CHIPPEWA RIVER
FECAL COLIFORM AND
TURBIDITY
TMDL IMPLEMENTATION PLAN
JUNE 2011

Submitted By:
Chippewa River Watershed Project

Table of Contents

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 in January 2007 and the Turbidity TMDL in XXX, XXXX. Summaries of the TMDL Reports can be found in Section 2.

Throughout the development of the TMDL Reports and Implementation Plan, public meetings were held and input was gathered from local entities. On September 14, 2006 a public meeting was held for landowners, lakeshore residents, state, 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 the turbidity TMDL. 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. 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, Vegetative Practices, Drainage and/or Ditch Management, Urban Practices, and Septic System 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 $3,891,147 which includes $10,339,330 cash, $4,551,817 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, this is described in Section 8. 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 Total Maximum Daily Load (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 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 notice in August and September of 2006. The Chippewa River Fecal coliform TMDL 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 XX, XX, 2011. The document went on public review from XX, XX, XXX to XX, XX, XXXX. The Turbidity TMDL for the Chippewa River was submitted to the EPA and approved on XX, XX, XXXX.

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 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 swimming designated beneficial uses due to excessive Fecal coliform concentrations. These reaches are identified in Table X.

Table 2.2-1 Fecal coliform mpaired reaches

Reach	Description	Year Listed	Assessment Unit ID	Monitoring Station for Assessment (STORET ID #)	CRWP MPCA Site #	Subshed
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 Dryweather Cr		07020005-508	S002-203	18	Lower
Dryweather Creek	Headwaters to Chippewa R	06	07020005-509	S002-204	19	Dryweather 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 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 #	Subshed
Unnamed Creek to Chippewa R		2010	07020005-530			
Unnamed Creek (Huse Creek)		2010	0702005-917			Shakopee Creek

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 #	Subshed
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		Upper and Middle Chippewa R
				S001-772		
				S004-234		
Chippewa River	Unnamed Creek to E Branch Chippewa River	2006	505	S002-193		Middle and Lower Chippewa R
				S001-862		
Chippewa River	Cottonwood Creek to Dryweather Cr	2006	508	S002-203		Lower Chippewa R
East Branch Chippewa R	Mud Creek to Chippewa R	2006	514	S002-196		East Branch

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 exacerbates 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 stormwater overshadow 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 stormwater, 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	Within 1000' surface water	Not within 1000' surface water	Total
Non-CAFO Livestock[1]	Dairy	25491 AU	12981 AU	38472 AU
	Beef	43215 AU	22725 AU	65940 AU
	Swine	14736 AU	12735 AU	27471 AU
	Chickens	--	437 AU	437 AU
	Turkeys	11847 AU	14457 AU	26304 AU
	Ducks	400 AU	--	400 AU
	Horses	4332 AU	2688 AU	7020 AU
Human[2]	Population with inadequate septic systems	2188 People	--	2188 People
	Population in unsewered communities	590 People	--	590 People
	WWTP	Facilities which discharge above 200 cfu/100 ml		
Wildlife[3]	Deer	21000 Deer		210000 Deer
	Geese	16250 Geese	--	16250 Geese
	Other wildlife including rural cats & dogs	--	--	Accounted for in deer population
Urban Stormwater[4]	Dogs and cats-urban	--	9288 Individuals	9288 Individuals

[1]2002 MPCA registered feedlot database
[2]Olson and Churchill, 2000; League of MN Cities, 2003; W. Gillingham, 2003
[3]MnDNR, 2003
[4]AVMA, 200

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 subwatersheds in the Chippewa River watershed and 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 E. coli (Escherichia 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 assessment purposes, only *E. coli* measurements will be used. 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.

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.). A minimum of five values for each month is ideal, but is not always necessary to make a determination. 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 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.

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 classified

and therefore fall under Minnesota Rules Chapter 7050.0430 which says that all water bodies have a 2B classification unless they are otherwise specifically classified.

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.

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	0.922	0.922	0.922	0.922	*
	Construction Stormwater	0.041	0.023	0.012	0.005	*
	Industrial Stormwater	0.041	0.023	0.012	0.005	*
Load Allocation	Nonpoint source and channel	35.782	20.006	9.615	3.682	*
Margin of Safety (MOS)		4.087	2.331	1.173	0.513	0.513
Total Daily Loading Capacity		40.874	23.305	11.734	5.127	5.127
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	2.3%	4.0%	7.9%	18.0%	*
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	*
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	*
Load Allocation	Nonpoint source and channel	87.5%	85.8%	81.9%	71.8%	*
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%

*note: WWTF design flow exceed low flow minus MOS; Allocation = (flow contribution from source) X (54 mg/L)

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	34.825	17.961	8.935	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	0.053	0.053	0.053	0.053	0.053
	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	88.465	52.169	27.019	13.420	3.207
Margin of Safety (MOS)		9.857	5.815	3.015	1.500	0.363
Total Daily Loading Capacity		98.572	58.154	30.147	15.004	3.630
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.1%	0.1%	0.2%	0.4%	1.5%
	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%	89.7%	89.6%	89.4%	88.3%
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	0.157	0.157	0.157	0.157	*
	Construction Stormwater	0.011	0.006	0.002	< 0.001	*
	Industrial Stormwater	0.011	0.006	0.002	< 0.001	*
Load Allocation	Nonpoint source and channel	9.848	5.598	1.215	0.052	*
Margin of Safety (MOS)		1.114	0.641	0.153	0.023	NA
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	1.4%	2.5%	10.3%	67.4%	*
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	*
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	*
Load Allocation	Nonpoint source and channel	88.4%	87.3%	79.5%	22.4%	*
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: WWTF design flow exceeds observed dry condition loading capacity;
Allocation = (flow contribution from source) X (54 mg/L)

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

East Branch 07020005-514		Flow Zones				
		Very High	High	Mid-Range	Low	Dry
		TSS Load (tons/day)				
Wasteload Allocation	Permitted Point Source Dischargers	0.097	0.097	0.097	0.097	0.097
	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	80.480	40.148	20.044	9.901	2.912
Margin of Safety (MOS)		8.973	4.482	2.243	1.113	0.335
Total Daily Loading Capacity		89.730	44.817	22.428	11.133	3.350
Value expressed as percentage of total daily loading capacity						
Wasteload Allocation	Permitted Point Source Dischargers	0.1%	0.2%	0.4%	0.9%	2.9%
	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%	88.9%	86.9%
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	< 0.000
	Industrial Stormwater	0.051	0.022	0.009	0.004	< 0.000
Load Allocation	Nonpoint source and channel	45.649	19.943	8.444	3.303	0.254
Margin of Safety (MOS)		5.083	2.221	0.940	0.368	0.028
Total Daily Loading Capacity		50.834	22.208	9.402	3.679	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	0.033	0.033	0.033	0.033	*
	Construction Stormwater	0.003	0.001	< 0.001	< 0.001	*
	Industrial Stormwater	0.003	0.001	< 0.001	< 0.001	*
Load Allocation	Nonpoint source and channel	2.249	0.964	0.389	0.132	*
Margin of Safety (MOS)		0.254	0.111	0.047	0.018	NA
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	1.3%	3.0%	7.0%	17.9%	*
	Construction Stormwater	0.1%	0.1%	0.1%	0.1%	*
	Industrial Stormwater	0.1%	0.1%	0.1%	0.1%	*
Load Allocation	Nonpoint source and channel	88.5%	86.8%	82.8%	71.9%	*
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: WWTF design flow exceeds observed dry condition loading capacity;
Allocation = (flow contribution from source) X (54 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	0.522	0.522	0.522	0.522	0.522
	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	221.806	113.781	59.638	27.269	8.371
Margin of Safety (MOS)		24.758	12.729	6.699	3.095	0.990
Total Daily Loading Capacity		247.582	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%	0.4%	0.8%	1.7%	5.3%
	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	89.6%	89.4%	89.0%	88.1%	84.5%
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 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 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.

Areas of priority as identified by the Advisory Committee are as follows: 1) Upper Mainstem 2) Shakopee Creek and Shakopee Lake 3) Little Chippewa/Middle Mainstem.

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, many of the suggestions 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 are 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 tools 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. 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.
- Vegetative Buffers: Vegetative buffers can be an efficient method to filter runoff from fields and manure application. The perennial grass vegetation can trap nutrient rich sediment, bacteria and utilize nutrients. Encourage the establishment of buffers that could also be harvested or hayed.
- 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 and clean water diversions.
- Agricultural Waste Pit Closures: The closure of waste impoundment 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.

- Agricultural Waste Pit Inspections: Several of the aging ag waste pits in our watershed were built either without specifications or the specs of construction have been lost and cannot be verified. Inspections are needed to assess if the ag 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.

4.2 *Structural Practices*

- Terraces: Terraces break long slopes into shorter ones. As water makes it 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 build across a depressional area concentrates 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. When installed, the barbs constructed of rock, re-direct the energy of the stream back into the channel, reducing further bank erosion and creating habitat.
- Dam Replacement, Repair, Alteration and/or Removal: Existing dams within the watershed are reaching their life expectancies and need to be addressed as sediment sources.
- 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. Options to explore include physical removal and pheromone control.
- Urban Stormwater Ponds: Constructed settling ponds to collect stormwater runoff before the water enters the river or lake. These settling ponds along sediments to settle out and reduce the flow rate which helps to alleviate downstream erosion issues as well.
- Well Sealing: A well that is not in use, sometimes referred to an "abandoned" well, can be a potential threat to health, safety, and the environment. An unused well can act as a drain, allowing surface water runoff, contaminated water, or improperly disposed waste to reach an uncontaminated aquifer. Sealing is the process of clearing an unused well of debris and filling the well with a special material called grout. The sealing must be done by a licensed contractor.
- Rip-rap or Hard Armor for Shoreline Erosion Control: In certain cases when the 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 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: In appropriately placed locations, subsurface pattern tiling can encourage infiltration and aid in the timing of surface flow reaching the ditch or river.
- Redetermination of Benefits on Drainage Systems: When many of the watershed's drainage systems were established it was unforeseeable the additional amount of acres that would be drained to that system or benefit from its drainage. If a system is re-determined, everyone is accessed fairly and water may be better managed within the system.

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.
- Rain gardens: Rain gardens are depressional areas planted with native plants and designed to capture and filter storm water runoff from the impervious surfaces in residential areas.
- Buffer Strips: 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 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 right of ways.
- 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 scenario that allows for the harvesting, haying and grazing of these lands.

4.5 *Urban Practices*

- Rain gardens: Rain gardens are depressional areas planted with native plants and designed to capture and filter storm water runoff from the impervious surfaces in residential areas.
- Pervious Pavers: In an effort to reduce impervious surfaces and stormwater runoff, utilizing this product in construction has added benefits.
- Permeable Asphalt: In an effort to reduce impervious surfaces and stormwater runoff, utilizing this product 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 stormwater.
- Stormwater Ponds/Treatment: The construction of water holding areas to allow for sediment settling before stormwater is released into its outlet would be beneficial practices in many urban and developed areas of the watershed.

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 non-compliant systems are a source of Fecal coliform and their 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 100% effective by providing nearly complete treatment of Fecal coliform bacteria. 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 Sewage 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 addresses through the replacement of failing infrastructure, fixing cross connections and disconnecting sump pumps and down spouts from the sanitary sewers.

5.3 *Unsewered Communities*

There are five unsewered communities within the Chippewa River Watershed: Hagen/Big Bend, Long Beach, N. Benson Subdivision, Swift Falls 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.

5.4 *MS4 Communities 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 stormwater 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.

Smaller communities should still be looking at actions to reduce stormwater and associated bacteria and sediment runoff.

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.

6.0 Identification and Summary of Implementation Objectives and Action Items

Identification and Summary of Implementation Objectives and Action Items

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 SWCD's. These partners in the watershed would assist the producers in calibration.
- County by county inventory of livestock producers with less than 300 animal units. The number is an unknown and is necessary.
- Time frame: 1-10 years
- Person(s) responsible: , CRWP, 7 County SWCD, Environmental Offices, NRCS, and Certified Crop Consultant or agronomist
- Total Costs: $195,800.00
    - Cash: $165,000.00
        - $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 use a liquid manure applicator with meter, maximum of 200 acres x 25 producers = $25,000.00
        - $4,000 to County SWCD's to perform inventory of livestock producers x 7 counties = $28,000
    - Inkind: $30,800.00
        - 100 hours x $40/hr x 5 years for promotion and plan review = $20,000

- 3 hours x $40/hr x 50 producers for weighing and calibration of solid manure spreaders = $10,800.00

6.1.1.2 Action A-2: 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, 0-300 feet from an open tile intake also requires injection or incorporation within 24 hours.
- The Minnesota Department of Agriculture (MDA) leads this program to insure appropriate manure application for commercial applicators, however the number of inspectors is considerably less than what is needed.
- Provide local support as needed for the program, estimating that each county will spend 80 hours per year inspecting applicators and applications.
- Years 1-10
- Person(s) responsible: CRWP, Seven-County SWCDs Environmental Offices, NRCS, MDA, and Certified Crop Consultant or agronomist
- Total Costs: $32,000.00
    - Cash: $32,000.00
        - 80 hrs x $40/hr x 10 years = $32,000.00
    - Inkind: $0.00
    -

6.1.1.3 Action A-3: 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, 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, SWCD's, NRCS, SWCDJPO, landowners
- Total Cost: $550,000.00
    - Cash: $300,000.00
        - 25 sites x $10,000/site incentive = $250,000.00
        - 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

6.1.1.4 Action A-4: 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, SWCD's, 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

6.1.1.5 Action A-5: 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, woody invasive species removal.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCD's NRCS, Landowners
- Total Costs: $1,700,000.00
  - Cash: $1,000,000.00
    - 5,000 acres x $200.0 per acre = $1,000,000.00
  - Inkind: $700,000.00
    - Producer labor: 5,000 acres x $100/acre = $500,000.00
    - Technical Assistance: 5000 acres x 1 hr/acre x $40/hr = $200,000.00

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 2,4,6,8,10
- Persons responsible: CRWP, 7 county SWCD, NRCS, Landowners, Agronomist and U of MN Extension
- Total Costs: $20,500.00
  - Cash: $ 12,500.00
    - 100 attendees/workshop x $10/attendee x 5 workshops = $5,000.00
    - 100 attendees/field days x $10/attendee x 5 field days = $5,000.00
    - $500.00/yr for landowner costs x 5 years = $2,500.00
  - Inkind: $8,000.00
    - 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:
    - 15 terrace projects x $1,250.00/structure = $18,750.00
    - 75 water and sediment control basins x $1,000.00/structure = $75,000.00
    - 50 stream barbs or j-hooks x $5,000.00/structure = $250,000.00
    - 3 Dam replacement, repair, alteration and/or removal x $300,000 = $900,000.00
    - 50 locations of Carp Removal and/or barriers, pherome control x 5,000 = $250,000.00
    - 15 Urban Stormwater Ponds x $10,000/structure = $150,000.00
    - 200 Well Sealings x $500/well = $100,000.00
- Timeframe: Years 1-10
- Persons Responsible: CRWP, 7 county SWCD's, 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
        - Landowners: 25% of $93,750 (terrace, water and sediment basins) = $23,437.00
        - Communities: 25% of $150,000 for urban stormwater ponds = $37,500.00
        - Counties, DNR, SWCDs, other partners: 50% of $1,500,000.00 = $750,000

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
        - Landowners 8 hrs x 75 side inlets x $40/hr = $24,000
        - County Ditch Inspectors 8 hrs x 75 inlets x $40/hr = $24,000

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.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, Landowners

- Total Cost: $250,000.00
    - Cash:
        - 500 alternative tile intakes x $500 x 75% = $187,500.00
    - Inkind:
        - Landowners share 500 intakes x $500 x 25% = $62,500.00

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. Wetland programs include CRP, RIM, WRP and other land retirement programs
- Time Frame: Years 1-10
- Persons Responsible: CRWP, 7 county SWCD's, NRCS, BWSR, USFWS, Landowners
- Total Cost: $330,000.00
    - 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: $80,000.00
        - USFWS 15 wetlands at $2,000/wetland = $30,000
        - SWCDJPO technical assistance at 10 hrs/acre x 100 acres x $50/hr = $50,000

6.1.4.2 Action D-2: Vegetative Buffers:

- Promote the installation of 418 miles of vegetative buffers to a width of 2 rods (32 feet)
- Provide a one-time incentive payment of $1,000 per acre of buffer strip when enrolled in a conservation program such as CRP, with crop and land prices at record highs the incentive to take land out of production and put in a buffer needs to be economically appealing.

- Inkind contributions will be the landowners share of seed and seeding estimated at $200 per acre and technical assistance from SWCD's and NRCS in the seven counties. Although federal CRP payments cannot be used as inkind it is of substantial 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 SWCD;s NRCS, Landowners
- Total Cost: $1,070,080.00
    - Cash: $836,000.00
        - 836 acres x $1,000 per acre = $836,000.00
    - 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: Rain gardens and rain barrels

- Provide cost share to urban homeowners and businesses to install rain gardens and/or rain barrels to lessen the runoff from impervious surfaces
- Timeframe: Years 1-10
- Persons Responsible: CRWP, 7 County SWCD's, Water Planners, Homeowners, Businesses
- Total Cost: $1,048,000.00
    - Cash: $813,000.00
        - 60 homeowner rain gardens x $500 = $30,000.00
        - 10 business rain gardens x $2,000 = $20,000.00
        - 7000 rain barrels x $109 = $763,000
    - Inkind: $235,000.00
        - 60 homeowners x $250.00 = $15,000.00
        - 10 businesses x $1,000.00 = $10,000.00
        - Homeowner share of rain barrels, 7000 x $30 = $210,000

6.1.4.4 Action D-4: Conservation Tillage and Residue Management

- Promote 8,000 acres of conservation tillage
- Provide producers with a $7 per acre incentive payment for development and installation of an EQIP conservation tillage plan.
- Timeframe: Years 1-10
- Persons Responsible: CRWP, SWCD's NRCS, SWCDJPO, Landowners
- Total Cost: $176,000.00
    - Cash: $56,000.00
        - 8,000 acres x $7/acre incentive = $56,000.00
    - Inkind: $120,000.00
        - Landowners share of 8,000 acres x $7/acre = $56,000.00

- Technical Assistance .5 hr/ac x 8,000 x $40/hr = $64,000.00

6.1.4.5 Action D-5: Shoreline Restoration on Lakes

- Provide cost share and technical assistance to lakeshore owners for planting native grasses and forbs on the numerous lakes in the watershed.
- Timeframe: Years 1-20
- Persons Responsible: CRWP, SWCD's, MN-DNR, Landowners
- Total Cost: $59,200.00
  - Cash: $40,000.00
    - 20 shoreline projects x $2,000 = $40,000.00
  - Inkind: $19,200.00
    - Technical assistance $40/hr x 24 hrs/project x 20 projects = $19,200.00

6.1.4.6 Action D-6: Grassed 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, SWCD's 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

6.1.5 Task E: Watershed Specialist

6.1.5.1 Action E-1: Watershed Specialist

- Responsibilities will include but not be limited to:
  - Coordinate all education activities and create educational literature
  - Facilitate the Local Work Group comprised of the cooperating partners from the 7 counties which may include the following: SWCD's, NRCS, County Water Planners, Environmental/Land and Resource Management Offices, Feedlot Officers
  - Report practices in Elink
  - Provide overall coordination of installation of BMP's, 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

6.2 *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. 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, 7 County SWCD, Environmental/Land and Resource Management Offices, Water Planners
- Total Cost: $238.000.00
  - Cash: $218.400.00
    - 7 counties over 3 years, 2080 hrs x 3 years x $35/hr = $218,400.00
  - 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 SWCD/ 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/system for design/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 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.

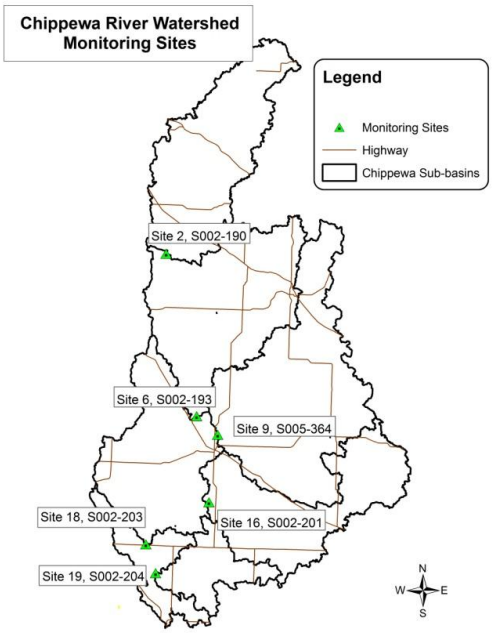
Table 6.3-1 Monitoring Sites

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	S005-364	TP, OP, TSS, Turbidity, NO2/NO3, *E. coli*, DO, Temp, pH,

Benson		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

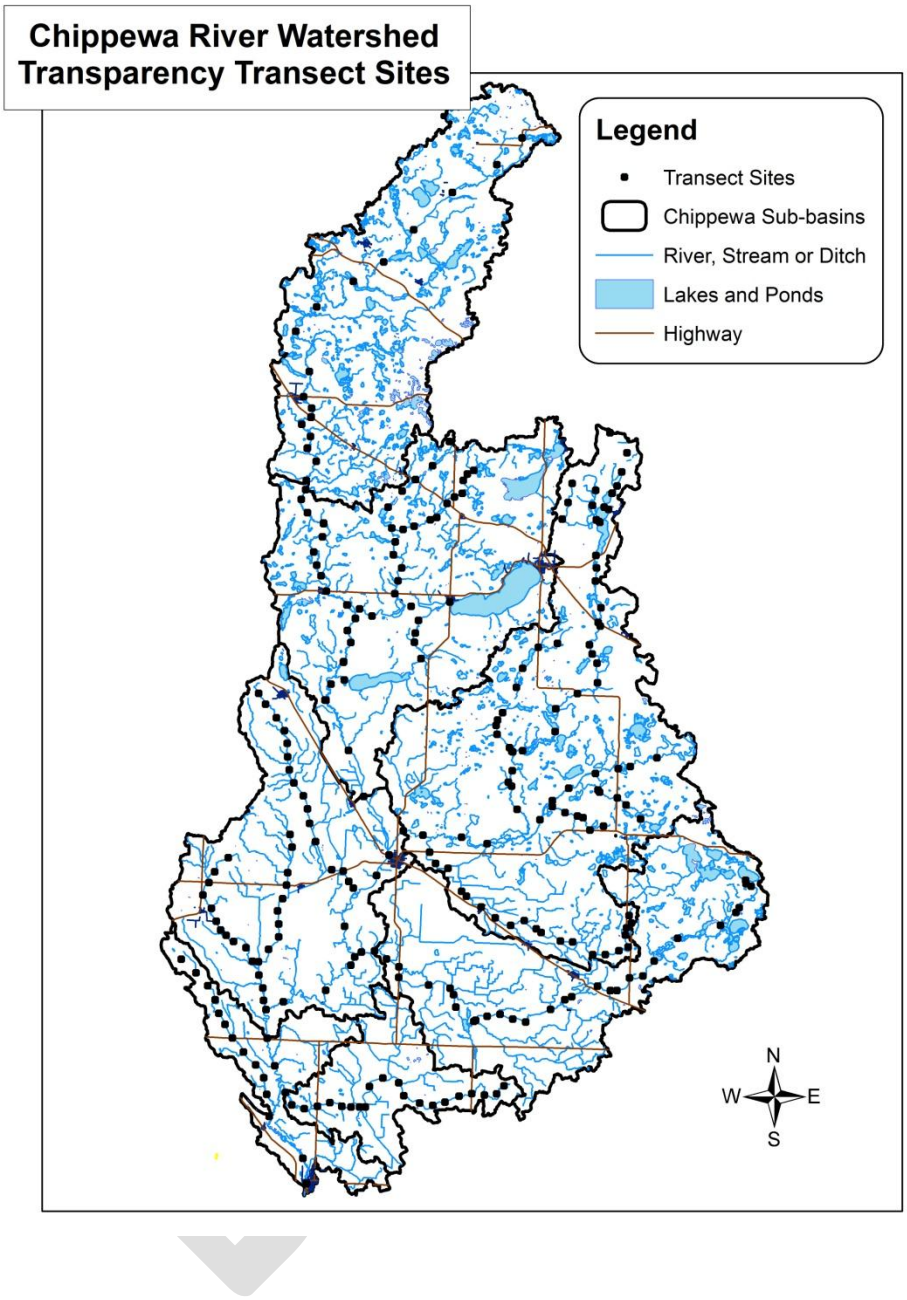
- Primary monitoring at these sites will use continuous flow monitoring equipment to monitor stage. Grab samples taken during low and high flows will be used to estimate load and flow weighted mean concentration of pollutants. Water samples collected will be analyzed by MVTL Laboratory in New Ulm, MN. 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.

Figure 6-1 Primary Monitoring Sites



- 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 6-2 Transparency Transect 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: $304,880.00
    - Cash: $244,880.00
        - Lab Analyses: 30 samples/hr x 6 sites x 10 years at $73.60 per sample set = $132,480.00
        - Equipment replacement/maintenance: $35,000.00
        - Delivery and shipping charges: $6,000.00
        - Mileage $0.51/mile x 14000 x 10 yrs = $71,400.00
    - 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-3: 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
        - Consulant = $2,000.00

        - 200 student intern hrs x $16/hr = $3,200.00
        - Postage = $3,000
    - Inkind: $0.00

6.3.3 Task C: Watershed Scientist

6.3.3.1 Action C-2: Watershed Scientist

- Provide a full time Watershed Scientist to conduct Tasks A and B
- 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
        - Scientist: 2080 hrs x 10 yrs x $35/hr = $728,000.00

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 partners 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

6.5 *Task B: Printed Media*

6.5.1.1 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

6.5.1.2 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

6.5.2 Task C: Public Events

6.5.2.1 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

6.5.2.2 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

6.6 *Objective 5: Administration*

6.6.1 Task A: Administration staff

6.6.1.1 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 Executive Committee for the CRWP will be conducted
- Timeframe: Years 1-10
- Person Responsible: CRWP Executive Director
- Total cost: $916,000.00
    - Cash: $832,000.00
        - 2080 hrs x 10 yrs x $40/hr = $832,000.00
    - Inkind: $84,000
        - 7 County Commissioners x 120 months x $100/Comm. = $84,000.00

6.6.2 Task B: Evaluation

6.6.2.1 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, SWCD's, 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

6.7 *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	$195,800	Years 1-10	30-75% removal rate of Fecal coliform depending on proximity to Chippewa River	CRWP, 7 County SWCD's Environmental Offices, NRCS, Certified Crop Consultants, Agronomist, MDA
	Observation of Setbacks	$32,000	Years 1-10		CRWP, 7 County SWCD's Environmental Offices, NRCS, Certified Crop Consultants, Agronomist, MDA
	Feedlot Fixes	$550,000	Years 1-10		CRWP, SWCD's NRCS, SWCDJPO, Landowners
	Agricultural Waste Pit Closures	$100,000	Years 1-10		CRWP, SWCD's NRCS, Landowners
	Pasture Management	$1,700,000	Years 1-10		CRWP, SWCD's NRCS, Landowners
	Workshops, demonstration plot and field days	$20,500	Years 2,4,6,8,10		CRWP, SWCD's NRCS Landowners, Agronomist and U of MN Extension
Task B Structural Practices	Cost share for terraces, sediment basins, stream j-hooks, dam replacement/repair, carp	$2,564,687	Years 1-10	100% stream bank, 50% basins and structures reduction in	CRWP, SWCD's, NRCS, Water Planners, DNR, Environmental/Land and Resource Mgmt Offices, Communities, Landowners

	removal, urban stormwater ponds, well sealing			sediment yield[1]	
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		CRWP, Landowners
	Controlled Drainage/two stage ditch design	$320,000	Years 1-10		CRWP, Landowners, County Engineers, County Ditch Inspectors
	Action Item	Estimated Costs (Cash, Inkind, loan)	Timeline*	Estimated Load Reduction	Partners**
Task D Vegetative Practices	Wetland Restorations	$330,000	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP, SWCD's NRCS, BWSR, USFWS, Landowners
	Vegetative Buffers	$1,070,080	Years 1-10		
	Rain Gardens/rain barrels	$1,048,000	Years 1-10		CRWP, SWCD's Water Planners, Homeowners
	Conservation Tillage and Residue Management	$176,000	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP, SWCD's NRCS, SWCDJPO, Landowners
	Shoreline Restoration	$59,200	Years 1-10		CRWP, SWCD's MN-DNR, Landowners
	Grassed Waterways	$67,800	Years 1-10	50-90% reduction in sediment yield[1,2,3,4,5,6]	CRWP SWCD's NRCS, Landowners

Task E Watershed Specialist	Facilitate partners, coordinate all education activities and create educational information, report practices in Elink, provide overall coordination of installation of BMP's, payments to landowners, provide reports to local work group	$728,000	Years 1-10		CRWP
Objective 2: Point Source Management Measures					
Task A Subsurface Sewage Treatment Systems	SSTS Compliance Inventory	$238,000	Years 1-3	Not Applicable	CRWP, SWCD's, Environmental/Land & Resource Mgmt Offices, Water Planners
	SSTS Upgrades	$16,320,000 (loan)	Years 1-10	99% removal rate of Fecal coliform[9]	CRWP, SWCD's, 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, SWCD's, Environmental/Land & Resource Mgmt Offices, Water Planners, MPCA, MDA

	Action Item	Estimated Costs (Cash, Inkind, loan)	Timeline*	Estimated Load Reduction	Partners**
Objective 3: Monitoring					
Task A Water Quality and Quantity Monitoring	Long-term Trend, Effectiveness Monitoring	$304,880	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
Task C Watershed Scientist	Conduct Task A and B, analyze and compile data, present findings, train citizen monitors	$728,000	Years 1-10	Not Applicable	CRWP Watershed Scientist
Objective 4: Education and Outreach					
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	Annual Meeting for watershed residents	$23,000	Years 1-10	Not Applicable	CRWP

Annual Meeting					
Task D Public Events	County fairs/open houses	$16,300	Years 1-10	Not Applicable	CRWP, SWCD's, Environmental/Land & Resource Mgmt Offices, Water Planners
Objective 4: Administration					
Task A Administration	CRWP Executive Director - County Commissioners	$916,000	Years 1-10	Not Applicable	CRWP Executive Director
Task B	Evaluation - outcomes and measures	$268,800	Years 1-10	Not Applicable	CRWP staff, SWCD's, Environmental/Land & Resource Mgmt Offices, Water Planners, NRCS, MN-DNR, USFWS
Total funding needed:		$30,891,147			

*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 e 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														
		Year	1	2	3	4	5	EVALUATE	6	7	8	9	10	EVALUATE
Objective 1: Non-point Source Measures														
Task A	**Livestock and Manure Management**		X	X	X	X	X	X	X	X	X	X	X	X
	Observation of Setbacks		X	X	X	X	X	X	X	X	X	X	X	X
	Feedlot fixes		X	X	X	X	X	X	X	X	X	X	X	X
	Agricultural Waste Pit Closures		X	X	X	X	X	X	X	X	X	X	X	X
	Workshops, Demonstration plot and field days			X		X		X	X		X		X	X
Task B	**Structural Practices**													
	BMP Installation		X	X	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	X	X
	Alternative Tile Intakes		X	X	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	X	X
Task D	**Vegetative Practices**													
	Wetland Restorations		X	X	X	X	X	X	X	X	X	X	X	X
	Vegetative Buffers		X	X	X	X	X	X	X	X	X	X	X	X
	Rain Gardens/rain barrels		X	X	X	X	X	X	X	X	X	X	X	X
	Conservation Tillage/Residue Management		X	X	X	X	X	X	X	X	X	X	X	X
	Shoreline Restoration		X	X	X	X	X	X	X	X	X	X	X	X
	Grass Waterways		X	X	X	X	X	X	X	X	X	X	X	X
Task E	**Watershed Specialist**		X	X	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	X	X
	SSTS Compliance Inventory		X	X	X									
	SSTS Upgrade		X	X	X	X	X	X	X	X	X	X	X	X
	Low Income Financial Aid		X	X	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	X	X

Task B	**Research**													
		Year	1	2	3	4	5	EVALUATE	6	7	8	9	10	EVALUATE
	DNA Fingerprinting			X	X	X								
	Social Indicators		X	X	X	X	X	X	X	X	X	X	X	X
Task C	**Watershed Scientist**		X	X	X	X	X	X	X	X	X	X	X	X
Objective 4: Education and Outreach														
Task A	**Website, Internet, Email**													
Obj.4, Task A continued	TMDL project website		X	X	X	X	X	X	X	X	X	X	X	X
	Bi-annual newsletter		X	X	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	X	X
	County fairs/open houses		X	X	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	X	X
Task B	**Evaluation - outcomes and measures**		X	X	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 Executive 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 many 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, stormwater 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.

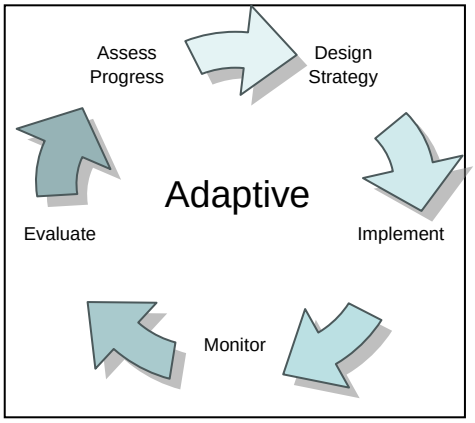
9.0 Adaptive Management Process

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 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	10,800		22,800
Financial Assistance - application	1000	5/200ac	25	producers	25,000			25,000
Inventory	4000	county	7	county	28,000			28,000
Action A-2 Observation of Setbacks								-
Financial Assistance to counties	80	hrs	$40	hr x10yrs	32,000			32,000
Action A-3 Feedlot Fix								-
Financial assistance	$10,000	site	25	sites	250,000			250,000
Technical Assistance	$2,000	site	25	sites	50,000			50,000
Landowners share	10,000	site	25	sites		250,000		250,000

Action A-4 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
Task B: Structural Practices								-
Action B-1: Install structural Management measures								-
Terraces	$1,250	structure	15	structures	18,750			18,750
Water and Sediment control basins	$1,000	structure	75	structures	75,000			75,000
Stream barbs or j-jooks	$5,000	structure	50	barbs	250,000			250,000
Dam Replacement/repair	$300,000	damn	3	dams	900,000			900,000
Carp Removal	$5,000	locations	50	locations	250,000			250,000
Urban Stormwater Ponds	$10,000	stsructure	15	structures	150,000			150,000
Well Sealing	$500	well	200	wells	100,000			100,000
Landowners share	25%	of cost	93750	cost		23,437		23,437

Communities	25%	of cost	150000	ponds		37,500		37,500
Counties - technical assistance	50%	of cost	1,500,000	practices		750,000		750,000
Task C: Drainage and/or Ditch Bank Management								-
Action C-1 Side Inlets								-
Side Inlets	$800	inlets	150	inlets/75%	900,000	30,000		930,000
Landowners share	$40	hrs	75	inlets/8hr		24,000		24,000
County Ditch Inspectors	$40	hrs	8hr	75 inlets		24,000		24,000
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				-
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		300,000		300,000
SWCDJPO	$50	hrs	10	hr/100ac		500,000		500,000
Action D-2 Vegetative Buffers								-
Financial Incentive	$1,000	acre	836	acres	836,000			836,000
Landowners share	$200	acre	836	acres		167,200		167,200
Technical Assistance	$40	hrs	2	hr/836ac		66,880		66,880
Action D-3: Rain Gardens and rain barrels								-
Rain garden-homeowners	$500	Rain gard	60	homeowner	300,000	15,000		315,000
Rain garden - businesses	$2,000	Rain gard	10	business	20,000	10,000		30,000
Rain Barrels (29 communities in watershed)	$109	barrel	7000	barrels	763,000	210,000		973,000
Action D-4 Conservation Tillage and Residue Management								-
Conservation tillage	$7	acre	8000	acres	56,000			56,000
Landowners share	$7	acre	8000	acres		56,000		56,000
Technical Assistance	$0	hrs	0.5	hr/8000ac		64,000		64,000

Action D-5 Shoreline Restoration on Lakes								-
Shoreline restorations	$2,000	projects	20	projects	40,000			40,000
Technical Assistance	$40	hrs	24	hr/20proj		19,200		19,200
Action D-6 Grassed Waterways								-
Grassed Waterways	$2,000	structure	20	structures	40,000			40,000
Technical Assistance	$40	hrs	16	hr/20struc		12,800		12,800
Landowners share	$750	structure	20	structures		15,000		15,000
Task E: Watershed Specialist	$72,800	yr	10	yrs	728,000			728,000
Totals Objective 1					**7,313,750**	**3,773,317**		**11,087,067**

Objective 2: Point Source Management Measures								
Task A: Subsurface Sewage Treatment Systems								
Action A-1 SSTS Compliance Inventory								
7 counties over 3 years	$35	hr	2080	hrs/3yrs	218,400			218,400
Mapping/reporting	$35	hr	80	hr/7 ctys		16,900		16,900
Action A-2 SSTS Upgrades								-
County personnel design/inspection	$40	hr	4	hr/2000 systems		320,000		320,000
Low interest loans	$8000 systems		2000	systems			16,000,000	16,000,000

Action A-3 Low income Financial Aid	$8,000	system	100	systems	800,000			800,000
County personnel design/inspection	$40	hr	4	hr/100systems		16,000		16,000
Total Objective 2					**1,018,400**	**352,900**	**16,000,000**	**17,371,300**

Objective 3: Monitoring								
Task A: Water Quality and Quantity Monitoring								
Action A-1 Long-term trend and effectiveness monitoring								
Lab Analyses	$73.60	sample set	1800	samples	132,480			132,480
Equipment/supplies					35,000			35,000
Sample delivery/shipping					6,000			6,000
Mileage	$0.51	mile	140000	miles	71,400			71,400
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

Task C: Watershed Scientist	$72,800	yr	10	hrs	728,000			728,000
Total Objective 3					**1,024,280**	**60,000**	**-**	**1,084,280**

Objective 4: Education and Outreach								
Task A: Website, Internet, Email								
Action A-1: TMDL project website	$120	mo	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	60,000			60,000
Task C: Public Events								-
Action C-1 Annual Meeting								-
Meeting	$1,700	hr	10	hrs	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
Total Objective 4					**150,900**	**12,800**	**-**	**163,700**

Objective 5: Administration								
Task A: Administration staff								
Action A-1 CRWP Executive Director	83200	yr	10	yrs	832,000			832,000

County Commissioner	$100	mo	120	mox7Comm		84,000		84,000
Task B: Evaluation								-
Action B-1 Evaluate-outcomes and measures								-
County representatives	$40	hr	6720	hrs		268,800		268,800
Total Objective 5					**832,000**	**352,800**	**-**	**1,184,800**
Totals:					**Cash**	**Inkind**	**Loan**	**Total**
Objective 1					**7,313,750**	**3,773,317**		**11,087,067**
Objective 2					**1,018,400**	**352,900**	**16,000,000**	**17,371,300**
Objective 3					**1,024,280**	**60,000**	**-**	**1,084,280**
Objective 4					**150,900**	**12,800**	**-**	**163,700**
Objective 5					**832,000**	**352,800**	**-**	**1,184,800**
Totals					**10,339,330**	**4,551,817**	**16,000,000**	**30,891,147**

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.*