fish count	3 stewardship opportunities and 50 participants per year; 10% (3) of reaches covered	5 mentions per year
Mid Term Milestones (2013-2018) (5-10 years)	On average, 50% less contaminated material exists, by weight	2 hydrologic connections restored; 25% increase in fish count	6 stewardship opportunities and 100 participants per year; 25% (7) reaches covered	10 mentions per year
Long Term Milestones (2018+) (10+ years)	On average, 75% less contaminated material exists, by weight	100% of hydrologic connections restored; 100% increase in fish count	10 stewardship opportunities and 150 participants per year; 75% (21) reaches covered	20 mentions per year
Party Responsible for Monitoring	IDNR, USEPA / IEPA, Watershed Planning Committee	IDNR	LCSMC / Watershed Planning Committee, IDNR	LCSMC / Watershed Planning Committee
Priority				
Mode of Collection	Physical sampling using accepted protocols; landowner / resource manager contact and anecdotal reporting; agency contact	Visual / stream survey; landowner / resource manager contact and anecdotal reporting;	Watershed event reports; review volunteer and monitoring databases; internal audit recordkeeping	Internal audit / recordkeeping; news clipping service
Number of Actions				
Location of Implementation				
Percent Complete				

## 6 plan implementation and evaluation

Table 6.6 Monitoring Plan (continued)

Issue	Issue 4: Watershed Education and Communication	Issue 4: Watershed Education and Communication	Issue 5: Water Quality	Issue 5: Water Quality
Goal	Goal D: Watershed residents, students, and communities have adequate knowledge, skills, resources, assistance, and stewardship opportunities to implement the watershed plan.	Goal D: Watershed residents, students, and communities have adequate knowledge, skills, resources, assistance, and stewardship opportunities to implement the watershed plan.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.
Objective	3. Provide technical assistance to watershed communities, the development community, and stakeholders to help them implement watershed plan recommendations.	4. Increase technical knowledge and understanding of alternative development approaches by distributing conservation-oriented / Low Impact Development (LID) land use planning and development guidelines and practices information to public entities.	1. All watershed streams and lakes meet or exceed state water quality standards.	2. Reduce non-point source pollution loading from existing and new development by controlling inputs at the source / on site using BMPs.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality	Water Quality
Indicators	Number of brochures, information packets, and other educational materials distributed; number of participants in technical workshops.	Number of local government officials and staff participating in LID workshops; number of permits / acres of conservation development approved as compared to conventional development.	Water quality monitoring data (Phosphorous < 0.05 mg/L; Dissolved oxygen > 5.0 mg/L; Index of Biotic Integrity (IBI) > 30; Macroinvertebrate Biotic Index (MBI) < 6.0; Trophic State Index < 70 (Sand Pond))	Water quality monitoring data (DO, phosphorous, TSS); acres / linear feet of BMPs installed.
Frequency of Monitoring	Annual	Annual	Annual	Annual
Baseline (2007)	0 educational materials currently distributed; baseline # needed for participants in technical workshops	0 local government officials and staff participating in LID workshops; 0 permits / acres of conservation development approved	P (no baseline); DO=7.58 (two-year mean); baseline needs to be established for biological indices	P (no baseline); DO=7.58 (two-year mean); Turbidity (as proxy for TSS)=14.3 NTU; 0 acres / lf of BMPs installed
Short Term Milestones (2008-2013) (1-5 years)	500 educational material packets distributed per year; 10 participants in technical workshops per year	5 local government participants in LID workshops per year; 1 permit / 10 acres of conservation development approved	P=0.5 mg/L or less; DO=8.0 (two-year mean); baseline biological indices established	P=0.5 mg/L or less; DO=8.0 (two-year mean); Turbidity (as proxy for TSS)=12.9 NTU (10% improvement); 5 acres / 1000 lf of BMPs installed
Mid Term Milestones (2013-2018) (5-10 years)	1000 educational material packets distributed per year; 25 participants in technical workshops per year	15 local government participants in LID workshops per year; 3 permits / 50 acres of conservation development approved	P=0.25 mg/L or less; DO=8.25 (two-year mean); improvement trend established for biological indices	P=0.25 mg/L or less; DO=8.25 (two-year mean); Turbidity (as proxy for TSS)=10.7 NTU (25% improvement); 10 acres / 5000 lf of BMPs installed
Long Term Milestones (2018+) (10+ years)	2000 educational material packets distributed per year; 50 participants in technical workshops per year	25 local government participants in LID workshops per year; 5 permits / 100 acres of conservation development approved	P=0.1 mg/L or less; DO=8.5 (two-year mean); improvement trend established for biological indices	P=0.1 mg/L or less; DO=8.5 (two-year mean); Turbidity (as proxy for TSS)=1.4 NTU (90% improvement); 20 acres / 10,000 lf of BMPs installed
Party Responsible for Monitoring	LCSMC / Watershed Planning Committee	LCSMC / Watershed Planning Committee, Municipality	LCHD, IEPA	Municipality, LCSMC
Priority				
Mode of Collection	Watershed workshop / event reports; internal audit / recordkeeping	Watershed workshop / event reports; contact municipal officials and staff; review policies and regulations; review public land records; internal audit / recordkeeping	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program; homeowner / landowner contact and anecdotal reporting; contact municipal officials and staff
Number of Actions				
Location of Implementation				
Percent Complete				

Table 6.6 Monitoring Plan (continued)

Issue	Issue 5: Water Quality	Issue 5: Water Quality	Issue 5: Water Quality	Issue 5: Water Quality
Goal	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.
Objective	3. Prevent erosion from construction sites to reduce total suspended solids.	4. Prevent erosion and flow of agricultural and golf course chemicals (fertilizers and pesticides) from farmland, golf courses, parks and yards into streams and wetlands by reducing / controlling inputs at the source using BMPs.	5. Prevent dumping of inappropriate substances (e.g., yard waste, garbage, household or automotive fluids, etc.) within the stream channel, riparian corridor, and stormsewer network.	6. Reduce fecal coliform contamination on Lake Michigan beaches / nearshore waters by controlling gull populations and other contributing sources.
Impairments Addressed	Water Quality	Water Quality	Water Quality; Habitat Degradation and Alteration	Water Quality
Indicators	Water quality monitoring data (TSS); construction site inspection reports showing violations of SESC standards.	Water quality monitoring data (DO, phosphorous); acres / linear feet of BMPs installed.	Illicit Discharge Detection and Elimination reports.	Number of beach closures.
Frequency of Monitoring	Annual	Annual	Annual	Annual
Baseline (2007)	Turbidity (as proxy for TSS)=14.3 NTU; 0 construction site inspection reports	P (no baseline); DO=7.58 (two-year mean); Turbidity (as proxy for TSS)=14.3 NTU; 0 acres / lf of BMPs installed	Baseline needs to be established	72 total beach closures per year (5 year average 2002-2006)
Short Term Milestones (2008-2013) (1-5 years)	Turbidity (as proxy for TSS)=12.9 NTU (10% improvement); 5 or fewer construction site inspection reports per year showing violations	P=0.5 mg/L or less; DO=8.0 (two-year mean); Turbidity (as proxy for TSS)=12.9 NTU (10% improvement); 5 acres / 1000 lf of BMPs installed	5 or fewer IDDE reports	60 total beach closures per year (5 year average)
Mid Term Milestones (2013-2018) (5-10 years)	Turbidity (as proxy for TSS)=10.7 NTU (25% improvement); 3 or fewer construction site inspection reports per year showing violations	P=0.25 mg/L or less; DO=8.25 (two-year mean); Turbidity (as proxy for TSS)=10.7 NTU (25% improvement); 10 acres / 5000 lf of BMPs installed	3 or fewer IDDE reports	45 total beach closures per year (5 year average)
Long Term Milestones (2018+) (10+ years)	Turbidity (as proxy for TSS)=1.4 NTU (90% improvement); 0 construction site inspection reports per year showing violations	P=0.1 mg/L or less; DO=8.5 (two-year mean); Turbidity (as proxy for TSS)=1.4 NTU (90% improvement); 20 acres / 10,000 lf of BMPs installed	0 IDDE reports	25 total beach closures per year (5 year average)
Party Responsible for Monitoring	Municipality, LCSMC	Landowner, Municipality	?	LCHD, IEPA
Priority				
Mode of Collection	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program; municipal and agency contact / reports; internal audit / recordkeeping	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program; homeowner / landowner contact and anecdotal reporting; contact municipal officials and staff	Contact municipal officials and staff; internal audit recordkeeping	Agency contact / recordkeeping
Number of Actions				
Location of Implementation				
Percent Complete				

## 6 plan implementation and evaluation

Table 6.6 Monitoring Plan (continued)

Issue	Issue 5: Water Quality	Issue 5: Water Quality	Issue 5: Water Quality	Issue 5: Water Quality
Goal	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.	Goal E: Improve water quality in streams, lakes, and wetlands by reducing the impacts of land use and development, land management, and modified hydrology.
Objective	7. Restore natural hydrology and baseflow to address low dissolved oxygen, water temperature, and streambank erosion impacts.	8. Develop and implement a watershed monitoring program to collect and monitor water quality and biological data on a regular basis.	9. Retrofit existing stormwater management structures such as detention ponds and roadside swales to improve water quality.	10. Reduce or modify the use / application of road salt and other chemicals for snow and ice management to reduce the impact of chlorides and toxic substances on water quality
Impairments Addressed	Water Quality; Habitat Degradation and Alteration	Water Quality; Habitat Degradation and Alteration	Water Quality	Water Quality
Indicators	Water quality monitoring data (flow, temperature, and DO).	Established monitoring program; record of monitored data.	Number / acres of retrofitted detention basins; linear feet of improved roadside swale.	Water quality monitoring data (specific conductivity)
Frequency of Monitoring	Annual	Every 3 years	Every 3 years	Annual
Baseline (2007)	DO=7.58 (two-year mean); baseflow baseline needs to be established; 14.96°C (two-year mean)	No data exists for biological measures; hydrologic and water quality data has been collected consistently (spring through fall) for 2006-07; 0 watershed plan recommendations implemented.	35 detention basins needing attention; 1,043,400 lf of swale targeted for improvement	0.93 mS/cm (two-year mean)
Short Term Milestones (2008-2013) (1-5 years)	DO=8.0 (two-year mean); 10% greater stability in baseflow over previous 5 year period; 14.0°C (two-year mean)	4 years of consistently collected biological, hydrologic, and water quality data; 10 watershed recommendations implemented	5 detention basins addressed; 25,000 lf of swale improved	0.8 mS/cm (10% improvement)
Mid Term Milestones (2013-2018) (5-10 years)	DO=8.25 (two-year mean); 10% greater stability in baseflow over previous 5 year period; 13.5°C (two-year mean)	8 years of consistently collected biological, hydrologic, and water quality data; 25 watershed recommendations implemented	10 detention basins addressed; 50,000 lf of swale improved	0.7 mS/cm (25% improvement)
Long Term Milestones (2018+) (10+ years)	DO=8.5 (two-year mean); 10% greater stability in baseflow over previous 5 year period; 13°C (two-year mean)	20 years of consistently collected biological, hydrologic, and water quality data; 50 watershed recommendations implemented	20 detention basins addressed; 100,000 lf of swale improved	0.1 mS/cm (90% improvement)
Party Responsible for Monitoring	LCHD, IEPA	LCSMC / Watershed Planning Committee	Municipality / Drainage District, LCSMC	LCHD, IEPA
Priority				
Mode of Collection	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program; streamflow monitoring data	Physical / chemical sampling and / or lab analysis using accepted protocols, e.g., IDNR Riverwatch program	Contact municipal officials and staff; internal audit recordkeeping; homeowner / landowner contact	Physical / chemical sampling and / or lab analysis using accepted protocols
Number of Actions				
Location of Implementation				
Percent Complete				

Table 6.6 Monitoring Plan (continued)

Issue	Issue 6: Watershed Coordination	Issue 6: Watershed Coordination	Issue 6: Watershed Coordination	Issue 6: Watershed Coordination
Goal	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.
Objective	1. Pursue cross-jurisdictional cost-sharing arrangements for projects with multi-jurisdictional benefits and impact.	2. Establish a watershed organization or council with funding and support to guide watershed plan implementation and provide assistance to watershed stakeholders.	3. Adopt, strengthen, and enforce ordinances and guidelines intended to protect watershed resources.	4. Understand and minimize detrimental impact of local land use decisions on watershed resources.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages
Indicators	Number of projects funded by multiple jurisdictions.	Establishment of lead organization with budget and executive committee; number of projects undertaken under the auspices of the watershed organization.	Number of communities adopting, strengthening, and enforcing protective ordinances and guidelines.	Number of communities using LID and conservation-oriented approaches to development.
Frequency of Monitoring	Every 3 years	Annual	Every 3 years	Every 3 years
Baseline (2007)	Baseline average # of multi-jurisdictional projects needs to be established	No organization exists; 0 projects	Baseline is current set of municipal ordinances and guidelines	0 municipalities using LID approaches to development
Short Term Milestones (2008-2013) (1-5 years)	2 multi-jurisdictional projects per year	Organization established; 3 projects undertaken	1 municipality has strengthened guidelines	1 municipality using LID approaches to development
Mid Term Milestones (2013-2018) (5-10 years)	5 multi-jurisdictional projects per year	Organization established; 10 projects undertaken	3 municipalities have strengthened guidelines	3 municipalities using LID approaches to development
Long Term Milestones (2018+) (10+ years)	10 multi-jurisdictional projects per year	Organization established; 25 projects undertaken	3 municipalities have strengthened guidelines	3 municipalities using LID approaches to development
Party Responsible for Monitoring	Municipality, LCSMC/ Watershed Planning Committee	LCSMC/ Watershed Planning Committee	Municipality, LCSMC/ Watershed Planning Committee	Municipality, LCSMC/ Watershed Planning Committee
Priority				
Mode of Collection	Contact municipal officials and staff; internal audit / recordkeeping; agency contact	Internal audit / recordkeeping	Contact municipal officials and staff; review policies and regulations; internal audit / recordkeeping	Contact municipal officials and staff; review policies and regulations; internal audit / recordkeeping
Number of Actions				
Location of Implementation				
Percent Complete				

## 6 plan implementation and evaluation

Table 6.6 Monitoring Plan (continued)

Issue	Issue 6: Watershed Coordination	Issue 6: Watershed Coordination	Issue 6: Watershed Coordination
Goal	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.	Goal F: Improve coordination, research, and decision-making between public, private, and non-profit entities to help achieve watershed plan goals and objectives.
Objective	5. Help communities and stakeholders secure project funding by disseminating information to communities and stakeholders on funding sources and mechanisms for implementing watershed projects.	6. Incorporate watershed improvement elements into local government ongoing management, maintenance, and infrastructure projects (i.e. streets, the manmade drainage system etc.)	7. Understand and track watershed conditions by monitoring watershed resources and trends (hydrologic, biologic, and water quality) and implementation of plan recommendations.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages
Indicators	Number of communities receiving funding for watershed improvement projects; funding amount secured; number of projects installed / undertaken.	Number of communities adding watershed improvement practices and functions to ongoing activities, plans, and budgets.	Watershed monitoring data; years of data collected; number of recommendations implemented.
Frequency of Monitoring	Annual	Every 3 years	Annual
Baseline (2007)	Baseline assumed to be 0 municipality; 0 funding secured; and 0 projects	Baseline assumed to be 0 municipalities	No data exists for biological measures; hydrologic and water quality data has been collected consistently (spring through fall) for 2006-07; 0 watershed plan recommendations implemented.
Short Term Milestones (2008-2013) (1-5 years)	1 municipality; \$50,000 secured; 5 projects installed	1 municipality	4 years of consistently collected biological, hydrologic, and water quality data; 10 watershed recommendations implemented
Mid Term Milestones (2013-2018) (5-10 years)	3 municipalities; \$100,000 secured; 10 projects installed	3 municipalities	8 years of consistently collected biological, hydrologic, and water quality data; 25 watershed recommendations implemented
Long Term Milestones (2018+) (10+ years)	3 municipalities; \$150,000 secured; 15 projects installed	3 municipalities	20 years of consistently collected biological, hydrologic, and water quality data; 50 watershed recommendations implemented
Party Responsible for Monitoring	Municipality, LCSMC/ Watershed Planning Committee	Municipality, LCSMC/ Watershed Planning Committee	LCSMC/ Watershed Planning Committee
Priority			
Mode of Collection	Contact municipal officials and staff; internal audit / recordkeeping; agency contact	Contact municipal officials and staff; review plans, policies and regulations; internal audit / recordkeeping	Review volunteer and monitoring databases; internal audit / recordkeeping
Number of Actions			
Location of Implementation			
Percent Complete			

Table 6.6 Monitoring Plan (continued)

Issue	Issue 7: Watershed Hydrology	Issue 7: Watershed Hydrology	Issue 7: Watershed Hydrology	Issue 7: Watershed Hydrology
Goal	Goal G: Restore and enhance watershed hydrology and stabilize the stream systems by reducing surface runoff.	Goal G: Restore and enhance watershed hydrology and stabilize the stream systems by reducing surface runoff.	Goal G: Restore and enhance watershed hydrology and stabilize the stream systems by reducing surface runoff.	Goal G: Restore and enhance watershed hydrology and stabilize the stream systems by reducing surface runoff.
Objective	1. Reduce/minimize the rate and volume of runoff from the developed and developing landscape by installing urban BMPs.	2. Protect, restore and enhance overland flow paths.	3. All new development incorporates conservation design and LID practices to minimize changes / maintain pre-development hydrology and minimize impervious cover.	4. Restore natural hydrologic regime to watershed wetlands, Illinois Beach State Park, Spring Bluff Nature Preserve, Lyons Woods Forest Preserve, and other natural areas.
Impairments Addressed	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Increased Flood Flows	Water Quality; Habitat Degradation and Alteration; Increased Flood Flows; Flood Damages	Water Quality; Habitat Degradation and Alteration
Indicators	Average difference between maximum and minimum flow rate; peak flow data / hydrographs showing reduction in peak flows for the 1-year event; change in rainfall event attenuation time; reduction in stream flow for a given rainfall event.	Change in rainfall event attenuation time.	Number of stormwater management plans demonstrating maintenance of pre-development hydrology as compared to number of development applications; percentage of impervious cover in watershed.	Natural area management and monitoring reports and FQI scores.
Frequency of Monitoring	Annual	Annual	Annual	Every 3 years
Baseline (2007)	203 cfs	Baseline needs to be established.	0 stormwater plans demonstrate maintenance of pre-development hydrology; XX% watershed imperviousness.	Baseline FQI for each natural area needs establishment.
Short Term Milestones (2008-2013) (1-5 years)	182.7 cfs (10% decrease)	10% increase in rainfall event attenuation time.	100% of stormwater plans demonstrate maintenance of pre-development hydrology; no increase in watershed imperviousness.	Increase by 1 point in FQI score
Mid Term Milestones (2013-2018) (5-10 years)	152.3 cfs (25% decrease)	25% increase in rainfall event attenuation time.	100% of stormwater plans demonstrate maintenance of pre-development hydrology; 5% reduction in watershed imperviousness.	Increase by 1.5 points in FQI score
Long Term Milestones (2018+) (10+ years)	20.3 cfs (90% decrease)	90% increase in rainfall event attenuation time.	100% of stormwater plans demonstrate maintenance of pre-development hydrology; 10% reduction in watershed imperviousness.	Increase by 2 points in FQI score
Party Responsible for Monitoring	Municipality, LCSMC/ Watershed Planning Committee	Municipality	Municipality, LCSMC/ Watershed Planning Committee	LCFPD, IDNR, Municipalities
Priority				
Mode of Collection	Streamflow monitoring data	Streamflow monitoring data	Contact municipal officials and staff; internal audit / recordkeeping; review plans, policies, and regulations	Landowner / resource manager contact; wetland / natural areas survey and monitoring
Number of Actions				
Location of Implementation				
Percent Complete				



