

Section 4: Evaluation of Existing Management Efforts

Introduction

As part of developing the Protection Plan an assessment of the effectiveness of existing management efforts, and the identification of gaps was completed and is summarized in this Section. This assessment is not limited to regulatory controls. The Credit River watershed is largely in the Scott Watershed Management Organization (Scott WMO), with smaller portions in the Black Dog Watershed Management Organization (Black Dog WMO), and the Lower Minnesota River Watershed District. These organizations are responsible for implementing BWSR approved Comprehensive Water Resource Management Plans and have been around for 10 or more years. Thus, the water quality of the Credit River is a reflection of comprehensive watershed management, not just regulatory controls.

In addition, management is not limited to the Watershed Organizations. Cities do projects, the Metropolitan Council and Three Rivers Parks District monitor water quality, the MPCA enforces permits and does studies, the DNR also does permitting, and most of the watershed is covered by Municipal Separate Storm Sewer System (MS4) permits. The Cities of Lakeville, Savage and Prior Lake, Credit River and Spring Lake Townships, and Scott County are all MS4 permittees and are responsible for developing and implementing Storm Water Pollution Prevention Plans (SWPPPs).

This section provides a brief, but comprehensive, description of the current management efforts in the watershed. It describes future development expected under the 2030 Comprehensive Land Use Plans of the Cities and the County, and potential future impacts. It also summarizes an assessment of the effectiveness of current stormwater requirements for mitigating water quality impacts of development that is expected by 2030. Greater detail regarding this assessment can be found in Metropolitan Council's modeling report included as Appendix C. Table 4-1 at the end of the section is a summary of a matrix completed by the Technical Advisory Committee (TAC) for the project that organizes the various management efforts, identifies management gaps and ways to address the gaps. The full matrix is attached as Appendix H. The description of

existing efforts focuses mostly on efforts in the Scott County areas of the watershed since the study found that the Orchard Lake subwatershed did not have much effect on turbidity in the river. Also included are descriptions of efforts that affect water quality parameters and aquatic life stressors other than turbidity. Recent data has shown that the river is not impaired for turbidity, and that the watershed is low on the Human Disturbance Scale, but other water quality parameters and factors could be threatening the river. These descriptions are not as thorough as the descriptions for programs affecting turbidity. The initial focus of this project was on turbidity, and the decision to include other efforts came later. The intent would be to incorporate additional efforts as needed in the Protection Plan based on the identification of threats as the plan is implemented and the potential for additional threats is assessed. The MPCA biomonitoring scheduled for 2014 will be particularly important for assessing additional potential stressors and management needs.

Existing Management Efforts

A short description of existing management efforts are provided below. Those interested in more detail are referred to the respective Comprehensive Water Resource Management Plans of the Watershed Organizations, and the SWPPPs of the MS4 permittees. For presentation purposes management acts are organized as follows:

- Programs
- Projects
- Regulations
- Monitoring
- Inventory and Assessment

Programs. A number of programs are offered by the organizations in the watershed that affect water quality. Programs are efforts that are re-occurring or on-going. These are briefly described below.

Scott WMO Technical Assistance and Cost Share (TACS) Program. The Scott WMO TACS program provides Technical Assistance, cost share funds and incentives for landowners to adopt conservation practices. The draft Lower Minnesota River Watershed

District (LMRWD) Plan update also has a Cost Share Incentive Program that includes “Credit River Restoration Projects” estimated at \$10,000 per year for 5 years. Other programs such as the Natural Resource Conservation Service (NRCS), Environmental Quality Incentive Program (EQIP) and Conservation Reserve Program (CRP) are passively promoted.

Scott WMO program is on-going, but is generally passively promoted in the Credit River Watershed. There have been about ½ dozen projects over the last four years. These include stream bank stabilizations with private land owners along the creek, and several innovative projects with the Cities of Savage and Prior Lake involving Low Impact Development (LID) practices. The TACS program targeted riparian landowners and improvements in 2009. The LMRWD program is new.

Targeted Projects/ Capital Improvement Programs. The Scott WMO Plan and Local Water Plans by the Cities in the area have identified capital improvements for completion. The Lower Minnesota River Watershed District plan currently under revision will also identify capital improvements. The Scott WMO and the Cities routinely update their CIP list. Scott WMO does so every two years. New potential CIPs identified can be added.

The targeted projects/capital improvements identified in the Scott WMO Plan for the Credit River have all been completed in partnership with the City of Savage. These include: the Utica Ravine Stabilization and the 133rd Street grade stabilization Figure 4-1.

Education. The Scott WMO has an education program and participates with other MS4 communities in the County (including those in the Credit River watershed) to promote water quality education through the joint Scott Clean Water Education Program (SCWEP). The Cities of Prior Lake and Savage, and Credit River and Spring Lake Townships are also part of the partnership. This partnership not only helps members satisfy MS4 public education and outreach efforts, it also provides targeted education and



Utica Ravine Before



Utica Ravine After



133rd Street Before



133rd Street After

Figure 4-1. Recent City of Savage Stabilization Projects

information for TMDLs and particular problems. The draft LMRWD Plan also has education programming, but it will target Minnesota River issues. The Black Dog WMO also provides water quality/stormwater education.

One full time staff person to implement SCWEP is housed at the Scott SWCD. A contract is in place to continue the partnership through 2011. The Scott WMO together with the Scott SWCD is also hosting a series of rain garden workshops in 2011 patterned after the Blue Thumb program. Participants can receive a small cost share incentive for installing a rain garden through the TACS program.

Scott County Household Hazardous Waste Facility. Scott County operates a Household Hazardous Waste recycling facility located in the northeast corner of Spring Lake Township. The facility can accept items from residents that are flammable, corrosive, toxic, poisonous, or reactive such as: paint products, wood preservatives or bleaches, household chemicals, yard chemicals, automotive chemicals, adhesives and putties, aerosol spray products, fuels and solvents, and mercury. Appliances, electronics, tires are accepted for a small fee. Having an option for proper disposal of waste is designed to reduce discharge into the environment.

Currently operating hours are:

Wednesday: 12:00 noon to 6:00 p.m.

Thursday: 12:00 noon to 4:00 p.m.

Saturday: 8:00 a.m. to 12:00 noon

The facility should be operational into the foreseeable future although hours of operation and services provided may change from year to year.

Natural Area Corridors. The Credit River has been identified as a Natural Area Corridor in the Scott County 2030 Comprehensive Land Use Plan. Land in Natural Area Corridors is given a priority for participation in the Scott WMO TACS program (described above) and development is eligible for Public Values Incentives (described below under Regulations). These efforts are designed to promote green infrastructure, although

participation is voluntary. Ordinances are in place allowing Public Value Incentives and the County has designed an approach for the management of easements.

Municipal Stormwater Inspection and Maintenance Programs. All three cities have on-going stormwater inspection and maintenance programs. When these programs identify problems or needs the cities may choose to upgrade if it is a priority, is feasible and has a benefit. The Scott WMO has an LGU cost share strategy to encourage projects with LGUs.

The Cities and the Scott WMO routinely update their CIP list. Scott WMO updates every two years. New potential CIPs identified can be added.

Projects. Projects are one time actions. They may be actions completed as part of a larger program – for example individual construction projects that are part of a Capital Improvement Program. A few completed and/or pending projects were identified and are discussed below.

Subwatershed Assessment and Retrofit Project. The Scott SWCD is working on a subwatershed assessment with the City of Savage to identify the most cost-effective urban BMPs that could be implemented in a retrofit fashion. The study is a dynamic document to guide the City on how to best spend funds allocated for stormwater improvements over time. The types of projects that can be constructed include pond modifications, bioretention systems, pavement reductions, new storage opportunities, etc. Funding may be available from the Clean Water Fund for implementation.

City of Savage – Rain Garden Funds/Incentives. The City of Savage has \$15,000 to promote rain gardens in 2011. This effort will be implemented together with the rain garden workshops and the Scott WMO TACS program.

Orchard Lake Curly Leaf Pondweed Control. City of Lakeville has been working on Curly Leaf Pondweed control in Orchard Lake for several years. The DNR is providing grant assistance. Reduction of Curly Leaf Pondweed may help control

phosphorus and reduce algae turbidity. The affect on the Credit River is not expected to be significant, but the effort contributes to the overall health of the watershed. The City has received DNR grant funding for the past two years, however, they were unable to complete treatments in 2010 due to plant conditions.

Orchard Pond Aeration. City of Lakeville is planning to aerate a pond that drains to Orchard Lake as a way of reducing phosphorus discharged to the lake. This is intended to reduce phosphorus in the lake and algae growth. There may be some reduction in algae turbidity. The affect on the Credit River is not expected to be significant, but the effort contributes to the overall health of the watershed.

Geomorphic Study Potential Projects. As part of the Geomorphic Study completed by the Scott WMO 48 potential projects that would improve the stability and help maintain the dynamic equilibrium of the river were identified. A number of property owners have been contacted where some of the projects were identified and some projects have been completed. The focus to date has been on those potential projects that would improve riparian vegetation in the urban area. Other projects (particularly some of the wetland restorations) have been identified as not feasible.

The Scott WMO is currently still following up with some property owners where contacts have been made. The LMRWD has identified the completion of those in their District in their draft Plan update.

Regulations. The following summarizes some of the regulations affecting stormwater and future development.

Stormwater Standards for New and Redevelopment. In general, Scott County and cities use five management approaches for new development that can be generalized as follows.

- 1) All the Local Government Units (i.e., the county and the cities) require retention of ½ inch of surface water runoff from new impervious surfaces to mitigate the anticipated increases in runoff volume associated with new development.
- 2) All of the Local Government Units (LGUs) require some form of peak runoff rate control. For the cities in Scott County the requirement is that the peak runoff rates cannot exceed the peak rate that occurred under the pre-development land use. For the unincorporated areas of the County, the requirement is that the peak runoff rate cannot exceed the peak rate that occurred under pre-settlement land use.
- 3) All of the LGUs require some form of post construction water quality treatment, typically a water quality pond constructed in conformance with the MPCA specifications in the NPDES Construction General permit.
- 4) All of the LGUs require buffers adjacent to water courses and wetlands. The County and the Cities of Savage and Prior Lake have requirements equivalent to the Scott WMO, which requires wetland buffer widths from 25 to 65 feet (depending on wetland quality) and watercourse buffer widths of 30 feet.
- 5) All of the LGUs have construction erosion control programs to control erosion during construction.

All requirements under the current Scott WMO Plan are in County ordinance and are being applied. Other Local Units of Government are required to update their Local Water Plans to include the new WMO requirements by the end of May 2011, and will then have 180 days to begin implementation. However, new WMO requirements are largely the same as they were under the previous WMO Plan, the biggest exceptions being the need for a buffer adjacent to waterways such as the Credit River. The Cities of Savage and Prior Lake have Local Water Plans approved as equivalent under previous Scott WMO Plan. Thus, cities are largely implementing the standards.

Scott County, the Cities of Savage, Prior Lake, Lakeville, and Credit River Township all have Construction Erosion Control programs for development. Scott County and Credit River Township use the Scott SWCD to complete inspections.

MS4 NPDES Permits. The entire Credit River watershed is covered by Municipal Separate Storm Sewer System (MS4) communities with Stormwater Pollution Prevention Plans (SWPPPs) under the Clean Water Act National Pollution Discharge Elimination System (NPDES) program, except the southernmost part of the watershed in New Market Township.

Scott County, the Cities of Savage, Prior Lake, and Lakeville; and Credit River and Spring Lake Townships all have MS4 permits and SWPPPs. The three cities also have nondegradation plans. Implementation of the SWPPPs is on-going and the MS4s in Scott County work together to implement a joint education program called the Scott Clean Water Education Program (described above under Programs). The current general permit under which the communities are operating expires May 31, 2011. A new general permit is not expected to be produced by the MPCA until the end of 2011.

Land Use Planning. The Cities of Savage, Prior Lake and Lakeville, and the County have recently completed Comprehensive Land Use Plan Updates. Scott County portions of the watershed are guided as “urban expansion” and “rural residential”. “Urban expansion” is guided for 40 acre lots with the expectation that the area would not be annexed or served by public utilities until after 2030. “Rural residential” is 2.5 acre lots, although clustering and community septic systems can be used allowing smaller lots.

County ordinances are in place for the zoning, and a Detailed Area Plan has been completed identifying the infrastructure needs for developing at rural residential densities of 2.5 acre lots.

Development Incentives. Scott County has Public Value Incentives for development in the rural residential areas to promote Planned Urban Developments that incorporate attributes that benefit the public. In exchange for incorporation of these attributes, incentives such as extra density of a few lots can be considered. Specific Public Values that may help protect the Credit River include preserving land in Natural Area Corridors,

dedicating parkland, restoring wetlands, dedicating lands for regional stormwater facilities, or using Low Impact Development practices. Enabling ordinances have been written and adopted.

Spring Lake Township LID Requirements. Spring Lake Township has developed requirements for new development in addition to the County's and Scott WMO's stormwater management standards. These include the requirements to use Low Impact Development practices. The Township has written the necessary ordinances.

Cleary Lake TMDL. Cleary Lake is considered water quality impaired due to excessive nutrients. This means that a Total Maximum Daily Load (TMDL) study is required to determine the necessary phosphorus load reduction to achieve the standard. This may affect MS4 stormwater permits, and improve the quality of discharges from the lake to the Credit River. The TMDL study is scheduled to start in 2014 and be complete by 2018.

Hobby Farm Requirements. Farm program participants are required to have a conservation plan on any fields containing highly erodible land. Currently Scott County code regarding maximum animal unit (AU) densities states that parcels less than 40 acres in size need to have 2 productive acres of land for the first animal unit and one productive acre for each animal unit thereafter. Landowners may exceed maximum AU densities by obtaining an administrative permit with approved management practices and subject to annual review if necessary. MPCA rules chapter 7020 and 7053 regulate animal waste pollution to waters of the state through proper management of manure storage and handling. MN Extension service has small landowner information publications and occasionally workshops for education and outreach. Applicable USDA, MPCA and Scott County requirements are administered by Scott SWCD and NRCS staff. Scott SWCD and MN extension service provide technical assistance to educate hobby farm owners.

Monitoring. Monitoring is a necessary part of protecting water bodies since it provides the basis for assessing trends and identifying and taking corrective actions. The following summarizes known monitoring efforts in the watershed.

Metropolitan Council Environmental Services (MCES) Outlet Monitoring.

MCES operates a monitoring station at RM0.9 where data on flow and a number of water quality parameters is collected. MCES also collects information on macroinvertebrates. Water quality monitoring at RM0.9 is expected to remain in place. Macroinvertebrate monitoring was completed 2004 through 2009, however samples have been analyzed from 2004-2007 at this time. There is a need to find a funding source to help with analysis. MCES plans to keep collecting samples.

Lakes. Orchard Lake is monitored annually through the MCES Citizen Assisted Monitoring Program (CAMP). Cleary Lake and other Lakes in the Murphy Harahan Regional Park are monitored by the Three Rivers Park District. Markley Lake is not monitored, but is land locked and does not discharge.

MPCA Intensive Watershed Monitoring (IWM). MPCA is scheduled to complete its monitoring program for the Lower Minnesota River Watershed in 2014, and then on 10 year cycles. Monitoring of the Credit River is expected to be part of this effort. This monitoring is for Aquatic Life, Aquatic Recreation and Aquatic Consumption and includes biological sampling (macroinvertebrates, fish and habitat).

Well Water Level Monitoring. The Department of Natural Resources coordinates a water level monitoring network. Discussions with Michael McDonald who Administers the program found that there is currently one monitoring well in the watershed. There were additional limited time sites historically, and the DNR also gets water level information from the appropriators in the area (i.e., from wells operated by the cities in the area).

Inventory and Assessment. This management element includes efforts to convert data into information, the collection of physical inventory information, assessing trends, and other forms of assessing progress and learning to adapt.

Water Quality Trend Analysis. On-going or periodic assessment of water quality trends is important for a protection program in order to have early detection of trends and have a basis for making adaptive management decisions. Metropolitan Council has not completed a trend analysis of the data at the RM0.9 site, but is currently completing such an analysis with publication of results expected in 2011. They expect to do additional trend analyses on a periodic basis, on a 10 year cycle at a minimum.

Water Quality Data Assessments. The Metropolitan Council assesses and publishes the CAMP Lake monitoring data annually. Three Rivers Parks also assesses their lake monitoring data annually and provides summary reports to local WMOs to publish on their websites.

The Metropolitan Council provides some level of data assessment and calculates loads annually for their stream sites. The MPCA evaluates available stream data for impairments every other year as part of their biannual impaired waters listing (303d) review.

MPCA will assess the data they collect as part of the Lower Minnesota River Basin monitoring effort in the years immediately following data collection. Results will be disseminated through reports and publications of the MPCA. The first monitoring cycle by the MPCA is scheduled for 2014. Data analysis is expected to be completed in 2015 and 2016, and then on 10 year cycles.

Observation of Sediment Delta Formation. The Lower Minnesota River Watershed District receives reports and observes sediment delta formation where the Credit River discharges to the Minnesota River.

Groundwater Assessment and Planning. The Scott County Groundwater Management Plan expired in 2009. Efforts in the old plan were voluntary. Recent studies have shown that projected development will negatively affect the baseflow of the river. Cities are currently assessing whether they can work together more through cross connections to maintain supply. Scott WMO is planning a well sampling effort to screen for pesticides and nitrates in the unincorporated areas. This effort is scheduled for the summer of 2011.

The County is assessing whether to complete a new plan. To make that decision the County is waiting for the results of the study by the cities and the rural well pesticide screening. It is expected that these studies will be complete early summer of 2011, with the County anticipating on revisiting the planning process in the fall of 2011.

Minnesota Land Cover Classification System Update. The Minnesota Land Cover Classification System (MLCCS) inventory completed by the County provides an important tool for managing natural systems and the Natural Areas Corridor. The current inventory for the unincorporated areas of the watershed was completed in 2007. The Scott WMO is planning to update portions of the inventory in 2013. It is uncertain whether the update planned for 2013 will focus on the Credit River watershed or other portions of the Scott WMO. Priority areas will be determined early 2013.

Plan Progress Tracking and Review. Scott WMO has metrics for measuring implementation of the Scott WMO Plan that are assessed and reported on in the WMO Annual Report. The Scott WMO Plan was recently amended to add the Credit River Protection Plan as an implementation strategy. The draft Lower Minnesota River Watershed District Plan includes similar metrics.

Assessment of Future Conditions

The SWAT model was used to assess future runoff and total suspended solids loads and concentrations under expected 2030 land use conditions.

To simulate future development conditions for the Credit River Watershed, the projected 2030 land use map was incorporated into the original model developed using the 2002 land cover map. A new 2030 land use map was created by MCES using the Scott County 2030 land use map for the unincorporated areas and the Metropolitan Council 2030 land use map for the incorporated areas (see Appendix C for details).

The Metropolitan Council 2030 land use map was developed specifically for use in SWAT modeling. The urban areas of the watershed located in Dakota County are not included in the map. These areas include portions of the Cities of Burnsville and Lakeville, preserved regional parks, forests or wetlands. It was assumed that the differences between the 2002 and 2030 land use conditions would be marginal for those areas. Therefore, the 2002 land cover map, which was used for model development, was used for the portions of the watershed not defined by the Council's 2030 map. According to the Scott County 2030 planned land use map, all rural areas in the Credit River Watershed will be used either as urban expansion or as low density rural residential area in 2030. The boundary of these areas was defined using the Scott County 2030 planned land cover map.

New databases for the new urban and rural residential land uses in the 2030 map were also created in the SWAT model for simulations. Based on inputs received from the Scott County staff, the land covers for all rural residential area were simulated as switch grass, except for a small portion of the existing rural residential areas in the Metropolitan Council's 2002 map, which were simulated at various residential densities following the 2002 model. Switch grass was used as land cover for rural residential areas to reflect the low residential densities planned for the rural residential areas in the County. The rural residential medium and high densities and commercial land uses account for a very minimal amount of land cover. These land uses were eventually excluded by SWAT in model setup.

Representing the rural residential development as switch grass will underestimate runoff and TSS generated from this land use, since there will be impervious surfaces such as roads, driveways and rooftops associated with the rural residential development. This needs to be considered when interpreting the modeling results.

In the end, a new SWAT model based on the calibrated 2002 model was built for the Credit River Watershed using the developed 2030 land use map. Except for the land use information, the 2030 model has the same inputs and parameters as 2002 model. For scenario assessments, the model was run using precipitation records from 1997 - 2008.

According to SWAT delineation based on the created 2030 land use map, there will be about 6,540 acres of new development in the Credit River Watershed by 2030. Total urban and rural residential area in the watershed will be 8,700 acres (18 percent increase) and 10,700 acres (94 percent increase) respectively. Agricultural land uses will be eliminated in urban and rural areas in 2030 except for in the urban expansion area, which has about 1,650 acres of agricultural land use and is not expected to be developed by 2030. Forests will be reduced by 34 percent to 4,440 acres and pasture lands will be reduced by 26 percent to 1,550 acres. Wetlands and lakes are preserved and therefore have minimal changes. Figure 4-2 shows a comparison of land uses between 2002 and 2030 conditions.

Urban and rural residential land uses will be the dominant land uses in the watershed in 2030, accounting for 28 percent and 35 percent of the total watershed area respectively (Figure 4-3). The remaining land uses will be forests (15 percent), wetlands (11 percent), agriculture (5 percent), water (3 percent), and pasture (3 percent).

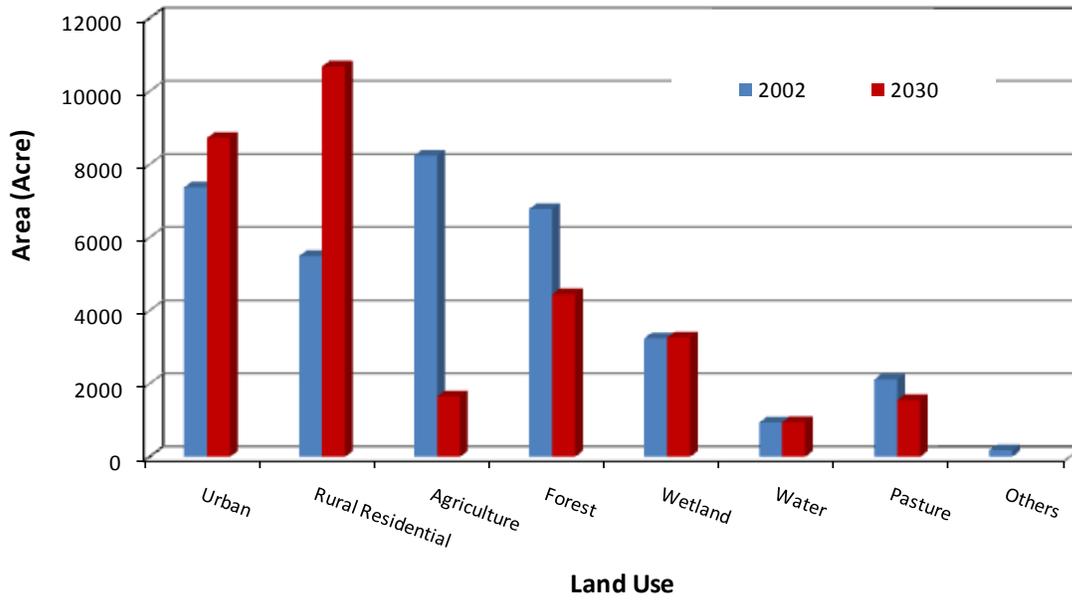


Figure 4-2. Comparison of Land Uses between 2002 and 2030

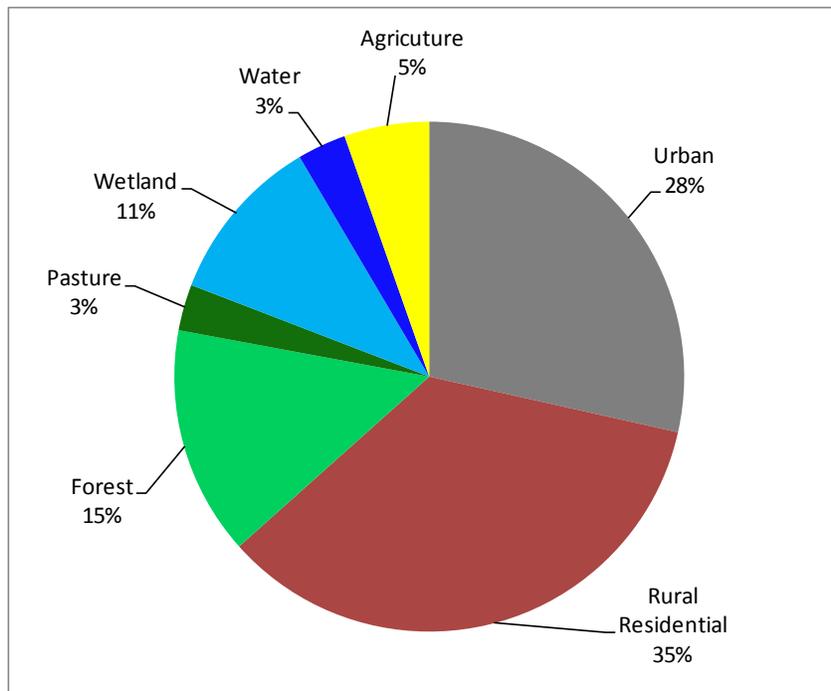


Figure 4-3. Land Use Conditions of Credit River Watershed in 2030

Figure 4-4 breaks down the 2030 urban and new rural residential areas by densities for existing and new development. In the urban and new rural residential areas in 2030, 45 percent will be urban and 55 percent will be rural residential. New development will account for 51 percent of the total urban and new rural residential areas. Of the new development area only about 20 percent will be urban and 80 percent of it will be rural residential.

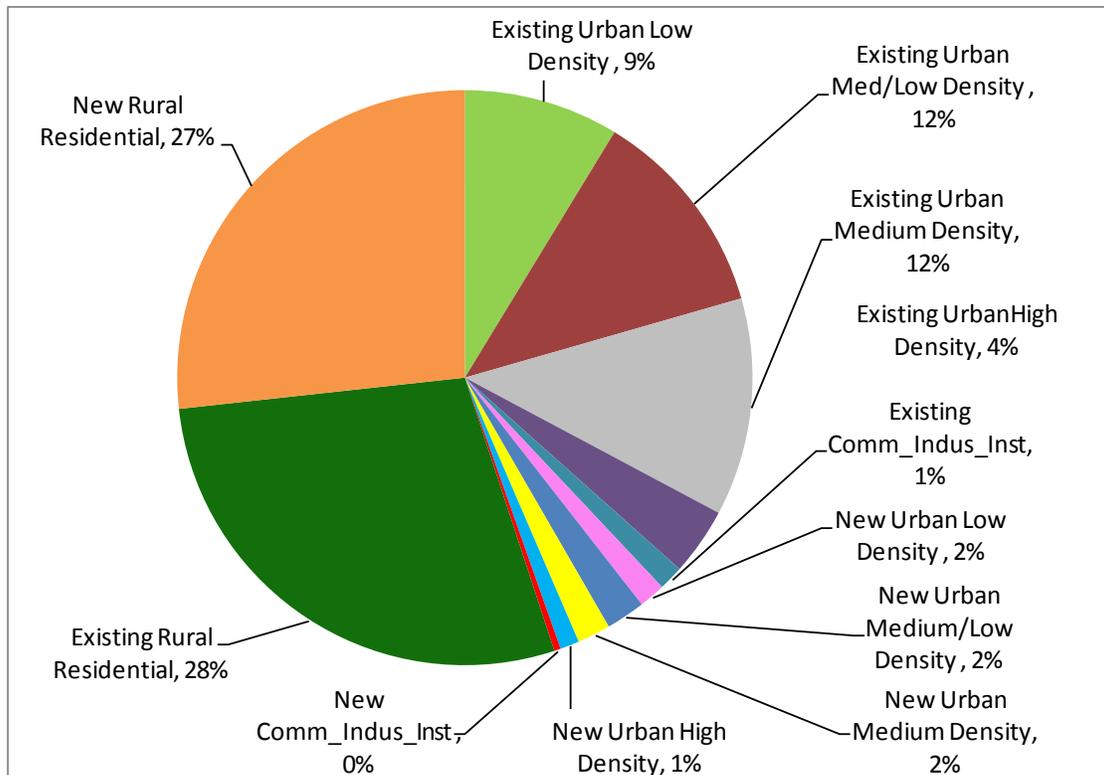


Figure 4-4. Urban and Rural Residential Land Uses in 2030

Figures 4-5 and 4-6 present annual flow rates and TSS loads for 2002 and 2030 land use conditions without runoff or water quality controls. The results were simulated at the watershed outlet using the 2002 and 2030 land use models and precipitation records from 1997 - 2008. Comparisons between the two models show that the average flow rate at the watershed outlet will increase about 6 percent from 2002 to 2030 if the projected new development occurs without runoff volume control standards. Increased flow from new development not only brings more TSS from runoff from upland, but also leads to a potential increase in bank erosion

downstream. As a result, the TSS load in the watershed will likely increase by 10 percent. Relatively larger increases in flow and TSS load were simulated for 1997, 2000, 2002, 2004 and 2008, probably due to the relatively high precipitation totals in those years. Without application of the County’s storm water standard, average flow rate and TSS load from new development were predicted to increase only slightly, even though the extent of new urban area is projected to increase by 18 percent and rural residential by 94 percent.

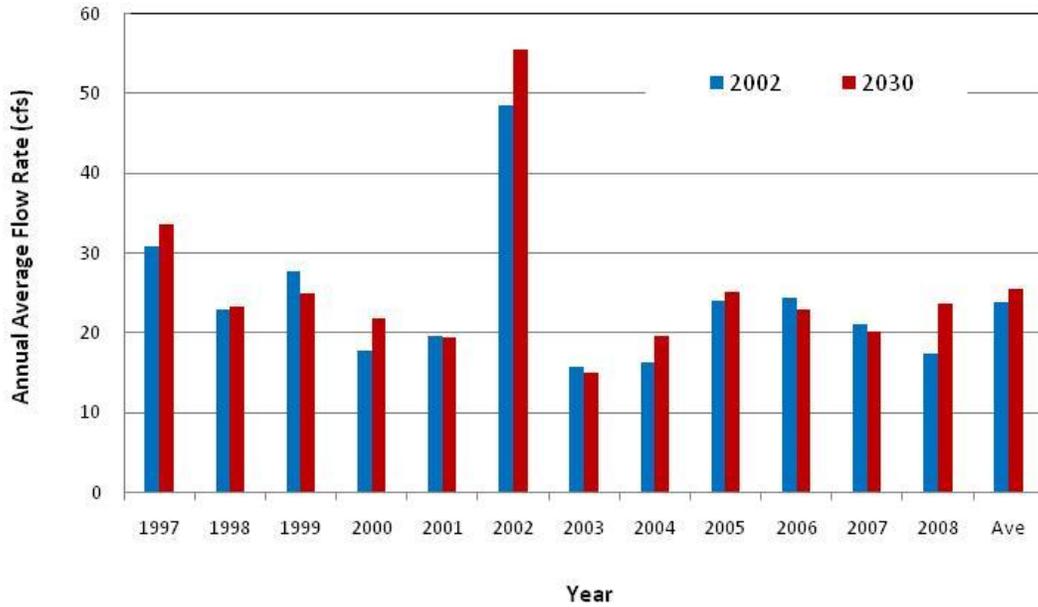


Figure 4-5. Comparison of Flow Rates between 2002 and 2030 Land Use Conditions

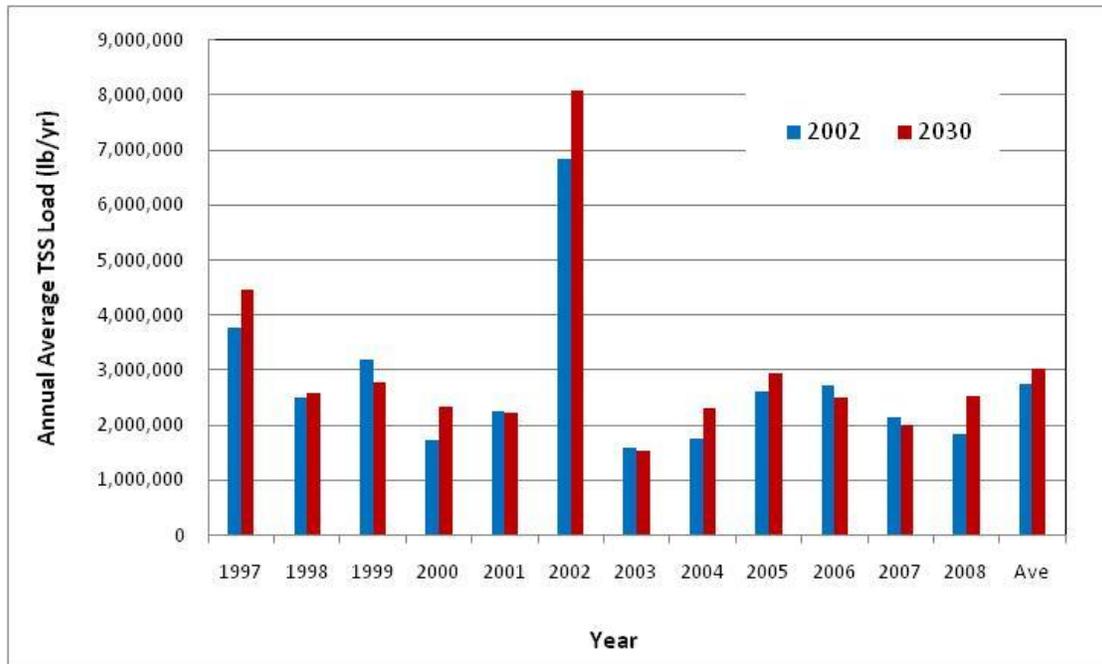


Figure 4-6. Comparison of TSS Loads between 2002 and 2030 Land Use Conditions

Assessment of Existing Stormwater Controls

The future conditions SWAT model was used to assess the effectiveness of local stormwater standards. This study was different from most SWAT modeling studies, which tend to focus on how site-specific BMPs reduce flow and pollutant loads. Representing the application of watershed-wide development standards in SWAT is not straight forward. After much discussion it was determined that:

- 1) Construction erosion control standards did not need to be modeled as these are temporary efforts, and what was of interest was the post construction condition.
- 2) The peak runoff control standard and the water quality pond standards could not be explicitly modeled in SWAT because of the site specific nature of building ponds could not be easily identified and represented in SWAT.
- 3) The runoff volume standard would be represented by adjusting the curve numbers (CN) associated with new development impervious surface.
- 4) Required buffers would be represented using 30 foot wide filter strips.

The scenarios for this study should be reviewed with the understanding that SWAT is a predictive tool developed for general watershed hydrology and non-point source studies. It was not developed for use in site-specific engineering design. In addition, two of the standards could not be modeled using SWAT; thus modeling results likely under-represent the collective effectiveness of the standards. In addition, other assumptions regarding how to represent the future rural residential land uses in the model probably underestimate the impact from land use changes as well. As always, the proposed scenario results are to be used to inform management decisions, in the context of how things are represented in the model, and not to be used for engineering design (see Appendix G for additional detail).

The model was run from 1997 to 2008 under 2030 land use conditions with the following scenarios:

- Implementation of storm water volume control standard by adjusting impervious CN from 98 to 82.7, and
- Implementation of the standard plus 30 foot buffer strips to the water bodies in new development areas.

The results were compared to the 2002 baseline and 2030 land use condition without the standards to understand impacts of land use changes and implementations of the local standards on the watershed hydrology and TSS load.

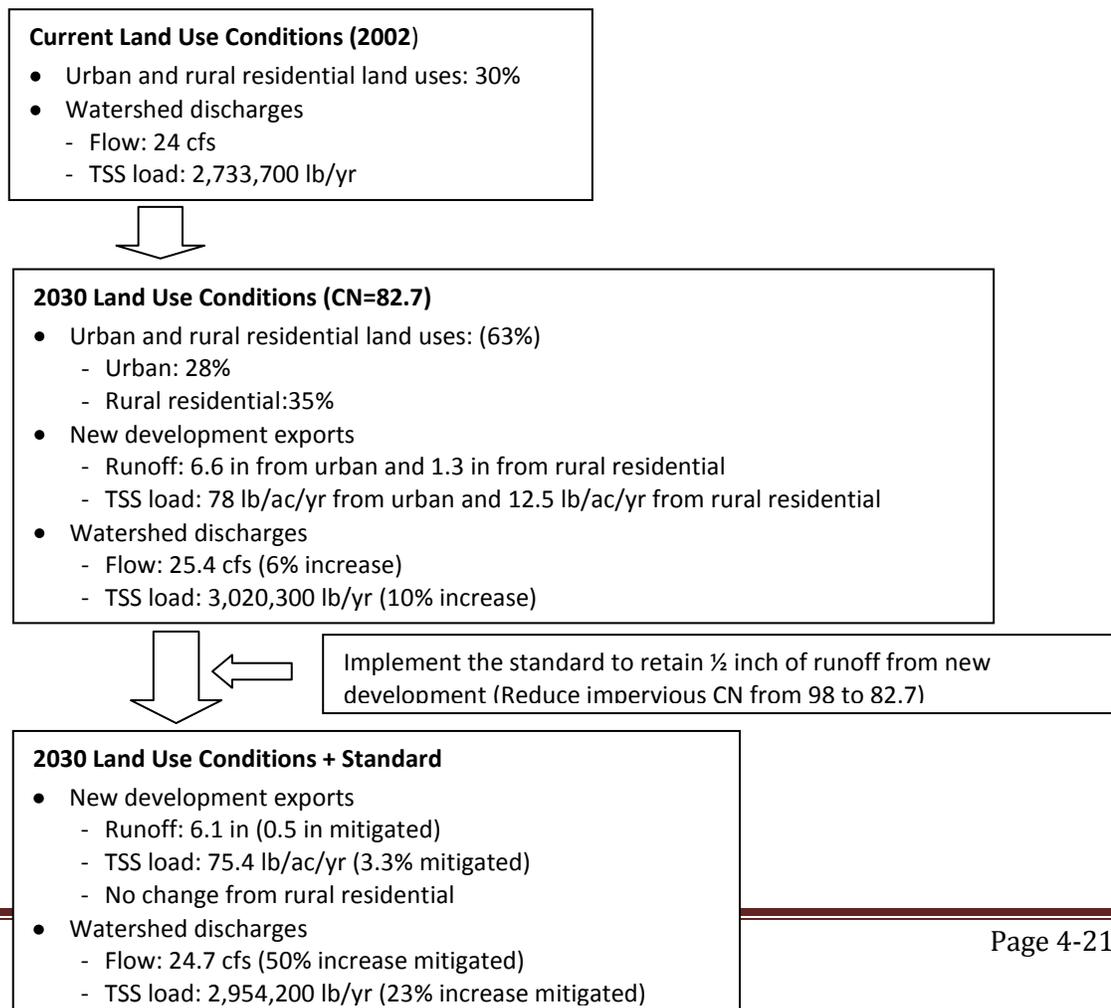
Scenarios based on SWAT simulations provided the following findings:

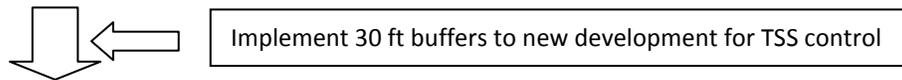
- With implementation of the volume control standard ($\frac{1}{2}$ inch runoff retention from new development impervious surface), the watershed flow and TSS load were estimated to be 24.7 cfs and 2,954,200 lb/yr, which are about 3 percent and 2 percent lower than 2030 conditions without the standard, but still 4 percent and 8 percent higher than the 2002 conditions for flow and TSS respectively.
- With implementation of 30 foot buffers the watershed TSS load was estimated to be 3 - 6 percent less than 2030 conditions but still 4 - 8 percent higher than 2002 conditions. No storm volume retention was simulated for buffer strips in SWAT.

Therefore, it was concluded that:

- New development as guided for 2030 is expected to have limited impacts on overall watershed hydrology and TSS loading (about 6 percent and 10 percent increases respectively). This is most likely due to the fact that the majority of new development is expected to occur in the rural residential area at lower densities with less impervious cover and this area was modeled using switch grass.
- The local storm water volume control standard and buffer requirements have the potential to mitigate much of the volume, TSS and turbidity increases from future development. The volume control standard and 30 foot buffers are expected to mitigate 50% of the expected flow increase and 23% - 62% of expected TSS increase in 2030.

Figure 4-7 provides a summary of the future conditions and management scenarios modeling results.





- 2030 Land Use Conditions + Standard + 30 ft buffers**
- New development exports
 - Runoff: no change
 - TSS load: 22.3 lb/ac/yr (74% mitigated)
 - Watershed discharges
 - Flow: 24.7 cfs (50% increase mitigated)
 - TSS load: 2,954,200 - 2,844,000 lb/yr (23% - 62% increase mitigated)



- Conclusions based on the scenarios:**
- New development is expected to have limited impacts on watershed hydrology and TSS loads (about 4% and 8% increases respectively). This is most likely due to the fact that the majority of new development is in the rural residential areas where densities are much lower and the model simulated this area with switch grass.
 - Standard and buffer implementation has the potential to mitigate watershed flow volume, TSS and turbidity impacts from future development (3% and 6% lower than without standard and buffers or 23% - 62% mitigations of the expected increases of flow and TSS by 2030).

Figure 4-7. Summary of Management Scenarios Modeling

Management Gaps Analysis

The Technical Advisory Committee (TAC) for the project considered available monitoring data, the SWAT modeling results, and information on various management efforts in April 2011, and identified management gaps listed in Table 4-1. The complete gaps analysis matrix completed by the TAC is provided as Appendix H.

Review of Table 4-1 shows that most of the gaps identified were in Inventory and Assessment rather than other management areas. For example, only one management gap was identified for Regulations. This emphasis on Inventory and Assessment may be due to several reasons as follows:

1. The TAC recognized that protection is different than restoration. Water quality restoration needs to reduce pollutant loads and may require significant physical corrections or capital improvements. Protection relies mostly on measures that preserve existing conditions.

2. A number of capital improvements and cost share projects were recently completed in the watershed. Suspended solids reductions from most of these improvements occurred after the collection of the data that showed the river is meeting the turbidity standard. Thus, these reductions provide a safety factor.
3. The Credit River Watershed is covered by three Watershed Organizations; cities, townships, and a County that are holders of MS4 permits and are already implementing SWPPPs. The regulatory programs of these organizations are fairly mature.
4. The SWAT modeling of existing stormwater controls showed that they would likely mitigate much of the expected hydrologic and suspended solids load increases expected from future development. Most future development in the watershed is guided as rural residential or large lot development with agriculture largely being eliminated.
5. While there are a number of agencies and local organizations managing stormwater, it became apparent that there were gaps with respect to coordinating and assessing monitoring data. In addition, the importance of monitoring and data assessment was recognized in a Protection Plan since these actions form the basis for identifying trends and threats. It was recognized that protection is less costly than restoration, with the ability to recognize trends and adapt appropriately as a critical need.
6. None of the local Watersheds had an exclusive role managing the Credit River Watershed, and thus it became apparent that there was a gap with respect focusing and tracking efforts on the Credit River.

Summary

This section provides a review of current management programs and an assessment of management gaps. Gaps identified form the basis of the Management Plan presented in Section 5.

Table 4-1. Assessment of Management Gaps

Management Element	Gaps Identified	Potential Solution
Programs		
Education	Education efforts targeting hobby farms and continuation of SCWEP beyond 2011 are gaps or uncertainties.	<p>Scott WMO and Scott SWCD to develop specific education and technical assistance efforts targeting hobby farms.</p> <p>The discontinuation of SCWEP may not be a gap in education program delivery since the MS4 partners will still need to continue education efforts in their permits. However, education programs may not be as efficient.</p>
Projects		
Subwatershed Assessment and Retrofit Project	Current funding has been used for other projects.	Expecting to be able to access unused funds from other projects.
City of Savage – Rain Garden Funds/Incentives	Currently only identified for completion in 2011.	The Scott WMO and the City will evaluate the 2011 workshop(s) and decide on the value of continuing in 2012 as part of the WMOs annual review of the cost share and incentive program docket (completed annually in December).
Geomorphic Study Potential Projects	The Scott WMO has only followed up on a few of the potential projects identified.	A systematic approach to assess, track and follow-up on the potential projects is needed. More detailed feasibility and benefits analyses also need to be completed with property owner contacts for those deemed feasible and beneficial.

Management Element	Gaps Identified	Potential Solution
Regulation		
Hobby Farms	Education efforts targeting hobby farms are a gap. Education on livestock exclusion is a gap.	Additional education and outreach efforts needed for Hobby Farm management through SCWEP or Extension. County code could be revised to include provisions that prohibit uncontrolled livestock access to streams, wetlands, etc., and feedlots without adequate control measures.
Monitoring		
MCES Outlet Monitoring	There is a gap with respect to funding and sustaining biomonitoring.	The Metropolitan Council, Scott WMO and LMRWD to coordinate to ensure macroinvertebrate monitoring occurs every other year. Will be coordinated with the 2014 biomonitoring by MPCA to prevent duplication.
Biomonitoring	There currently is a gap for fish biomonitoring.	Fish biomonitoring is part of the MPCA biomonitoring scheduled for 2014.
Well Water Level Monitoring	There is only one water level monitoring well in the watershed. Data is also obtained from water appropriators in the area, but this level of monitoring is not adequate.	Consider expanding the number of monitoring sites as part of updating the County Groundwater Management Plan.

Management Element	Gaps Identified	Potential Solution
Inventory and Assessment		
Water Quality Trend Analysis	Metropolitan Council has not completed a trend analysis at the RM0.9 site, but is currently completing such an analysis with publication of results in expected in 2011. They expect to do additional trend analyses on a periodic basis (every 10 years at a minimum)..	Metropolitan Council to consider assessing trends on a cycle of 5 to 10 years.
Water Quality Data Assessments	Three Rivers Parks District and the Scott WMO have not coordinated to get summary reports posted on the WMO website.	The Park District and the WMO to coordinate to get reports posted.
Observation of Sediment Delta Formation	Observations need to be relayed to the Scott WMO.	LMRWD and Scott WMO to coordinate transfer of information.
Groundwater Assessment and Planning	There is a gap regarding how to mitigate predicted baseflow reductions in the river.	Consider updating County-wide Groundwater Plan, Cities to consider cross connections and additional conservation. Additional ideas to be developed as art of updating the Groundwater Plan.
Minnesota Land Cover Classification System Update	Uncertain whether the update planned for 2013 will focus on the Credit River watershed or other portions of the Scott WMO.	Priority areas will be determined early 2013.
Plan Progress Tracking and Review	There is not a specific metric for tracking and reporting implementation of the Protection Plan.	Scott WMO will add a metric for the Protection Plan in the Scott WMO Comprehensive Water Resources Management Plan. This metric will be assessed each year when the WMO completes its Annual Report.
Reviewing and Updating the Protection Plan	There needs to be a process for reviewing and updating the plan. Since the Protection Plan is currently under development a process has not yet been developed.	The implementation section of the plan will include a process for updating the plan: 1) when trend analyses or the annual assessment suggest a change is needed, and 2) after a set period of time. It is most efficient to update concurrent with the Scott WMO Plan update so that it can be included as an implementation strategy and tracked by the WMO. The Scott WMO Plan is scheduled to be updated in 2019.

