CHIPPEWA RIVER FECAL COLIFORM AND TURBIDITY TMDL IMPLEMENTATION PLAN FEBRUARY 2016

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1.0 Executive Summary

This Implementation Plan was written by the staff of the Chippewa River Watershed Project (CRWP) with input from the CRWP Local Work Group and the TMDL Advisory Committee, and guidance from the Minnesota Pollution Control Agency. This implementation plan is an action strategy to address the *Chippewa River Fecal Coliform TMDL Report* and the *Chippewa River Turbidity TMDL Report*. The EPA approved the fecal coliform TMDL Report in January 2007 and the Turbidity TMDL in September, 2014. Summaries of the TMDL Reports can be found in Section 2.

Throughout the development of the TMDL (Total Maximum Daily Load) Reports and Implementation Plan, public meetings were held and input was gathered from local citizens and entities. On September 14, 2006 a public meeting was held for landowners, lakeshore residents, and state and federal agency representatives to receive information about fecal coliform bacteria, and the TMDL process and report. On January 15, 2009 a kickoff meeting was held to bring all interested parties together to begin the process of developing a turbidity TMDL report. In December 2009, a follow-up meeting was held to bring together even more stakeholders. From these meetings the TMDL Advisory Committee was formed. During 2011, Wenck Associates developed the load duration curves and along with CRWP staff wrote the Turbidity TMDL Report. The TMDL Advisory Committee was convened in January 2011 and met nine times over the next four months. The report was reviewed and the draft implementation plan developed by this group. The TMDL Advisory Committee held its last input meeting on April 14, 2011. All members were given the opportunity to suggest best management practices and priority areas.

Since the Chippewa River Watershed is quite large and diverse, management needs and techniques will vary throughout out the basin. Section 3 discusses how prioritization will be made and areas that are of most concern.

There are several strategies and practices that address the reduction of turbidity and bacteria loading. It was important to the CRWP and its partners to provide as many opportunities as needed to address the impairments. Using a discussion based approach and individual written comments, the CRWP selected Livestock and Manure Management, Structural Practices, Drainage and/or Ditch Bank Management, Vegetative Practices, Perennial Landscapes, Cover Crops, Urban Practices, and Subsurface Sewage Treatment Systems Upgrades as primary implementation measures. Practices related to these areas of implementation are found in Sections 4 and 5. Section 6 outlines objectives, tasks, actions, and funding necessary to move forward in the implementation activities. Total implementation plan projects costs are estimated to be $31,166,767 which includes $10,902,770 cash, $4,263,997 in-kind and $16,000,000 loan funds. This is referenced in Section 9.

Section 7 lays out a ten-year timeline for the implementation phase. Roles and responsibilities of those involved with the implementation process will vary depending on the action item and the project, which is described in Section 8. The probability of successfully completing the action items will depend on funding and landowner/homeowner participation. The plan and action items are also highly dependent on the adaptability of the plan as described in Section 9. The CRWP Executive Committee, CRWP Local Work Group, and the TMDL Advisory Committee will continue to meet as needed to review, evaluate and develop strategies for achieving the goals of the TMDL Implementation Plan.

2.0 TMDL Report Summary

The Chippewa River Watershed Project began collecting surface water samples in 1998 and results were submitted to the Minnesota Pollution Control Agency (MPCA). Since then, reaches in the watershed were listed on the 303(d) Impaired Waters List for not meeting water quality standards for fecal coliform bacteria and turbidity.

In 2002, the MPCA began work to develop the Chippewa River Fecal Coliform TMDL Report. After initial findings, the Chippewa River Watershed Project (CRWP) conducted four public meetings in June 2003 around the watershed to discuss the proposed fecal coliform TMDL Report and its impact on the Chippewa River Watershed. Following the meetings, MPCA staff reevaluated their strategy and made adjustments to the loading allocations. The draft document, prepared by the MPCA, was put on public notice in August and September of 2006. The Chippewa River Fecal Coliform TMDL Report was submitted to the Environmental Protection Agency and approved on January 11, 2007.

In 2009, the CRWP received funding from the MPCA to develop a TMDL assessment for the reaches impaired by turbidity in the Chippewa River Watershed. Public kick-off meetings were held in January 2009 and the following two years were used to further understand the existing data, fill any data gaps, and consult with Wenck Associates, Inc. to develop load allocations for each of the nine impaired stretches. In January 2011, the TMDL Advisory Committee was convened to review the draft Turbidity TMDL for the Chippewa River Watershed. The draft TMDL was submitted to the MPCA June 30, 2011. The document went on public review from September 24, 2012 to October 24, 2012. The Turbidity TMDL for the Chippewa River was submitted to the EPA and approved on September, 29, 2014.

The Implementation Plan to address both the Chippewa River Fecal Coliform and Turbidity TMDL was developed in the spring of 2011. The TMDL Advisory Committee and the CRWP Local Work Group assisted with the development of the implementation plan.

2.1 *Watershed Characteristics*

The Chippewa River is one of 13 major tributaries of the Minnesota River. The Chippewa River Watershed drains a 2,080 square mile, 1,331,200 acre basin. The counties in this basin include portions of Otter Tail, Grant, Douglas, Stevens, Pope, Swift, Kandiyohi, Chippewa and a very small portion of Stearns. The source of the Chippewa River is in southern Otter Tail County near the Fish Lake area, from where it flows 130 miles south to its mouth in the Minnesota River at Montevideo, Chippewa County. The Chippewa's average gradient is 4.5 feet per mile. The annual mean flow at the mouth is 200 cubic feet per second, although it has been as high as 14,400 cubic feet per second at record flood stage in 1997 (USGS 2010). The main tributaries are: the Little Chippewa River, East Branch Chippewa, and Shakopee Creek. Together, these tributaries contribute nearly half the flow of the main stem. The total distance of the stream network is 2,091 miles of which 1,567 miles are intermittent streams and 525 miles are perennial streams.

More than 75 lakes are found within its boundaries including notable recreational waters such as Lake Minnewaska, Emily, Pelican, Norway, Games, Andrew, Red Rock, Reno and Villard. Three state parks: Glacial Lakes, Sibley, and Monson Lake, call the watershed their home and more than 60 State Wildlife Management areas, including the 2,298 acre Danvers Marsh, dot the watershed's landscape.

The Chippewa River Watershed is largely rural. A population base of roughly 41,000 residents make up the demographics of the watershed. Approximately 20,000 of the residents reside in the 25 cities, towns, and hamlets scattered across the watershed with the remainder of residents in rural homesteads. According to the U.S. Census Bureau's Annual Estimates of the Population for Incorporated Places in Minnesota, April 1, 2000 to July 1, 2005, the population trend for the counties in the watershed is on the decline.

The major landuse of the watershed is agricultural at 73.5 percent or approximately 980,000 acres. Major crops include corn, soybeans, small grains and sugar beets. Grasslands, including pastures and acres enrolled in conservation programs are roughly another 11 percent of the landuse.

A wide variety of recreational activities take place in the watershed. Fishing, canoeing, snowmobiling, bird watching, nature walks, camping and cross country skiing, along with duck and geese hunting, deer and pheasant hunting are all very popular activities throughout the watershed. The Ordway Prairie, Inspiration Peak, Terrace Mill Pond, Glacial Lakes Regional Trail, a state canoe and boat route and three State Parks all combine to make the Chippewa River Watershed landscape a unique and diverse area.

2.2 *Impairments*

The Chippewa River Watershed has been monitored by the Chippewa River Watershed Project since 1998. Previous to that, the Minnesota Pollution Control Agency and the MN Department of Natural Resources had limited monitoring sites established and collected water samples for analysis. All water samples were collected by trained staff and analyzed at state certified laboratories. The data was submitted to the MPCA and used for determination of impairment.

2.2.1 Fecal coliform Impairment

The 1994 and 2006 Minnesota TMDL Clean Water Act Section 303(d) lists identified one and eight impaired reaches respectively for the Chippewa River Watershed. These reaches were listed as impaired for failure to meet their aquatic recreational designated beneficial uses due to excessive fecal coliform concentrations. These reaches are identified in Table 2.2-1.

Table 2.2-1 Fecal coliform impaired reaches

Reach	Description	Year Listed	Assessment Unit ID	Monitoring Station for Assessment (STORET ID #)	CRWP MPCA Site #	Sub-watershed
Chippewa River	Watson Sag to Diversion to Minnesota River	94	07020005-501	S000-175	CH-0.5	Bottom
Chippewa River	Headwaters to Little Chippewa R	06	07020005-503	S002-190	2	Upper
Chippewa River	Unnamed Cr to E Br Chippewa R	06	07020005-505	S002-193	6	Middle
Chippewa River	Cottonwood Cr to Dry weather Cr		07020005-508	S002-203	18	Lower
Dry weather Creek	Headwaters to Chippewa R	06	07020005-509	S002-204	19	Dry weather Creek
Chippewa River, East Branch	Mud Cr to Chippewa R	06	07020005-514	S002-196	9	East Branch
Shakopee Creek	Shakopee Lk to Chippewa R	06	07020005-559	S002-201	16	Shakopee Cr
Unnamed Ditch (Judicial Ditch 29)	Headwaters to CD 29	06	07020005-566	S002-206	B	Shakopee Cr
County Ditch 29	Headwaters to Unnamed Ditch	06	07020005-567	S002-197	C	Shakopee Cr
County Ditch 27	Unnamed Ditch to Unnamed Ditch	06	0702005-570	S002-198	A	Shakopee Cr

* Drainage areas were taken from either the 8 digit HUCs or the NRCS watersheds (similar to 12 digit HUCs). For reaches that do not correspond to the outlet of these watersheds, Arc Hydro was used to generate drainage areas. The Arc Hydro delineations were checked against the DNR minor watersheds for error. Discrepancies between the two watershed datasets were approximated and appended to the total drainage area. The datum and projection that this was done in is Nad 1983, UTM 15N.

** This area was corrected for discrepancies in the Arc Hydro delineation (vs. DNR delineation). The final drainage area was adjusted to reflect the DNR delineation (12,829 acres were added to the Arc Hydro delineation acreage).

Two additional reaches were listed as impaired for bacteria on the 2010 303(d) List.

Table 2.2-2 Additional impairments listed in 2010

Reach	Description	Year Listed	Assessment Unit ID	Monitoring Station for Assessment (STORET ID #)	CRWP MPCA Site #	Sub-watershed
Unnamed Creek to Chippewa R		2010	07020005-530*			
Unnamed Creek (Huse Creek)		2010	0702005-917			Shakopee Creek

*This reach was recently split by the MPCA into two reaches (713 and 714), with the bacteria impairment remaining with 713.

2.2.2 Turbidity Impairment

The 2006 and 2010 Minnesota TMDL Clean Water Act Section 303(d) lists identified seven and two impaired reaches respectively for the Chippewa River Watershed. These reaches were listed as impaired for failure to meet the turbidity standard required to support aquatic life and recreation.

Table 2.2-3 Turbidity Impaired Reaches

Reach Name	Description	Year Listed	Assessment Unit ID	Monitoring Station for Assessment (STORET ID #)	CRWP MPCA Site #	Sub-watershed
Chippewa River	Little Chippewa R to unnamed Creek	2010	504	S002-192		Middle Chippewa R
Little Chippewa R	Unnamed Creek to Chippewa R	2010	530*	S004-705		Middle Chippewa R
Shakopee Creek	Shakopee Lake to Chippewa R	2006	559	S002-201		Shakopee Cr
Unnamed Creek	Unnamed Creek to Unnamed Ditch	2006	574	S001-866		Shakopee Cr
Unnamed Creek	Freeborn Lake Inlet	2006	901	S001-771		Upper Chippewa R
Chippewa River	Headwaters (Stowe Lake) to Little Chippewa R	2006	503	S002-190 S001-772 S004-234		Upper and Middle Chippewa R
Chippewa River	Unnamed Creek to E Branch Chippewa River	2006	505	S002-193 S001-862		Middle and Lower Chippewa R
Chippewa River	Cottonwood Creek to Dry weather Cr	2006	508	S002-203		Lower Chippewa R
East Branch Chippewa R	Mud Creek to Chippewa R	2006	514	S002-196		East Branch

*This reach was recently split by the MPCA into two reaches (713 and 714), with the turbidity impairment remaining with 713.

2.3 *Fecal coliform Source Assessment*

The assessment of fecal coliform sources within a watershed and establishing the cause-effect relationship between the sources, the transport mechanisms, and the subsequent stream loading is complex and difficult to quantify. The survival rate of fecal coliform in terrestrial and aquatic environments is poorly understood and further complicates efforts to track sources.

Data at several Chippewa sub-watershed sites shows a strong positive correlation between precipitation, and fecal coliform bacteria concentrations. When storms occur, weather-driven sources, e.g. feedlot runoff, overgrazed pasture runoff, manure applied fields, and urban storm water overshadows continuous sources. In drought or low-flow conditions, continuous sources, e.g. cattle in streams, failing individual sewage treatment systems, unsewered communities, and wastewater treatment facilities dominate. Besides precipitation and flow, factors such as temperature, livestock management practices, wildlife activities, fecal deposit age, and channel and bank storage also affect bacterial concentrations in runoff (Baxter-Potter and Gilliland, 1988).

Despite the complexity of the relationship between sources and in-stream concentrations of fecal coliform, the following can be considered major source categories: wastewater treatment facilities, unsewered communities, urban and rural storm water, manure application from livestock facilities with NPDES permits, NonCAFO livestock facilities and manure, subsurface sewage treatment systems, and background loads.

Table 2.3-1 Animal Units

		Animal Units or Individuals
Category	Source	Total
Livestock[1]	Dairy	52,416 AU
	Beef	70,182 AU
	Swine	34,612 AU
	Chickens	189 AU
	Turkeys	21,700 AU
	Horses	852 AU
	Other Livestock	773 AU
Human[2]	Population with inadequate septic systems	2188 People
	Population in unsewered communities	590 People
	WWTP	Facilities which discharge above 200 cfu/100 ml
Wildlife[3]	Deer	21000 Deer
	Geese	16250 Geese
	Other wildlife including rural cats & dogs	Accounted for in deer population
Urban Stormwater[4]	Dogs and cats-urban	9288 Individuals

[1]2014 MPCA registered feedlot database
[2]Olson and Churchill, 2000; League of MN Cities, 2003; W. Gillingham, 2003
[3]MnDNR, 2003
[4]AVMA, 2000

2.4 *Turbidity Source Assessment*

Identifying the sources of turbidity in a stream system is difficult because of the complex nature of stream systems and their interaction with the watershed. However, a general sense of the timing, magnitude and sources of TSS can be developed using available data to provide a weight of evidence for the sources.

When assessing sources of turbidity and ultimately TSS in streams, the first step is to determine the relative proportions of external and internal sources. External sources include those sources outside of the stream channel and include point sources, field and gully erosion, livestock grazing, runoff from construction sites, lakeshore development, and urban/impervious surface runoff. Internal sources of sediment include sediment resuspension, bank erosion and failure, and in-channel algal production. A potential source assessment was developed for each of the major sub-watersheds in the Chippewa River watershed and was included as part of the Turbidity TMDL Report.

2.5 *Fecal coliform Bacteria Measurable Water Quality Goals*

The TMDL Report was based on Minn. R. ch. 7050.0222 subp. 4 and 5, fecal coliform water quality standard for Class 2B and 2C waters that states fecal coliforms shall not exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 2,000 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

The MPCA has replaced the fecal coliform standard with an *Escherichia coli* (*E. coli*) standard based on a geometric mean EPA criterion of 126 *E. coli* colony forming units (cfu) per 100ml. E. coli has been determined by EPA to be the preferred indicator of the potential presence of waterborne pathogens. The *E. coli* standard is in Minnesota rule, and there is a considerable amount of *E. coli* data available. For future MPCA assessment purposes, only *E. coli* measurements will be used for impairment determination. This change has been made because of the variability in the *E. coli*/fecal coliform statistical relationship and to emphasize that current and future monitoring for aquatic recreations use support should be based on the newly adopted *E. coli* standard. Therefore, to adapt the fecal coliform TMDL allocations based on the new *E. coli* standard requires a multiplication factor of 0.63.

In order to assess impairment status, data over the full 10-year period are aggregated by individual month, as mentioned above (e.g., all April values for all 10 years, all May values, etc.) by the MPCA. A minimum of five values for each month is ideal, but is not always necessary to make a determination on impairment status. If the geometric mean of the aggregated monthly values for one or more months exceeds 126 organisms per 100 ml, that reach is placed on the 305(b) not supporting list and on the 303(d) impaired waters list. Also, a waterbody is considered impaired if more than 10 percent of individual values over the 10-year period (independent of month) exceed 1260 organisms per 100 ml This assessment methodology more closely approximates the five-samples-per-month requirement of the standard while recognizing typical sampling frequencies, which rarely provide five samples in a single month and usually only one.

Interim measurable milestones for implementing management measures

The watershed-wide goal for fecal bacteria is to reduce fecal bacteria to meet the standard (126 colony forming units per 100 mL). Strategies and methods to prioritize regions to address bacteria are summarized in Section 4 and 5. Individual AUID reduction goals were calculated from AUID specific monitoring and can be found in the Chippewa River Fecal Coliform TMDL Report.

The Chippewa watershed-wide interim 10-year target of 20% reduction in bacteria loading for streams was selected. Strategies and methods to prioritize regions to address bacteria pollution are summarized in section 4 and 5 of this report.

2.6 *Turbidity Measurable Water Quality Goals*

The applicable water body classifications and water quality standards are specified in Minnesota Rules Chapter 7050. Minnesota Rules Chapter 7050.0470 lists water body classifications and Chapter 7050.0222 lists applicable water quality standards for all waters with a given use classification. However, none of the reaches in this TMDL are specifically addressed or classified in the rule and therefore fall under Minnesota Rules Chapter 7050.0430 which says that all water bodies are classified as 2B unless they have a different classification specified in the rule.

Turbidity assessment protocol includes pooling of data over a ten-year period and requires a minimum of 20 independent observations. The surface water standard for each of the nine impaired reaches covered in this report is 25 nephelometric turbidity units (NTUs). For assessment purposes, a stream is listed as impaired if at least three observations and 10% of the observations exceed 25 NTUs. Transparency and total suspended solids samples may also be used as a surrogate for the turbidity standard. Transparency measurements below 20 cm are considered violations of the turbidity standard. The total suspended solid turbidity surrogate value for the Chippewa River Watershed Project is 54 mg/L. If there are two or more parameters observed in a single day, the hierarchy of consideration is turbidity, then transparency, then total suspended solids.

Interim measurable milestones for implementing management measures

The Chippewa watershed-wide goal of 56 ppm was established for the Chippewa River Watershed Turbidity TMDL (PCA, 2014) prior to the establishment of the new 65 ppm TSS standard. This goal will meet the 10 year target for the Sediment Reduction Strategy for the MN River Basin. Individual sub-watershed goals were calculated from TMDL data and can be found in the Turbidity TMDL (PCA, 2014).

The Chippewa watershed-wide Interim measurable milestone is 65 mg/L. It should be noted that 2010 FWMC data indicate that the Chippewa Watershed is well on its way to meeting this target. Strategies and methods to prioritize regions to address sediment are summarized in Section 4 and 5.

2.7 *Fecal coliform Bacteria Allocations*

Table 2.7-1 Daily fecal coliform Loading Capacities and Allocations – Chippewa River, Watson Sag Diversion to Minnesota River (AUID: 07020005-501)

Drainage area for listed reach (sq. mi): 2084.0					
Flow gage used: 5304500					
Land Area MS4 Urban (%): 0.22	Flow Zone				
Total WWTF Flow (mgd): 9.217	High	Moist	Mid	Dry	*Low
	Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY	8026	2386	841	249	46
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	71	71	71	71	"*"
Communities Subject to MS4 NPDES Requirements	12	3	1	0.1	"*"
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	5297	1146	454	26	"*"
Margin of Safety	2646	1166	315	152	NA
	Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1%	3%	8%	29%	"*"
Communities Subject to MS4 NPDES Requirements	0.1%	0.1%	0.1%	0.02%	"*"
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	66%	48%	54%	10%	"*"
Margin of Safety	33%	49%	37%	61%	NA

Note - Allocation for all "" = (flow contribution from source) x (200 orgs./100 ml); see Sect. 5.1

Table 2.7-2 Daily fecal coliform Loading Capacities and Allocations – Dry Weather Creek, Headwaters to Chippewa River (AUID: 07020005-509)

Drainage area for listed reach (sq. mi): 106					
Flow gage used: Dry Weather Creek					
Land Area MS4 Urban (%): 0	Flow Zone				
Total WWTF Flow (mgd): 0	High	Moist	Mid	Dry	Low
	Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY	640	141	49	23	6
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	326	71	36	10	2
Margin of Safety	313	70	13	13	4
	Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	51%	50%	74%	44%	35%
Margin of Safety	49%	50%	26%	56%	65%

Table 2.7-3 Daily fecal coliform Loading Capacities and Allocations – Chippewa River, Cottonwood Creek to Dry Weather Creek (AUID: 07020005-508)

Drainage area for listed reach (sq. mi):	1901					
Flow gage used:	5304500					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	6.192	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		7321	2177	767	228	42
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		48	48	48	48	"*"
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		4859	1065	431	41	"*"
Margin of Safety		2414	1064	287	139	NA
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		1%	2%	6%	21%	"*"
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		66%	49%	56%	18%	"*"
Margin of Safety		33%	49%	37%	61%	NA
Note - Allocation for all "" = (flow contribution from source) x (200 orgs./100 ml); see Sect. 5.1						

Table 2.7-4 Daily fecal coliform Loading Capacities and Allocations – Shakopee Creek, Shakopee LK to Chippewa River (AUID: 07020005-559)

Drainage area for listed reach (sq. mi): 320					
Flow gage used: Skakopee Creek					
Land Area MS4 Urban (%): 0	Flow Zone				
Total WWTF Flow (mgd): 0.15	High	Moist	Mid	Dry	*Low
	Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY	1780	838	397	186	23
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1	1	1	1	1
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	1383	526	276	69	"*"
Margin of Safety	396	311	120	116	NA
	Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	1%	5%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	78%	63%	70%	37%	"*"
Margin of Safety	22%	37%	30%	62%	NA
Note - Allocation for all "" = (flow contribution from source) x (200 orgs./100 ml); see Sect. 5.1					

Table 2.7-5 Daily fecal coliform Loading Capacities and Allocations – Unnamed Ditch (Judicial Ditch 29), Headwaters to CD 29 (AUID: 07020005-566)

Drainage area for listed reach (sq. mi): 2.7					
Flow gage used: Skakopee Creek					
Land Area MS4 Urban (%): 0	Flow Zone				
Total WWTF Flow (mgd): 0	High	Moist	Mid	Dry	Low
	Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY	15	7	3	2	0.2
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	12	5	2	0.6	0.01
Margin of Safety	3	3	1	1	0.2
	Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	78%	63%	70%	38%	4%
Margin of Safety	22%	37%	30%	62%	96%

Table 2.7-6 Daily fecal coliform Loading Capacities and Allocations – County Ditch 29, Headwaters to Unnamed Ditch (AUID: 07020005-567)

Drainage area for listed reach (sq. mi):	6.7					
Flow gage used:	Skakopee Creek					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	0	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		37	17	8	4	0.5
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0	0	0	0	0
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		29	11	6	1	0.02
Margin of Safety		8	6	2	2	0.5
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		78%	63%	70%	38%	4%
Margin of Safety		22%	37%	30%	62%	96%

Table 2.7-7 Daily fecal coliform Loading Capacities and Allocations – County Ditch 27, Unnamed Ditch to Unnamed Ditch (AUID: 07020005-570)

Drainage area for listed reach (sq. mi):	13.4					
Flow gage used:	Skakopee Creek					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	0	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		74	35	17	8	1
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0	0	0	0	0
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		58	22	12	3	0.03
Margin of Safety		17	13	5	5	1
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		78%	63%	70%	38%	4%
Margin of Safety		22%	37%	30%	62%	96%

Table 2.7-8 Daily fecal coliform Loading Capacities and Allocations – Chippewa River East Branch, Mud Creek to Chippewa River (AUID: 07020005-514)

Drainage area for listed reach (sq. mi):	509					
Flow gage used:	East Branch					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	0.442	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		3387	1549	829	484	242
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		3	3	3	3	3
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		2386	1045	674	309	106
Margin of Safety		997	501	152	171	132
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0%	0%	0%	1%	1%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		70%	67%	81%	64%	44%
Margin of Safety		29%	32%	18%	35%	55%

Table 2.7-9 Daily fecal coliform Loading Capacities and Allocations – Chippewa River, Unnamed Creek to East Branch Chippewa River (AUID: 07020005-505)

Drainage area for listed reach (sq. mi):	758					
Flow gage used:	Middle					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	4.5	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		3621	2070	1057	664	262
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		34	34	34	34	34
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		2953	1321	808	335	74
Margin of Safety		634	715	216	295	154
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		1%	2%	3%	5%	13%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		82%	64%	76%	50%	28%
Margin of Safety		18%	35%	20%	44%	59%

Table 2.7-10 Daily fecal coliform Loading Capacities and Allocations – Chippewa River, Headwaters to Little Chippewa River (AUID: 07020005-503)

Drainage area for listed reach (sq. mi):	427					
Flow gage used:	Upper					
Land Area MS4 Urban (%):	0	Flow Zone				
Total WWTF Flow (mgd):	3.8	High	Moist	Mid	Dry	Low
		Billion organisms per day				
TOTAL DAILY L0ADING CAPACITY		1911	1312	561	331	137
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		29	29	29	29	29
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Load Allocation		1687	726	444	162	17
Margin of Safety		194	558	89	140	91
		Percent of total daily loading capacity				
TOTAL DAILY L0ADING CAPACITY		100%	100%	100%	100%	100%
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		2%	2%	5%	9%	21%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Load Allocation		88%	55%	79%	49%	13%
Margin of Safety		10%	42%	16%	42%	67%

2.8 *Turbidity Allocations*

Table 2.8-1Reach 503 TSS Total Daily Loading Capacities and Allocations.

Upper Chippewa River 07020005-503		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.774	0.774	0.774	0.774	0.774
	Construction Stormwater	0.041	0.023	0.012	0.005	0.001
	Industrial Stormwater	0.041	0.023	0.012	0.005	0.001
Load Allocation	Nonpoint source and channel	35.930	20.154	9.763	3.830	0.036
Margin of Safety (MOS)		4.087	2.331	1.173	0.513	0.090
Total Daily Loading Capacity		40.873	23.305	11.734	5.127	0.902
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	1.9%	3.3%	6.6%	15.1%	85.8%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	87.9%	86.5%	83.2%	74.7%	4.0%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-2 Reach 901 TSS Total Daily Loading Capacities and Allocations.

Unnamed Creek (Freeborn Lake inlet) 07020005-901		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.000	0.000	0.000	0.000	0.000
	Construction Stormwater	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Industrial Stormwater	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Load Allocation	Nonpoint source and channel	0.294	0.167	0.084	0.037	0.006
Margin of Safety (MOS)		0.033	0.019	0.009	0.004	0.001
Total Daily Loading Capacity		0.327	0.186	0.094	0.041	0.007
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.0%	0.0%	0.0%	0.0%	0.0%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.8%	89.8%	89.8%	89.8%	89.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-3 Reach 504 TSS Total Daily Loading Capacities and Allocations.

Middle Chippewa River 07020005-504		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.000	0.000	0.000	0.000	0.000
	Construction Stormwater	0.059	0.035	0.018	0.009	0.002
	Industrial Stormwater	0.059	0.035	0.018	0.009	0.002
Load Allocation	Nonpoint source and channel	53.111	31.272	16.129	8.024	1.921
Margin of Safety (MOS)		5.914	3.483	1.796	0.893	0.214
Total Daily Loading Capacity		59.143	34.826	17.961	8.934	2.139
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.0%	0.0%	0.0%	0.0%	0.0%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.8%	89.8%	89.8%	89.8%	89.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-4 Reach 505 TSS Total Daily Loading Capacities and Allocations.

Middle Chippewa River 07020005-505		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.040	0.040	0.040	0.040	0.040
	Construction Stormwater	0.099	0.058	0.030	0.015	0.004
	Industrial Stormwater	0.099	0.058	0.030	0.015	0.004
Load Allocation	Nonpoint source and channel	88.478	52.182	27.032	13.433	3.220
Margin of Safety (MOS)		9.857	5.815	3.015	1.500	0.363
Total Daily Loading Capacity		98.573	58.153	30.147	15.003	3.631
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.0%	0.1%	0.1%	0.3%	1.1%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.8%	89.7%	89.7%	89.5%	88.7%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-5 Reach 530 TSS Total Daily Loading Capacities and Allocations.

Little Chippewa River 07020005-530		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.123	0.123	0.123	0.123	*
	Construction Stormwater	0.011	0.006	0.002	< 0.001	< 0.001
	Industrial Stormwater	0.011	0.006	0.002	< 0.001	< 0.001
Load Allocation	Nonpoint source and channel	9.882	5.631	1.250	0.086	0.088
Margin of Safety (MOS)		1.114	0.641	0.153	0.023	0.010
Total Daily Loading Capacity		11.141	6.408	1.529	0.233	0.098
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	1.1%	1.9%	8.0%	52.8%	*
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	88.7%	87.9%	81.8%	37.0%	89.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	NA
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

*Note – Starbuck and Lowry WWTF effluent TSS concentrations under this TMDL shall not exceed their permitted limit of 30 mg/L and 45 mg/L, respectively, as a calendar monthly average. Permitted point source allocation values were calculated but not factored in the dry condition flow zone allocation since the facilities do not operate at their permitted design flow under these flow conditions. Instead, the point source discharge allocation for the dry flow zone is represented by the following equation: Allocation = (flow contribution from source) X (permitted TSS monthly average).

Table 2.8-6 Reach 514 TSS Total Daily Loading Capacities and Allocations.

		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
East Branch	07020005-514	TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.081	0.081	0.081	0.081	0.081
	Construction Stormwater	0.090	0.045	0.022	0.011	0.003
	Industrial Stormwater	0.090	0.045	0.022	0.011	0.003
Load Allocation	Nonpoint source and channel	80.497	40.164	20.059	9.916	2.927
Margin of Safety (MOS)		8.973	4.482	2.243	1.113	0.335
Total Daily Loading Capacity		89.731	44.817	22.427	11.132	3.349
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.1%	0.2%	0.4%	0.7%	2.4%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.7%	89.6%	89.4%	89.1%	87.4%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-7 Reach 559 TSS Total Daily Loading Capacities and Allocations.

Shakopee Creek	07020005-559	Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.000	0.000	0.000	0.000	0.000
	Construction Stormwater	0.051	0.022	0.009	0.004	< 0.001
	Industrial Stormwater	0.051	0.022	0.009	0.004	< 0.001
Load Allocation	Nonpoint source and channel	45.649	19.943	8.443	3.304	0.254
Margin of Safety (MOS)		5.083	2.221	0.940	0.368	0.028
Total Daily Loading Capacity		50.834	22.208	9.401	3.680	0.283
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.0%	0.0%	0.0%	0.0%	0.0%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.8%	89.8%	89.8%	89.8%	89.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.8-8 Reach 574 TSS Total Daily Loading Capacities and Allocations.

Unnamed Creek 07020005-574		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.019	0.019	0.019	0.019	*
	Construction Stormwater	0.003	0.001	< 0.001	< 0.001	< 0.001
	Industrial Stormwater	0.003	0.001	< 0.001	< 0.001	< 0.001
Load Allocation	Nonpoint source and channel	2.263	0.978	0.403	0.146	0.013
Margin of Safety (MOS)		0.254	0.111	0.047	0.018	0.001
Total Daily Loading Capacity		2.542	1.110	0.470	0.184	0.014
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.7%	1.7%	4.0%	10.3%	*
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.1%	88.1%	85.8%	79.5%	89.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	NA
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

*Note – Kerkhoven WWTF effluent TSS concentrations under this TMDL should not exceed its permitted limit of 30 mg/L as a calendar monthly average. Permitted point source allocation values were calculated but not factored in the dry condition flow zone allocation since the facility does not operate at their permitted design flow under these flow conditions. Instead, the point source discharge allocation for the dry flow zone is represented by the following equation: Allocation = (flow contribution from source) X (30 mg/L).

Table 2.8-9 Reach 508 TSS Total Daily Loading Capacities and Allocations.

Lower Chippewa River 07020005-508		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.393	0.393	0.393	0.393	0.393
	Construction Stormwater	0.248	0.127	0.067	0.031	0.010
	Industrial Stormwater	0.248	0.127	0.067	0.031	0.010
Load Allocation	Nonpoint source and channel	221.936	113.191	59.767	27.398	8.500
Margin of Safety (MOS)		24.758	12.729	6.699	3.095	0.990
Total Daily Loading Capacity		247.583	127.286	66.993	30.948	9.903
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.2%	0.3%	0.6%	1.3%	4.0%
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	0.1%
Load Allocation	Nonpoint source and channel	89.6%	89.5%	89.2%	88.5%	85.8%
Margin of Safety (MOS)		10.0%	10.0%	10.0%	10.0%	10.0%
Total Daily Loading Capacity		100.0%	100.0%	100.0%	100.0%	100.0%

3.0 Priority Management Areas

While best management practices programs have traditionally been, and still most often are, utilized by those landowners who voluntarily seek them, focused approaches and identifying landowners within a priority watershed or sub-basin will be needed as implementation continues to move forward. Several strategies will be used to prioritize practices and target locations including: looking at problem areas located closer to and within the impaired reaches, utilizing transparency tube transect data and water quality data, cost-effectiveness, and expected benefits to water quality and fish and wildlife habitat.

There are areas of priority throughout the Chippewa Watershed. Recommendations are based off of the monitoring results. They focus on the problems for each basin. E-coli will be discussed at the end since it is a watershed wide problem.

Dry Weather Creek: This basin has the highest levels of Nitrogen (NO2-3) and Ortho Phosphorus (OP) in the watershed. It also has the least number of ditch banks with buffers and the lowest portion of lakes, wetlands, grass and woodlands. In order to control the water soluble OP and NO2-3 farmers should be encouraged to alter their fertilizer applications. Examples such as applying fertilizer in the spring rather than the fall or decreasing fertilizer applications to follow University of Minnesota recommendations are possible alterations. These would maintain crop yields, save farmers money and minimize nutrient loss to waterways. In addition, buffers at least 16 ft. on ditches and 50 ft. on public waters need to be extended to those areas where none are present (as required by law). This sub-basin has a large number of open tile intakes. Efforts to replace these with appropriate alternatives would be highly effective at reducing the targeted pollutants. Furthermore, low lying, minimally productive crop lands should be converted to some kind of perennial land use via new market opportunities, or through incentive payments and easements. This will help filter the waterborne nutrients out of the water; they will have the additional benefit of decreasing high water levels which are causing havoc on the stream banks of the basin's lower regions.

Lower Mainstem: This basin's issues are Sediment (TSS), Total Phosphorus (TP), e-coli, turbidity and bank erosion. Intensive monitoring has revealed that the main sediment contributing areas of this sub-basin are not Cottonwood Creek nor Judicial Ditch 3 and 9 but rather the region around the Mainstem of the Chippewa. The area from Benson to Hwy 40 is responsible for the majority of this area's sediment. Bank erosion and gullies coming down into the river are a likely source. Gullies should be targeted for remediation. A strong focus on upland water retention should be enacted throughout the Chippewa Watershed to help minimize high water events that are causing the stream bank erosion. The OP level is an issue of agricultural practice, farmers should be encouraged to spring apply fertilizer and follow UMN recommendations for fertilizer applications. This sub-basin has a large number of open tile intakes. Efforts to replace these with appropriate alternatives would be highly effective at reducing the targeted pollutants. As a result of these practices turbidity levels should improve.

Shakopee Creek: Nitrogen (NO2-3), Ortho Phosphorous (OP), Suspended Sediment (TSS), e-coli, turbidity and transparency are all major issues for Shakopee Creek. Intensive monitoring over the last three years has yielded a wealth of information about this basin. For example, Shakopee Lake (261 acres) is responsible for 39% of the suspended solids and 19% of the phosphorous. The lake is full of sediment, nutrients, algae and carp. Water coming out of Shakopee Lake is orders of magnitude worse than the water going in, even during low flow. Furthermore, bank erosion problems downstream of the lake's dam are a direct result of the dam. If the Shakopee Lake (Buffalo Lake) problem could be solved it would be the single most significant improvement project for the Chippewa River in 20 years. In order to control the water soluble OP and NO2-3 which are critical in driving up the algae, TSVS and Turbidity levels, farmers should be encouraged to follow UMN recommendations for fertilizer applications and apply them in the spring. This would maintain crop yields, save farmers money and minimize nutrient loss to waterways. In addition, buffers at least 16 ft. on ditches and 50 ft. on public waters need to be extended to those areas where none are present (38% of the basin has no buffer). This sub-basin has a large number of open tile intakes. Efforts to replace these with appropriate alternatives would be highly effective at reducing the targeted pollutants. Furthermore low lying, minimally productive crop lands should be converted to some kind of perennial land use via incentive payments and easements. This will help filter the waterborne nutrients out of the water. They will have the additional benefit of decreasing high water levels which are causing havoc on the stream banks of the basins lower regions. In particular, areas downstream of Shakopee Lake should be the main target for these programs. The region downstream of the lake has been found to yield 70% of the Shakopee's water and a disproportionate amount of this basin's pollutants (61% NO2-3, 54% OP, 38% TP, 20% TSS) in addition this region has a higher portion of ditches without any buffer than the rest of the basin.

East Branch: The East Branch's major issue throughout is e-coli. There are localized issues in Total Phosphorous (TP), Ortho Phosphorous (OP), and Turbidity. High slopes in the upland areas represent localized concerns and are a threat to the sub-basin's lakes and wetlands. The lower region of the East Branch, before it joins the Chippewa Mainstem, consistently faces sediment and turbidity problems. Recent surveys have shown that the source for this is largely hydrologic in nature but is being exasperated by human activities. The largest portion of the region's OP is coming out of the agriculturally dominated JD19 sub-basin, fertilizer practices need to be targeted to match UMN recommendations there. Livestock manure finding its way to the River and non-compliant septic systems are likely sources for the e-coli. These need to be fixed to limit feces coming in contact with the water.

Middle Mainstem: This basin faces trouble with Sediment (TSS), volatile solids (TSVS), Total Phosphorous (TP), turbidity, transparency and e-coli. Evidence suggests that the region along the Mainstem channel of this basin should be targeted. The Little Chippewa River faces intense pressure from cattle with long-term access to the creek. This causes the turbidity levels and TSVS levels to be high. This transfers downstream to Lake Emily which then contributes to Chippewa River pollution. Cattle access to waterways must be controlled, especially in the hot months when TSVS levels have been seen to rise. Areas along the River should be targeted for removing gullies and in the steep areas controlling field erosion. Buffer rates are pretty good but those areas without any buffer should be protected with buffers at least 16.5 ft. on ditches and 50 ft. on public waters. Lake Emily is a major settling pond for TSS and TP and this has caused serious algae outbreaks that are impacting the river. Lake management actions that deal with the carp and lack of emergent vegetative cover need to be undertaken to hold down sediment and phosphorous. Further downstream, near Clontarf the river has been channelized through unstable layers of alluvial sand, silt and clay. This needs to be stabilized through bank and stream stabilization methods. High slopes in the upland areas represent localized concerns and are a threat to the sub-basin's lakes and wetlands.

Upper Chippewa: This basin's issues include Suspended Sediment (both TSS and TSVS), e-coli, TP, turbidity and transparency. Surveys from Urbank to Cyrus have documented that e-coil levels are high throughout this basin. TSS, Turbidity and transparency are fine until the river reaches Peterson Lake from here they plummet and never recover. The fact that these levels begin at a lake suggest algae and carp are factors from this point on and that there are contributions coming from the surrounding landscape on downstream. High slopes in the upland areas represent localized concerns and are a threat to the sub-basin's lakes and wetlands. Transect Surveys regularly document numerous cattle operations with uncontrolled access to the river. Fine particulates dislodged by these cattle dominate mid-season water samples. - Management practices that control livestock access to the river should be encouraged. Stream and ditch bank erosion also need to be stabilized.

Bacteria levels can be reduced by eliminating the pathways that feces enter the river. Upgrading human septic systems that are delivering their waste directly to the river, controlling livestock access to the water and by following MPCA manure application guidelines would be a good start.

4.0 Non-point Management Alternatives

This section describes management alternatives and strategies for the reduction of turbidity and fecal coliform from non-point sources. Since there are a variety of sources and pathways for fecal coliform bacteria and turbidity loading, many of the strategies would work well to reduce both pollutant loads. The list of suggested alternatives should not be considered final or unchangeable. The list outlines practices that have been used in the watershed in the past and/or have been suggested as practices to be considered for reducing bacteria and turbidity in the river system. The wide array of strategies is available for consideration and will be prioritized to those that seem to be the most acceptable and have the greatest ability to cause water quality improvement. As turbidity and bacteria dynamics are further examined and understood, the recommended actions will be amended. The overall goal is to meet the TMDL allocations, thus supporting the designated uses and ultimately delisting the impaired reaches of the Chippewa River Watershed. It will be important to utilize all existing and potential strategies to achieve this goal.

4.1 *Livestock and Manure Management*

- Development of Manure Management Plans (MMP): A MMP is a document that assists producers in managing rate, timing, location, form and method of all nutrient applications. A Comprehensive Nutrient Management Plan will include addressing manure and wastewater handling and storage facilities to provide for adequate collection, handling, storage, and/or treatment of manure and organic by-products that facilitate application during favorable weather conditions and is compatible with crop management strategies, including the application of nutrients at agronomic rates., thus by reducing the likelihood of bacteria moving from the livestock facility and landscape to waterways. All producers with 300 animal units or greater are required to complete a MMP. Landowners smaller than 300 animal units should be encouraged and receive incentive to create and follow a MMP. Landowners who have a plan also need to be encouraged to update it regularly.
- Observation of Setbacks: The MPCA has defined the following setbacks to perennial and intermittent streams, lakes, and drainage ditches for the application of manure: 25 feet-no application, 25-300 feet-inject or incorporate within 24 hours, 0 to 300 feet from an open tile intake also requires injection or incorporation within 24 hours.
- Filter strip: Filter strips can be an efficient method to filter feedlot runoff. The perennial grass vegetation can trap nutrient rich sediment and bacteria and utilize nutrients.
- Feedlot fixes: Utilizing structural and management practices to repair and upgrade to eliminate runoff from existing feedlots to nearby bodies of water. Practices could include roof structures, gutters, clean water diversions and increased manure storage.

- Agricultural Waste Pit Closures: The closure of waste impoundments, such as lagoons as ponds that are no longer being used for their intended purposes, in an environmentally safe manner that reduces risk of contamination to surface waters.
- Feedlot and Agricultural Waste Pit Inspections: Several of the aging agricultural waste pits in the Chippewa River watershed were built either without specifications of construction, or the specifications of construction have been lost and cannot be verified. Inspections are needed to assess if the agricultural waste pit is properly protecting ground and surface water and meets today's conditions. Landowners need encouragement and funding to complete this step.
- Pasture Management: Livestock with direct and unlimited access to streams present a risk of increasing the pollutant loads of both bacteria and turbidity through the direct deposit of fecal matter and unstable stream banks. Utilizing stream crossings, fencing, remote water systems and a managed grazing plan would be an alternative.
- Manure management workshops, demonstration plots and field days: Engage producers on the importance of correct planning of manure application by hosting workshops. Educate producers on the importance of correct manure management by holding field days. These events will include addressing methods that provide for adequate collection, handling, storage, and/or treatment of manure and organic by-products that facilitate application during favorable weather conditions and is compatible with crop management strategies, including the application of nutrients at agronomic rates, thereby reducing the likelihood of bacteria moving from the livestock facility and landscape to waterways. Depending on the site, various manure application BMP's may be shown. Long-term agreements will be developed with landowner/s to install demonstration site and to work with an agronomist to develop various plots.

4.2 *Structural Practices*

- Terraces: Terraces break long slopes into shorter ones. As water makes its way down a hill, terraces serve as small dams to intercept water and guide it to an outlet. Terraces can be effective at reducing overland runoff that carries sediment and nutrients.
- Water and Sediment Control Basins: A water and sediment control basin is an embankment that is built across a depressional area to capture water runoff. These basins trap sediment and water running off farmland above the structure. These structures help to reduce gully erosion by controlling flow within a drainage area.
- Stream barbs or j-hooks: Stream bank erosion is a concern in the Chippewa River Watershed. Stream barbs or j-hooks can be installed where stream bank erosion is occurring. The barbs, constructed of rock, re-direct the energy of the stream back into the channel, reducing further bank erosion and creating habitat.
- Dam Alteration and/or Removal: Existing dams within the watershed are reaching their life expectancies and need to be addressed as sediment sources. Failed or unmaintained dams can cause stream bank erosion above and around the dam.
- Carp Removal and/or Barriers: Carp are recognized as a factor affecting turbidity in the Chippewa River Watershed and ways to limit their impact need to be explored. Carp are

bottom feeders that stir up and re-suspend bottom sediments into the water column. Options to explore include physical removal, barrier construction and pheromone control.

- Rip-rap or Hard Armor for Shoreline Erosion Control: In certain cases when the shoreline erosion is severe or conditions don't allow for adequate vegetation establishment, the practice if sloping and rip-rap or hard armor products is needed.

4.3 *Drainage and/or Ditch Bank Management*

- Side Inlets: Intakes and pipe structures are used to stabilize the grade and control erosion in natural and designed channels to prevent the formation or advancement of gullies.
- Alternative Tile Intakes: The removal of an existing open tile intake and replacing it with an alternative intake such as a rock inlet or densely spaced or coiled perforated tile. The goal is to limit the amount of sediment and/or fecal matter leaving the field thorough an open intake but still retaining drainage benefits.
- Controlled Drainage: Controlled or conservation drainage is the introduction of a structure in a drainage management zone to control the flow of water leaving the drainage system. A controlled drainage system could also incorporate gravity and mechanical pumping stations.
- Two-Stage Ditch Design: Ditches designed with a low flow channel and a bench constructed in the channel. This design has the potential to produce a more stable cross section thus reducing erosion and still provide drainage function.
- Pattern Tile: Subsurface pattern tiling, in appropriately placed locations with proper controls can encourage infiltration and aid in delaying surface erosion reaching the ditch or river. Care must be taken to avoid unintended side effects such as allowing water to arrive at streams faster and in greater quantities and thereby causing downstream hydrologic alteration or stream channel erosion.
- Redetermination of Benefits on Drainage Systems: County and judicial drainage systems were established and benefits assessed on systems that in many cases function much differently than initially designed. A redetermination to assess all drainage fairly and in line with today's market can greatly increase the benefits to a system. The increase in benefits often allows costly maintenance to address gully erosion and ditch bank erosion to be addressed with best management practices for reducing sediment.

4.4 *Vegetative Practices*

- Wetland Restorations: Wetlands are areas of saturated soils and water loving plants. Wetlands can act as natural filters and overland flow reducers. Wetlands are beneficial for the removal of nutrients, pesticides and bacteria from surface waters. Wetlands can reduce erosion and downstream flooding. Wetlands are applicable in both agricultural and urban settings.

- Vegetative Buffers: Strips of grass and/or trees help to slow water flow and cause sediment, nutrients and bacteria to collect in the vegetation. Buffers can provide benefits along field edges, streams, lakes and drainage ditches.
- Conservation Tillage and Residue Management: No-till, reduced till, ridge till and zone tillage are all crop production methods that increase the amount of crop residue left on the surface of the soil. By increasing the crop residue on the surface, soil erosion goals may be met.
- Shoreline Restoration and/or Stabilization on Lakes and Rivers: Addressing erosion issues with the planting of native grasses and forbs or other bioengineering techniques such as root wads, willow wattles, and coconut logs. The restoration creates a natural buffer between the lakeshore and the upland use.
- Grassed Waterways: A grassed waterway is a natural drainage that is graded and shaped to form a smooth, bowl shaped channel. This area is seeded to sod forming grasses. Runoff water that flows down the drainage way flows across the grass rather than tearing away soil and forming a gully. An outlet is often installed to stabilize the waterway and prevent gully formation. The grass protects the drainage way and can act as a filter.
- Encourage the establishment and maintenance of vegetative rights of way.
- Encourage the establishment of restored prairie or other perennial vegetation on highly erodible soils. This can be accomplished using a variety of existing programs or developing a new approach that allows for the harvesting, haying and grazing of these lands.
- Cover crops: Cover crops are Crops including grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes. Cover crops have a number of benefits including preventing erosion and returning nutrients to the soil.

4.5 *Urban Practices*

- Rain gardens: Rain gardens are depressional areas planted with native plants and are designed to capture and filter storm water runoff from impervious surfaces such as roofs and driveways in residential areas.
- Rain Barrels: Rain barrels are tanks designed to catch rain water from roofs and store the water for later use.
- Pervious Pavers: In an effort to reduce impervious surfaces and storm water runoff, utilizing this product, which allows precipitation to pass through the paver, in construction has added benefits.
- Permeable Asphalt: In an effort to reduce impervious surfaces and storm water runoff, utilizing this product, which allows precipitation to pass through the pavement, in construction has added benefits.
- Street Sweeping: Encourage small communities to partake in street sweeping campaigns to avoid the addition of sediment, nutrients and bacteria into the storm water.

- Urban Stormwater Ponds: Constructed settling ponds to collect storm water runoff before the water enters the river or lake. These settling ponds allow sediments to settle out, and reduce the flow rate which helps to alleviate downstream erosion issues as well.

5.0 Point Source Management Alternatives

This section describes management alternatives and strategies for the reduction of turbidity and fecal coliform from point sources. Point sources are generally permitted sources of discharge. Many of the strategies would work well to reduce both pollutant loads. The list of suggested alternatives should not be considered final or unchangeable. The list outlines practices that have been used in the watershed in the past and/or have been suggested as practices to be considered for reducing bacteria and turbidity in the river system. It will be important to utilize all existing and potential tools to achieve the allocation goals.

5.1 *Subsurface Sewage Treatment Systems (SSTS):*

These systems treat sewage from individual dwellings. Failing and other non-compliant systems are a source of fecal coliform and their relative load contribution is higher during periods of low flow. The replacement of non-conforming and failing systems with proper drain fields or mound systems would be effective at providing nearly complete treatment of fecal coliform bacteria if the systems are properly maintained.
Acceptable designs are described in Minn. R. ch. 7080. All counties in the Chippewa River Watershed are responsible to enforce these rules. Fecal coliform loading from these sources can be reduced in proportion to the faulty SSTS that are fixed.

5.2 *Municipal Wastewater Control*

There are 19 wastewater treatment plants servicing residents in the watershed. Fourteen of the 19 municipalities with WWTPs discharge to surface waters, the other five do not. All permitted wastewater treatment facilities are required to monitor their effluent to ensure that concentrations of specific pollutants remain within levels specified in the discharge permit. They are held to allowable discharge limits under Minnesota State Rules. The Minnesota Pollution Control Agency regularly reviews the Discharge Monitoring Reports to determine if violations have occurred.

Bypass discharges of sewage treatment plants are regulated under the Clean Water Act Phase II Storm Water Program and are the responsibility of MPCA. Many urban areas are experiencing aged and failing sanitary infrastructure, cross connections, and illegal and improper sump pump and downspout connections to the sanitary sewer. This creates inflow and infiltration (I/I) problems. I/I increases the amount of water in the sanitary sewer and contributes to the need for emergency bypass discharges of sewage treatment plants. I/I can be addressed through the replacement of failing infrastructure, fixing cross connections and disconnecting sump pumps and down spouts from the sanitary sewers.

MPCA has primary control over these facilities, so BMPs for them were not selected or summarized in section 6.

5.3 *Unsewered Communities*

There are six unsewered communities within the Chippewa River Watershed: Hagen/Big Bend, Long Beach, N. Benson Subdivision, Swift Falls, De Graff, and Terrace. These communities are serviced by SSTS and correction of any failing or non-compliant systems would reduce the potential for fecal coliform contributions to the Chippewa River.
MPCA has primary control over these unsewered communities, so BMPs for them were not selected or summarized in section 6.

5.4 *MS4 Community Stormwater*

Montevideo is the only city in the watershed which is required to have a Municipal Separate Storm Sewer System permit. This permit requires a range of actions to limit the impact of storm water runoff from the community. However, Montevideo is on the most downstream portion of the Chippewa River Watershed and is not included in any of the impaired reaches for this TMDL study, but it is accounted for in the Minnesota River Turbidity TMDL study.

Smaller communities should still be looking at actions to reduce storm water and associated bacteria and sediment runoff utilizing identified urban storm water practices.

MPCA has primary control over MS4 communities, so BMPs for them were not selected or summarized in section 6.

5.5 *National Pollutant Discharge Elimination System (NPDES) Livestock Facilities*

Livestock facilities that have been designated as a Confined Animal Feeding Operation (CAFO) are required to operate in accordance with a NPDES permit. These facilities are allowed zero discharge and are regulated by the Minnesota Pollution Control Agency. According to the MPCA Feedlot Database, there are eight CAFOs in the Chippewa River Watershed.

MPCA has primary control over these facilities, so BMPs for them were not selected or summarized in section 6.

6.0 Identification and Summary of Implementation Objectives and Action Items

Identification and Summary of Implementation Objectives and Action Items that address nonpoint management strategies identified in section 4. The list of suggested strategies should not be considered final or unchangeable. The list outlines practices that have been used in the watershed in the past and/or have been suggested as practices to be considered for reducing bacteria and turbidity in the river system. The wide array of strategies is available for consideration and will be prioritized to those that seem to be the most acceptable and have the greatest ability to cause water quality improvement. As turbidity and bacteria dynamics are further examined and understood, the recommended actions will be amended. The costs should be used as a guideline. Cost will be variable due to site specificity and current economic conditions.

6.1 *Objective 1. Nonpoint source management measures*

6.1.1 Task A: Livestock and Manure Management

(Also see Vegetative Buffers under Task D: Action D-2)

6.1.1.1 Action A-1: Manure Management Plans (MMP)

- Provide a cash incentive to producers with less than 300 animal units, those who do not qualify for EQIP or those that need to continue after the expiration of an EQIP contract, to use the services of a Certified Crop Consultant or Agronomist to develop and maintain a written nutrient management plan. The incentive will be offered for three years if the producer is shown to be following the plan.
- The need exists for better calibration of solid manure application equipment. Scale pads are a tool for measuring and calibrating solid manure application. Scale pads would be purchased by the project and housed by CRWP cooperating partners such as the Chippewa, Swift, Pope, Kandiyohi, Stevens, Grant, and Douglas SWCDs. These partners in the watershed would assist the producers in calibration.
- Complete Chippewa and Grant County inventories of livestock producers with less than 300 animal units. The current number is unknown.
- Time frame: 1-10 years
- Person(s) responsible: , CRWP, County SWCD, Environmental Offices, NRCS, and Certified Crop Consultant or agronomist
- Total Costs: $175,000.00
    - Cash: $145,000.00

        - $2,000 incentive/producer for hiring a consultant to write and update a plan for producer to follow for five years. $2,000 x 50 producers = $100,000.
        - $2,400/scale pad x 5 pads = $12,000.00
        - $5.00/acre incentive to meter manure application with, maximum of 200 acres x 25 producers = $25,000.00
        - $4,000 to County SWCDs to perform inventory of livestock producers x 2 counties = $8,000
    - Inkind: $30,000.00
        - 100 hours x $40/hr. x 5 years for promotion and plan review = $20,000
        - 5 hours x $40/hr. x 50 producers for weighing and calibration of solid manure spreaders = $10,000.00

6.1.1.2 Action A-2: Feedlot fixes

- Utilize structural and management practices to repair and upgrade existing feedlots to eliminate runoff to nearby bodies of water. Practices may include but are not limited to roof structures, gutters, filter strips, increased manure storage and clean water diversions with 25 feedlot sites.
- Provide technical assistance to each feedlot site that implements runoff control practices.
- Timeframe: Years 1-10
- Persons responsible: CRWP, SWCDs, NRCS, SWCDJPO, landowners
- Total Cost: $800,000.00
    - Cash: $550,000.00
        - 25 sites x $20,000/site incentive = $500,000.00
        - Technical Assistance 25 sites x $2,000/site - $50,000.00
    - Inkind: $250,000.00
        - Landowners: 25 sites x $10,000/site = $250,000.00

6.1.1.3 Action A-3: Agricultural Waste Pit Closures

- Provide cost share for the closure of waste impoundments such as lagoons or ponds that are no longer being used for their intended purposes.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCDs, NRCS, Landowners
- Total Cost: $100,000.00
    - Cash: $50,000.00
        - 20 ag waste pit closures x $2,500.00 = $50,000.00
    - Inkind: $50,000.00
        - Landowners 20 x $2,500.00 = $50,000.00

6.1.1.4 Action A-4: Pasture Management

- Promote 5,000 acres of pasture management by utilizing the following practices but not limited to: stream crossings, fencing, remote water systems, managed grazing plan, seeding, paddocks, and woody invasive species removal.

- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCDs NRCS, Landowners
- Total Costs: $1,700,000.00
    - Cash: $1,000,000.00
        - 5,000 acres x $200.0 per acre cost share= $1,000,000.00
    - Inkind: $700,000.00
        - Producer labor cost: 5,000 acres x $100/acre = $500,000.00
        - Technical Assistance: 5,000 acres x 1 hr./acre x $40/hr. = $200,000.00

6.1.1.5 Action A-5: Feedlot and Agricultural Waste Pit Inspections

- Inspect and assess agricultural waste pits to understand if they are properly protecting ground and surface water and meet today's specifications.
- Timeframe: Years 1-10
- Persons Responsible: County Environmental Services, County Land and Resource Management, CRWP, SWCDs, NRCS, SWCDJPO, landowners
- Total Costs: $55,080.00
    - Cash: $40,800
        - 102 systems x $400.0 per system = $40,800.00
    - Inkind: $14,280.00
        - Producer: 102 systems x $100/ system= $10,200.00
        - Technical Assistance: 102 systems x 1 hr./ system x $40/hr. = $4,080.00

6.1.1.6 Action A-6: Manure management workshops, demonstration plot and field day

- Educate producers on the importance of correct planning of manure application by hosting five workshops.
- Educate producers on the importance of correct manure management by holding five field days over ten years. The demonstration site will have different rates of manure and application methods. Depending on the site, various manure application BMP's may be shown.
- Develop long-term agreement with landowner to install demonstration site and to work with an agronomist to develop various plots.
- Timeframe: Years 1-10
- Persons responsible: CRWP, 7 county SWCDs, NRCS, Landowners, Agronomist and U of MN Extension
- Total Costs: $18,500.00
    - Cash: $ 12,500.00
        - $1000/workshop x 5 workshops = $5,000.00
        - $1000/field days x 5 field days = $5,000.00
        - $500.00/yr. for field site landowner compensation x 5 years = $2,500.00
    - Inkind: $6,000.00
        - 10 hrs./workshop x $40 x 5 workshops = $2,000.00
        - 20 hrs./field day x $40.00/hr. x 5 field days = $4,000.00

6.1.2 Task B: Structural Practices

6.1.2.1 Action B-1: Install structural management measures

- Provide cost share up to 75% in combination with EQIP or State-Cost share programs to landowners to implement structural practices which may include but are not limited to:
    - Terrace projects
    - Water and sediment control basins
    - Stream barbs or j-hooks
    - Dam replacement, repair, alteration and/or removal
    - Locations of Carp Removal and/or barriers, pheromone control
    - Lake draw downs
- Timeframe: Years 1-10
- Persons Responsible: CRWP, 7 county SWCDs, NRCS, Water Planners, DNR, Environmental/Land and Resource Management Offices, Communities, Landowners
- Total Costs: $2,564,687.00
    - Cash: $1,743,750.00
    - Inkind: $820,937.00

6.1.3 Task C: Drainage and/or Ditch Bank Management

6.1.3.1 Action C-1: Side Inlets

- Provide up to 75% cost share on intakes and pipe structures to control gully erosion on natural and designed channels
- Timeframe: Years 1-10
- Persons Responsible: CRWP, County Ditch Inspectors, Landowners
- Total Cost: $168,000.00
    - Cash: $90,000.00
        - 150 side inlets x $800/inlet x 75% = $90,000.00
    - Inkind: $78,000.00
        - 150 side inlets x $800/inlet x 25% = $30,000.00
        - County Ditch Inspectors 8 hrs. x 150 inlets x $40/hr. = $48,000

6.1.3.2 Action C-2: Alternative Tile Intakes:

- Provide up to 75% cost share to remove open tile intakes and replace with alternative intakes such as rock inlets or densely spaced pattern tile or coiled perforated tile. Goal: 375 to 1,000 intakes replaced.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, Landowners
- Total Cost: $250,000.00
        - Cash: $187,500.00
        - 500 intakes x $375/intake = $187,500.00
    - Inkind: $62,500.00
        - 500 intakes x $125/intake = $62,500.00

6.1.3.3 Action C-3: Controlled Drainage and Two Stage Ditch Design

- Provide up to 75% cost share on controlled drainage projects
- Have future drainage ditches designed with a two stage ditch design
- Timeframe: Years 1-10
- Persons Responsible: CRWP, Landowners, County engineers, County Ditch Inspectors
- Total Cost: $320,000.00
  - Cash: $90,000.00
    - 10 controlled drainage projects x $12,000 x 75% = $90,000.00
  - Inkind: $230,000.00
    - Landowner 25% x $120,000 = $30,000.00
    - Counties/engineers 2 two-stage ditches x $100,000.00 = $200,000.00

6.1.4 Task D: Vegetative Practices

6.1.4.1 Action D-1: Wetland Restorations:

- Restore wetlands in both agricultural and urban settings
- Partner with the US Fish and Wildlife service to provide up to 90% cost share or $10,000 whichever is less for wetland restorations
- Provide landowners with a $1,000 per acre incentive payment for program enrollment and restoration of wetlands through permanent easements.
- Time Frame: Years 1-10
- Persons Responsible: CRWP, 7 county SWCDs, NRCS, BWSR, USFWS, Landowners
- Total Cost: $345,000.00
  - Cash: $250,000.00
    - 15 Wetland restorations x $10,000.00/wetland = $150,000.00
    - 100 acres wetlands x $1,000/acre = $100,000.00
  - Inkind: $95,000.00
    - USFWS 15 wetlands at $2,000/wetland = $30,000
    - SWCDJPO technical assistance at 10 hrs./acre x 100 acres x $50/hr. = $50,000
    - Landowners 10% of $150,000 = $15,000

6.1.4.2 Action D-2: Vegetative Buffer strips:

- Promote the installation of 418 miles of vegetative buffers to a width of 2 rods (33 feet) on ditches.
- Provide a one-time incentive and or cost share payment to landowners to install buffers greater than required by law, incentive will only be paid on part of buffer not required by law. Incentive rate to be determined by local conservation partner input.
- Inkind contributions will be the landowners' share of seed and seeding estimated at $200 per acre and technical assistance from SWCDs and NRCS in the seven counties It is substantial to note how much federal money this buffer incentive could bring to the watershed (approximately $8 million dollars)
- Timeframe: Years 1-10
- Person(s) responsible: CRWP, 7 County SWCDs NRCS, Landowners

- Total Cost: $652,080.00
    - Cash: $418,000.00
        - 836 acres x $500 per acre = $418,000.00
    - Inkind: $234,080.00
        - Landowners 836 acres x $200/acres = $167,200
        - Technical Assistance 2 hrs./acre x 836 acres x $40/hr. = $66,880.00

6.1.4.3 Action D-3: Conservation Tillage and Residue Management

- Promote 8,000 acres of conservation tillage
- Provide producers with a $7 per acre one time incentive payment for development and installation of an EQIP conservation tillage plan (no till, ridge till or strip till).
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCDs NRCS, Landowners
- Total Cost: $192,000.00
    - Cash: $56,000.00
        - 8,000 acres x $7/acre incentive = $56,000.00
    - Inkind: $1360,000.00
        - Landowners share of 8,000 acres x $7/acre = $56,000.00
        - Technical Assistance 0.25 hr./ac x 8,000 x $40/hr. = $80,000.00

6.1.4.4 Action D-4: Shoreline Restoration and/or stabilization on Lakes and Rivers:

- Provide cost share and technical assistance to lakeshore owners for planting native grasses and forbs on the numerous lakes in the watershed.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCDs, MN-DNR, Landowners
- Total Cost: $126,200.00
    - Cash: $80,000.00
        - 20 shoreline projects x $4,000 = $80,000.00
    - Inkind: $46,200.00
        - Technical assistance $40/hr. x 24 hrs./project x 20 projects = $19,200.00
        - Landowner share = $1,350 x 20 projects = $27,000

6.1.4.5 Action D-5: Grassed Waterways/ Lined Waterways

- Provide up to 25% cost-share in addition to the 50% cost share provided by the EQIP program or $2,000 whichever is less for grassed waterways
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCDs, Landowners
- Total Cost: $67,800.00
    - Cash: $40,000.00
        - 20 waterways x $2,000.00/structure = $40,000.00

- Inkind: $27,800.00
    - Technical assistance $40/hr. x 16hr/structure x 20 structures = $12,800.00
    - Landowners share $750/structure x 20 = $15,000.00

6.1.4.6 Action D-6: Cover Crops

- Provide incentive for cover crops for 20,000 acre years
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCD's, Landowners
- Total Cost: $940,000
  - Cash: $750,000
    - $37.50/acre x 20,000 acres = $750,000
  - Inkind: $190,000

6.1.4.7 Action D-7: Urban Practices

- Provide up to 75% cost share for communities and citizens to implement the following practices
  - Rain gardens and rain barrels
  - Pervious Pavers
  - Permeable Asphalt
  - Street Sweeping cost share incentive to start a new program
  - Stormwater Ponds/Treatment
  - Stormwater Planning for watershed communities
- Timeframe: Years 1-10
- Persons Responsible: CRWP, Communities, Landowners, Water Planners, Businesses, 7 County SWCD's
- Total Cost: $1,048,000.00
  - Cash: $786,000.00
  - Inkind: $262,000.00

6.2 *Objective 2: Point Source Management Measures*

6.2.1 Task A: Subsurface Sewage Treatment Systems (SSTS)

6.2.1.1 Action A-1: SSTS Compliance Inventory

- It is estimated that approximately 72 percent of SSTS in the watershed are non-conforming systems that can contribute fecal coliform bacteria and nutrients to the Chippewa River, but the number is only an estimate from the counties' Environmental/Land and Resource Management Offices and Water Planners. A compliance inventory of existing systems would provide useful information to project partners for planning and funding efforts. A licensed inspector would be hired to conduct inspections and provide a GPS location for each site for each county to map.
- Timeframe: Years 1-3

- Persons Responsible: CRWP, Environmental/Land and Resource Management Offices, Water Planners
- Total Cost: $487,600.00
    - Cash: $468,000.00
        - Chippewa Watershed in 7 counties over 5 years, 2080 hrs. x 5 years x $45/hr. = $468,000.00
    - Inkind: $19,600.00
        - Mapping and reporting by County offices, 80 hours x 7 counties x $35/hr. = $19,600.00

6.2.1.2 Action A-2: SSTS Upgrades

- Provide counties with MPCA Clean Water Partnership low interest loan programs and the MDA Agricultural Best Management Practices Loan Program to help landowners finance upgrades
- Timeframe: Years 1-10
- Persons responsible: CRWP, 7 County SWCD/ Environmental/Land and Resource Management Offices, Water Planners, MCPA, MDA
- Total Cost: $16,320,000.00
    - Cash: $0.00
    - Inkind: $320,000.00
        - County personnel 4 hrs./system for design and inspection x 2,000 systems x $40/hr. = $320,000.00
    - Loans: $16,000,000.00
        - $8,000/SSTS loan x 2,000 systems

6.2.1.3 Action A-3: Low Income Financial Aid

- Using a figure of 100 households in the watershed below the poverty level that would not be able to afford replacing their SSTS, this action would finance the total cost of the system.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, 7 County / Environmental/Land and Resource Management Offices, Water Planners
- Total Costs: $816,000.00
    - Cash: $800,000.00
        - 100 systems x $8,000/SSTS
    - Inkind: $16,000.00
        - County personnel 4 hrs. inspection x 100 systems x $40/hr. = $16,000.00

6.3 *Objective 3. Monitoring*

6.3.1 Task A: Water Quality and Quantity Monitoring

6.3.1.1 Action A-1: Long-term trend and effectiveness monitoring

- The CRWP's long term plan emphasizes the critical need for the ongoing monitoring component, with the baseline established in the Diagnostic Study Phase, to be able to show quantitative measureable results in water quality and provide continuity to the long term record for the Chippewa River watershed. The ongoing monitoring for this project will include the following sites and parameters to be analyzed.

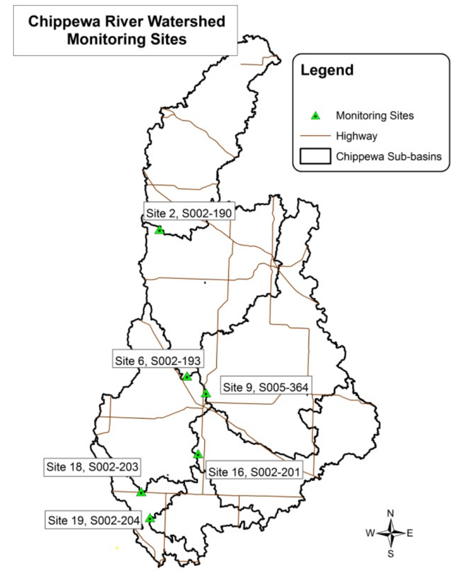
Table 6.3-1 Monitoring Sites

Site Name	STORET ID	Parameters
Site 2 Cyrus	S002-190	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow
Site 6 Clontarf	S002-193	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow
Site 9 NE Branch near Benson	S005-364	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow
Site 16 Shakopee Creek	S002-201	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow
Site 19 Dry Weather	S002-204	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow
Site 18 Hwy 40	S002-203	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH, Conductivity, Transparency, Flow

- Primary monitoring at these sites will use continuous flow monitoring equipment to monitor stage. Grab samples taken during low and high flows will be used to estimate load and flow weighted mean concentration of pollutants. Water samples collected will be analyzed by MVTL Laboratory in New Ulm, MN. Water quality and quantity data will be collected each year from April 1 to October 1 or on dates specified by the MPCA. See Figure 1 for monitoring site locations.

- Secondary monitoring will be conducted to survey the existence and quality of streamside buffers and conduct transparency tube transects. On the transect routes data will be collected on transparency, temperature, dissolved oxygen, pH, and conductivity. See Figure 2 for transparency transect routes.

Figure 6-1 Primary Monitoring Sites



- Additionally, streambank erosion will be monitored on the main channel of the Chippewa River. Fluvial geomorphology studies will be conducted including cross sectional surveys and particle size counts and used to analyze channel stability, bed and bank material characterization.

- The citizen monitoring network established during the Diagnostic Study phase of the CRWP will continue to be coordinated by the CRWP staff, with their data being submitted to both the CRWP and the MPCA's citizen stream monitoring program.
- CRWP staff will prepare water quality reports, presentation for CRWP committees, annual report of water quality/quantity data, GIS layers that identify critical areas and any other maps requested.
- This intensive monitoring program will cover long-term trend monitoring, effectiveness monitoring,
- Timeframe: Years 1-10
- Persons Responsible: CRWP Staff, Citizen Monitoring Network
- Total Cost: $368,920.00
    - Cash: $308,920
        - Lab Analysis: 30 samples/hr. x 6 sites x 10 years at $104.90 per sample set = $188,820.00
        - Equipment replacement/maintenance: $35,000.00
        - Delivery and shipping charges: $6,000.00
        - Mileage commissioners rate x 14000 x 10 yrs. = $79,100.00
    - Inkind: $60,000.00
        - Citizen Monitors: 10 x 4hr/mo. x 60months x $25/hr. = $60,000

6.3.2 Task B: Research

6.3.2.1 Action B-1: DNA fingerprinting

- Conduct water sampling to use DNA markers for hogs, cattle, turkeys, and humans to identify *E. coli* sources in the Chippewa River Watershed. Collect samples 2 times per month for 6 months for 3 years
- Timeframe: Years 2-4
- Persons responsible: CRWP Staff, U of M
- Total Cost: $43,200.00
    - Cash: $43,200.00
        - 2 samples/mo. x 6 months x 3 yrs. x $1200/sample = $43,200.00
    - Inkind: $0.00

6.3.2.2 Action B-2: Social Indicators

- Hire a student intern to conduct a Social Indicator Study to identify and provide information about key social issues affecting land use in the Chippewa River Watershed.
- Utilize a consultant from the University of Minnesota to organize and assist with analysis.

- Timeframe: Year 1 Conduct study, Year 2 Analyze data, Years 3-10 implement social indicator options.
- Persons Responsible: CRWP, Student Intern, U of M
- Total Cost: $8,200.00
    - Cash: $8,200.00
        - Consultant = $2,000.00
        - 200 student intern hrs. x $16/hr. = $3,200.00
        - Postage = $3,000
    - Inkind: $0.00

6.4 *Objective 4. Education and Outreach*

6.4.1 Task A: Website, Internet, Email

6.4.1.1 Action A-1: TMDL project website

- Development webpage on CRWP's current website, www.chippewariver.org, for the TMDL projects. The webpage will be linked from each partner's website as well as MPCA's.
- Maintain internet and email for watershed project
- Timeframe: Years 1-10
- Person Responsible: CRWP Staff
- Total cost: $14,400.00
    - Cash: $14,400.00
        - $120/mo. x 12months x 10 yrs. = $14,400.00
    - Inkind: $0.00

6.4.2 Task B: Printed Media

6.4.2.1 Action B-1: Bi-annual Newsletter

- The CRWP would publish a newsletter twice a year and include information to update the watershed residents about the Chippewa River TMDL process and Implementation opportunities.
- Timeframe: Years 1-10
- Persons responsible: CRWP Staff
- Total Costs: $50,000.00
    - Cash: $50,000.00
        - $2,500/newsletter x 2/yr. x 10 yrs. = $50,000.00
    - Inkind: $0.00

6.4.2.2 Action B-2: Major Watershed Brochure

- Develop a color brochure promoting best management practices
- Timeframe: Year 1-2
- Person Responsible: CRWP Watershed Specialist

- Total Cost: $6,000.00
    - Cash: $6,000.00
        - 10,000 brochures print and mail x $0.60/brochure = $6,000.00
    - Inkind: $0.00

6.4.3 Task C: Public Events

6.4.3.1 Action C-1 Annual Meeting for watershed residents

- Provide an annual meeting with a meal to present watershed residents with water quality information, effectiveness monitoring information, best management practices information and an annual update on the watershed project.
- Timeframe: Years 1-10
- Person Responsible: CRWP Staff
- Total Cost:
    - Cash: $23,000.00
        - $1,700/yr. x 10 yrs. for event = $17,000.00
        - Advertising $600/yr. x 10 yrs. = $6,000.00
    - Inkind: $0.00

6.4.3.2 Action C-2: County fairs/open houses

- Each county will promote the project at one public event annually such as a county Fair or Open House
- Timeframe: Years 1-10
- Person Responsible: CRWP, 7 County SWCD/ Environmental/Land and Resource Management Offices, Water Planners
- Total Cost: $16,300.00
    - Cash: $3,500.00
        - $50.00 booth rent x 7 counties x 10 years = $3,500.00
    - Inkind: $12,800.00
        - 32 hrs. x $40/hr. x 10 yrs. = $12,800.00

6.4.4 Task D: Outreach and Engagement

6.4.4.1 Action D-1 Landowner Engagement

- Meet with Landowners on a one-to-one basis to engage them in discussions surrounding their values and possible conservation measures for their land.
- Provide opportunities for neighborhood focus groups
- Develop farmer to farmer networks
- Timeframe: Years 1-10
- Person Responsible: CRWP

- Total Cost: $850,000
    - Cash: $600,000.00
        - $60,000 per year x 10 years = $600,000.00
    - Inkind: $250,000.00
        - 20 hrs. x $25/hr. x 50 landowners/yr. x 10 yrs. = $250,000.00

6.5 *Objective 5: Administration*

6.5.1 Task A: Administration staff

6.5.1.1 Action A-1: CRWP Executive Director

- The Executive Director responsibilities will include:
    - Facilitate and coordinate project activities with project partners
    - Supervise CRWP employees,
    - Compile financial reports
    - Work on obtaining other funding
    - Administer accounts receivable/payable and payroll
    - Conduct grant writing
- Monthly facilitation of the 7 County elected Commissioners who serve as the Joint Powers Board for the CRWP will be conducted
- Timeframe: Years 1-10
- Person Responsible: CRWP Executive Director
- Total cost: $916,000.00
    - Cash: $832,000.00
    - Inkind: $84,000

6.5.1.2 Action A-2: Watershed Specialist

- Provide a full time Watershed Specialist to conduct Objectives 1, 2, 3b and 4
- Responsibilities will include but not be limited to:
    - Coordinate all education outreach and engagement activities and create educational literature
    - Facilitate the Local Work Group comprised of the cooperating partners from the 7 counties which may include the following: SWCDs, NRCS, County Water Planners, Environmental/Land and Resource Management Offices, Feedlot Officers
    - Report practices in eLINK
    - Provide overall coordination of installation of BMPs, payments to landowners
    - Provide reports to Local Work Group
- Timeframe: Years 1-10
- Person responsible: CRWP Watershed Specialist
- Total Cost: $728,000.00
    - Cash: $728,000.00
        - 2080 hrs. x 10 yrs. x $35/hr. = $728,000.00
    - Inkind: $0.00

6.5.1.3 Action A-3: Watershed Scientist/Technician

- Provide a full time Watershed Scientist/Technician to conduct Objective3 (monitoring and research) and install and maintain equipment
- Scientist will analyze data for effectiveness, trends
- Responsible for submitting data to MPCA for inclusion in EQuIS database
- Compile data into a yearly monitoring report
- Utilize data to help partners prioritize areas for implementation of best management practices
- Present findings to partners and the public
- Train Citizen Monitors and compile their data
- Timeframe: Years 1-10
- Person Responsible: CRWP Watershed Scientist
- Total Cost: $728,000.00
    - Cash: $728,000.00

6.5.2 Task B: Evaluation

6.5.2.1 Action B-1: Evaluate - outcomes and measures

- Bi-annual meetings with CRWP staff and project partners to evaluate implementation activities, monitoring data, and education activities
- Timeframe: Years 1-10
- Person Responsible: CRWP staff, SWCDs, NRCS, MNDNR, Environmental/Land and Resource Management offices, Water Planners, USFWS, MDA, U of M Extension
- Total Cost: $268,800.00
    - Cash: $0.00
    - Inkind: $268,800.00
        - 32hrs/yr. x 10 yrs. x 21 representatives x $40/hr. = $268,800.00

6.6 *Summary of Objectives, Timeline, Costs, and Partners*

To achieve the fecal coliform and turbidity reductions needed, a 10-year period was chosen. The 10-year goal is considered attainable assuming adequate funding is available. All dollar figures are in today's costs, and figures will be reviewed as project needs change.

	Action Item	Estimated Costs (Cash, Inkind, loan)	Timeline*	Estimated Load Reduction	Partners**
Objective 1: Non-point Source Measures					
Task A Livestock and Manure Management	Manure Management Plans	$175,000	Years 1-10	30-75% removal rate of fecal coliform depending on proximity to Chippewa River	CRWP, 7 County SWCDs Environmental Offices, NRCS, Certified Crop Consultants, Agronomist, MDA
	Feedlot Fixes	$800,000	Years 1-10		CRWP, SWCDs NRCS, Landowners
	Agricultural Waste Pit Closures	$100,000	Years 1-10		CRWP, SWCDs NRCS, Landowners
	Pasture Management	$1,700,000	Years 1-10		CRWP, SWCDs NRCS, Landowners
	Feedlot and Agricultural Waste Pit Inspections	$55,080	Years 1-10		CRWP, SWCDs , Landowners, MPCA
	Manure management workshops, demonstration plot and field days	$18,500	Years 2,4,6,8,10		CRWP, SWCDs NRCS Landowners, Agronomist and U of MN Extension
Task B Structural Practices	Install structural management measures	$2,564,687	Years 1-10	100% stream bank, 50% basins and structures reduction in sediment yield[1]	CRWP, SWCDs, NRCS, Water Planners, DNR, Environmental/Land and Resource Mgmt. Offices, Communities, Landowners

Task C Drainage and/or Ditch Bank Mgmt.	Side Inlets	$168,000	Years 1-10	75% reduction in sediment yield	CRWP, County Ditch Inspectors, Landowners
	Alternative Tile Intakes	$250,000	Years 1-10	70-90% reduction in sediment yield	CRWP, Landowners
	Controlled Drainage/two stage ditch design	$320,000	Years 1-10		CRWP, Landowners, County Engineers, County Ditch Inspectors
Task D Vegetative Practices	Wetland Restorations	$345,000	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP, SWCDs NRCS, BWSR, USFWS, Landowners
	Vegetative Buffers	$652,080	Years 1-10		
	Conservation Tillage and Residue Management	$192,000	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP, SWCDs NRCS, SWCDJPO, Landowners
	Shoreline Restoration and/or stabilization on Lakes and Rivers	$126,200	Years 1-10	50-90% reduction in sediment yield	CRWP, SWCDs MN-DNR, Landowners
	Grassed Waterways/ Lined Waterways	$67,800	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP SWCDs NRCS, Landowners
	Cover Crops	$940,000	Years 1-10	50-90% reduction in sediment yield	CRWP, Landowners, Renters, SWCD's
	Urban Practices	$1,048,000	Years 1-10	45% reduction in Fecal coliform and sediment	CRWP, Communities, Landowners, Water Planners, Businesses, 7 County SWCD's

Objective 2: Point Source Management Measures					
Task A Subsurface Sewage Treatment Systems	SSTS Compliance Inventory	$487,600	Years 1-5	Not Applicable	CRWP, SWCDs, Environmental/Land & Resource Mgmt. Offices, Water Planners
	SSTS Upgrades	$16,320,000 (loan)	Years 1-10	99% removal rate of fecal coliform[9]	CRWP, SWCDs, Environmental/Land & Resource Mgmt. Offices, Water Planners, MPCA, MDA
	Low Income Financial Aid	$816,000	Years 1-10	99% removal rate of fecal coliform[9]	CRWP, SWCDs, Environmental/Land & Resource Mgmt. Offices, Water Planners, MPCA, MDA

Objective 3: Monitoring					
Task A Water Quality and Quantity Monitoring	Long-term trend, Effectiveness Monitoring	$368,920	Years 1-10	Not Applicable	CRWP, Citizen Monitors
Task B Research	DNA Fingerprinting	$43,200	Years 2-4	Not Applicable	CRWP, U of M
	Social Indicators	$8,200	Years 1-10	Not Applicable	CRWP, Student Intern, U of M
Objective 4: Education and Outreach/Citizen Engagement					
Task A Website, Internet, Email	TMDL project website	$14,400	Years 1-10	Not Applicable	CRWP

Task B Printed Media	Bi-annual Newsletter	$50,000	Years 1-10	Not Applicable	CRWP
	Major Watershed Brochure	$6,000	Years 1-2	Not Applicable	CRWP
Task C Public Events	Annual Meeting for watershed residents	$23,000	Years 1-10	Not Applicable	CRWP
	County fairs/open houses	$16,300	Years 1-10	Not Applicable	CRWP, SWCDs, Environmental/Land & Resource Mgmt. Offices, Water Planners
Task D Outreach and Engagement	Landowner engagement	$850,000	Years 1-10	Not Applicable	CRWP
Objective 4: Administration					
Task A Administration	CRWP Executive Director - County Commissioners	$916,000	Years 1-10	Not Applicable	CRWP Executive Director
	Watershed Specialist	$728,000	Years 1-10	Not Applicable	CRWP
	Watershed Scientist/Technician	$728,000	Years 1-10	Not Applicable	CRWP
Task B Evaluation	Outcomes and Measures	$268,800	Years 1-10	Not Applicable	CRWP staff, SWCDs, Environmental/Land & Resource Mgmt. Offices, Water Planners, NRCS, MN-DNR, USFWS
Total funding needed:		$31,166,767			

*The timeline is run on a yearly length basis rather than specifically identified years due to not knowing when funding will become available. By using this method, it is easier to adapt the time frame when funding becomes available. Another factor that would affect the timeline may be due to different funding sources having varying funding deadlines. The timeline would start when funding became available.

**Roles and responsibilities of each partner can and will vary with each action item. With a 10-year time line there will be a tremendous amount of change, depending on funding, program availability and landowner interest. As this Implementation Plan is reviewed and adapted, responsibilities may change. Each agency or organization will be responsible for their individual programs where they could assist in the described measures. When applying for funding for each action item, a detailed work plan will address responsibilities for each part of the program.

7.0 Timeline

Chippewa River fecal coliform and Turbidity TMDL Implementation Plan												
Task	Evaluate in Years 6 and 10	Year	1	2	3	4	5	6	7	8	9	10
Objective 1: Non-point Source Measures												
Task A	Livestock and Manure Management		X	X	X	X	X	X	X	X	X	X
	Manure Management Plans		X	X	X	X	X	X	X	X	X	X
	Feedlot fixes		X	X	X	X	X	X	X	X	X	X
	Agricultural Waste Pit Closures		X	X	X	X	X	X	X	X	X	X
	Pasture Management		X	X	X	X	X	X	X	X	X	X
	Feedlot and Agricultural Waste Pit Inspections		X	X	X	X	X	X	X	X	X	X
	Manure Management Workshops, Demonstration plot and field days		X	X	X	X	X	X	X	X	X	X
Task B	Structural Practices											
	Install structural management measures		X	X	X	X	X	X	X	X	X	X
Task C	Drainage and/or Ditch Bank Management											
	Side Inlets		X	X	X	X	X	X	X	X	X	X
	Alternative Tile Intakes		X	X	X	X	X	X	X	X	X	X
	Controlled Drainage/Two Stage Ditch Design		X	X	X	X	X	X	X	X	X	X

Task D	Vegetative Practices											
	Wetland Restorations		X	X	X	X	X	X	X	X	X	X
	Vegetative Buffers		X	X	X	X	X	X	X	X	X	X
	Conservation Tillage/Residue Management		X	X	X	X	X	X	X	X	X	X
	Shoreline Restoration and/or stabilization on Lakes and Rivers		X	X	X	X	X	X	X	X	X	X
	Grassed Waterways/ Lined Waterways		X	X	X	X	X	X	X	X	X	X
	Cover Crops		X	X	X	X	X	X	X	X	X	X
	Urban Practices		X	X	X	X	X	X	X	X	X	X
Objective 2: Point Source Management Measures												
Task A	Subsurface Sewage Treatment Systems		X	X	X	X	X	X	X	X	X	X
	SSTS Compliance Inventory		X	X	X	X	X					
	SSTS Upgrade		X	X	X	X	X	X	X	X	X	X
	Low Income Financial Aid		X	X	X	X	X	X	X	X	X	X
Objective 3: Water Quality and Quantity Monitoring												
Task A	Water Quality and Quantity Monitoring											
	Long-term trend and effectiveness monitoring		X	X	X	X	X	X	X	X	X	X
Task B	Research											
	DNA Fingerprinting			X	X	X						
	Social Indicators		X	X	X	X	X	X	X	X	X	X

Objective 4: Education and Outreach													
Task A	Website, Internet, Email												
	TMDL project website		X	X	X	X	X	X	X	X	X	X
Task B	Bi-annual newsletter		X	X	X	X	X	X	X	X	X	X
	Major watershed brochure		X	X								
Task C	Public Events												
	Annual meeting		X	X	X	X	X	X	X	X	X	X
	County fairs/open houses		X	X	X	X	X	X	X	X	X	X
Task D	Outreach and Engagement		X	X	X	X	X	X	X	X	X	X
	Landowner Engagement		X	X	X	X	X	X	X	X	X	X
Objective 5: Administration													
Task A	Executive Director		X	X	X	X	X	X	X	X	X	X
	Watershed Scientist		X	X	X	X	X	X	X	X	X	X
	Watershed Specialist		X	X	X	X	X	X	X	X	X	X
Task B	Evaluation - outcomes and measures		X	X	X	X	X	X	X	X	X	X

8.0 Roles and Responsibilities of Partners

Chippewa River Watershed Project: The CRWP will provide coordination and administer the activities assigned to them through the TMDL Implementation Plan. Staff will be responsible for the completion of all grant applications and reports. Staff will be responsible for the primary coordination of the implementation plan. Staff will coordinate monitoring efforts, convene the Local Work Group, and plan outreach activities. The CRWP Joint Powers Board will oversee the budgets and actions of the CRWP staff.

Soil and Water Conservation Districts: The SWCDs in Chippewa, Swift, Kandiyohi, Pope, Stevens, Grant and Douglas support the CRWP and will participate in the activities assigned to them through the TMDL Implementation Plan as a means to improve and protect water quality and quantity within the Chippewa River Watershed. Individual staff will be primary contact points for many of the objectives. Each SWCD will provide technical assistance as needed and will have an active role in the CRWP Local Work Group.

Natural Resources Conservation Service: The NRCS offices in Chippewa, Swift, Kandiyohi, Pope, Stevens, Grant and Douglas Counties support the CRWP and the Implementation Plan as a means for improving and protecting water quality and quantity. Each individual NRCS office will assist in the assigned objectives of this plan.

Counties: Chippewa, Swift, Kandiyohi, Pope, Stevens, Grant, and Douglas Counties will support and administer the activities assigned to them through the TMDL Implementation Plan as a way to protect and improve water quality and quantity within the Chippewa River Watershed. County Land and Resource Management Offices will provide technical assistance when needed and will serve a key role in the feedlot and SSTS arena. County Drainage Inspectors will assist and provide technical assistance when needed. County Engineers will be consulted when necessary. County Water Planners will provide technical assistance when applicable and will participate in educational activities. Each county will provide a Commissioner to serve on the Executive Board. Chippewa County will provide office space and office supplies for the CRWP staff.

Minnesota Department of Agriculture: The MDA will continue their role in the promotion and education of best management practices for preventing sedimentation and erosion, proper manure use and application, and new drainage technologies.

Minnesota Department of Natural Resources: The DNR supports the CRWP and the TMDL Implementation Plan and will participate in projects that will help to protect and improve water quality and quantity within the Chippewa River Watershed. The DNR will provide technical assistance when necessary, promote environmental education, and employ regulatory actions when needed.

US Fish and Wildlife Service: The USFWS supports the CRWP and the TMDL Implementation Plan as a way to improve and protect water quality and quantity in the Chippewa River Watershed. The projects implemented through this effort will help to protect and restore key wetlands and upland areas that will provide multiple benefits. The USFWS will provide technical assistance when needed.

Board of Water and Soil Resources: BWSR is a state entity which provides cost-share and technical assistance. Staff will continue to provide assistance to the Local Work Group and will provide input on funding opportunities and assist in securing funding for implementation activities.

Communities: The thirty-plus communities and/or highly developed lakeshore developments are a key player in the TDML Implementation Plan and their support and participation in urban best management practices will be a means to improved and protected water quality and quantity in the Chippewa River Watershed. Those cities with permit requirements will work with the MPCA to meet the requirements of each respective NPDES permit.

Certified Crop Consultants: Crop consultants will assist with BMP promotion and adoption.

University of Minnesota and Extension Service: The UMM will provide much research information on best management practices, assist in watershed education and provide technical assistance as needed.

Minnesota Pollution Control Agency: The MPCA will be a valuable resource during the implementation phase. The MPCA will provide an oversight and regulatory role in feedlots, SSTS, storm water and WWTP. They will offer expertise and assistance in monitoring and analysis tasks. The MPCA will provide notification of funding opportunities and work with staff to obtain funding and serve as a member on the Local Work Group. The MPCA will also assist in outreach and educational activities.

Citizen Monitors: A network of individuals that are trained by CRWP staff and collect valuable water quality data within the Chippewa River Watershed. They are charged with monitoring specific locations and turning in data in a timely manner. Their data provides an additional resource for practice prioritization and effectiveness analysis.

Landowners/Homeowners: Landowners and homeowners within the Chippewa River Watershed play a vital role in the protection and improvement of water quality and quantity. Landowners and homeowners will participate in conversations and workshops that identify programs and practices for their use. Landowners and homeowners will implement projects that address the needs of their properties and have a positive impact on the water quality of the Chippewa River Watershed.

Non-profits: Several non-profits in the watershed support the TMDL Implementation Plan and will seek to promote best management practices, and participate in educational activities.

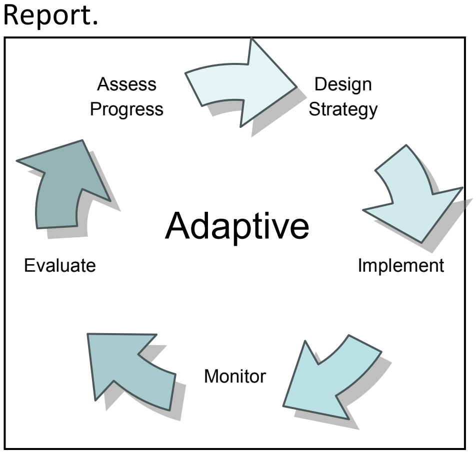
9.0 Adaptive Management Process

The actions outlined in this implementation plan will decrease pollutant loading in the Chippewa River Watershed and its impaired reaches. However, funding opportunities and participation rates are not guaranteed and future economic and environmental factors are unknown. A continual process of stream and lake water quality evaluation must be employed to best tailor implementation strategies and practices to water quality conditions and priorities.

As implementation takes place, water quality monitoring will also occur to evaluate the impact collective practices have on the watershed impairments. If water quality improves, that is indication that current strategies are working. If water quality declines, it would suggest that current approaches are not adequate and need to be refined. The overall approach would be actions, analysis and adjustments based on water quality conditions. This process is known as adaptive management.

In order to be successful and see true water quality and quantity improvement across the entire Chippewa River Watershed, this implementation plan must be flexible and adaptable to current and future research data. Practices or programs that are proven successful at reducing bacteria and turbidity in other watersheds will need to be examined and possibly incorporated into this plan. There are programs, projects and policies that are in planning stages and will need to be analyzed for benefits, success and addition to the Chippewa River TMDL Implementation Plan.

The analysis of effect, public perception and success of each current or future objective will come from input by the CRWP Local Work Group, the CRWP Executive Committee, and participating landowners/homeowners. As funding is secured and objectives are accomplished, the advisors will continue to meet and direct future steps for meeting the goals of the TMDL Report.



10.0 Budget

Chippewa River fecal coliform and Turbidity Implementation Plan Budget								
Cost Category	**Unit cost**	**Unit**	**Quantity**	**Unit**	**Cash**	**In-Kind**	**Loan**	**Total**
Objective 1: Nonpoint source management measures								
Task A: Livestock and Manure Management								
Action A-1 Manure management Plans								
Financial Assistance - MMP	2,000	plan	50	producers	100,000	20,000		120,000
Scale Pads	2,400	pads	5	pads	12,000	10,000		22,000
Financial Assistance - application	1000	5/200ac	25	producers	25,000			25,000
Inventory	4000	county	2	county	8,000			8,000
Action A-2 Feedlot Fix								-
Financial assistance	$20,000	site	25	sites	500,000			500,000
Technical Assistance	$2,000	site	25	sites	50,000			50,000
Landowners share	10,000	site	25	sites		250,000		250,000
Action A-3 Agricultural Waste Pit Closures								
Ag waste Pit Closures	2,500	pit	20	pits	50,000	50,000		100,000
Action A-4 Pasture Management								
Pasture Management plans/equipment	$200	acre	5000	acres	1,000,000			1,000,000
Landowners share	$100	acre	5000	acres		500,000		500,000
Technical Assistance	$40	hrs.	5000	ac/1hr/ac		200,000		200,000
Action A-5: Feedlot and Agricultural Waste Pit Inspections								
Certified inspections	$400	system	102	systems	40,800			40,800

Producer in-kind	$100	system	102	systems		10,200		10,200
Technical Assistance	$40	system	102	systems		4080		4,080
Action A-6 Manure Management Workshops, demonstration plot and field days								
Workshop	$1,000	event	5	events	5,000	2,000		7,000
Field Day	$1,000	event	5	events	5,000	4,000		9,000
demo site	$500	year	5	years	2500			2,500
Task B: Structural Practices								
Action B-1: Install structural Management measures								
Structural Practices				structures	1,743,750	820,937		2,564,687
Task C: Drainage and/or Ditch Bank Management								
Action C-1 Side Inlets								
Side Inlets	$800	inlet	150	inlets/75%	90,000	30,000		120,000
County Ditch Inspectors	$320	inlet	150	inlets		48,000		48,000
Action C-2 Alternative Tile Intakes								
Alternative Tile Intakes - 75% cost share	$375	intakes	500	intakes	187,500			187,500
Landowners share	$125	intakes	500	intakes		62,500		62,500
Action C-3: Controlled Drainage and Two Stage Ditch Design								
Controlled drainage project-75% cost share	$12,000	project	10	projects	90,000			90,000
Landowners share	$3,000	project	10	projects		30,000		30,000
Counties/engineers	$100,000	ditches	2	ditches		200,000		200,000
Task D: Vegetative Practices								
Action D-1 Wetland Restorations								
Wetland restorations	$10,000	wetland	15	wetlands	150,000			150,000
Incentive	$1,000	acre	100	acres	100,000			100,000
USFWS	$2,000	wetland	15	wetlands		30,000		30,000

SWCDJPO	$500	hrs.	100	acres		50,000		50,000
Landowner share	$1,000	$/project	15	Projects		15,000		15,000
Action D-2 Vegetative Buffer strips								
Financial Incentive	$500	incentive/acre	836	acres	418,000			418,000
Landowners share	$200	cots/acre	836	acres		167,200		167,200
Technical Assistance	$80	2 hrs./acre	836	acres		66,880		66,880
Action D-3: Conservation Tillage and Residue Management								
Financial Incentive	$7	incentive/acre	8000	acres	56,000			56,000
Landowners share	$7	share/acre	8000	acres		56,000		56,000
Technical Assistance	$10	0.25hr/acre	8000	acres		80,000		80,000
Action D-4 Shoreline Restoration and/or stabilization on Lakes and Rivers								
Shoreline restorations	$4,000	$/project	20	projects	80,000			80,000
Technical Assistance	$960	$40X24hrs/project	20	projects		19,200		19,200
Landowners share	$1,350	$/project	20	projects		27,000		27,000
Action D-5: Grassed Waterways/ Lined Waterways								
Waterways	$2000	$/project	20	Projects	40,000	27,800		67,800
Action D-6: Cover Crops								
Incentive	$37.50	$/acre	20,000	acres	750,000	190,000		940,000
Action D-7: Urban Practices								
Urban BMP practices					786,000	262,000		1,048,000
Totals Objective 1					**6,289,550**	**3,232,797**		**9,522,347**

Objective 2: Point Source Management Measures								
Task A: Subsurface Sewage Treatment Systems								
Action A-1 SSTS Compliance Inventory								
Compliance inventory	$45	hr.	10400	2080hrsX5yrs	468,000			468,000
Mapping/reporting	$35	hr.	560	80 hrsX7counties		19,600		19,600
Action A-2 SSTS Upgrades								
Inspection	$160	$40/hr. X 4hrs	2000	systems		$320,000		320,000
Low interest loans	$8,000	$/system	2000	systems			16,000,000	16,000,000
Action A-3 Low income Financial Aid								
Financial Aid	$8,000	system	100	systems	800,000			800,000
County personnel design/inspection	$160	$40/hr. X 4 hrs.	100	systems		16,000		16,000
Total Objective 2					**1,268,000**	**355,600**	**16,000,000**	**17,623,600**

Objective 3: Monitoring								
Task A: Water Quality and Quantity Monitoring								
Action A-1 Long-term trend and effectiveness monitoring								
Lab Analyses	$104.90	sample set	1800	samples	188,820			188,820
Equipment/supplies					35,000			35,000
Sample delivery/shipping					6,000			6,000
Mileage	commissioner's rate	mile	140000	miles	79,100			79,100
Citizen Monitors	$25	hr.	2400	hrs.		60,000		60,000
Task B: Research								
Action B-1 DNA Fingerprinting	$1,200	sample set	36	samples	43,200			43,200

Action B-2 Social Indicators								
Consultant					2,000			2,000
Student intern	$16	hr.	200	hrs.	3,200			3,200
Postage					3,000			3,000
Total Objective 3					**360,320**	**60,000**		**420,320**

Objective 4: Education and Outreach								
Task A: Website, Internet, Email								
Action A-1: TMDL project website	$120	cost/month	120	months	14,400			14,400
Task B: Printed Media								
Action B-1: Bi-annual Newsletter	$2,500	newsletter	20	newsletter	50,000			50,000
Action B-2: Major Watershed Brochure	$0.60	brochure	10000	brochures	$6,000			6,000
Task C: Public Events								
Action C-1: Annual Meeting								
Meeting	$1,700	cost per meeting	10	meetings	17,000			17,000
Advertising	$600	yr.	10	yrs.	6,000			6,000
Action C-2 County fairs/open houses	$50	booth	7	cty/10yr	3,500	12,800		16,300
Task D: Outreach and Engagement								
Action D-1 Landowner Engagement								
Engagement and outreach	$60,000	cost per year	10	years	600,000			600,000
Landowner time	$500	$25X20 hrs./person	500	landowners/10 years		$250,000		250,000
Total Objective 4					696,900	262,800		959,700

Objective 5: Administration								
Task A: Administration staff								
Action A-1 CRWP Executive Director	$83,200	yr.	10	Yrs.	832,000			832,000
County Commissioner	$100	$/month	840	10yearsX7Counties		84,000		84,000
Action A-2: Watershed Specialist	$35	$/hr.	20800	2080 hrsX10 years	728,000			728,000
Task C: Watershed Scientist/Technician	$35	$/hr.	20800	2080 hrsX10 years	728,000			728,000
Task B: Evaluation								
Action B-1 Evaluate-outcomes and measures								
County representatives	$40	hr.	6720	Hrs.		268,800		268,800
Total Objective 5					**2,288,000**	**352,800**		**2,640,800**
Totals:					**Cash**	**In kind**	**Loan**	**Total**
Objective 1					**6,289,550**	**3,232,797**		**9,522,347**
Objective 2					**1,268,000**	**355,600**	**16,000,000**	**17,623,600**
Objective 3					**360,320**	**60,000**		**420,320**
Objective 4					**696,900**	**262,800**		**959,700**
Objective 5					**2,288,000**	**352,800**		**2,640,800**
Totals					**10,902,770**	**4,263,997**	**16,000,000**	**31,166,767**

11.0 References

[1]An evaluation of structural best management practices 20 years after installation by Bracmort, Kelsi Simone, Ph.D., Purdue University, 2004, 242 pages; AAT 3150743
Applying 2003 land use resulted in a 35-59% sediment reduction and a 25-29% total P reduction when no BMPs were implemented compared to the 1975 land use.

[2]Riparian Buffer Systems in Crop and Rangelands by Richard C. Schultz, Thomas M. Isenhart and Joe P. Colletti Agroforestry and Sustainable Systems: Symposium Proceedings August 1994
Riparian forest and grass communities can filter up to 90 percent of the sediment entering them from the uplands. The vertical structure of the standing plants and the organic litter provide frictional surfaces which slows water flow causing the sediment to be deposited (Magette et al. 1989; Dillaha et al. 1989; Cooper et al. 1987; Lowrance et al. 1986, 1988; Peterjohn & Correll, 1984; Brinson et al. 1981; Mahoney & Erman 1984).

[3]Osmond, D.L., J.W. Gilliam and R.O. Evans. 2002. Riparian Buffers and Controlled Drainage to Reduce Agricultural Nonpoint Source Pollution, North Carolina Agricultural Research Service Technical Bulletin 318, North Carolina State University, Raleigh, NC.
The effectiveness of well maintained grass riparian buffers for sediment removal maybe as high as 90 to 95%.

[4]EPA's A Farmer's Guide To Agriculture and Water Quality Issues
The U.S. Geological Survey has documented nearly 50% reductions in suspended sediment loads from the Maumee River Basin (Ohio) following adoption of conservation tillage on ~55% of the cropland acreage in the basin. Bacteria reductions of 30-70% have been reported after filtering barnyard and feedlot runoff through vegetated filter strips. Studies of vegetated filter strip treatment of cropland runoff have been contradictory. Some studies have reported up to 90% reduction in bacteria counts in runoff after passage through a filter strip.

[5]A Review of BMPs for Managing Crop Nutrients and Conservation Tillage to Improve Water Quality By Richard Fawecett, Ph.D. Edited and Updated by Tim Smith *No-till has sometimes dramatically increased water infiltration and reduced runoff. Edwards et al. (1988) compared season-long water runoff from a 0.6-acre watershed with a 9% slope that had been farmed for 20 years in continuous no-till corn to a similar conventionally tilled watershed. Over four years, runoff was 99% less under the long-term no-till. No-till has reduced runoff well even under extreme conditions. A no-till watershed on a 21% slope had almost no soil erosion and held water runoff to levels similar to a conventional tillage watershed of only 6% slope during a once- in-100 yr storm of 5 in. (12.7 cm) in 7 hr (Harold and Edwards 1972).*

[6]Conservation Technology Information Center –Conservation Buffer fact sheet
Buffers can reduce up to 80% of sediment and up to 60% of pathogens are removed from runoff.

[7]National Management Measures to Control Nonpoint Source Pollution from Agriculture EPA 841-B-03-004, July 2003 *Strategy A: Ungrazed 40/L Strategy B: Grazing without management for livestock distribution; 20.3 ac/AUM. 150/L Strategy C: Grazing with management for livestock distribution: fencing and water developments; 19.0 ac/AUM. 90/L Strategy D: Intensive grazing management, including practices to attain uniform livestock distribution and improve forage production with cultural practices such as seeding, fertilizing, and forest thinning; 6.9 ac/AUM. 920/L.*

[8]National Management Measures to Control Nonpoint Source Pollution from Agriculture EPA 841-B-03-004, July 2003 *Concentration reductions in barnyard and feedlot runoff treated with solids separation - Percent Total Solids reduction Ohio-basin only 49-54%, Ohio-basin and vegetative infiltration 82%, Canada-basin only 56%, Canada-basin and vegetative infiltration-90%.*

[9]ONSITE WASTEWATER TREATMENT MANUAL US EPA 2002 Gerba-1975; *99-99.99% reduction in fecal coliform.*

USGS, 2012 http://www.usgs.gov/sdc/adaptive_mgmt.html