

Addendum I

2007 Water Quality Protection Assessment

Shakopee Mdewakanton Sioux Community Land Department staff conducted an assessment of water bodies using the Minnesota Routine Assessment Methodology (MnRAM V.2.0). Within MnRAM V.2.0 there is a section dedicated to water quality protection (pg. 19). While MnRAM V.20 is dated, the Water Quality Protection section of the document was used again in order to provide a direct comparison to the original assessment where new water quality data is the only variable.

Water quality data from 1999 – 2006 was used to determine if, from a water quality perspective, the original assessments were still valid. In order to make a determination nine questions (Table 1) from MnRAM V.2.0 were answered based on the most recent data and then compared to the 1999 assessment. The 2003 and 2006 water quality reports can be found in Addendum II and III.

In some cases, particularly where the water body was not fully contained within the trust boundary, buffer reconnaissance was completed with the aid of 2005 aerial photography.

Water Quality Protection (BWSR, 1998)

Table 1. Water Quality Protection Data Collection Questions

Does the wetland receive direct discharge of managed water (e.g. municipal or road stormwater drainage, agricultural drainage outlet, industrial or municipal wastewater)?	Y	N	
Do the surrounding or upstream land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland?	Y	N	
Does the wetland shape, flow inputs, and outlet configuration allow adequate residence time so the sediments are able to settle?	Y	N	
For non-isolated wetlands, does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials?	Y	N	N/A
Does the wetland have significant vegetative material to potentially increase uptake of dissolved nutrients?	Y	N	
Does the wetland have a vegetative buffer area on upland adjacent to its boundary that slows and filters overland flow? If yes, describe buffer area width and slope:	Y	N	
Are there recreational lakes, watercourses or water supply sources down gradient in the local watershed?	Y	N	
Is the position of the wetland in the landscape such that run-off is held or filtered before entering a downstream surface water?	Y	N	
Are there signs (or historical reports) of excess nutrient loading to the wetland (e.g. algal mats, excessive submergent macrophyte growth or monotypic vegetation)?	Y	N	U

The responses to the questions were then summarized to determine if the functional level of water quality protection changed from the original assessment. The original and current functional water quality protection assessments for each water body are described in Table 2.

Table 2. Individual Basin Water Quality Protection Status Comparison

Water Body	Original Water Quality Protection Functional Assessment	Current Water Quality Protection Functional Assessment	Changes since 2000 assessment	Extent of Record of Water Quality Data
Wetland N-2	Medium	Medium	No additional data from original assessment	1999
Wetland N-7	Low	Low	No additional data from original assessment	No WQ data
Wetland N-8	Low	Low	No additional data from original assessment	No WQ data
Wetland C-1L	Medium	<i>Low</i>	Concerns: Low DO; high TP, conductivity and chloride	1999-2006
Wetland C-2	Medium	<i>Medium - Low</i>	Some additional construction along south side	1999
Wetland C-4	Medium - Low	Medium - Low	Extensive buffer, drain tile removed controlled inlet installed since first assessment	1999-2004
Wetland C-8	Medium - High	Medium - High	New road and stormwater pond since first assessment	1999
Wetland S-1	Medium	<i>Medium - High</i>	Stormwater pond installed upstream to treat 25% of residential area	1999 - 2005
Wetland S-3	Low	Low	Extensive native vegetative buffer installed	1999
Wetland S-4	Low	Low	Wetland size reduced by ½ since initial assessment, buffer installed	No WQ data
Wetland S-5	Low	<i>Medium</i>	Water control structure installed, increased vegetative diversity, potential waste water discharge site	2006
Wetland S-8	Medium	<i>Low</i>	Hydrology substantially changed, No flow through characteristics, performs minimal water quality functions	1999-2005
Wetland S-10	Medium	Medium	Buffer expanded, some side slope excavation – artificial drainage	1999
Wetland S-11a	Medium	<i>Medium - High</i>	Wetland excavated to maximize vegetative contact with water, buffer expanded along south side, wastewater inflow, additional area on west side	No WQ data
Wetland S-11b	Medium	<i>Medium - Low</i>	Additional impervious surface, inlet to wetland close to outlet – short residence time, monoculture, sediment deposition	No WQ data
Wetland S-11c	High		This wetland no longer exists	NA
Wetland S-13	Medium	<i>Medium - Low</i>	Additional impervious surface and direct storm sewer since previous assessment, new inlet close to outlet – short residence time	1999
Wetland S-16	Medium	Medium - Low	Wetland has been substantially changed since previous assessment; now acts as stormwater pond, no vegetation, short residence time	No WQ data
Wetland S-17b	Medium	Medium	Wetland has been substantially changed since previous assessment; now acts as stormwater and irrigation pond; despite design nutrient and chloride concentrations elevated at outlet	1999-2006
Wetland S-18	Medium - High	<i>Medium</i>	Expanded residential drainage from Wilds development	No WQ data
Petsch	Medium - Low		This wetland no longer exists	NA
Mystic Lake	Medium	Medium	Residential housing expansion since original assessment, reduced nutrients in water column	1999 - 2006
Arctic Lake	Medium	<i>Medium - High</i>	Significant buffer installed, sediment load decreased, nutrient level elevated	1999 - 2006

Of the twenty-three MnRAM assessments, the water quality protection capacity of six water bodies was downgraded and four water bodies were upgraded. Two wetlands, S-11c and Petsch Pond were eliminated due to urban expansion or reconstruction and thus a second water quality assessment was not completed. Where water quality data was lacking reassessment was completed based on other indicators.

A review of the most recent water quality data was also needed to determine if water quality has improved, remained stable or degraded. Total dissolved phosphorus was not collected beyond 1999. As a surrogate total phosphorus was reviewed over the period 2000 – 2006 where data length permitted. Nitrate + Nitrite was sampled continuously over the extent of the record so this was also reviewed. This process was only completed for those water bodies where records were available from 1999, 2000 and beyond (Table 3), and where the water body still exists. All water bodies reviewed were given a condition of improvement based on the water quality variable; Improved, unchanged, degraded, and an overall water quality improvement rating based on these two variables and other ancillary data. Five water bodies experienced degraded water quality, four experience improved water quality, and two remain unchanged since 2000. More detailed information can found in Addendum II.

Table 3. Water Quality Status Designation Based on 2007 Water Quality Data

Water Body	Quality based on total phosphorus	Quality based on nitrate + nitrite	Overall Water Quality Ranking
Arctic Lake	Improved	Improved	Improved
Mystic Lake	Improved	Improved	Improved
Stream Site 1	Improved	Degraded	Degraded
Stream Site 2	Degraded	Degraded	Degraded
Stream Site 3	Improved	Degraded	Improved
Stream Site 4	Unchanged	Unchanged	Unchanged
Stream Site 5	Improved	Degraded	Degraded
Wetland C-1L	Unchanged	Degraded	Degraded
Wetland C-4	Improved	Unchanged	Improved
Wetland S-5/S-8	Unchanged	Improved	Unchanged
Wetland S-17b	Unchanged	Degraded	Degraded

Reference

Board of Water and Soil Resources. 1999. Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM), Version 2.0.