9.0 Measuring Plan Progress & Success

It is essential to have a monitoring plan and evaluation component as part of any watershed plan to evaluate plan implementation progress and success over time. This watershed plan includes two monitoring/evaluation components:

1. The "**Water Quality Monitoring Plan**" includes methods and locations where monitoring should occur and a set of criteria (indicators & targets) used to determine whether impairment reduction targets and other watershed improvement objectives are being achieved over time.

2. "**Report Cards**" for each plan goal were developed that include interim, measurable milestones linked to evaluation criteria that can be evaluated by the planning committee over time.

9.1 Water Quality Monitoring Plan & Evaluation Criteria

Background Information

This subsection provides a monitoring plan that can be implemented to measure changes in watershed impairments related primarily to water quality. Water quality monitoring is performed by first collecting physical, chemical, biological, and/or social indicator data. This data is then compared to criteria (indicators & targets) related to established water quality objectives.

Available water quality data collected within the Upper South Branch Kishwaukee River watershed is summarized in Section 4.1. The most recent chemical water quality data was collected in 2019 by Applied Ecological Services, Inc. (AES), in coordination with Kishwaukee Water Reclamation District, as part of this planning effort

and by Northern Illinois University. AES also analyzed historical water quality for the Upper South Branch Kishwaukee River available via EPA's WQX/Storet water quality database for the last ten years (2010 through 2019). According to Illinois EPA's most recent 2018 *Integrated Water Quality Report and Section 303(d) List*, Upper South Branch Kishwaukee River (IEPA Segment Codes: IL_PQC-02 and IL_PQC-13) are "Fully Supporting" for *Aquatic Life*, "Not Supporting" for *Fish Consumption*, and the upper half of the Kishwaukee is also "Not Supporting" for *Aesthetic Quality*; neither reach was assessed for *Primary Contact Recreation*. Analyzing all of the data suggests that there is moderate impairment to the Upper South Branch Kishwaukee River due to elevated phosphorus, nitrogen, total suspended solids, and *E. coli* levels.

The water quality monitoring plan is designed to: 1) capture snapshots of water quality within the Upper South Branch Kishwaukee River watershed over time; 2) assess changes in water quality following implementation of Management Measures, and 3) assess the public's social behavior related to water quality issues. It is crucial that representative water quality samples be carefully collected using method appropriate handling procedures. Unrepresentative samples or samples contaminated during collection or handling can prove useless. It is important that future monitoring be completed using protocol and methods used by the EPA for QAQC purposes. EPA Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs) can be found at https://www.epa.gov/sites/production/files/2015-06/documents/vol_qapp.pdf. Physical, chemical, and biological water quality indicators in streams are typically measured during base flow and after significant (≥ 1.5 inches) storm events. Chemical parameters typically include nutrients (nitrogen and phosphorous) and total suspended solids. All samples should be analyzed by certified labs to ensure accurate results. Physical parameters, such as temperature, dissolved oxygen, pH, and water clarity (turbidity) should be collected in the field using properly maintained and calibrated field equipment. It is also important to obtain stream discharge calculations as a determination of potential pollutant loading. These calculations are easily obtained by measuring the stream width, average depth, and flow rate at the monitoring location. Biological (fish and macroinvertebrate) and habitat assessments may also be performed, site assessment criteria dependent.

When management measures are implemented, monitoring should ideally take place both before and after implementation to track the effectiveness of those projects. Management Measure implementation sampling locations should include points of water ingress and egress, such as the inflow and outflow points on a retrofitted detention basin as an example. To achieve the best results with respect to performance, Management Measure implementation monitoring should occur during or shortly after large rain events (≥ 1.5 inches). Biological and/or habitat assessments should also be included on any habitat improvement project, such as a stream restoration. Because funding for post implementation monitoring is typically limited, money should be built into the initial Management Measures project budget.

Monitoring Plan Implementation

Existing and recommended water quality monitoring regimes, including recommended monitoring entity, monitoring locations, schedule/monitoring frequency, type of parameters sampled, and expected costs, are outlined in Table 51. All existing monitoring should continue and in addition, AES recommends that E. coli and macroinvertebrate sampling should be added to the 5-year monitoring regimes. The Steering Committee and partners should work together to accommodate this additional sampling. This monitoring will yield data over time that will help track changes in watershed water quality over time. Figure 74 includes the location of all recommended monitoring locations. Note: monitoring locations related to individual Management Measures are not described or mapped as this monitoring will come later when projects are implemented.

Table 51. Recommended water quality monitoring programs/locations.

Monitoring Entity/ Program	Monitoring Location (See Figure 74)	Schedule/ Monitoring Frequency	Parameters Sampled	Cost to Implement
Existing Monitoring Programs				
Illinois EPA Intensive Basin and Special Study	IL-02, IL-13, and IL-99	Every 5 years	Physical; Chemical	Not Applicable
NIU	8 sites along USBKR and tributaries	Yearly	Physical; Chemical	$14K/year
New Monitoring Programs				
Steering Committee or other partners	IL-02, IL-13, and IL-99	Every five years	*E. coli*	$1,000 each 5-year cycle
Illinois Tollway or NIU or Illinois RiverWatch	IL-02, IL-13, and IL-99	Every five years	Biological (Macroinverts)	$5,000 each 5-year cycle
Project lead or landowner	Varies: Specific to each management measure	Pre and post implementation	Physical, Chemical	$5,000 for each project

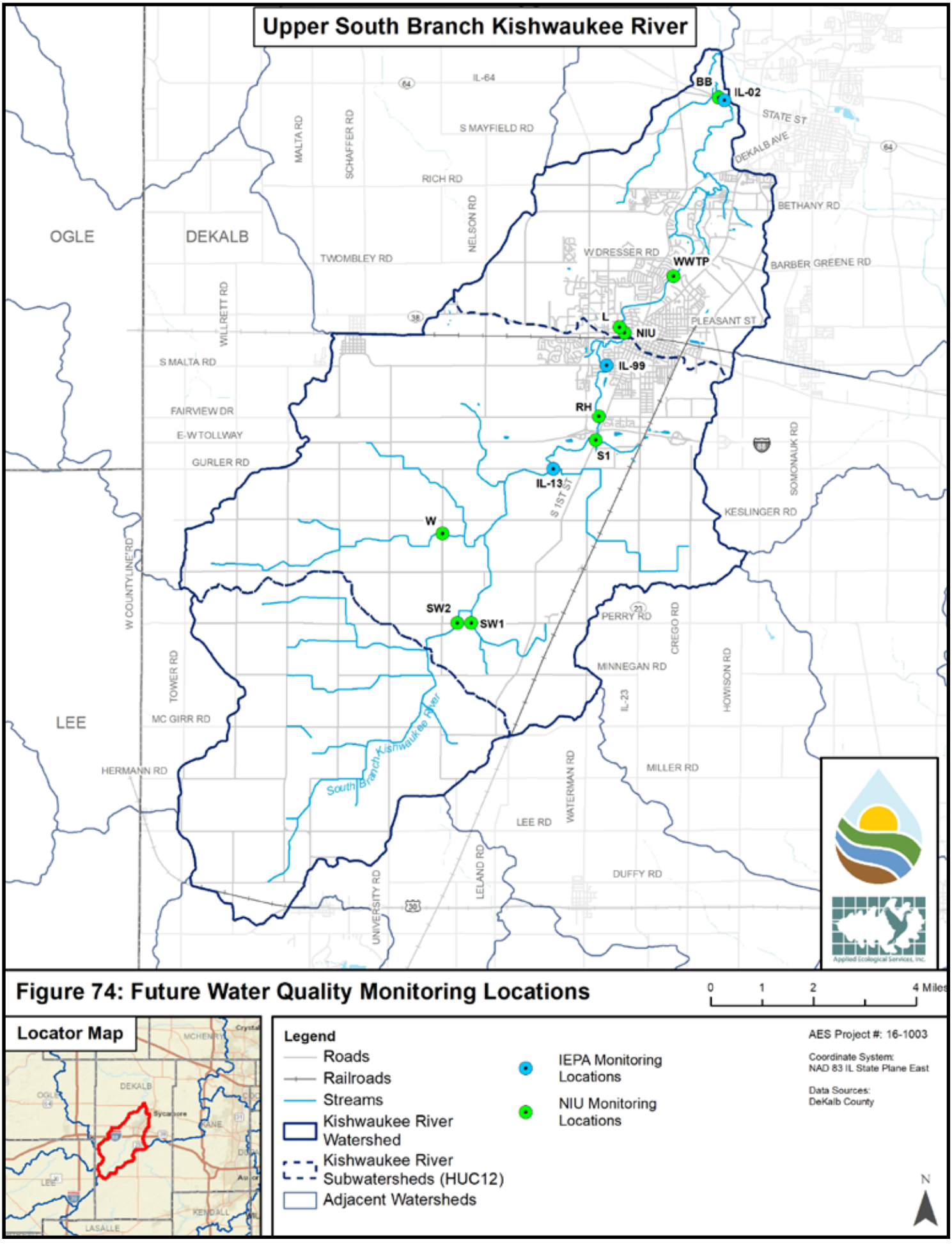

Figure 74: Future Water Quality Monitoring Locations

Physical and Chemical Monitoring Methods & Recommendations

Physical and chemical monitoring of water can be time consuming and expensive depending on the complexity of the monitoring program. Usually the budget and/or personnel available for monitoring limit the amount of data that can be collected. Therefore, the monitoring program should be developed to maximize the usable data given the available funding and personnel. Any monitoring program should be flexible and subject to change to collect additional information or use newer equipment or technology when available while maintaining a link to past data.

Future physical/chemical monitoring should continue according to the existing schedule/ frequency, averaged annually for each parameter, and then compared to target water quality values. Many different parameters can be included in physical monitoring of water quality in streams. Measurements of temperature, pH, conductivity, dissolved oxygen, and turbidity should be collected in the field for any monitoring done on Upper South Branch Kishwaukee River using portable instruments. The measurements can then be recorded on data sheets in the field or the units can be taken back to the lab and the data downloaded. Chemical parameters should generally include total phosphorus, total nitrogen, total suspended solids, chloride, and E. coli at a minimum, all of which are already be monitored by NIU except for E. Coli, which we recommend adding to the sampling regime. Unlike physical monitoring, chemical monitoring requires grab samples be collected and taken to certified labs for analysis and collection needs to follow handling procedures for samples as outlined in Table 52. Unrepresentative samples or samples contaminated during collection or handling are often useless. The collected samples should be submitted for analysis to a laboratory certified by the National Environmental Laboratory Accreditation Conference (NELAC). Alternatively, one of the Steering Committee partners could work with Kishwaukee Water Reclamation District for to save on sampling costs. Generally, the laboratory will work closely with the monitoring entity to assure that the samples are collected in the proper containers with preservatives for the parameter of interest.

Table 52. Physical & chemical stream monitoring parameters, collection, and handling procedures.

Parameter	Statistical, Numerical, or General Use Guideline	Container	Volume	Preservative	Max. Hold Time
Physical Parameters Measured in Field					
pH	>6.5 or <9.0	These parameters are measured in the field			
Conductivity	<1,667 µmhos/cm				
Dissolved Oxygen	>5.0 mg/l				
Temperature	<90 F				
Turbidity	<14 NTU				
Chemical & Physical Parameters Analyzed in Lab					
Total Suspended Solids	<19 mg/l	Plastic	*32 oz*	*Cool 4 oC*	7 days
Biochemical Oxygen Demand	<5.0 mg/l	Plastic	32 oz	Cool 4 oC	48 hours
Ammonia Nitrogen, Nitrate-Nitrite, & Total Kjeldahl Nitrogen	Total Nitrogen (mg/L) *calculated* <2.461 mg/l	Plastic	32 oz	Cool 4 oC 20% Sulfuric Acid	28 days
Total Phosphorus	<0.0725 mg/l (streams)	Plastic	4 oz	Cool 4 oC	28 days
Chloride	<500 mg/l	Plastic	32 oz	Cool 4 oC	28 days
E. coli	<235 MPN/100mL	Plastic	4 oz	Cool 4 oC	<6 hours

Macroinvertebrate sampling in stream

Biological Monitoring Methods and Recommendations

The Illinois EPA uses biological data for determining "Aquatic Life" Use Attainment in streams because fish and macroinvertebrates are relatively easy to sample/identify and reflect specific and predictable responses to human induced changes to the landscape, stream habitat, and water quality.

Two indices have been developed that measure water quality using fish and macroinvertebrates - fish Index of Biotic Integrity (fIBI) and Macroinvertebrate Biotic Index (MBI). These indices are best applied prior to a project such as a stream restoration to obtain baseline data and again following restoration to measure the success of the project. Or, they can be conducted simply to assess resource quality in a stream or tributary reach.

Fish Index of Biotic Integrity (fIBI)
The fIBI is designed to assess water quality and biological health directly through several attributes of fish communities in streams. After the fish have been collected using electrofishing equipment and identified, the data is used to evaluate 12 metrics and a rating is assigned to each metric based on whether it deviates strongly from, somewhat from, or closely approximates the expected values found in a high quality reference stream reach. The sum of these ratings gives a total IBI score for the site. The best possible IBI score is 60. The Illinois EPA has determined that a score less than 41 indicates a stream is not fully supporting for "*Aquatic Life*" (Table 53). A manual for calculating IBI scores for streams in Illinois is available from Illinois DNR.

Fish sampling was historically conducted by IEPA during the 1990s, but no additional ongoing fIBI monitoring recommendations are made due to limited resources. Where possible however, fish sampling and calculation of fIBI values should be built into future stream restoration projects.

Macroinvertebrate Biotic Index (MBI)
The MBI is designed to rate water quality using aquatic macroinvertebrate taxa tolerance to degree and extent of organic pollution in streams. The MBI is calculated by taking an average of tolerance ratings weighted by the number of individuals in the sample. The Illinois EPA has determined that an MBI score greater than 5.9 indicates a stream is not fully supporting "*Aquatic Life*" (Table 53). A manual for collecting and calculating MBI scores for streams is available from Illinois EPA.

It is recommended that future monitoring include macroinvertebrate sampling conducted by Illinois Tollway, NIU, or Illinois RiverWatch and occur at sites IL-02, IL-13, and IL-99 every five years in order to capture data that better reflects the impact of pollutants (Table 51; Figure 74).

Habitat Monitoring Methods and Recommendations

Stream habitat assessments comprise a major component of physical water quality monitoring. Many habitat assessment methods are available for assessing streams such as those developed by Illinois DNR and Ohio EPA. The Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA is a quick, accurate, and straightforward analysis with dependable and repeatable results found to correlate well with biological integrity of streams in the Midwest. The QHEI is also used by the Illinois EPA to assess "Aquatic Life" Use Attainment in streams. It is composed of six criteria that are scored individually then summed to provide the total QHEI score. The best possible score is 100. QHEI scores from hundreds of stream segments indicate that habitat values greater than 60 generally support average quality warm-water fauna. Scores greater than 80 typify pristine habitat conditions that have the ability to support exceptional warm-water fauna (Ohio EPA 1999). Areas with habitat scores lower than 60 may support warm-water fauna but usually exhibit significant degradation. Table 54 summarizes QHEI score classifications. Stream restoration projects should strive to create conditions that produce QHEI scores of at least 60.

The index should be used on any stream reach and for stream restoration projects to document improvements. Prior to stream restoration, a QHEI evaluation should be completed by the project watershed coordinator, ecologist, or engineer. A follow-up QHEI for comparison purposes should be conducted by the same individual at least 2-4 years following project implementation after plant material grows and in-stream structures have had time to perform. QHEI forms and a narrative explaining how to use the index can be located on the web at http://rock.geo.csuohio.edu/norp/qhei.htm.

Table 53. Illinois EPA indicators of aquatic life impairment using MBI and fIBI scores.

Biological Indicator	MBI and fIBI Scores		
MBI	> 8.9	5.9 < MBI < 8.9	≤ 5.9
fIBI	≤ 20	20 < IBI< 41	≥ 41
Impairment Status - Use Support - Resource Quality			
Impairment Status	Severe Impairment	Moderate Impairment	No Impairment
Designated Use Support	Not Supporting	Not Supporting	Fully Supporting
Resource Quality	Poor	Fair	Good

Source: Integrated Water Quality Report (2010).

Table 54. QHEI score classes and characteristics.

QHEI	Class	Usual Characteristics
80-100	Excellent	Comparable to pristine conditions; exceptional assemblage of habitat types; sufficient riparian zone
60-79	Good	Impacts to riparian zone
30-59	Fair	Impacts to riparian zone; channelization; most in-stream habitat gone
0-29	Poor	All aspects of habitat in degraded state

Tillage Practices and Residue Management

Changes in agricultural management practice implementation, such as tillage conditions within watersheds can be difficult to assess and track over time. NRCS currently conducts transect surveys to estimate tillage practices across the county. Recently, analysis of satellite imagery has been used to track these changes in conservation practices at the watershed scale as an alternative method of collecting the same data. Since tillage takes place at different times, a series of satellite images can be analyzed in spring and fall months to calculate a minimum Normalized Difference Tillage Index (NDTI) for the Upper South Branch Kishwaukee River watershed. The NDTI estimates crop residue levels based on shortwave infrared wavelengths. This analysis of imagery can also be used to track implementation of cropping practices in a watershed as more years of imagery is collected, since satellites are always updating aerial imagery (Meyer, 2018).

For more information, a webinar produced by Elliot Meyer of WI Land+Water+Media called "Satellite Imagery Used in Conservation" as well as a document on how to calculate vegetation indices using ArcMap and Earth Explorer can be found online at http://wislandwatermedia.org/2018/05/02/webinar-satellite-imagery-used-in-conservation/.

Social Indicators of Water Quality

Quantifying social indicators of success in a watershed planning initiative is difficult. It is subjective to a large degree and complaints about poor conditions are often heard rather than compliments on improvements. The Great Lakes Regional Water Program (GLRWP), a leading organization that addresses water quality research, education, and outreach in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, defines social indicators as standards of comparison that describe the context, capacity, skills, knowledge, values, beliefs, and behaviors of individuals, households, organizations, and communities at various geographic scales. The GLRWP suggests that social indicators used in water quality management plans and outreach efforts are effective for several reasons including:

- Help watershed committee evaluate projects related to education and outreach;
- Help support improvement of water quality projects by identifying why certain groups install Management Measures while other groups do not;
- Measure changes that take place within grant and project timelines;
- Help watershed committee with information on policy, demographics, and other social factors that may impact water quality;
- Measure outcomes of water quality programs not currently examined.

GLRWP has developed a Social Indicators Data Management and Analysis Tool (SIDMA) to assist watershed stakeholders with consistent measures of social change by organizing, analyzing, and visualizing social indicators related to non-point source (NPS) management efforts. Detailed information about GLRWP's social indicator tool can be found at: http://35.8.121.111/si/Home.aspx.

To summarize, the SIDMA tool uses a seven-step process to measure social indicators as shown in Figure 75.

Several potential social indicators could be evaluated by the Steering Committee using different strategies to assess changes in water quality. For example, surveys, public meetings, and establishment of interest groups can give an indication of the public feelings about the water quality in the watershed. It is important to involve the public in the water quality improvement process at an early stage through public meetings delineating the plans for improvement and how it is going to be monitored. Table 55 includes a list of potential social indicators and measures that can be used by the watershed committee to evaluate the social changes related to water quality issues.

Monitoring social indicators in the watershed should be the responsibility of Upper South Branch Kishwaukee River Watershed Steering Committee. On-line internet surveys are among the most popular method to gauge social behavior toward water quality. Demographic information on a county basis can be obtained from the U.S. Census Bureau but will need to be modified based on the watershed boundary. This information is then used to select a random sample of individuals in the watershed. Next, a survey is developed that identifies citizens' perceptions of water quality problems and protections strategies. Citizens that respond to the survey are given a chance to donate a small amount of money ($1 for example) to a not for profit environmental group, then sent thank you letters, while those that did not respond should be sent a second survey. The results of the survey can be used to develop appropriate media, citizen awareness, and watershed management activities to support social behavior that will improve the watershed.

Figure 75. Steps to measure social indicators.

Table 55. Social indicators and measures to understand behavior toward watershed issues.

Social Indicator	Measure
Media Coverage	• # of radio broadcasts related to watershed protection • # of newspaper articles related to watershed protection • # of press releases relate to watershed protection • # of social media posts related to watershed protection
Resident Awareness	• # of residents who are aware a watershed plan exists • # of informational flyers distributed per given time period • % of citizens who are able to identify where pollution is originating from • % change in volunteer participation to protect water quality • % change in attendance at water quality workshops and "Volunteer Days"
Watershed Management Activities	• # of watershed signage along roads • # of schools helping implement the watershed monitoring plan • # of residents that perform ecological restoration on their properties • # of stream miles cleaned up per year • # of linear feet or miles of trails created or maintained each year • # of watershed partners who adopt the watershed management plan • # of watershed groups implementing plan recommendations

Water Quality Evaluation Criteria

Water quality criteria (expressed as measurable indicators & targets) have been developed so that water quality objectives can be evaluated over time. The criteria are designed to be compared against data gathered from the Monitoring Plan and other data then analyzed to determine the success of the watershed plan in terms of protecting and improving water quality. These criteria also support an adaptive management approach by providing ways to reevaluate the implementation process if adequate progress is not being made toward achieving water quality objectives.

Section 2 of this plan includes a water quality goal (Goal 3) with six objectives. Criteria are selected for each water quality objective to determine whether components of the water quality goal are being met (Table 56). Criteria are based on Illinois EPA water quality criteria, data analysis, reference conditions, literature values, and/or expert examination. Criteria are also designed to address potential or known sources of water quality impairment identified in Section 5.

Future evaluation of the criteria will allow the Steering Committee to gage plan implementation success or determine if there is a need for adaptive management. Note: evaluation criteria are included for the water quality goal only; criteria for other plan goals are examined within the appropriate progress evaluation "Report Cards" in Section 9.2.

Table 56. Set of criteria related to the water quality goal and objectives.

GOAL 3: Improve Surface Water Quality to Meet Applicable Standards.	
Water Quality Objective	**Criteria: Indicators and Targets**
1) Continue existing water quality monitoring programs and implement the Water Quality Monitoring Plan outlined within the plan.	• *Number of Monitoring Programs that continue:* All existing monitoring (IEPA and NIU) continue. • *Number of additional parameters sampled:* Both *E. coli* and macroinvertebrates added to existing monitoring programs. • *Number of implementation projects that include monitoring:* All implementation projects conduct monitoring before and after installation.
2) Implement additional policy recommendations that focus on improving watershed conditions by preserving green infrastructure, protecting groundwater, minimizing road salts, minimizing lawn fertilizer, sustainable management of stormwater, and allowances for native landscaping.	• *Number of policy changes or additions that occur at the local government level:* Additional and more protective policies put in place that address preserving green infrastructure, protecting groundwater, minimizing road salts, minimizing lawn fertilizer, sustainable management of stormwater, and allowances for native landscaping. • *Social Indicator:* 100% of municipal decision makers know the importance of additional policy and protections that improve watershed conditions.
3) Restore 298,920 linear feet of riparian areas buffers and spot stream stabilization along all High Priority and Medium Priority stream reaches.	• *Linear Feet of Restored Stream Reaches:* All 289,920 lf of riparian areas buffers and spot stream stabilization along all High Priority and Medium Priority stream reaches implemented. • *Chemical & Physical Water Quality Standards:* <19 mg/l TSS, <0.0725 mg/l TP, and <2.461 mg/l TN in stream water quality samples. • *Biotic Indexes:* Macroinvertebrate and fish communities achieve at least "Fair" resource quality based on MBI scores respectively. • *Social Indicator:* >50% of surveyed residents know that stream and riparian area conditions are a problem in the watershed and support stream restoration efforts.
4) Implement 708 acres of other management measures recommended in this plan.	• *Acres of Other Management Measures implemented:* All 708 acres of other management measure identified in plan are implemented. • *Social Indicator:* >50% of surveyed residents know the importance of other management measure restoration projects.
5) Implement 175 acres of site-specific and 19,658 acres of programmatic recommendations on agricultural land identified in the plan.	• *Acres of Site-Specific Projects Installed:* All 175 acres of agricultural areas in need of additional grass waterways or vegetated swales installed. • *Number of Landowners Increasing Residue:* All 19,658 acres of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands. • *Social Indicator:* >75% of farmers know the importance of reduced or no-till farming for reducing pollutants to Upper South Branch Kishwaukee River.
6) Track changes in water quality over time and make adaptive management changes to the plan as necessary to ensure water quality improvements toward meeting identified pollutant load reductions.	• *Monitor changes in TP, TN, and TSS:* Track changes in TP, TN, and TSS over time. • *Chemical & Physical Water Quality Standards:* <19 mg/l TSS, <0.0725 mg/l TP, and <2.461 mg/l TN in stream water quality samples. • *Number of Adaptive Management Changes Needed:* Track any additional adaptive management changes needed as goal milestone report cards are completed over time.

9.2 Goal Milestones/ Implementation & Progress Evaluation "Report Cards"

Milestones are essential when determining if Management Measures are being implemented and how effective they are at achieving plan goals over given time periods. Tracking milestones allows for adaptive management whereby periodic plan updates and changes 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. Criteria that reflect these characteristics may be used as a measure of watershed health. Goals and objectives in the watershed plan determine which criteria should be monitored to evaluate the success of the watershed plan.

A successful watershed plan involves stakeholder participation to get projects completed and must include a feedback mechanism to measure progress toward meeting goals. Watershed "Report Cards," developed specifically for each goal in this plan, provide this information. Each Report Card provides:

- Summaries of current conditions for each goal to set the stage for what efforts are needed
- Most important performance criteria related to goal objectives (see Section 2.0)
- Milestones for various time frames
- Monitoring needs and efforts required to evaluate milestones
- Remedial actions to take if milestones are not met
- Notes section

Report Cards were developed for each of the six plan goals and are located at the end of this section. The milestones are generally based on "Short Term" (1-10 years; 2020-2030) and "Long Term" (10-20 years; 2030-2040) objectives. Grades for each milestone term should be calculated using the following scale: 80%-100% of milestones met = A; 60%-79% of milestones met = B; 40%-59% of milestones met = C; and < 40% of milestones met = failed.

Report Cards should 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. Lack of progress could be demonstrated in factors such as monitoring that shows no improvement, new environmental problems, lack of technical assistance, or lack of funds. In these cases, the Report Card user should explain why other factors resulted in milestones not being met in the notes section of the Report Card.

Early on in the plan implementation process, the Steering Committee should assign or hire a Watershed Implementation Coordinator to call meetings and update the committee on plan implementation progress by way of the Report Cards. If needed, adaptive management should be implemented accordingly by referencing the adaptive management recommendations on each Report Card then developing a strategy to either change the milestone(s) or decide how to implement projects or actions to achieve the milestone(s).

Report Cards can be evaluated at any time. However, it is recommended that they be evaluated at least every five years to determine if sufficient progress is being made toward achieving milestones or if adaptive management is needed.

Goal 1 Report Card

Build stakeholder awareness of watershed issues through education and stewardship while increasing communication and coordination among stakeholders.

Current Condition:

Many of the stakeholders in the watershed have been active in the creation and leadership of the Upper South Branch Kishwaukee River Watershed Improvement Plan. Key stakeholders include the DeKalb County Community Foundation, DeKalb County SWCD, the Cities of DeKalb and Sycamore, the Villages of Malta and Shabbona, DeKalb County, local drainage districts, Kishwaukee Water Reclamation District, the Forest Preserve District of DeKalb County, the DeKalb Park District, Illinois Tollway, Illinois Environmental Protection Agency, Northern Illinois University, Illinois Department of Natural Resources, and many private residents and land owners. These groups, led by the DeKalb County Soil & Water Conservation District and the DeKalb County Community Foundation, are actively engaging the public in watershed activities such as: educational seminars, watershed outings and bus tours, Regenerative Agriculture workshops, Name-That-Stream programs, water quality monitoring, and extensive public education programs and outreach events. The planning process has allowed watershed partnerships to form that will help with implementing the watershed plan and initiating projects.

Criteria/Targets to Meet Goal Objectives:

- Number of Education Actions completed from Information & Education Campaign.
- Number of public officials that support conservation design and low impact development ordinance language changes.
- Number of agricultural landowners that are informed about healthy land management.
- Number of riparian landowners that are informed about healthy land management.
- Number of educational and environmental interpretation signs posted throughout the watershed.
- Number of people attending public education events regarding fertilizer, road salt, and pet waste disposal.

Goal/Objective Milestones:		Grade
1-10 Yrs: (Short)	1. At least half of Education Actions completed from Information & Education Campaign. 2. At least one municipality adopts conservation design and LID within their ordinances. 3. At least 25% of agricultural landowners are educated about healthy land management. 4. At least 25% of riparian landowners are educated about healthy land management. 5. Educational signage is installed in at least three locations in the watershed. 6. At least 50 people per year attend fertilizer, road salt, and pet waste disposal education campaigns.	
10-20 Yrs: (Long)	1. All Education Actions completed from Information & Education Campaign. 2. At least 3 municipalities or the county adopt conservation design, LID within their ordinances. 3. At least 50% of agricultural landowners are educated about healthy land management. 4. At least 50% of riparian landowners are educated about healthy land management. 5. Educational signage is installed in at least six locations in the watershed. 6. At least 100 people per year attend fertilizer, road salt, and pet waste disposal education campaigns.	

Monitoring Needs/Efforts:

- Track number of Education Actions completed from Information & Education Campaign
- Track number of public officials with each municipality that support conservation design and low impact development.
- Track amount of information targeted to agricultural and riparian landowners.
- Track number of educational signs that are installed in the watershed.
- Track number of people that attend education campaigns for management of fertilizer, road salt use, and pet waste.

Remedial Actions:

- Ask partners for funding to implement the watershed plan and Information & Education Campaign.
- Meet with public officials to discuss the importance of conservation design and LID ordinance changes.
- Ask municipalities for funding related to creating and installing watershed signage.
- Actively recruit public to attend watershed education campaigns.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 2 Report Card

Protect and manage natural and cultural components of the Green Infrastructure Network and improve fish and wildlife habitat.

Current Condition:

- Ecological communities were balanced ecosystems with clean water and diverse with plant and wildlife populations among prairies, wetlands, and woodlands prior to European settlement in the 1830s.
- Following European settlement, fires rarely occurred, prairies were tilled for farmland or developed, wetlands were drained, woodland corridors were harvested for timber, and several streams were channelized.
- Degraded or lacking riparian areas and invasive species establishment are causing loss of wildlife habitat and reduced floodplain function.
- Important Natural Areas in the watershed include P.A. Nehring Forest, County Farm Woods, Elwood Park, Hopkin's Park, and Prairie Park.
- Eight Natural Area Restoration sites and 3 Golf Course Naturalization projects were identified in the Action Plan.

Criteria/Targets to Meet Goal Objectives:

- All local governments include the Green Infrastructure Network (GIN), conservation design, and low impact development standards in comprehensive plans and development review maps.
- Riparian buffers along 32 critical area stream reaches are enhanced for wildlife habitat, pollutant filtration, and floodplain storage purposes.
- Detailed ecological management plans are developed for all 8 Natural Area Restoration sites.
- All golf courses within the GIN incorporate native landscaping.
- >50% of landowners within the GIN take steps to manage land for green infrastructure benefits.

Goal/Objective Milestones:		Grade
1-10 Yrs: (Short)	1. At least half of local governments include the GIN, conservation design, and LID in comprehensive plans and development review maps. 2. At least 16 riparian buffers along priority stream reaches are enhanced. 3. Detailed ecological management plans are developed for 4 Natural Area Restoration sites. 4. At least one golf course implements native landscaping recommendations. 5. At least 25% of landowners within GIN manage their land for green infrastructure benefits.	
10-20 Yrs: (Long)	1. All local governments include the GIN, conservation design, and LID in comprehensive plans and development review maps. 2. All 32 riparian buffers along priority stream reaches are enhanced. 3. Detailed ecological management plans are developed for all 8 Natural Area Restoration sites. 4. All (3) golf courses implement native landscaping recommendations. 5. At least 50% of landowners within GIN manage their land for green infrastructure benefits.	

Monitoring Needs/Efforts:

- Track number of local governments adopting GIN, conservation design and LID standards.
- Track number of riparian buffer projects implemented each year that include ecological benefits.
- Track management plan status and implementation progress at Natural Area Restoration sites.
- Track implementation progress at golf course naturalization sites.
- Track landowner management practices within the GIN.

Remedial Actions:

- Work with IEPA, DeKalb County SWCD, and others identified in Appendix E to find funding for riparian are restoration projects.
- Appropriate entities prepare budgets for creating and implementing ecological management plans.
- Hold additional meeting with landowners to educate them on need for managing their land as part of the green infrastructure network.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 3 Report Card

Improve surface water quality to meet water quality standards.

Current Conditions:

- According to IEPA's most recent 2018 Integrated Water Quality Report and Section 303(d) List, Upper South Branch Kishwaukee River is "Fully Supporting" for Aquatic Life, "Not Supporting" for Fish Consumption, and the upper half of the Kishwaukee is also "Not Supporting" for Aesthetic Quality; neither reach was assessed for Primary Contact Recreation. Analyzing all of the data suggests that there is moderate impairment to the Upper South Branch Kishwaukee River due to elevated phosphorus, nitrogen, total suspended solids, and *E. coli* levels.
- The majority of non-point source pollutants are originating from agricultural and urban sources and streambank erosion.

Criteria/Targets to Meet Goal Objectives:

- All 20 "High Priority-Critical Area" detention basins retrofitted.
- All 10 "High Priority-Critical Area" wetlands restored.
- All 32 (215,995 lf) "High Priority-Critical Area" stream and riparian area reaches restored.
- All 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed.
- All 39% (19,658 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands.
- All 13 Other Management Measures identified as "High Priority-Critical Area" implemented.

Goal/Objective Milestones:		Grade
1-10 Yrs: (Short)	1. At least half (10 of 20) of "High Priority-Critical Area" detention basins retrofitted. 2. At least 5 of 10 "High Priority-Critical Area" wetlands are restored. 3. At least 16 of 32 "High Priority-Critical Area" stream and riparian area reaches are restored. 4. At least 2 or 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed. 5. At least 20% (or 9,829 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands. 6. At least 7 of 13 "High Priority-Critical Area" Other Management Measures are implemented.	
10-20 Yrs: (Long)	1. All 20 "High Priority-Critical Area" detention basins retrofitted. 2. All 10 "High Priority-Critical Area" wetlands restored. 3. All 32 (215,995 lf) "High Priority-Critical Area" stream and riparian area reaches restored. 4. All 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed. 5. All 39% (19,658 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands. 6. All 13 Other Management Measures identified as "High Priority-Critical Area" implemented.	

Monitoring Needs/Efforts:

- Track implementation of restoration projects (agricultural, stream, detention basin, wetland, other management measures.
- Track implementation of grass waterways/swales and tillage practices and amount of residue on existing cropland by acre.

Remedial Actions:

- Locate and track grants that are being submitted for recommended stream, wetland, detention basin, and other management measure projects and determine success rate.
- NRCS/SWCD contact farmers to determine barriers to implementing higher residue tillage practices or grass waterways/swales.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 4 Report Card

Encourage agricultural techniques and soil conservation practices that will protect and conserve topsoil, improve soil health, and protect our water resources.

Current Condition:

- Agricultural land comprises virtually 80% of the watershed at 50,405 acres and as such can affect the most widespread improvements in watershed health.
- Watershed health faces challenges and threats from agricultural land and the pollutant loading model suggests that cropland areas are the leading cause of nutrient and sediment loading in the watershed. Since a significant amount of the watershed is held as private agricultural property, any efforts to improve water quality will need to include significant education, outreach, and funding efforts targeting the agricultural community.
- 4 "High Priority-Critical Area" agricultural areas were found in need of additional grass waterways or vegetated swales.
- The 2018 Illinois Soil Conservation Transect Survey conducted by DCSWCD identified the most common tillage practice in the watershed as reduced till with 34 of fields (39.1% of fields). Mulch till was practiced on 27 fields (31.0%), while conventional tillage was found on 20 of fields (23.0%). No-till was found at 5 sites, or 5.7% of the surveyed sites.

Criteria/Targets to Meet Goal Objectives:

- At least one agricultural related workshop dedicated to the topics of cost-share programs, regenerative agriculture and/or the principles of soil health, and the importance of buffers held annually.
- At least one workshop dedicated to implementation of additional conservation practices is held annually.
- All 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed.
- All 39% (19,658 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands.
- Number of landowners utilizing NRCS cost share programs and supporting the IL NLRS increases over time.

Goal Milestones:		**Grade**
1-10 Yrs: (Short)	1. Ten agricultural related workshops dedicated to cost-share programs, regenerative agriculture and/or the principles of soil health, and the importance of buffers are held. 2. Ten workshops dedicated to implementation of additional conservation practices are held. 3. At least 2 or 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed. 4. At least 20% (or 9,829 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands. 5. Number of landowners utilizing NRCS programs and supporting IL NLRS increases by 10%.	
10-20 Yrs: (Long)	1. Ten agricultural related workshops dedicated to cost-share programs, regenerative agriculture and/or the principles of soil health, and the importance of buffers are held.All (100%) of stream restoration projects in coldwater reaches include detailed fish habitat designs. 2. Ten workshops dedicated to implementation of additional conservation practices are held. 3. All 4 "High Priority-Critical Area" agricultural areas in need of additional grass waterways or vegetated swales installed. 4. All 39% (19,658 acres) of existing cropland landowners already participating in reduced or low residue tillage (30-59% residue) to increase residue to 60% or more on their lands. 5. Number of landowners utilizing NRCS programs and supporting IL NLRS increases by 20%.	

Monitoring Needs/Efforts:

- Track number of conservation practice workshops held every 10 years.
- Track number of cost-share programs, regenerative agriculture and/or the principles of soil health, and buffers workshops held every 10 years.
- Track number of agricultural landowners participating in NRCS cost-share programs.
- Track number of agricultural landowners/acres where recommended agricultural management practices or increased tillage residue are implemented.

Remedial Actions:

- Counties work with NRCS/SWCD to raise funds for and/or sponsor agricultural related workshops.
- Counties work with NRCS/SWCD to increase participation in existing programs.
- NRCS/SWCD approach individual landowners to offer assistance with implementing management practices.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 5 Report Card

Protect groundwater quantity and quality.

Current Conditions:

- The shallow aquifers are found in unconsolidated sand and gravels within the Quaternary Unit. An impermeable layer of bedrock separates the shallow aquifers from the deep aquifers found in layers of sandstone within the Ancell Unit, Ironton-Galesville Unit, and Mt. Simon Unit. Both shallow and deep aquifers are tapped and used by residences, farms, or entire communities.
- A 2012 study by Illinois State Water Survey suggests relatively modest increases in groundwater withdrawals will be seen between 2005 and 2050 of up to about 5 mgd in the Quaternary and future water levels in the deep bedrock aquifers are projected to remain stable in the Upper South Branch Kishwaukee River watershed planning area.
- Modeling also suggests that drawdown could reach 150 feet in the Ancell Unit and up to 700 feet in the Galesville Unit by 2050.
- Septic systems are common in throughout the unincorporated portions of DeKalb County and estimated at 1,232 systems in the watershed, yet little is known about the conditions of these systems.
- Traditional development over the past 30-40 years generally did not incorporate groundwater infiltration practices.

Criteria/Targets to Meet Goal Objectives:

- DeKalb County identifies and encourages replacement of potentially failing septic systems.
- DeKalb County educates homeowners on septic system maintenance and private well testing.
- 10 downspout disconnection practices installed at homes or businesses every 10 years.
- Stormwater Treatment Train, Conservation Design, or LID practices are used in all new and redevelopment.

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1. Counties/homeowners identify and replace half of potentially failing septic systems. 2. At least 1 workshop conducted annually regarding septic system maintenance and private well testing. 3. At least 10 downspout disconnection practices are installed as homes or businesses. 4. Stormwater Treatment Train, Conservation Design, or LID practices are used in all new and redevelopment.	
10-20 Yrs: (Long)	1. Counties/homeowners identify and replace all potentially failing septic systems. 2. At least 1 workshop conducted annually regarding septic system maintenance and private well testing. 3. At least 10 downspout disconnection practices are installed as homes or businesses. 4. Stormwater Treatment Train, Conservation Design, or LID practices are used in all new and redevelopment.	

Monitoring Needs/Efforts:

- Track number of potentially failing septic systems and number replaced each year.
- Track number of workshops conducted regarding septic system maintenance and private well testing.
- Track number of downspout disconnection practices installed each year.
- Track development that uses Stormwater Treatment Train, Conservation Design, or LID practices.

Remedial Actions:

- County develops additional funding sources for homeowners to replace potentially failing septic systems.
- Municipalities develop funding sources for homeowners and businesses to install downspout disconnection practices.
- Meet with municipalities to review policy changes related to developments.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 6 Report Card

Manage and mitigate for existing and future structural flood problems.

Current Condition:

- Subwatershed Management Units 17, 20, 23, 24, 25, 28, 30, 31, and 34 identified as "Highly Vulnerable" to future development changes and associated impervious cover.
- FEMA's 100-year floodplain occupies 1,828.7 acres or 3% of the watershed along the Upper South Branch Kishwaukee River.
- 8 documented Flood Problem Areas (FPAs) were identified, all of which are considered examples of Overbank Flooding.
- According to existing wetland inventories, about 1,570 acres or 6% of the pre-European settlement wetlands remain.

Criteria/Targets to Meet Goal Objectives:

- Stormwater Treatment Train, Conservation Design, or LID practices are used in all new and redevelopment within Highly Vulnerable SMU's 17, 20, 23, 24, 25, 28, 30, 31, and 34.
- Limited or no development is allowed within FEMA's 100-year floodplain.
- All 8 (100%) overbank flooding Flood Problem Areas (FPAs) are addressed.
- All 10 (100%) critical wetland restoration recommendations implemented.

Goal/Objective Milestones: **Grade**

1-10 Yrs: (Short)	1. Stormwater Treatment Train, Conservation Design, or LID practices are used in at least half of new and redevelopment within Highly Vulnerable SMU's. 2. Limited or no development is allowed within FEMA's 100-year floodplain. 3. At least 4 of 8 overbank flooding Flood Problem Areas are addressed. 4. At least 5 (50%) critical wetland restoration recommendations implemented.	
10-20 Yrs: (Long)	1. Stormwater Treatment Train, Conservation Design, or LID practices are used in at all new and redevelopment within Highly Vulnerable SMU's. 2. Limited or no development is allowed within FEMA's 100-year floodplain. 3. All 8 (100%) overbank flooding Flood Problem Areas (FPAs) are addressed. 4. All 10 (100%) critical wetland restoration recommendations implemented.	

Monitoring Needs/Efforts:

- Track number of Stormwater Treatment Train, Conservation Design, or LID practices are used in new and redevelopment within Highly Vulnerable SMU's 17, 20, 23, 24, 25, 28, 30, 31, and 34.
- Track number of developments that are allowed within FEMA's 100-year floodplain.
- Track number of Flood Problem Areas addressed.
- Track number of critical wetland restoration recommendations implemented.

Remedial Actions:

- Meet with municipalities that do not encourage Stormwater Treatment Train, Conservation Design, or LID practices in Highly Vulnerable SMU's 17, 20, 23, 24, 25, 28, 30, 31, and 34.
- Meet with municipalities that allow development within FEMA's 100-year floodplain.
- Conduct follow-up visits to Flood Problem Area sites during flood events to determine if additional remedial work is needed.
- Meet with critical wetland restoration landowners to encourage implementation and assist with funding if needed.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.