Token Creek TMDL for Sediment and Habitat

Final May 30, 2002

Preface

Wisconsin Department of Natural Resources, working with numerous federal, state and local partners is undertaking a substantial project to restore Token Creek. This watershed project has a number of components, including:

- Removal of a dam;
- Restoration of stream morphology and habitat (with assistance of the Corps of Engineers);
- Managing sediment and other pollutants for agricultural land through the Lake Mendota Priority Lake Project; and
- Managing storm water discharges through the Lake Mendota Priority Lake Project and the storm water discharge permit program.

This Total Maximum Daily Load (TMDL) deals the sedimentation and degraded habitat impairments in segments of Token Creek. Implementation of the above components along with achieving the load allocation presented in this TMDL should restore and maintain the designated uses of Token Creek.

Background

Two segments of Token Creek, a small Dane County stream within the Lake Mendota Watershed and tributary to Cherokee Marsh, are listed for two types of impairments on the 1998 Wisconsin 303(d) list. Both segments are listed as high priority on Wisconsin 303(d) list.

This TMDL deals with the impairments to the designated uses in both segments of Token Creek listed on the 303(d) list. Specifically, it deals with the impairments caused by sedimentation and the impaired habitat caused by the impoundment. Indirectly, this TMDL will address the concerns with turbidity and increased temperature. However, this TMDL is not developed for those two parameters.

Token Creek originates in the township of Windsor (T9N, R10E, Sec. 24) and flows 10 miles south to Cherokee Marsh. There are four segments to the stream, with two segments on the 303(d) list as described below.

- Impoundment and Upstream (mile 4 to mile 6.5)

  This segment is listed on Wisconsin's 303(d) list as impaired by sedimentation leading to habitat degradation and elevated temperature. The impoundment has up to 15 feet of deposited sediment. The section of stream above the impoundment has "soft sediment" covering the native peat/sand substrate. The designated use of this segment is that of a warm water sport fishery. Its current use is that of a Hillsenhoff Biotic Index values vary from very good to very bad. From information on page 2-14 of the Lake Mendota Priority Watershed Plan, this segment of Token Creek is "characterized by low flows, increased rates of sedimentation, elevated temperatures and lack of habitat". Recent assessments indicate the potential of a coldwater fishery throughout this segment, if the dam is removed.

- Highway 51 to Dam (mile 2 to mile 4)

  The designated use of this two-mile segment that of a coldwater fishery. Presently, the stream's existing use is a coldwater class III. However, it has the potential to be class I or II coldwater fishery and the present fishery is more indicative of a warmwater fishery. Habitat impairments are due to "soft sediment" covering the native substrate. Macroinvertebrates tend to be tolerant species. Low numbers of trout have been found in this stream. From information on page 2-14 of the Lake Mendota Priority Watershed Plan, this segment of Token Creek is "characterized by moderate velocities, high turbidity, heavy sedimentation, natural occurring log jams, overall channel widening and heavy in-stream aquatic plant growth". It is presumed that the high turbidity will be addressed through the control of sediment sources identified in the load allocation section of this TMDL.[1] Temperature may have been a concern is the impoundment. However, with the removal of the dam, temperature should not be a concern.

Water Quality Standards

The two segments of Token Creek are not meeting Wisconsin's water quality standards. Specifically, both segments are not meeting the following narrative standard:

- S. NR 102.04 (1) intro and (a), Wis. Adm. Code:

[1] Wisconsin DNR will consider whether or not to continue to list this segment for turbidity as part of the process for preparing for submittal the 2002 303(d) list.

"To preserve and enhance the quality of waters, standards are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all waters including the mixing zone and the effluent channel meet the following conditions at all times and under all flow conditions: (a) **Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.**"

The designated uses applicable to the two segments of Token Creek are as follows:

- S. NR 102.04(3) intro, (a) and (b), Wis. Adm. Code:

  "FISH AND OTHER AQUATIC LIFE USES. The department shall classify all surface waters into one of the fish and other aquatic life subcategories described in this subsection. Only those use subcategories identified in pars. (a) to (c) shall be considered suitable for the protection and propagation of a balanced fish and other aquatic life community as provided in federal water pollution control act amendments of 1972, P.L. 92-500; 33 USC 1251 et.seq.

  For segment 2 (mile 2 to mile 4) -- "(a) Cold water communities. This subcategory includes surface waters capable of supporting a community of cold water fish and aquatic life, or serving as a spawning area for cold water fish species. This subcategory includes, but is not restricted to, surface waters identified as trout water by the department of natural resources (Wisconsin Trout Streams, publication 6-3600 (80))."

  For segment 1 (mile 4 to 6.5) -- "(b) Warm water sport fish communities. This subcategory includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish."

Existing Sediment Loads

Token Creek's watershed is about 25.3 square miles (about 16,000 acres). The land cover for the entire length of Token Creek is approximately as follows:

- Agriculture 73%
- Residential 7%
- Transportation 4%
- Wetlands 4%
- Other 12%

For purposes of this TMDL, the most important land uses for the two listed segments are agriculture and urban (residential and transportation). Growth of the City of Sun Prairie is extending into the headwaters of Token Creek and land in transition from agricultural land to urban land is becoming an important land use in the watershed. The open space is primarily park land at the downstream end of the watershed and much of the other category is downstream of the two listed segments. For a map of the land cover/use in Token Creek's watershed, see Figure 4 of the "Water Resources Atlas for Token Creek".

The estimated sediment loads to Token Creek are shown on the table below. They represent a worst case situation. To account for increased loadings due to urban development, year 2020 conditions are factored it. Although these estimates cover the entire length of the stream, given the distribution of the land uses within the watershed, the sediment loads are representative of the two segments on the 303(d) list.

Category	Present (1996) Annual Load		Projected 2020 Annual Load		Reference	Model
	Tons	%	Tons	%		
Crop and other uplands	752	53	660	42	Table 3-4 PWS Plan	WINHUSLE
Stream banks (primarily agricultural)	146	10	146	9	PWS Plan	NRCS Spreadsheet Method
Existing Urban (residential and transportation)	148	10	383	~~24~~ 25	Table 3-8 PWS Plan	SLAMM
Transitional Urban (primarily residential)	370	26	370	24	PWS Plan	USLE with adjustments
Total	1416	~~1~~99	1559	100		

Brief Discussion of Models

- The WINHUSLE model calculates average annual soil erosion based on actual field conditions, existing best management practices and crop rotations, from the Universal Soil Loss Equation and then routes the sediment from field to field to stream using runoff methods generally accepted by the Natural Resources Conservation Service (NRCS). Sediment load reductions were then estimated by applying best management practices to specific fields. Modeling was based on 1996 conditions.

- The NRCS spreadsheet model uses field data to determine the three-dimensional volume of eroding stream banks on an average annual basis. Densities based on the soil type are used to determine mass of sediment (generally described in Tons/year). Analysis was based on 1996 conditions.

- The Source Load and Management Model estimates annual pollutant loads from urban areas based on the type of urban land use and soils. Management practices are then applied to determine the pollutant load reduction. Modeling was based on 1996 conditions and conditions projected for 2020.

- The Universal Soil Loss equation with adjustments for local conditions and sediment delivery was used for estimating sediment loads from construction sites. In general, an 80% pollutant control was assumed, although individual best management practices may achieve greater pollutant load efficiencies and sites may not remain "disturbed" exposed for the entire year. Development of 62 acres per year is projected as on 1996 conditions and projected 2020 conditions.

Total Load Capacity, Wasteload Allocation and Load Allocation

The objective of the TMDL is to produce conditions in both segments that will result in water quality standards being met, including meeting the potential use of establishing a coldwater fishery. A class II trout fishery is described in NR 1.02(7)(b), Wis. Adm. Code as follows:

> "A class II trout stream is a stream or portion thereof that:
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> a. Contains a population of trout made up of one or more age groups, above the age one year, in sufficient numbers to indicate substantial survival from one year to the next, and
>
> b. May or may not have natural reproduction of trout occurring; however, stocking is necessary to fully utilize the available trout habitat or to sustain the fishery."

WDNR considered defining the goal of the TMDL in additional terms, such as condition of the substrate. However, due to the native peat substrate with sand lenses, it is difficult to assess improvements using presently available physical habitat metrics. Therefore, the goal is expressed in terms of attaining the coldwater fishery.

Total Load Capacity. The total load capacity is the combinations of:

- Reduction is the sediment load to both segments to no greater than an average load of 746 tons.

- Removal of the impoundment.

Wasteload Allocation. There are no point sources in the watersheds. Therefore, the wasteload allocation is zero. If a point source discharge were proposed one of the following would need to occur:

- An effluent limit of zero sediment load would be included in the WPDES permit.
- An offset would need to be created through some means, such as pollutant trading.
- A re-allocation of sediment load would need to be developed and approved by EPA.

Load Allocation. The load allocation is described in two parts. One is the reduction in sediment. The other is removal of the dam with removal of deposited sediment. The load allocation associated with the reduction of sediment was derived through an iterative process with the objective of reducing sediment load to the maximum extent practicable using best management practices. Through this process, a 47% reduction in average annual sediment load based on 1996 conditions was identified. The load allocation for present conditions is as follows:

Load Allocation analysis for present conditions.

Category	Annual Load (tons)	% Reduction	Reduction in Load (tons)	Load Allocation (LA) (tons)
Croplands and other uplands	752	36	271	481
Stream banks (primarily agricultural)	146	50	73	73
Existing Urban (residential and transportation)	148	20	30	118
Transitional Urban (residential and transportation) (assuming 62 acres per year of development)	370	80	296	74
Total	1416	47	670	746

Since this is a developing area, the load allocation is also calculated for year 2020 conditions. The intent is to be able to achieve the same load allocation for the 2020 conditions and for the 1996 conditions.

Load Allocation analysis for 2020 conditions.

Category	Annual Load (tons)	% Reduction	Reduction in Load (tons)	Load Allocation (LA) (tons)
Croplands and other uplands	660	36	238	422
Stream banks (primarily agricultural)	146	50	73	73
Existing 1996 Urban (residential and transportation)	148	20	30	118
Existing 1996-2020 Urban (residential and transportation)	235	75	176	59
Transitional Urban (residential and transportation) (assuming 62 acres per year of development)	370	80	296	74
Total	1559	53	813	746

In the analysis for year 2020 conditions, it is assumed that all development from 1996 to 2020 will have post-construction storm water management practices incorporated into the development. The storm water management practices are assumed to be at least 75% effective in the control of sediment.

As shown in the table for 2020 conditions, the same load allocation for sediment can apply as calculated for the present conditions.

Due to the nature of the problem, an adaptive management approach will be used. If necessary, this TMDL will be revised if the level of sediment loading is insufficient to meet the water quality standards.

Margin of Safety

A margin of safety is provided in two ways. The first way is through conservative assumptions in the efficiencies in the best management practices used in the modeling.

For a number of the practices the effectiveness in terms of pollutant control can be expressed as a range. Where a range is appropriate, the low end of the range was used. For example, control of sediment from transitional urban (construction sites) can exceed 80 percent, if practices are applied and maintained properly. However, 80 percent was used in the analysis. Similarly, the 75% projected control of sediment for development for the period 1996 to 2020 does not include maintenance of vegetated buffers and practices to encourage infiltration of urban stormwater that will be required if Wisconsin's non-agricultural nonpoint source performance standards are enacted.[2]

The second way is through implementation of additional best management practices. The primary example is the establishment of vegetative buffers along streams through programs, such as the Conservation Reserve Enhancement Program. Vegetative buffers along streams were not included in the modeling for the load allocation. In October 2001, the Conservation Reserve Enhancement Program was approved for portions of Wisconsin, including the Token Creek Watershed. Implementation of the Conservation Reserve Enhancement Program in this watershed should result in establishment of riparian vegetative buffers; resulting in 10 to 15% greater control of sediment. In addition, the Department of Natural Resources will work with the City of Sun Prairie to install additional structural best management practices to further reduce the pollutant load from existing urban areas.

Seasonal Variation

There is no seasonal variation in the sedimentation of the stream. Sediment is a "conservative" pollutant and does not degrade over time or during periods of the year. Under certain stream flow regimes, sediment is deposited and under other regimes, sediment is scoured and transported down stream. Much of the sediment in the stream tends to stay within the confines of the stream until major floods scour some of the sediment. Over time, the net result has been a build-up of sediment.

Sediment reaches Token Creek carried in rainfall and snowmelt runoff events throughout a year. However, most of the sediment enters through spring runoff and intense summer rainstorms.

Public Participation

Consistent with the Wisconsin DNR Continuing Planning Process and as required by Sections NR 120.08, Watershed Plans, and NR 121.07(1), Water Quality Management Plans, Wis. Adm. Code, there was public participation on the Lake Mendota Priority Watershed Project Plan. There were public meetings in the developmental stage of the

[2] The administrative rules for agricultural and non-agricultural performance standards and prohibitions have been approved by the Natural Resources Board. However, further Legislative review may take place prior to enactment.

plan and a public hearing was held on the Lake Mendota Priority Project Plan on March 25, 1997. Public comments were incorporated into the final plan. The plan was presented to the Land and Water Conservation Board on June 3, 1997 and approved at that time. Dane County and Sun Prairie enacted storm water management ordinances that implement the Lake Mendota Priority Watershed Plan. The load allocations in this TMDL are consistent with the Lake Mendota Priority Watershed Plan and with Dane County's storm water management ordinance.

Reasonable Assurance

Implementation of this TMDL is provided through implementation of Wisconsin's 319 management plan and, in the future, through issuance of storm water discharge permits.

In general, Wisconsin's section 319 Management Plan (approved by EPA in 2000) describes the variety of financial, technical and educational programs in the state. In addition, it describes the "back-up" enforcement authorities for nonpoint source management in Wisconsin. The primary state program described in the 319 Management Plan is the Wisconsin Nonpoint Source Water Pollution Abatement Program (Section 281.65 of the Wisconsin Statutes and Chapter NR 120 of the Wisconsin Administrative Code).

Specific to this TMDL, Token Creek is part of a larger priority watershed project, Lake Mendota Priority Lake Project. As part of a financing plan for priority watershed and priority lake projects, long-term state cost sharing and local staff funding is committed to the Lake Mendota Priority Lake Project. A copy of the plan is attached to this TMDL.

In addition, as described in the priority watershed plan, specific sites within the Token Creek Lake watershed have been designated as critical sites for enforcement under the provisions of s. 281.20 and 281.65, Wis. Stats. Landowners have three years to voluntarily enter into cost share agreements. If a landowner does not participate by the specified time, the WDNR may take enforcement action to order the installation of needed best management practices at which point cost share assistance is also reduced by 50%. No new or additional enforcement authorities are proposed under this TMDL. However, future enforcement of nonpoint source performance standards and prohibitions will likely take place in the watershed, pending approval of administrative rules.

In addition, as mentioned above in the discussion on Margin of Safety, farmers may enroll in the Conservation Reserve Enhancement Program or similar programs to establish vegetated buffers on cropland and marginal pastures.

It is also anticipated that the regulatory agricultural and non-agricultural performance standards and performance standards called for in Wisconsin Statutes will be

implemented in the Token Creek watershed. It is the stated intent in administrative rules passed by the Natural Resources Board that watersheds with impaired waters will have the highest priority for enforcement.

Sun Prairie is presently implementing storm water management practices on new development in a manner more stringent than those called for in the Dane County storm water ordinance. Sun Prairie will also come under the provisions of Ch. NR 216, Storm Water Discharge Permit Program no later than 2003. Sun Prairie has been notified of the requirement of a permit under the current provisions of NR 216. Presently, construction on sites of five or more acres is subject to the provisions of Ch. NR 216. However, no later than 2003, this threshold will be lower to 1 or more acres.

Monitoring

See attachment.

Attachments:

1. Lake Mendota Priority Watershed Surface Water Resource Appraisal Report
2. Water Resources Atlas for Token Creek
3. Nonpoint Source control Plan for the Lake Mendota Priority Watershed Project
4. Token Creek Monitoring Plan