

DRAFT

JOHNSON COUNTY STORMWATER MANAGEMENT 2016 STRATEGIC PLAN IMPLEMENTATION

Water Quality Focus Whitepaper



PREPARED ON BEHALF OF

Johnson County Public Works & Infrastructure
Urban Services Division

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I. INTRODUCTION

During the development of the 2016 Strategic Plan, the project team established that the State of Practice for stormwater management considered additional elements not currently in the program including watershed-level planning, water quality improvements, asset management and alternative funding. To keep with national State of Practice and to better address stormwater issues for stakeholders in Johnson County, the Board of County Commissioners (BOCC) adopted the Johnson County Stormwater Management 2016 Strategic Business Plan (2016 Plan), which states that the Stormwater Management Program (SMP) will enhance its efforts to improve water quality within and leaving Johnson County. This will include funding water quality improvement projects and developing additional programs to assist watershed committees.

Nationally, much of the focus on stormwater has expanded from flood damage reduction and public safety to stormwater quality concerns. Many of the SMP’s peer programs are concerned with meeting water quality regulatory requirements and meeting stakeholder concerns around quality of life and the condition of the environment. The SMP of the future will increase emphasis on water quality while continuing investments in flood damage reduction and public safety.

Water quality issues are best addressed on a watershed basis. Activities that occur in upstream areas of a watershed or within separate subbasins can affect water quality in other portions of the watershed, regardless of state, city, or development boundaries. Therefore, the shift to a watershed-based program, from what could currently be described as a municipal-based program, is particularly important for water quality projects. Using a watershed framework, planners will be better able to understand water quality problems and their sources and identify solutions that fit within the overall SMP.

Specific objectives related to developing a water quality focus were included in the 2016 Plan, providing direction for incorporating water quality in the SMP in the future. Those objectives are shown in Table 1 below.

Table 1: Waters Quality Focus Strategic Objectives

IMPLEMENTATION PHASE	WATER QUALITY FOCUS OBJECTIVES
PHASE I	<ul style="list-style-type: none"> • Develop funding criteria and procedures for water quality improvement projects as stand-alone projects • Define watershed specific goals for water quality improvement based on established water quality impairment and total maximum daily loads (TMDLs) • Develop plan to assist cities with compliance/implementation
PHASE II	<ul style="list-style-type: none"> • Implement funding criteria and procedures for water quality improvement projects County-wide • Meet watershed-specific metrics established in Phase I • Comply with established TMDL requirements and work towards removing streams from Kansas 303d list

The transition from a municipally-based program to a watershed-based program and the inclusion of a water quality focus represents significant changes in the implementation of the SMP. These changes require the careful consideration of several different factors. The Water Quality Focus Subcommittee (WQF sub-committee) will be looking at how the County should define and address

water quality issues. The logical outcome of the group will be the establishment of water quality goals and prioritization of water quality projects. This White Paper seeks to help the WQF sub-committee to better understand how others have addressed water quality projects, and to offer suggestions on approaches that could be used to prioritize water quality projects for funding purposes.

II. CASE STUDIES

It is easy for stakeholders who deal with the SMP on a regular basis to lose sight of just how unique the program is on a national scale. The Program is blessed with a dedicated funding source and exists to help fund infrastructure improvements owned by others. This point was driven home during the Strategic Planning effort, as the project team was looking for ‘similar’ programs. For the purposes of the 2016 Plan, the term ‘similar’ was defined as stormwater programs that dealt with multiple municipal stakeholders. This definition served the project team and the Steering Committee well, helping them to establish a national State of Practice on various facets of stormwater programs.

Likewise, when considering case studies for the WQF sub-committee’s review, a lack of perfectly analogous examples presents itself. No program that was identified and reviewed matched the SMP’s circumstances, drivers and diverse stakeholder set exactly. It is apparent to the project team that whatever guidance and practices the WQF sub-committee decides to recommend or adopt from other programs, Johnson County’s program will be unique. There is no one program that the SMP could simply ‘copy’ and continue to meet its own goals and stakeholder concerns.

Programs Reviewed Include:

Kansas Wraps Program
Metropolitan Sewer District of Greater Cincinnati Integrated Prioritization System (IPS)
New York State Guidance
Central Orange County Watershed Management Area (CA)
Cayuga Lake Watershed Inter-municipal Organization (NY)
Cherry Creek Water Quality Authority (CO)

The case studies presented offer an introduction to some common issues, as well as a diverse look at how programs are addressing those issues.

KANSAS WATERSHED RESTORATION AND PROTECTION STRATEGY (WRAPS)

The Kansas WRAPS program is a process that encourages citizens and other stakeholders to work together to protect and restore Kansas watersheds. The WRAPS process consists of 4 stages:



- Identifying the watershed restoration and protection needs
- Establishing watershed goals
- Creating actions steps/plans to achieve the established goals
- Implementing the plans

Currently, 36 WRAPS projects have completed the first three steps of the WRAPS process and are implementing their plans. To obtain funding for project implementation, projects must have an approved watershed plan. Funding for the WRAPS program is through the Environmental Protection Agency (EPA) Section 319 and the Kansas State Water Plan; administered by a program advisory board, the WRAPS Work Group.

The EPA has identified nine key elements that are to be included within watershed plans that obtain Clean Water Act section 319 funds. The key elements that are to be included in all KDHE-approved watershed plans are as follows:

- Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan.
- An estimate of the load reductions expected from management measures.
- A description of the nonpoint source management measures that will need to be implemented to achieve load reductions and a description of the critical areas in which those measures will be needed to implement the plan.
- Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the plan.
- An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.
- Schedule for implementing the nonpoint source management measures identified in the plan that is reasonably expeditious.
- A description of the interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.
- A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.
- A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under the previous element.

The WRAPS Work Group uses a Priority Scoring Matrix which has recently been updated. Using the new matrix, projects will be scored based on their respective State Interest Priority Scoring (SIPS) and a new Implementation Score. The SIPS and Implementation score account for 60 percent and 40 percent, respectively of the project priority score. Each of these two primary scores has several factors and KDHE has defined how points should be attributed for each factor. The factors along with their weight in the scoring are:

State Interest Priority Scoring

303 (d) list category 5 waters (6.67%)
Priority TMDLs (22.22%)
Exceptional State/National Resource Waters (6.67%)
Public water supply (13.33%)
Sensitive groundwater area (2.22%)
Reservoir public water supply (13.33%)
Reservoir Sedimentation (13.33%)
Nutrients (13.33%)
Forestry resources (8.89%)

Implementation Scoring

BMP targeted funding (11.9%)
Time efficient targeting of BMP funds (11.9%)
Leveraging of other existing cost share (9.52%)
Most cost effective BMPs (11.9%)
% of annual load reduction achieved (14.29%)
Water quality milestones achieved (14.29%)
Delisted waters (19.05%)
Previously delisted waters (7.14%)

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI (MSDGC)

The Metropolitan Sewer District of Greater Cincinnati (MSDGC) provides wastewater collection and treatment for residents and businesses in Hamilton County, Ohio and small portions of adjoining counties. MSDGC's mission is to protect public health and the environment through wastewater reclamation and watershed management. Water quality is an essential element of Project Groundwork, a multi-year and multi-billion-dollar initiative to reduce sewer overflows into rivers and streams.



Working toward the goal of understanding and improving water quality, MSDGC conducted a major multi-year study (2011-2014) to benchmark and monitor water quality and aquatic habitat in the Mill Creek, Little Miami River, Great Miami River and Ohio River and their tributaries through comprehensive biological, chemical, and physical sampling and analysis. The goals of the biotic, habitat, and water quality assessment studies were to:

- Establish a baseline for water quality and aquatic habitat to gauge improvements over time.
- Identify stressors to water quality and aquatic habitat
- Identify the overall health of each aquatic system, as indicated by attainment of Ohio EPA water quality standards
- Use the data - via the Integrated Prioritization System (IPS) - to help prioritize Capital Improvements Projects to improve water quality and aquatic habitat in each of these waterways.

The MSDGC Integrated Priority System (IPS) Data Exploration Tool was developed to assist in the prioritization of environmental restoration projects by synthesizing and analyzing large amounts of data collected over a number of years, a range of conditions, and presenting it in a comprehensive database format. The tool presents an understandable picture of the current condition of stream and river sites, reaches, and watersheds within the MSDGC service area. Both high quality and impaired sites and reaches are identified and assigned a restorability rating for impaired sites and a threatened and susceptibility rating for sites that are attaining their applicable WQS. This information is intended to assist in the setting of priorities for restoration projects and capital planning and also to assist in planning for future growth of the MSDGC service area.

A major IPS output are the restorability and susceptibility/threat rankings (Figure 1) that are communicated by a simple to use color code system. From there, this rating system can be used to show trends that are more granular in nature than simply whether a waterbody “meets” or “doesn’t meet” WQS. The color code system can reveal a trend of improvement from the abatement of stressors and can be used to help MSDGC plan for and document its best return on investments.

Individual Stressor and Response Variables (0-10 Scale)			Summary Restorability, Susceptibility and Threat Scores (0-100 Scale)		
Narrative Condition Scale/Aquatic Life Use Tier ¹		Stressor Rank	Restorability	Susceptibility	Threat
Excellent	EWH	0.1-2.0	<i>A restorability score is not assigned to sites that attain their designated use.</i>	50-100 High	Low 0-50
Good	WWH	2.01-4.0		0-50 Low	High 51-100
Fair	MWH	4.01-6.0	High 67-100	<i>A susceptibility or threat score is not assigned to impaired sites.</i>	
Poor	LRW	6.01-8.0	Intermediate 34-66		
Very Poor	-	8.01-10.0	Low 0-33		

1 – EWH = Exceptional Warmwater Habitat (“Excellent”); WWH = Warmwater Habitat (“good”); MWH = Modified Warmwater Habitat (“Fair”); LRW = Limited Resource Waters (“Poor”); “Very Poor” is below minimum acceptable condition under the CWA.

Figure 1: IPS conventions for ranking individual stressor and response variables and for total scores for Restorability, susceptibility and Threat

NEW YORK STATE GUIDANCE

The State of New York issued guidance on the preparation of watershed plans. The guidance does not include a system for prioritization of projects but does provide guidance on how to prioritize watersheds to identify the best opportunities for improvements and guidance on developing reasonable goals for each watershed area based on existing conditions.

The guidance states that by prioritizing watersheds it is possible to target priority areas. Priority watersheds are typically those that are currently impaired, are the most vulnerable to future development, contain important resources, or present the best opportunity for improvement. The guidance recommends that watershed planners select a manageable number of factors for comparison. These factors could then be used to score and weigh the watersheds. Some of the factors that could be considered for comparison are listed below. A manageable number of factors would include just a few from each category.

Example Factors Used to Classify and Rank Watersheds

Impairment

- % streams on 303(d) listing,
- # violations of water quality standards
- % impervious cover (current)
- % cropland
- Livestock density
- % forested stream buffer

Sensitivity

- % forest cover or % forest interior
- % critical habitat for rare, threatened and endangered species
- % wetlands
- Benthic macroinvertebrate diversity
- Fish diversity
- Physical in-stream habitat

Future Vulnerability

- % future impervious cover
- Net change in future impervious cover
- % developable land
- % future forest loss

Restoration Potential

- Length of eroded stream bank
- Condition of sewer system
- Density of point sources or hotspots
- Density of septic systems
- Density of stormwater outfalls
- Density of stormwater treatment practices
- # road crossings per stream mile
- % detached residential land
- Age of development

Other useful metrics

- Density of streams
- % public land
- Presence of community or watershed organization
- Presence of public drinking water supply
- Presence of combined sewer systems

The guidance also recommends using the Impervious Cover Model (ICM) developed by the Center for Watershed Protection to help predict current and future water resource conditions and develop improvement projects. The simple model assumes that watershed and water quality health begin to decline when impervious cover exceeds 10%, with severe degradation expected beyond 25%. Using the ICM, watersheds can be grouped into one of four categories to help set watershed goals.

The four watershed categories are:

- Sensitive (<10% impervious cover) - good to excellent water quality, typically high, stable channels, excellent habitat structure, and diverse fish and aquatic insect communities.
- Impacted (10-25% impervious cover) - clear signs of degradation due to changing land use such as increased urban development.
- Non-supporting (26-60% impervious cover) - channels highly unstable, exhibit severe widening, down-cutting, and streambank erosion.
- Urban drainage (>60% impervious cover) - stream often piped underground, or consists of concrete channels that do not support any aquatic life and serve only to convey flows.

The guidance states that the ICM allows predictions to be made based on build-out of current zoning to better understand which watershed may become degraded over time. Using the ICM, can provide a clearer understanding of the potential impacts and problems affecting specific watersheds and determine where potential protection measures should be focused, and where more intensive nonpoint source pollution management is needed. The guidance also provides information on the appropriate goals for each category of watershed.

CENTRAL ORANGE COUNTY WATERSHED MANAGEMENT AREA

In 2003, Orange County, California led the drafting of a countywide water quality strategic plan which resulted in the development of watershed-based management structures. Three Watershed Management Areas (WMAs) were created that combined the eleven watersheds in the County based on similar characteristics. Member agencies of the WMAs voluntarily formed via a Cooperative Agreement and established or adopted governing bodies.

As an example, the Central WMA is governed by the Newport Watershed Executive Committee. The Executive Committee was an existing body that was previously founded to oversee the implementation of sediment control measures in the Newport Bay Watershed. The Committee expanded its role to include the governance of the Central WMA so as to assist the community in collaborative efforts to receive funding for Integrated Regional Water Management Plans (IRWMPs).

Current members of the Executive Committee include representatives from 6 area municipalities, Orange County, Orange County Flood Control District, the California Department of Fish and Wildlife, a local water district, a regional water quality control board, and a municipal real estate development company. The key responsibility of the Executive Committee is to oversee policy and budget decisions related to the Central WMA. A Management Committee develops joint work plans and carries out the work directed by the Executive Committee.

The WMAs receive funding through a variety of sources, including agency resources such as water and sewer rates, general fund revenues, and capital funding. Such investments, however, are limited so the Integrated Regional Water Management Plans (IRWMPs) were drafted as key tools to access federal, state, and local grant opportunities. The Central WMA recently completed and adopted an IRWMP which includes information on the methodology for project prioritization and ranking criteria.

The plan states that the guiding principles related to goals, objectives and strategies are:

- Flood risk management
- Compliance with water quality regulations
- Nonpoint source pollution
- Aging infrastructure
- Enhancement of local water supplies
- Loss of habitat and poor habitat conditions

Several approaches to project prioritization were considered for the IRWMP. The IRWMP includes a list of the identified ranking criteria for prioritization. The main emphasis of this Plan is regional and local goals for water resources. The management committee identified four main categories of criteria that are relevant to prioritizing projects in the Central Orange County WMA.

Basic ranking criteria and the weight of each category of criteria are:

- Regional/local objectives (33 %) - The ranking criteria are tied directly to the ability to meet the goals and objectives developed for the Central Orange County WMA. Ranking criteria were defined for three regional/local objectives and for subcategories and sub-objectives.
- Regulatory compliance (28 %) - The ranking criteria are based on watershed-related regulatory requirements for the WMA. Criteria were defined for eight issues related to regulatory compliance.
- Project factors (21 %) - The ranking criteria are related to project type (study, plan, or implementation project) and how close a project is to being implemented (permits and matching funds secured). Ranking criteria were defined for nine project factors.
- State objectives (18 %) - the ranking criteria are based on the ability to meet state objectives as listed in Proposition 84. Ranking criteria were defined for 16 state objectives.

The steering committee explored several different processes and decided they would prioritize projects from low to high priority and from short to long term. In addition, they decided to prioritize projects based on a quantified methodology that had been agreed upon by the IRWMP participants. The IRWMP includes tables that list all of the ranking criteria and ranking percentages for each of the four categories of criteria.

CAYUGA LAKE WATERSHED INTER-MUNICIPAL ORGANIZATION

The Cayuga Lake watershed is the largest of the Finger Lakes located in central New York. The lake is fed by a network of 140 streams throughout a watershed that spans 785 square miles of agricultural, industrial, residential, and forested land. Management of the watershed is done by 40+ members of the Cayuga Lake Watershed Intermunicipal Organization (IO) that works together in partnership with a volunteer-based nonprofit.

The IO was originally formed via a grant under the New York State Department of State (NYS DOS) to bring all municipalities in the watershed together to develop and administer a watershed management plan. Membership into the IO is open to all municipalities in the watershed with voting rights given to municipalities that have signed a Municipal Memorandum of Agreement and are current with respect to dues payment. Each municipality is given one vote and a simple majority is needed to pass any motion or resolution.

In 2001, the IO led efforts to draft the Cayuga Lake Watershed Restoration and Protection Plan which was updated in 2017. The updated plan includes a significant amount of new information compiled about the watershed and factors that affect watershed protection such as climate change, regulatory changes, changes in watershed activities and water quality. The plan includes individual chapters that address various elements of watershed protection including public participation, Public watershed and water quality education, agricultural practices and prospects, stormwater



Figure 2: Cayuga Lake Watershed Inter-Municipal Organization Area

management and erosion control, wastewater management, hazardous waste management, forestry and silviculture management, wetland and riparian corridor management, regulatory management, and monitoring and assessment. At the end of each chapter new goals for the element are defined and actions to achieve those goals are identified. The plan lists the top 10 Priority Recommendations for Action. The recommendations for action were drawn from the 2017 plan's individual chapters and the work of water quality experts. The approved recommendations are grouped under four categories: monitoring, stormwater management & erosion control, collaboration and coordination, and public education and engagement. The plan identified many specific focus areas but did not identify projects.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

The Cherry Creek Basin Water Quality Authority was created by the Colorado Legislature in 1988. The organization is statutorily charged with improving, protecting, and preserving the water quality of Cherry Creek and the Cherry Creek Reservoir. Located in metropolitan Denver, the Cherry Creek Reservoir is a vital community asset as an urban recreational amenity. The Cherry Creek watershed encompasses 400 square miles with a diverse set of land uses.



Members of the Authority Board are representatives from eight cities, two counties, and districts that provide water and wastewater treatment in the watershed. In addition, the Board has seven public representatives appointed by the Governor that represent environmental, economic, and sporting interests. Each represented entity is entitled to one vote except for matters regarding the levy and collection taxes, which limit voting privileges to Board members who represent municipalities and counties.

The Authority is funded primarily through property taxes with other sources of revenue coming from recreation fees, building permit fees, and wastewater surcharges. The Authority's latest watershed plan was drafted in 2012 and defines their priorities and implementation strategy. The plan states that the implementation must support the Authority's vision and mission and that the overall goal is to preserve the beneficial uses of the reservoir. The watershed plan defined pollutant sources areas and defined potential management strategies for each of the areas. In a workshop, the Board and technical advisory committee prioritized the pollutant source areas and management strategies. The pollutant source areas were ranked as follows:

- Stream erosion
- Regulated stormwater
- Animal waste
- Agricultural operations
- Water development implications
- Individual septic disposal systems
- Wastewater treatment facilities
- Reservoir sediments
- Other point source discharges

The Authority also stated that good watershed and reservoir science was needed for all of the priority areas and was therefore, also a high priority. As a result, the Authority included development of a stream fate and transport model and a reservoir model in the Action Plan.

The watershed plan also included action plans for the following three years. The action items were identified as planning and evaluation tools and implementation items. Management strategies for high priority areas were included in the first year while lower priority strategies were included in later years. Tasks needed as input to a priority item (such as monitoring) were also included in the first year. The plan also stated that it would be important to define measurable endpoints for beneficial use protection in terms of biologic endpoints, water quality conditions and/or the use of indicator parameters. The models could then be used to identify strategies to best meet the goals.

FINDINGS FROM THE CASE STUDIES

An examination of the case studies indicates that there are many potential approaches to identifying, evaluating and prioritizing projects to improve or protect water quality in a watershed. Some of the findings for the case studies include:

- Defining goals and objectives for the program is a critical step. The ability of a management strategy or project to meet one or more program goals is an important consideration in project prioritization. Most plans also acknowledged the need to reevaluate goals and objectives on a periodic basis.
- Defining the current status of water quality and overall watershed condition was also a critical step. Most case studies included the prioritization of water quality concerns, and/or the ability of management strategies to improve or protect water quality as important factors in their watershed plans.
- Some case studies also identified the need for stream and lake models to aid in the understanding of watershed dynamics and to evaluate watershed projects.
- There was a wide range of prioritization methods including differences in what was prioritized and whether the prioritization was quantitative or qualitative. Case studies showed that the following approaches were used.
 - Evaluate the overall condition of the watershed and prioritize which stream segments or watershed areas should be targeted for improvements.
 - Evaluate the water quality/watershed concern and prioritize which water quality concern/issue should be targeted for improvement.
 - Use a detailed matrix approach to defining criteria and weighting factors to determine a score for project implementation.
 - Use a “professional judgment” approach to identifying priority issues, areas, or projects.
- Many of the case studies had a significant public involvement component.

III. POTENTIAL BARRIERS TO IMPLEMENTATION

As with any significant change to an important program with multiple stakeholders, there exist barriers to change for the SMP. Some specific barriers could include:

Acceptance of new concepts – In addition to funding flooding projects the SMP will now also include water quality. Funding for water quality could be seen by some as taking away available funds for flood control.

Development of watershed-based plans – While the County did develop floodplain mapping county-wide, these maps served a very specific purpose, and do not supply the information needed to meet the future vision of the SMP. Decisions about how best to make improvements within each watershed would require additional studies and planning.

Understanding the measures of success – While a project to alleviate flooding may have almost immediate and visible success, water quality projects normally take longer to yield improvements. It will be important to effectively communicate the expected outcomes of water quality projects and perform monitoring to quantify results.

Use of ‘matching’ funds outside municipal boundaries – Some municipalities may not be willing to make changes that would direct their funds to projects outside their municipal limits.

Of course, there are other significant issues that will need to be addressed over the course of the Strategic Plan implementation, but the above are issues specifically related to the water quality focus.

IV. IMPLEMENTATION APPROACHES

The BOCC’s adoption of the 2016 Plan in October requires fundamental changes in the SMP to include watershed-based planning and incorporate a water quality focus. County leaders have decided this is the best path forward for the SMP’s stakeholders. The change in incorporating water quality projects from the current state to the desired future state is illustrated in Figure 3.

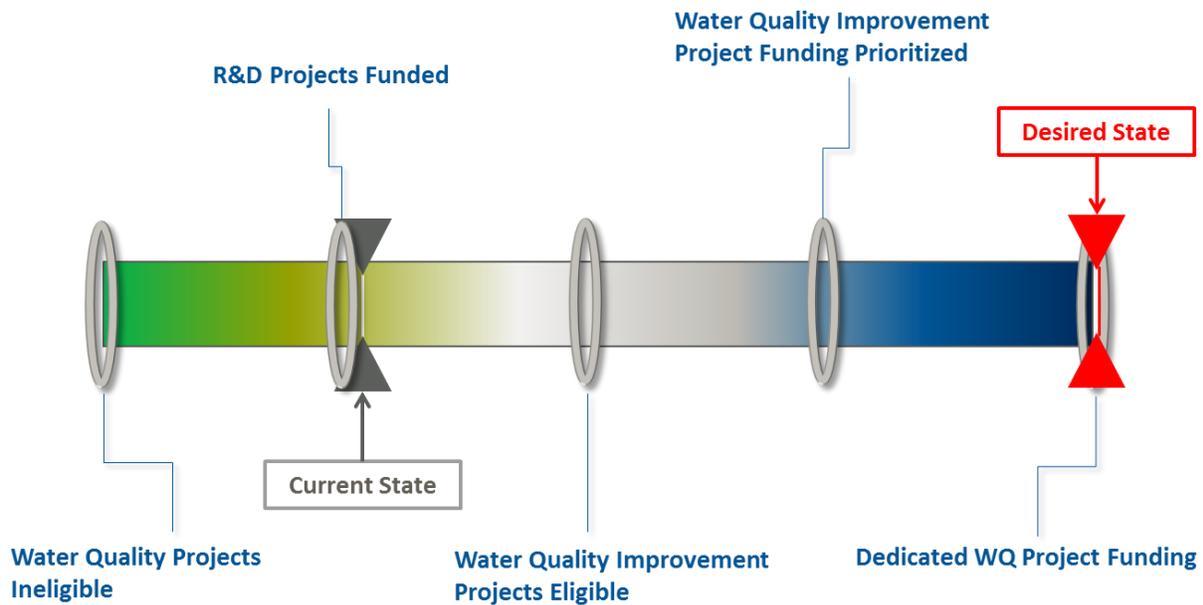


Figure 3: Water Quality Spectrum

The inclusion of water quality projects is certainly an important aspect of State-of-the-Practice programs for stormwater management. Current and anticipated future regulations will require programs to address water quality impairments, including TMDL issues, which will likely be a continuing and increasing concern for Kansas communities. While the timing of increased regulations to address TMDLs is uncertain, it is generally acknowledged, based on how other states have begun to address TMDLs, that at some point in the future, similar requirements may be enforced in Kansas.

Currently, every major watershed in Johnson County including Cedar, Indian, Kill, Mill, and Turkey creeks and the Blue and Kansas Rivers have stream segments on the 303 (d) list of impaired waters. In addition, more than 20 lakes in the county are on the list of impaired waters. The 303 (d) list identifies the beneficial use affected and the parameter of concern. For stream segments, the parameters of concern include bacteria, nitrate, chloride, atrazine, diazinon, total phosphorus, sediment, mercury and an unbalanced biological community. For lakes, the parameters of concern include eutrophication (algae), low dissolved oxygen, atrazine, lead, fluoride, selenium and chlordane. Many of the impaired waters are Category 5 which means they are a low priority for TMDL development. However, some of the impairments are Category 3 or 4, meaning they are a higher priority and TMDL development should be completed sooner.

While the SMP staff provides member municipalities support with MS4 permitting and water quality research projects, full-fledged water quality improvement projects have been outside the purview of the SMP. In addition, water quality projects are best assessed and developed on a watershed-wide basis, which adds another reason for a transition to a watershed-based program.

Determining a method by which water quality projects compete with and are awarded funding in consideration of flood damage reduction projects will be a challenge. One solution would be to have two dedicated budgets, one for flood damage reduction projects and the other for water quality improvement projects. However, some flood reduction projects could produce significant water quality improvements. Alternatively, the individual watershed boards could decide the means by which funds would be assigned within the watershed. Regardless of how funding is portioned between flooding and water quality projects, a method for prioritizing water quality projects will need to be developed.

To evaluate projects using the prioritization method some baseline information must be developed including water quality goals for each watershed and baseline water quality conditions within each watershed. It is anticipated that this information will be developed as part of the individual watershed plans. Specific baseline information includes:

WATER QUALITY GOALS

- Water Quality Goals should be included in each of the watershed plans
- Develop overall goals for the SMP which would apply to all watersheds. For example, this could include consideration of both restoration and remediation projects, addressing high priority TMDL issues, and de-listing 303 (d) segments.
- Develop individual goals or target areas for each watershed area which would address the priority area for the watershed such as recreation, aquatic life protection, aesthetics, etc.

BASELINE CONDITIONS

- Baseline conditions should be included in each of the watershed plans
- Use available data to establish baseline conditions that can be used to identify water quality problems and their sources
 - A lot of water quality data has been collected and water quality studies completed by KDHE, USGS, Johnson County Wastewater and others but a comprehensive database has not been developed
 - Guidelines should be developed for how a database should be organized. This could apply to individual watersheds or a comprehensive database for the county.
- Identify stream reaches and lakes on the 303 (d) list, the parameter(s) of concern, and their priority.
- Identify high quality water bodies or riparian areas and potential threats.
- Establish reference conditions to aid in understanding the level of the impairment and to help establish site specific criteria, if appropriate
- Additional monitoring or modeling may be required to adequately define water quality issues and sources.

PRIORITIZATION METHOD ELEMENTS

It is likely that a prioritization method will include the following elements:

Alignment of water quality enhancements with watershed water quality goals – projects that address the priority goals for the watershed should receive a higher ranking

Projected degree of Water Quality Improvement – The expected water quality improvement can be thought of as a level of service or measure of success. This should be estimated, likely through the use of a water quality model. While the overall goal should be full attainment of water quality criteria and de-listing as an impaired water (if applicable), that may not always be feasible. Other measures of success that quantify improvement should be considered including:

- Reduction in pollutant loads to waterbodies – for example, reduction in average loads of phosphorus, nitrogen or sediment into streams (lbs/year)
- Increase in the average number of days of water quality criteria attainment per year.
- Increase in scoring according to a water quality index
- Shift in benthic macroinvertebrate community composition to more pollutant sensitive organisms

Consideration of water quality remediation and/or preservation – While the focus in a watershed plan is often on improving water quality problems, preservation of high quality waters, or riparian areas, should also be considered. Preservation efforts can often be more cost effective than improvement projects.

Logistical feasibility of implementation – This element includes issues such as public acceptance and ease of permitting – projects that are more logistically feasible should receive a higher ranking.

Potential environmental impacts of implementation – while the overall goal of the projects is to improve water quality, potential negative impacts should also be considered and included in the rankings. For example, dredging of a lake can have positive long-term water quality impacts but could have negative short-term impacts.

Consideration of other Multiple Benefits – A project could have additional benefits not specifically related to water quality such as a public information/education element or suitability for alternative funding. At the WQF sub-committee kick off meeting comments were made that all projects should have a public education element. The WQF sub-committee will need to determine if a project seeking funding should have any required elements in addition to water quality improvements or preservation. Alternatively, projects with additional benefits could receive a higher ranking.

Cost of the improvement versus the water quality benefit anticipated – It is difficult to establish a meaningful benefit-cost ratio because it is hard to quantify the water quality benefit. The Kansas Wraps program quantifies this by calculating the cost per pound of pollutant removed. While this may work well for BMPs such as detention or infiltration basins it does not address all situations including preservation efforts or BMPs to reduce the generation of NPS loads including streambank stabilization, buffer areas or habitat improvements. The IPS developed by MSDGC does not directly consider costs but does give indications of the areas where projects have the best chance of significant water quality improvement. Some measure of cost versus benefit will likely be needed either a quantitative or qualitative measure.

V. METRICS AND MEASURES OF SUCCESS

Metrics for Water Quality Focus will, at least initially, be driven by binary measures; water quality project prioritization method is developed (or not). In addition, long term metrics will largely be driven by improvement in water quality metrics.