June 26, 2009

TO: INTERESTED PARTIES

RE: Princeton Wastewater Treatment Facility Expansion

Enclosed is the Environmental Assessment Worksheet (EAW) for the proposed City of Princeton’s Wastewater Treatment Facility Expansion, Sherburne County. The EAW was prepared by the Minnesota Pollution Control Agency (MPCA) and is being distributed for a 30-day review and comment period pursuant to the Environmental Quality Board (EQB) rules. The comment period will begin the day the EAW availability notice is published in the EQB Monitor, which will likely occur in the June 29, 2009, issue.

Comments received on the EAW will be used by the MPCA in evaluating the potential for significant environmental effects from this project and deciding on the need for an Environmental Impact Statement (EIS). Written comments on the EAW should be submitted to Nancy Drach and will be accepted until 4:30 p.m. on July 29, 2009.

A final decision on the need for an EIS will be made by the MPCA Commissioner after the end of the comment period. If a request for an EIS is received during the comment period, or if the Commissioner recommends the preparation of an EIS, the MPCA Citizens’ Board (Board) will make the final decision. The final EIS need decision will also be made by the Board if so requested by the project proposer, other interested parties or MPCA staff and if this request is agreed to by one or more members of the Board or the MPCA Commissioner. The Board meets once a month, usually the fourth Tuesday of each month, at the MPCA office in St. Paul. Meetings are open to the public and interested persons may offer testimony on Board agenda items. A listing of Board members is available on request by calling 651-296-7306.

Please note that comment letters submitted to the MPCA do become public documents and will be part of the official public record for this project.

If you have any questions on the EAW, please contact Nancy Drach at 651-757-2317.

Sincerely,

Craig Affeldt
Supervisor, Environmental Review Unit
St. Paul Office
Regional Division

CA: mbo

Enclosure
**ENVIRONMENTAL ASSESSMENT WORKSHEET**

**Note to reviewers:** The Environmental Assessment Worksheet (EAW) provides information about a project that may have the potential for significant environmental effects. This EAW was prepared by the Minnesota Pollution Control Agency (MPCA), acting as the Responsible Governmental Unit (RGU), to determine whether an Environmental Impact Statement (EIS) should be prepared. The project proposer supplied reasonably accessible data for, but did not complete the final worksheet. Comments on the EAW must be submitted to the MPCA during the 30-day comment period which begins with notice of the availability of the EAW in the Minnesota Environmental Quality Board (EQB) Monitor. Comments on the EAW should address the accuracy and completeness of information, potential impacts that are reasonably expected to occur that warrant further investigation, and the need for an EIS. A copy of the EAW may be obtained from the MPCA by calling 651-757-2101. An electronic version of the completed EAW is available at the MPCA Web site http://www.pca.state.mn.us/news/eaw/index.html#open-eaw.

1. **Project Title:** Princeton Wastewater Treatment Facility Expansion

2. **Proposer:** City of Princeton
   
   **Contact Person** Mark Karnowski
   **and Title** City Administrator

   **Address** 702 2nd Street North
   **Phone** 763-389-2040
   **Fax** 763-389-0993
   **E-mail** mark@princetonmn.org

3. **RGU:** Minnesota Pollution Control Agency
   
   **Contact Person** Nancy Drach
   **and Title** Project Manager

   **Address** 520 Lafayette Road North
   **Phone** 651-757-2317
   **Fax** 651-297-2343
   **E-mail** nancy.drach@pca.state.mn.us

4. **Reason for EAW Preparation:**
   
<table>
<thead>
<tr>
<th>EIS Scoping</th>
<th>Mandatory EAW</th>
<th>Citizen Petition</th>
<th>RGU Discretion</th>
<th>Proposer Volunteered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   If EAW or EIS is mandatory give EQB rule category subpart number and name: Minn. R. pt. 4410.4300, subp 18.B. Wastewater Systems

5. **Project Location:**
   
   **County** Sherburne
   **City/Twp** Princeton

   **NW 1/4** NW **1/4**
   **Section** 3
   **Township** 35 North
   **Range** 26 West

   **GPS Coordinates:** N
   **W**

   **Tax Parcel Number**
**6. Description:**

**a. Provide a project summary of 50 words or less to be published in the EQB Monitor.**

The city of Princeton (City or Proposer) is proposing to expand their existing wastewater treatment facility (WWTF) and add a discharge pipe to discharge treated effluent to the Rum River. The City’s existing WWTF is a mechanical treatment plant, designed for an influent average wet weather design flow (AWWF) of 0.635 million gallons per day (mgd), that discharges to seepage pond cells. The City proposes to construct additional treatment units, including filtration that would treat a 30-day AWWF of 1.905 mgd. The treated wastewater will be required to meet restrictive effluent limits, including a 0.3 milligrams per liter (mg/L) total phosphorus level from May through September.

**b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.**

The City is proposing to expand and upgrade its existing WWTF to provide additional wastewater treatment capacity to serve growth in the community.

The existing WWTF and the proposed expansion are shown in Figures 1, 2, and 3.

The AWWF of the existing WWTF is 0.635 mgd AWWF. The treated effluent is currently discharged to two seepage ponds at the location. There is no discharge to surface waters from the existing WWTF.

The AWWF capacity of the expanded facility would be 1.905 mgd. The treated effluent would be discharged to the Rum River, which is designated as a restricted Outstanding Resource Value Water (ORVW-R).

**Existing Facility Description**

The existing WWTF is an activated sludge plant that consists of three fine static screens, a splitter structure, two anaerobic selector tanks, flow splitter structures, two anaerobic selector tanks, two oxidation ditches, a diversion structure, two final clarifiers, and two aerated sludge storage tanks.

The treated effluent is discharged to two seepage ponds where the effluent seeps down through soil and mixes with groundwater. The first pond is 46 acres and the second pond is approximately 20 acres.
The existing WWTF is designed to treat an AWWF of 0.635 mgd per day with a five-day carbonaceous biochemical oxygen demand (CBOD₅) strength of 206 mg/L.

The existing WWTF includes recently constructed plant improvements for biological and chemical phosphorus removal. The new construction includes a chemical feed building with chemical storage tanks, pumps and piping, two anaerobic selector basins for biological phosphorus removal, influent/effluent flow splitter structures, modifications to the existing oxidation ditches for biological phosphorus removal and related mechanical, electrical and instrumentation/control work. This construction did not change the design flow of the WWTF, or the final disposal of effluent in the seepage ponds. These upgrades were completed May 31, 2009.

Biosolids are land applied.

**Proposed Expansion/Upgrade of WWTF**

The proposed project will include the following elements:

- The main pump lift station will be upgraded by adding variable frequency drives (VFDs). Dependent on funding and development, the main pump lift station will also be rebuilt to increase pumping capacity to the same design flow level as the WWTF. This would occur at the same time as the other construction and installation, or within five years. A new polyvinyl chloride forcemain will be added from the main pump station to the WWTF.

- The static screen process will be improved by installing a screen element washer and heat system to remove grease, as well as installation of a conveying auger to a screenings compactor.

- Two additional oxidation ditches will be constructed to handle additional wastewater flow and pollutant loading, as well as to provide redundancy.

- Two additional clarifiers will be constructed to handle additional wastewater flow and pollutant loading, as well as to provide redundancy.

- Modifications and additions will be made to the existing splitter structures in front of the oxidation ditches, and also in front of the clarifiers in order to accommodate the new oxidation ditches and clarifiers.

- Dry-pit pumps with VFD motors will be installed for return activated sludge and waste activated sludge pumping.

- An effluent filtration system will be constructed, and will be followed by ultra-violet (UV) disinfection along with flow metering, and effluent sampling equipment.
- A 21-inch diameter discharge pipe will be installed to convey treated effluent after filtration and UV disinfection. The discharge pipe will extend 1,200 linear feet from the WWTF to the Rum River. A riprapped outlet will be constructed at the proposed discharge point at the Rum River.

- Biosolids storage components would be modified and added, including conversion of the existing biosolids storage tanks to aerobic digestors and the addition of reed beds to store the biosolids. Biosolids would be stored in the reed beds for up to seven years, and then removed, trucked off-site and land applied at MPCA-approved sites.

- The existing seepage ponds will be decommissioned by having the biosolids removed and disposed of in accordance with Minn. R. 7041, and properly abandoning pipes and structures. The area of the secondary pond used for part of the new treatment components and a new stormwater pond.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of the proposed Project is to provide wastewater treatment service to both existing and potential new development in the City. The City’s existing WWTF continues to consistently meet effluent limitations in the issued State Disposal System (SDS) Permit No. MN0024538 for the WWTF; however, influent wastewater flows to the mechanical portion of the WWTF are approaching design treatment capacity. Groundwater monitoring at the existing WWTF has indicated increasing levels of ammonia and nitrates in groundwater in the vicinity of the seepage basins. Groundwater flow modeling by the City has predicted that the required separation distances between the ponds and the groundwater, necessary to be protective of the groundwater, cannot be maintained at existing or proposed design flows. Beneficiaries of the proposed Project include: current and future residents of the city; township residents with noncompliant septic systems; current and future residential developments located in areas that do not have suitable soil and groundwater conditions for community onsite septic systems; and current/future commercial users in the city. The City’s Comprehensive Land Use Plan (Comp. Plan), updated in early 2009, identified several growth areas in and close to the City. In particular, there is a new development area on the southeast side of Princeton that includes Baldwin Township that has begun an annexation process. Another new development area just north of the City that includes Princeton Township, has a high potential for near future development of this area based on development proposals. The Comp. Plan also prohibits installation of new onsite sewer systems unless a severe hardship exists, because of poor soils and high water table conditions in the area. The WWTF expansion/upgrade will enable the construction of residential, commercial, and light industrial development on land that is currently agricultural or open space.

d. Are future stages of this development including development on any other property planned or likely to happen? ☑ Yes ☐ No

If yes, briefly describe future stages, relationship to present project, time line and plans for environmental review.

New developments within the City’s planning area will require a separate EAW, with the City as the RGU, in accordance with Minn. R. 4410.4300, subp. 19, for new residential development. A trunk sewer for future developments may require a separate EAW with the MPCA as the RGU, in accordance with Minn. R. 4410.4300, subp. 18a.
e. **Is this project a subsequent stage of an earlier project?** ☒ Yes  ☐ No

If yes, briefly describe the past development, time line and any past environmental review.

The City initially constructed a two-cell stabilization pond system in 1961, with 69 acres divided into one primary and one secondary treatment cell. Although designed for a surface water discharge from the secondary cell to the Rum River, there has never been a discharge directly to the Rum River, as the seepage flow rate in the secondary seepage cell exceeds wastewater influent rates. Environmental review was completed in 1994 for the mechanical treatment system that was constructed in 1995. In 2003, a project proposal similar to the one in this EAW, went through the environmental review process and MPCA issued a National Pollutant Discharge Elimination system (NPDES)/SDS Permit for the proposed WWTF. The permit was challenged in court and the Minnesota Court of Appeals subsequently remanded the permit to the MPCA for further analyses under the MPCA’s nondegradation rule, Minn. R. 7050.0180. The Court required additional review of decentralized sewage treatment and associated downsizing of the proposed centralized treatment facility as a potential feasible and prudent alternative to discharge to the Rum River, and development of baseline water quality information for the reach of the Rum River affected by the proposed discharge. These analyses have now been completed.

7. **Project Magnitude Data**

<table>
<thead>
<tr>
<th>Total Project Area (acres)</th>
<th>14.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>or Length (miles)</td>
<td>2,400 feet of discharge pipe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Residential Units:</th>
<th>Unattached</th>
<th>N/A</th>
<th>Attached</th>
<th>N/A</th>
<th>Maximum Units Per Building:</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Commercial/Industrial/Institutional Building Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(gross floor space):</td>
<td>Total Square Feet: 800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicate area of specific uses (in square feet):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
</tr>
<tr>
<td>Retail</td>
</tr>
<tr>
<td>Warehouse</td>
</tr>
<tr>
<td>Light Industrial</td>
</tr>
<tr>
<td>Other Commercial (specify)</td>
</tr>
<tr>
<td>Building height</td>
</tr>
<tr>
<td>If over 2 stories, compare to heights of nearby buildings</td>
</tr>
</tbody>
</table>

The total project area is approximately 14.9 acres, including installation of the discharge pipe (3.0 to 3.5 acres), two new oxidation ditches, two new clarifiers, lift station modifications, sludge storage facility, UV disinfection and filtration buildings, and modifications to seepage cell number 2 to remove and replace soils with compacted soils suitable to support WWTF structures, and to construct a permanent stormwater pond (11.4 acres).
8. Permits and approvals required. List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans, and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minn. R. 4410.3100.

<table>
<thead>
<tr>
<th>Unit of Government</th>
<th>Type of Application</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Army Corps of Engineers</td>
<td>Section 404 General Permit/Letter of Permission</td>
<td>To be submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>Nondegradation Review</td>
<td>Submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>WWTF Facility Plan Preliminary Approval</td>
<td>Submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>NPDES/SDS Wastewater Permit</td>
<td>Submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>NPDES/SDS Construction Storm Water Permit</td>
<td>To be submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>WWTF Plans and Specifications</td>
<td>To be submitted</td>
</tr>
<tr>
<td>DNR Division of Waters</td>
<td>Dewatering Permit</td>
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<tr>
<td>DNR Division of Waters</td>
<td>Public Waters Work Permit</td>
<td>To be submitted</td>
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<tr>
<td>Sherburne County</td>
<td>Shoreland Alteration Permit</td>
<td>To be submitted</td>
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<tr>
<td>Sherburne County</td>
<td>Certificate of Wetland Exemption</td>
<td>To be submitted</td>
</tr>
<tr>
<td>Sherburne County</td>
<td>Conditional Use Permit</td>
<td>To be submitted</td>
</tr>
</tbody>
</table>

9. Land use. Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

A WWTF for the City has been located at the proposed project site since 1961; first as a stabilization pond system, then in 1995, a mechanical treatment system with seepage basins. The area immediately north of the site is a golf course. A wetland is located west of the WWTF and the Rum River is located east of the site. Area immediately to the south of the project site is farmland. There are also residential homes located approximately 600 to 800 feet south of the existing seepage ponds. The proposed project will not interfere with any nearby land use.

The City will remove and appropriately dispose of any biosolids in the seepage ponds. There are no known potential environmental hazards due to past site uses, and the project is not known to be near hazardous liquid or gas pipelines.

10. Cover Types. Estimate the acreage of the site with each of the following cover types before and after development:

<table>
<thead>
<tr>
<th>Types 1-8 wetlands</th>
<th>Before</th>
<th>After</th>
<th>Lawn/landscaping</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.5</td>
<td>3.5</td>
<td>Impervious Surfaces</td>
<td>2.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Wooded/forest</td>
<td>0</td>
<td>0</td>
<td>Stormwater pond</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Brush/grassland</td>
<td>0</td>
<td>0</td>
<td>Other (describe)</td>
<td>8.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Cropland</td>
<td>0</td>
<td>0</td>
<td></td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>14.9</td>
<td>14.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Secondary seepage cell
2. WWTF tank areas
3. Reed beds for biosolids
If before and after totals are not equal, explain why.

Not applicable.

11. Fish, Wildlife, and Ecologically Sensitive Resources.

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

There is a variety of wildlife in the area. The site has been used since 1961 for the City’s WWTF. In the area of the current WWTF, where the process structures are to be added, no ecologically sensitive resources are present.

The discharge pipe would be installed east of the WWTF and extend to the Rum River. The area consists of floodplain and wetland. A maximum of 3.5 acres of wetland would be temporarily affected by the installation of the discharge pipe in the area that would make the least disturbance as possible to any wildlife or ecologically sensitive resources. Any area disturbed would be restored to a preexisting condition when pipe installation is complete.

Short-term impacts on wildlife include the disruptive effects of construction, including noise. Smaller species may be deprived of their territories within the project area and forced to relocate and compete with other individuals of their species. Larger species may be forced to relocate portions of their territories that are not impacted. Seasonal activities such as nesting or mating may be disrupted or curtailed, depending on season of construction and the species in question.

Any construction activities within wetlands would be undertaken in such a way as to avoid adversely impacting the wildlife resources and habitats near the area. Wetland vegetation would be stripped off the surface and stored on geotextile mats nearby. Once the utility trench was opened, dewatering would occur within the controlled area of construction. Bedding material placed beneath the sewer pipe would be clean, granular soils free of organic materials. Any impacts caused by trenching or dewatering would be temporary. Once construction within the wetlands is completed, the trench would be backfilled and segregated wetland vegetation would be replaced over the disturbed areas prior to proceeding with the next segment of construction. Upon completion of the project, impacts to vegetation and groundwater elevations would cease. No long-term impacts to wetlands are expected.

Long-term impacts on area wildlife due to secondary development enabled by the WWTF expansion would be more expansive. The project is being constructed to enable residential, commercial, and other development within the service area in accordance with long-range regional plans and local comprehensive plans. With increased suburbanization of the service area, both the diversity and the populations of species would likely decline. Remnant populations of existing wildlife may also be isolated from other populations, and normal migration patterns would be disrupted. Mammals, reptiles, and amphibians will be killed by increased traffic or forced to relocate by habitat alteration. Ultimately, indigenous wildlife throughout the service area will be replaced by wildlife more typical of residential areas.
b. **Are any state (endangered or threatened) species, rare plant communities or other sensitive ecological resources on or near the site?** ☑ Yes ☐ No

**If yes, describe the resource and how it would be affected by the project.**

The proposed site for treatment process structures is currently used for a mechanical WWTF and effluent seepage pond. The process equipment would be constructed next to the existing process equipment. The new discharge pipe would be installed east of the WWTF and extend to the Rum River. The area consists of flood plain and wetlands. The DNR Nongame Wildlife and Natural Heritage Program were contacted in 1994 for the current WWTF. The past review determined that there were no known occurrences of rare species or natural communities at the site where construction occurred in 1995. No rare plant or animal species should be encountered during the construction of new process structures next to the existing structures.

The proposed project was recently resubmitted for review to the DNR Natural Heritage and Nongame Research Program to determine if any rare plant or animal species are known to occur in the area of the proposed discharge pipe. The request was a review of a larger area than was studied in 1994 because of the proposed discharge pipe. Based on results of the new review (Attachment 6), there are two known occurrences of one rare species and one natural community in the one-mile radius of the area requested to be reviewed.

**Blanding’s Turtle:** The two known occurrences involve a state-listed threatened species, Blanding’s Turtle (Emydoidea blandingii). A species is ranked as threatened if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Threatened species are protected under the Federal Endangered Species Preservation Act of 1973, as amended in 1978, 1982, and 1988; Minn. Stat. § 84.0895, Minn. R. ch. 6134, and the *County Plan*. Based on available information, the nearest Blanding’s Turtle sighting was over one mile away from the proposed project area. While the construction of the proposed WWTF expansion is not expected to adversely impact the population of Blanding’s Turtle, development enabled by the project may ultimately impact the species.

The preferred habitat of the Blanding’s Turtle includes calm, shallow water, rich, aquatic vegetation, and sand uplands for nesting. These turtles typically over-winter in lakes, and spend spring and summer in shallower wetlands. Studies in Michigan and Massachusetts have shown that nesting females may travel considerable distances (200 to 400 meters) to a nesting area, passing enroute what appears to be suitable nesting habitats immediately adjacent to the marsh in which they reside (Coffin and Pfannmuller, 1988).

Blanding’s Turtles need both wetland and upland habitat to complete their life cycle. The loss of wetland habitat through drainage or flooding to convert wetlands into ponds or lakes, loss of upland habitat through development or conversion to agriculture, human disturbances (including collection for pet trade and road kills during seasonal movements), and increases in predator populations (skunks, raccoons, etc.) that prey on nests and young, all contribute to decline in this species.

In long-lived species, protecting the adults is critical to any conservation strategy. A female turtle may produce as many as 500 eggs during her life. Losing many of these long-lived females through habitat loss or direct mortality will seriously jeopardize the ability of a population to maintain itself. One of the potential threats is mortality while crossing roadways.
Roadway design and large culverts or tunnels may provide an alternative route for turtles, but requires further evaluation to refine design and effectiveness.

The long-term impact of induced development will further impact the population of Blanding’s Turtle in the service area. Increased development may result in destruction of suitable habitat and greater interferences with natural migration of the species. As a result, the population of this species is likely to decline within the service area.

**Floodplain Forest:** A Floodplain Forest Natural Community is located along the west bank of the Rum River in the proposed project vicinity. The Minnesota County Biological Survey Program identified the site as a “Site of Biodiversity Significance.” The preservation of the remaining Minnesota forested land is necessary for the preservation of biodiversity in the state.

Describe any measures that will be taken to minimize or avoid adverse impacts. Provide the license agreement number (LA-___________) and/or Division of Ecological Resources contact number (ERDB________________) from which the data were obtained and attach the response letter from the DNR Division of Ecological Resources. Indicate if any additional survey work has been conducted within the site and describe the results.

Correspondence #ERDB 20090477, dated February 20, 2009 (Figure 6).

The project site is not considered an area known to be of statewide importance to Blanding’s Turtles. Even so, a fact sheet will be distributed to all contractors working at the projects site to give information about what to do with a Blanding’s Turtle should one be encountered, and the contractors will be asked to check trenches prior to backfilling, and remove and relocate any Blanding’s Turtles, if found.

In order to protect the Floodplain Forest Natural Community located along the west bank of the Rum River, the location and design of discharge pipe to the Rum River will be done to ensure that impacts will be avoided to the forest community.

12. **Physical Impacts on Water Resources.** Will the project involve the physical or hydrologic alteration (dredging, filling, stream diversion, outfall structure, diking, and impoundment) of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☑ Yes ☐ No

*If yes, identify water resource affected and give the DNR Public Waters Inventory (PWI) number(s) if the water resources affected are on the PWI. ____________ Rum River ____________*

Describe alternatives considered and proposed mitigation measures to minimize impacts.

**Stormwater**

Construction and installation of the project components for the expanded WWTF will be done within the area of the existing secondary pond.

An outfall structure will be constructed on the bank of the Rum River. The outfall structure is not expected to alter the course or channel cross-section, and the river bank will be stabilized with riprap. While constructing the outfall pipe, measures will be used to minimize disturbance of the river bank. These will include keeping the disturbed area as small as possible, stabilizing the slope using a fiber blanket and seeding, and controlling erosion with silt fence, bio-rolls, and a floating silt curtain. The outfall is designed to minimize the physical disturbance of the construction and long-term visual impacts. A Sherburne County Shoreland Alteration Permit application will be
required for the construction of the outfall, and a Public Waters Permit from the DNR will be required for construction of the outfall structure if it occurs below the ordinary high water mark on the Rum River.

As the Rum River is classified as An ORVW-R, it is considered special waters of the state, and special provisions and best management practices (BMPs) will be required as part of the MPCA Construction Stormwater Permit for the project to ensure that stormwater runoff from trenching and excavation is minimized. The areas disturbed will be returned to grade to prevent any ponding where trenching occurred.

Temporary Wetlands Impacts
The project will require the crossing of less than one acre of wetlands to construct the 1,200-foot sewer pipe, which will be located below ground. Wetlands were avoided to the extent practical in the design and location of outfall pipe. A geotechnical evaluation of the area will determine whether the work will be done using an “open-cut or directional method. The wetlands will be restored to match pre-construction grades and revegetated following construction of the pipe. To minimize wetland impacts, construction BMPs will be implemented in accordance with the required project erosion control plan. The erosion control plan will provide specific BMP measures as well as construction phasing, vehicle tracking and installation/inspection schedule. Silt fencing will be used to prevent sediments from entering ditches or wetlands. Phased construction will be used to minimize the amount of area disturbed at any one time and restoration will be completed within 14 days of completion of construction in the immediate area. A Sherburne County Certificate of Wetland exemption, as well as a Section 404 General Permit/Letter of Permission from the U.S. Army Corps of Engineers will be required for the work.

Development enabled by the project will be subject to the Wetland Conservation Act rules for wetland replacement, as well as other permits and approvals required from watershed organizations and/or the DNR. Potential wetland or other surface-water impacts associated with future development in the area will be addressed during the planning and permitting processes of the township, city, or county in which the development is proposed.

13. Water Use. Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)? ☒ Yes ☐ No

If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

The City proposes to abandon groundwater monitoring wells associated with the seepage ponds once the WWTF expansion is completed. The groundwater monitoring wells will no longer be necessary because discharge to the seepage ponds and any associated impact to the groundwater will be eliminated once the discharge pipe to the Rum River is operational.
Normal groundwater elevation is at or very near to the ground surface; therefore, groundwater dewatering will be necessary when constructing the new units. A DNR temporary water appropriation permit will be required. No groundwater impact is expected because of the high rates of recharge present.

14. **Water-related land use management districts. Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district?** ☑ Yes ☐ No

*If yes, identify the district and discuss project compatibility with district land use restrictions.*

The proposed project site lies in the 100-year floodplain of the Rum River. The tops of the dikes of the existing seepage ponds are above the 100-year flood elevation (960.8 feet). The WWTF constructed in 1995 was constructed on a two-acre area filled to an elevation ten feet above the existing secondary pond bottom. All of the existing structures at the WWTF have elevations at or above 964.0 feet. The proposed upgrades are to be built adjacent to existing structures and would have similar elevations as the existing structures, and be located at least two feet above the 100-year flood plain.

15. **Water Surface Use. Will the project change the number or type of watercraft on any water body?** ☐ Yes ☑ No

*If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.*

Not applicable.

16. **Erosion and Sedimentation. Give the acreage to be graded or excavated and the cubic yards of soil to be moved:**  
   19 acres; 17,000 cubic yards. *Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.*

No steep slopes or highly erodible soils are anticipated to be encountered. The site is relatively flat. The maximum slope and distance between the WWTF site and the banks of the Rum River is approximately ten feet over a distance of approximately 1,000 feet.

The areas disturbed by pipe installation would be restored to the pre-construction conditions. A stormwater pollution prevention plan will be developed as part of the design and will be incorporated into the project drawings and specifications, and also becomes incorporated as an enforceable part of the NPDES/SDS Construction Stormwater Permit required for the project. This plan will be required to include site-appropriate BMPs to be used during the construction of the facility to minimize erosion. Temporary erosion control measures, such as silt fences and rock check dams, would be utilized to prevent runoff and sedimentation.

The change in quantity and quality of site runoff before and after the construction of the expanded treatment system would be minimal. In accordance with the NPDES/SDS Permit requirements, biosolids remaining in the two seepage ponds will be removed, and the piping and structures for the seepage ponds will be properly abandoned. A permanent stormwater pond will be constructed within the boundary of the secondary seepage basin, and designed to handle increased stormwater runoff from the site as required by regulations.
17. Water Quality – Surface-water Runoff.
   
a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.

   There will be a negligible increase in the quantity of runoff from the site after construction due to the permanent stormwater pond constructed in the area for the site. The quality of runoff should not be changed. The WWTF expansion, as well as a permanent stormwater pond will be constructed within the area of the existing secondary cell. After construction is completed, turf would be reestablished immediately. Stormwater runoff at the site will be directed to the stormwater pond.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

   The WWTF expansion and permanent stormwater pond will be constructed within the area of the existing secondary cell. Stormwater pond discharge would be on land within the remaining area of the existing cell, and would seep into the ground. There will not be stormwater runoff directly going to a surface water.


   a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

   The wastewater to be treated at the WWTF will consist of typical domestic strength wastewater from the City. No major industrial process wastewaters are produced or treated at the site. Two industrial users have agreements with the City that limit volume and quality of wastewaters. The sewage treated at the site is normal domestic sewage within the following design loading characteristics:

   \[
   \text{Biochemical Oxygen Demand (CBOD}_5\text{)} = 3,995 \text{ pounds (lbs)/day} \\
   \text{Total Suspended Solids (TSS)} = 4,186 \text{ lbs/day}
   \]

   The wastewater design flow rates are as follows:

   \[
   \text{AWWF} \quad \text{1.905 mgd} \\
   \text{ADF} \quad \text{1.635 mgd}
   \]
b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies (identifying any impaired waters), and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

The existing WWTF is a mechanical WWTF that includes intake filter screens for the raw wastewater, two anaerobic selector tanks, two oxidation ditches with biological phosphorus treatment, two final clarifiers, chemical addition for additional phosphorus removal, anaerobic selector tanks, and two seepage basins.

The proposed project will expand the existing WWTF by adding two oxidation ditches and two additional clarifiers to handle additional wastewater flows and loadings, effluent filtration, ultraviolet disinfection and a discharge pipe to continuously discharge treated effluent to the Rum River, east of the WWTF. The receiving water has been assigned use classifications of 2B, 3C, 4A, 4B, 5, and 6 under Minn. R. ch. 7050.0470, subp. 4. The multiple classifications include considerations for aquatic life and recreation, industrial consumption, agriculture and wildlife, aesthetics and navigation, and other beneficial uses not specifically listed.

Nondegradation Review - Alternatives
The Rum River, from the State Highway 27 bridge in Onamia to Madison and Rice Streets in Anoka, is also designated as a restricted Outstanding Resource Value Water (ORVW-R) under Minn. R. 7050.0180, subps. 6 (D) and 6a (G.). This designation, which originates from the DNR’s designation in Minn. R. 6105.1430, recognizes the scenic qualities of the Rum River. This scenic reach includes the discharge point of the City’s proposed discharge.

Because this is a proposed new discharge to a restricted ORVW, a nondegradation review was required under Minn. R. 7050.0180, and has been completed. A nondegradation analysis considers information on the impact of the discharge on the receiving water, the characteristics of the receiving water, economic and social impacts of the project, cumulative impacts of all new or expanded discharges on the receiving water, and alternatives to the project.

The MPCA’s nondegradation rule prohibits any new discharge to an ORVW-R unless there is not a feasible and prudent alternative to the discharge. A prudent and feasible alternatives analysis is included in the MPCA’s nondegradation review. The City had previously conducted a prudent and feasible alternative analysis when it proposed this project (minus the filters) in 2002/2003. The analysis included technical, economic, and environmental analysis for the following alternatives:

- holding tanks with transport to a permitted system;
- pipeline conveyance to a permitted treatment system;
- land application systems including (as applicable) spray irrigation and mound systems;
- discharging to an alternative receiving water not designated as an ORVW-R;
- a downsized system using individual septic systems or cluster systems and/or implementation of water conservation practices;
- trading wastewater capacity with an existing permitted system within the same area, including trades between point and nonpoint sources; and
- an upgrade of the existing WWTF, but freezing the mass loading (not applicable as there is no surface water discharge from the existing WWTF).
The Minnesota Court of Appeals remanded the NPDES/SDS Permit, issued in 2003, for the proposal back to MPCA, directing that additional review be done of decentralized sewage treatment and associated downsizing of the proposed WWTF as a potential feasible and prudent alternative to discharge to the Rum River. At the same time, the Court of Appeals also directed the MPCA to develop and document baseline water quality information for the reach of the Rum River affected by the proposed discharge. To meet this goal, the City conducted river monitoring from August 2005 to June 2006 at the Minnesota Highway 95 Bridge. The bridge is located upstream of the site of the proposed discharge. The data is presented in Part A of Figure 7.

When the City resubmitted the proposed Project to the MPCA, it did so by supplementing the original analysis. To be consistent with the Minnesota Court of Appeals directive, the City provided additional analysis of decentralized sewage treatment and downsizing of the proposed WWTF.

The City’s analysis stated that neither decentralization nor downsizing the proposed WWTF are feasible and prudent alternatives for the following reasons: geologic sensitivity, increased risk of groundwater contamination from cluster systems, management limitations, and high operational and maintenance costs for decentralized/cluster systems. The advanced treatment and compliance capabilities of the proposed WWTF, with the addition of filters, represents a superior alternative with regards to environmental, technical, and economic considerations.

MPCA staff reviewed all submitted information regarding alternatives. MPCA staff has concluded that it concurs with the City that there is no prudent and feasible alternative to the proposed discharge to the Rum River.

Since the MPCA determined that there is not a feasible and prudent alternative to the proposed discharge to the Rum River, the MPCA must “restrict the discharge to the extent necessary to preserve the existing high quality, or to preserve the wilderness, scientific, recreational, or other special characteristics that make the water an outstanding resource value water,” Minn. R. 7050.0180, subp. 6.

**Nondegradation Review – Water Quality and Development of Effluent Limits**

The MPCA’s nondegradation review of the proposed new discharge also evaluated the baseline water quality of the affected reach of the Rum River. The baseline data are shown in Part A of Figure 7, and the baseline evaluation is summarized in Part B, C, and E of Figure 7 for carbonaceous biological oxygen demand (CBOD₅) and ammonia, phosphorus, and mercury, respectively.

Part B includes a summary of the water quality modeling work done to define effluent limits that would protect in-stream dissolved oxygen and prevent ammonia toxicity. “Worst case” mass balance analyses were conducted for CBOD₅, TSS, dissolved oxygen, and phosphorus to demonstrate that the maximum expected concentrations would not have an adverse impact on water quality at the point of discharge under low flow conditions in the river.

The March 17, 2009, MPCA staff memorandum titled, “City of Princeton Waste Water Treatment Plant (WWTP) Phosphorus Effluent Limit Review” (Part C in Figure 7) details how the baseline water quality evaluation was used to set effluent limits for phosphorus that are necessary to preserve the existing high quality of the receiving water. The MPCA proposes to set an effluent limit for total phosphorus of 0.3 mg/L as a low-flow, monthly average limit.
from May to September every year (mass load of 329 kilograms (kg) during the five month period), and 1.0 mg/L monthly average limit from October through April every year (1,533 kg mass load during the seven month period). These limits will be sufficient to maintain the existing water quality and designated water uses in the Rum River.

The restricted ORVW reach of the Rum River that includes the proposed discharge point is listed as impaired because of a fish consumption advisory due to excessive mercury in fish tissue. This fish advisory reach runs from the headwaters at the Mille Lacs Lake outlet to Rice Street in Anoka near the confluence with the Mississippi River. Parts D1 and D2 reflect the MPCA “Sources of Mercury Fact Sheet” and the MPCA Statewide Mercury Total Maximum Daily Load (TMDL) Plan, respectively.

Although most mercury getting into fish is from atmospheric sources, some wastewater discharges can include locally high concentrations. In the April 2, 2009, Toxics Review (Part E of Figure 7), the MPCA proposes a mass effluent limit for mercury for the WWTF of 28.1 mg/day. This limit takes into account the MPCA’s baseline water quality evaluation for the affected reach of the Rum River and is more restrictive than a water quality based effluent limit derived under the approved statewide mercury TMDL. The WWTF will also be subject to a reduced TSS limit of 10 mg/L calendar month average to further assure mercury concentrations are minimized to the extent possible for a new discharge to the restricted ORVW. The City must also implement a mercury pollutant minimization program. The proposed mercury and TSS effluent limits will assure that the new discharge does not contribute to further mercury impairment of the Rum River or of the Mississippi River downstream of the Rum River.

Downstream of the Rum River, the Mississippi River has impairments from other pollutants at several stretches of the river, including polychlorinated byphenyls, turbidity, and perfluorooctane sulfonic acid (PFOS). However, the proposed Princeton WWTF is not expected to contribute to any of these existing impairments. In addition, downstream portions of the Mississippi River (Lake Pepin) are impaired for excess nutrients. No TMDL has yet been adopted for sources of nutrients in Lake the Lake Pepin watershed.

The treatment capabilities of the proposed Project, along with MPCA-assigned site-specific seasonal effluent limits for phosphorus are is expected to preserve the existing water quality of the Rum River from excessive growth of photosynthetic aquatic life. However, the City has also entered into a pre-TMDL trading agreement with Metropolitan Council Environmental Services (MCES) to offset its permitted load of phosphorus to Lake Pepin, until completion of the Lake Pepin nutrient TMDL. In addition to offsetting its permitted phosphorus load, the City is required by its agreement with MCES to implement reductions of nonpoint sources of phosphorus in the Rum River watershed. Once the Lake Pepin nutrient TMDL is completed, a waste load allocation will be applied to the City’s WWTF, and additional controls or limits on the discharge of phosphorus may be required at the WWTF to achieve water quality goals in Lake Pepin.

The City will also be required to conduct toxics monitoring for priority pollutant monitoring, including chronic whole effluent toxicity testing, on the discharge of treated effluent from the WWTF.

**Proposed Effluent Limitations Summary**

The proposed WWTF will be designed to meet the effluent limitations shown in the following table and any other requirements contained in the NPDES/SDS Permit. The limits on the
discharge from the WWTF are set by the MPCA, through the NPDES/SDS Permit process so that the receiving stream will meet water quality standards and preserve the existing quality of the water in the ORVW-R as provided in MPCA nondegradation requirements. Therefore, the proposed permit limits will be protective of the Rum and Mississippi River, including Lake Pepin. The NPDES/SDS Permit will also require development and implementation of a river monitoring program to document dissolved oxygen and temperature conditions both above and below the point of discharge.

<table>
<thead>
<tr>
<th>Substance or Characteristic</th>
<th>Monthly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBOD5</td>
<td></td>
</tr>
<tr>
<td>June 1 – Sep 30</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>Oct 1 - Nov 30</td>
<td>25 mg/L</td>
</tr>
<tr>
<td>Dec 1 - Mar 31</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>Apr 1 – May 31</td>
<td>25 mg/L</td>
</tr>
<tr>
<td>TSS</td>
<td>10 mg/L</td>
</tr>
<tr>
<td>Fecal Coliform</td>
<td>200 org/100 mL</td>
</tr>
<tr>
<td>(Geometric mean)</td>
<td></td>
</tr>
<tr>
<td>(April – October)</td>
<td></td>
</tr>
<tr>
<td>Ammonia-N</td>
<td></td>
</tr>
<tr>
<td>June 1 - Sep 30</td>
<td>3.0 mg/L</td>
</tr>
<tr>
<td>Oct 1 - Nov 30</td>
<td>monitor only</td>
</tr>
<tr>
<td>Dec 1 – Mar 31</td>
<td>5.0 mg/L</td>
</tr>
<tr>
<td>Apr 1 – Jun 30</td>
<td>monitor only</td>
</tr>
<tr>
<td>pH (Range)**</td>
<td>6.0-9.0*</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>5.0 mg/L</td>
</tr>
<tr>
<td>(daily minimum)</td>
<td></td>
</tr>
<tr>
<td>June 1 – September 30, Dec 1 – Mar 31</td>
<td></td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>.3 mg/L</td>
</tr>
<tr>
<td>May 1 – Sep 30</td>
<td>2.15 kilograms per day (kg/day) for a 5-month total of 329 kg</td>
</tr>
<tr>
<td>Oct 1 – April 30</td>
<td>1.0 mg/L</td>
</tr>
<tr>
<td></td>
<td>7.23 kg/day</td>
</tr>
<tr>
<td></td>
<td>for a 7-month total of 1,533 kg</td>
</tr>
<tr>
<td>Mercury</td>
<td>28.1 mg/day</td>
</tr>
</tbody>
</table>

* Ultraviolet radiation will be used for disinfection
** Standard unit

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility’s ability to handle the volume and composition of wastes, identifying any improvements necessary.

The facility is a publicly owned WWTF.
19. Geologic hazards and soil conditions.

a. Approximate depth (in feet) to 

| Ground water: | 0 minimum; 0 average. |
| Bedrock: | 150 minimum; 170 average. |

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

There are no known or expected site hazards to groundwater at the site.

b. Describe the soils on the site, giving Natural Resources Conservation Service classifications, if known. Discuss soil texture and potential for ground-water contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

The natural soil in the project area consists mainly of the Natural Resources Conservation Service category Ad (alluvial land). Alluvial land is composed of soil material deposited by flooding streams on flood plains and low terraces. The material ranges from loamy sand to silt loam. There is some potential for ground and surface water contamination associated with this type of soil. The permeability is moderate with this soil class, and the water table is generally high.

The soils in place at the WWTF site consist of silty clays put in place when the pond dikes and bottoms were constructed. Biosolids remaining in the seepage ponds will be removed, and disposed of in accordance with the requirements of Minn. R. ch. 7041. Then, remaining soils in the WWTF area will be removed and replaced with soils suitable for support of WWTF structures. Both the design of the proposed project, including treatment components housed inside buildings, and the improved site conditions will keep the risk low for waste or chemical spills to occur or to filtrate through soils and contaminate groundwater.


a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

As part of the wastewater treatment process, biosolids are produced. Currently the City land-applies biosolids using MPCA-approved methods. After the proposed WWTF is constructed, generated biosolids will be placed in reed beds for further treatment and reduction in volume. The reed beds will be cleaned every five to seven years with the biosolids to be land applied, using MPCA-approved methods in accordance with Minn. R. ch. 7041.

Screenings and grit removed during routine maintenance will be transported to the nearest available landfill for final disposal.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures
to be used to prevent them from contaminating ground water. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

There are no known toxic or hazardous materials present at the site. If any hazardous materials are found during construction, the material will be removed and disposed of according to the MPCA guidelines.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

Not applicable.

21. Traffic. Parking spaces added: 0 Existing spaces (if project involves expansion): approx. 4
Estimated total average daily traffic generated: N/A
Estimated maximum peak hour traffic generated and time of occurrence: N/A

Construction of the proposed WWTF will generate equipment and truck traffic to the site.

Only a minimal amount of traffic would be present during operation. Chemical additives used for phosphorus treatment will be periodically delivered. A sludge hauling vehicle would continue to make trips for a period in either spring or fall only during the years when the biosolids reed beds are cleaned out.

Indicate source of trip generation rates used in the estimates.

Not applicable.

If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Using the format and procedures described in the Minnesota Department of Transportation’s Traffic Impact Study Guidance (available at http://www.oim.dot.state.mn.us/access/pdfs/Chapter%205.pdf) or a similar local guidance, provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project’s impact on the regional transportation system.

Not applicable.

22. Vehicle-related Air Emissions. Estimate the effect of the project’s traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts.

During construction, there will be some additional air emissions to the area from construction equipment, though there will be no significant increase in vehicle-related air emissions once the facility is operational. Vehicle emissions associated with the construction and operations of this P-project will not have a significant effect to air quality.
23. **Stationary Source Air Emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing), any greenhouse gases (such as carbon dioxide, methane, and nitrous oxides), and ozone-depleting chemicals (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

The existing WWTF has an emergency backup generator to supply standby power in times of electrical power outages. There will be no changes or additions because of the proposed WWTF. The generator runs only on an as needed basis to operate the WWTF or pump station during a power outage. Air emissions from emergency power generation are infrequent and are not considered a significant emission source.

24. **Odors, noise and dust.** Will the project generate odors, noise or dust during construction or during operation? □ Yes □ No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

**Noise**

There will be a temporary increase in noise generated by heavy machinery during the construction of the WWTF. Contractors will be required to comply with City noise ordinances. Construction will only be allowed during daylight and normal construction hours (Monday through Saturday). Noise impacts will be temporary and will be generally confined to the immediate vicinity of the construction area.

**Dust**

Dust emissions will increase during construction. Dust impacts will be temporary and will be generally confined to the immediate vicinity of the construction area. Contractors will be required to use dust control measures (application of water to construction roads) during construction. Operation of the proposed WWTF will not create dust.

**Odor**

Mechanical treatment plants and sludge drying reed beds will produce odors during operation and use. The odors produced by the operation of the proposed expansion to the WWTF are not anticipated to be more than that of the existing system.

25. **Nearby resources.** Are any of the following resources on or in proximity to the site?

   a. Archaeological, historical, or architectural resources? □ Yes □ No
   b. Prime or unique farmlands or land within an agricultural preserve? □ Yes □ No
   c. Designated parks, recreation areas, or trails? □ Yes □ No
   d. Scenic views and vistas? □ Yes □ No
   e. Other unique resources? □ Yes □ No
If yes, describe the resource and identify any project-related impacts on the resources. Describe any measures to minimize or avoid adverse impacts.

Although there are no known archaeological, historical, or architectural resources within the proposed project area, the Minnesota Historical Society was contacted. A request was made in early 2009 for an updated database review of the area, and a search to address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR 800, Procedures of the Advisory Council on Historic Preservation for the protection of historic properties has been completed. No historic properties listed or eligible for listing on the National Register of Historic Places will be affected by this project.

The Rum River is considered a unique resource. The DNR added the Rum River to the Minnesota Wild and Scenic Rivers System in 1978. The stretch of the Rum River that includes the proposed discharge point is classified as “scenic.” On November 5, 1984, the Rum River was designated as an ORVW-R, under MPCA water quality rules. Item 18 discusses what this designation means in terms of the proposed discharge to the Rum River, and also the effluent limits necessary to protect the Rum River.

26. Visual impacts. Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☑ Yes ☐ No

If yes, explain.

27. Compatibility with plans and land use regulations. Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☑ Yes ☐ No

If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

The City’s Comprehensive Plan identifies the area of the proposed project zoned as floodplain. The zoning will not cause conflicts with this project.

28. Impact on infrastructure and public services. Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☑ Yes ☐ No

If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see EAW Guidelines for details.)

Although the construction of the project will not require additional infrastructure, the development that will be enabled by the project will. As development of the area progresses, other utilities and infrastructure, such as roadways, collector streets, collector sewers, potable water distribution systems, stormwater collection and treatment systems, schools, police and fire protection, and other urban services will be needed to service the area.
29. **Cumulative potential effects.** Minn. R. 4410.1700, subp. 7, item B requires that the RGU consider the “cumulative potential effects of related or anticipated future projects” when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative potential effects. (Such future projects would be those that are actually planned or for which a basis of expectation has been laid.) Describe the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects (or discuss each cumulative effect under appropriate item(s) elsewhere on this form).

The proposed additions to the WWTF are designed to meet the wastewater needs for the City through the design year of 2028. As noted in 6.b. and depending on funding, the City will either rebuild the main pump station to increase flow capacity concurrently with the proposed project, or in five or more years.

Further expansion of the WWTF to provide additional capacity beyond the proposed AWWF flow of 1.905 and beyond 2028 would probably occur only if the WWTF becomes a regional treatment system. Such an expansion would require additional environmental review.

**Development – Related Impacts**

Princeton’s land use ordinance and proposed expansion discourages urban sprawl that is currently occurring through adjoining townships by providing cost-effective development within Princeton’s proposed sewer service area. The availability of an expanded wastewater service area will encourage development that is consistent with the City’s adopted Comprehensive Plan. Along with increased development comes increased traffic, air pollution, stormwater runoff, and solid waste generation. As residential and commercial areas expand, the amount of farmland, open space, and wildlife habitat in the area decrease. The City will need to regularly assess and address impacts that occur due to the secondary development.

The growth and development that would be enabled by this project would cause increases in impervious surfaces in the service area. Substantial increases in impervious surfaces could result in an increase in the amount of precipitation that would runoff into surface waters. Precipitation will remove nutrients from the air as it falls. Stormwater runoff can transport these nutrients and numerous other pollutants (sediment, oil, grease, heavy metals, salt, etc.) to surface water, causing degradation of water quality and aquatic habitats. Runoff may also cause erosion as it flows over the ground, entraining phosphorus and sediment and resulting in nutrients and sediment entering surface water to the detriment of water quality.

Residential, commercial, and other types of developments will be enabled as a result of the project. This development will be substantial, and will result in a considerable increase in vehicular traffic both locally and regionally. It will be necessary for the Minnesota Department of Transportation, Mille Lacs and Sherburne Counties, and the City to plan for and provide appropriated roadways improvements and measures to mitigate traffic congestion. Vehicle emissions associated with the WWTF per se will not have a significant effect on air quality. However, residential and other development that may be enabled by the construction of wastewater conveyance capacity may result in measurable but not significant impacts. If traffic increases result locally in future deterioration in the levels of service and/or air quality violations, mitigative measures are available. They may include, but are not limited to, roadway improvements, signal installation, and provision of alternative transportation choice.
30. Other Potential Environmental Impacts. If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

No additional environmental impacts have been identified or anticipated.

31. Summary of issues. List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

No additional impacts were identified that need further investigation.

RGU CERTIFICATION.

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages, or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minn. R. 4410.0200, subps. 9b and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Name and Title of Signer: [Signature]
Craig Affeldt, Supervisor, Environmental Review Unit
St. Paul Office
Regional Division

Date: 06-24-09

The format of the Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Minnesota Department of Administration, Office of Geographic and Demographic Analysis. For additional information, worksheets or for EAW Guidelines, contact: Environmental Quality Board, 658 Cedar Street, St. Paul, Minnesota, 55155, 651-201-2492, or at their Web site http://www.eqb.state.mn.us.
Figure 1: State, County and Vicinity Maps

Projection: UTM, Zone 15, Meters
NAD83

Source: Mn/DOT, USGS, MNDNR, and SEH.
Figure 2: USGS Map Indicating Project Location

Source: Mn/DOT, USGS, MNDNR, and SEH.
Orderly Annexation process in progress

Mille Lacs County, Princeton Twp
Sherburne County, Baldwin Twp

City Water Supply Wells

Legend
- City Water Supply Wells
- Proposed Urban Service Area
- Existing City Limits/Urban Service Area
- New Development Areas under consideration
- County Boundary

New Development Areas Aerial Map
Princeton, Minnesota

FILE NO. APRINC0602.00
DATE: 03/27/2009

Figure 4
Figure 5
Surface Waters and Wetlands

Legend
- WWTF 1/2 Mile Buffer
- 100 Year Floodplain
- 2000 Municipal Boundary

NWI (Circular 39)
1. Seasonally flooded basin or flat
2. Wet meadow
3. Shallow marsh
4. Deep marsh
5. Shallow open water
6. Shrub swamp
7. Wooded swamps
8. Bogs
9. Municipal and industrial activities
10. Riverine systems

Source: Mn/DOT, USGS, MNDNR, and SEH.

Map Document: (S:\PT\P\prince\GIS\Princeton\Surface Waters.mxd)

Projection: UTM, Zone 15, Meters
NAD83
February 20, 2009

Mr. Dustin Maas
Short Elliott Hendrickson, Inc. (SEH)
3535 Vadnais Center Drive
St. Paul, MN 55110

RE: Natural Heritage information in the vicinity of the proposed City of Princeton WWTF Expansion,
T35N R26W Section 3, Sherburne County

Dear Mr. Maas,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, several rare features have been documented within the search area (for details, see the enclosed database reports). Please note that the following rare features may be impacted by the proposed project:

- Blanding’s turtles (*Emydoidea blandingii*), a state-listed threatened species, have been reported from the area and may be encountered on site. If Blanding’s turtles are found on the site, please remember that state law and rules prohibit the destruction of threatened or endangered species, except under certain prescribed conditions. If turtles are in imminent danger they should be moved by hand out of harms way, otherwise they should be left undisturbed.

For your information, I have attached a Blanding’s turtle fact sheet that describes the habitat use and life history of this species. The fact sheet also provides two lists of recommendations for avoiding and minimizing impacts to this rare turtle. Please refer to the first list of recommendations for your project. If greater protection for turtles is desired, the second list of additional recommendations can also be implemented. The attached flyer should be given to all contractors working in the area.

- The discharge pipe to the Rum River is routed through a floodplain forest native plant community (not on the enclosed reports). In general, floodplain forests in Minnesota have been heavily disturbed by drainage and conversion to agricultural land, logging, channel dredging, and dam construction. As such, the remaining floodplain forests are rare features of statewide significance. This floodplain forest is part of a larger area surrounding and including the Rum River that the Minnesota County Biological Survey (MCBS) has identified as a Site of Moderate Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as Moderate contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. (GIS shapefiles of MCBS Sites of Biodiversity Significance and MCBS Native Plant Communities can be downloaded from the DNR Data Deli at [http://deli.dnr.state.mn.us](http://deli.dnr.state.mn.us).) We encourage you to consider project alternatives that would minimize disturbance, including indirect impacts from surface runoff or the spread of invasive species, to this ecologically significant area. In addition,
the discharge should be treated to the greatest extent feasible to avoid negatively impacting the water quality of the Rum River.

- The above information, along with any proposed avoidance or mitigation measures, should be addressed in Item 11b of the project EAW.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota’s rare natural features, is maintained by the Division of Ecological Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area.

The enclosed results include an Index Report and a Detailed Report of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location information, which might result in the destruction of a rare feature, both reports are copyrighted.

The Index Report provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index report for any other purpose, please contact me to request written permission. The Detailed Report is for your personal use only as it may include specific location information that is considered nonpublic data under Minnesota Statutes, section 84.0872, subd. 2. If you wish to reprint or publish the Detailed Report for any purpose, please contact me to request written permission.

This letter does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. As noted above, additional rare features, for which we have no data, may be present in the project area. Furthermore, there may be other natural resource concerns, besides rare features, associated with the proposed project. For these concerns, please contact your DNR Regional Environmental Assessment Ecologist, Mike North at 320-255-4279 ext. 235. Please be aware that additional site assessments and review may be required.

An invoice will be mailed to you under separate cover. Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Lisa Joyal
Endangered Species Environmental Review Coordinator

enc. Rare Features Database: Index Report
Rare Features Database: Detail Report
Rare Features Database Reports: An Explanation of Fields
Fact sheets: Blanding’s Turtle

cc: Mike North
Jack Enblom
## Table 3

Rum River Monitoring by Princeton at the Minnesota Highway 95 Bridge in Princeton, Minnesota

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<th>Total Hardness as mg/L</th>
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<th>NO₂-N + NO₃-N mg/L</th>
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Note: the last pH readings seem suspect.

Figure 7

Part A
Part B

Estimated CBOD₅ and NH₃-N Impacts on the Receiving water

The adverse impact of a wastewater discharge on its receiving water cannot be zero as long as the strength of a pollutant is greater than the concentration in the receiving water. The concentration of any individual pollutant in a wastewater treatment plant’s discharge may be less than that in the receiving water, but that would not be the case for all of the pollutants present. To avoid increasing the concentration of all of over one hundred known pollutants would mean treating ORVW-Rs as if they were prohibited discharge ORVW-Ps. That is not the intent of the ORVW-R part of Minn. R. 7050.0180.

In the case of Princeton the focus is on whether the 5 mg/L minimum daily dissolved oxygen (DO) water quality standard and the 0.04 mg/L un-ionized ammonia-nitrogen (NH₃-N) standard were being protected.

Oxygen levels are impacted by the decay of both 5-day carbonaceous biochemical oxygen demand (CBOD₅) and ammonia, since as both substances decay they consume oxygen. Excessive NH₃-N concentrations can also result in ammonia toxicity under certain pH and temperature conditions.

Under Minn. R. 7053.0205, subp. 7 a stream’s water quality must be protected down to the low flow 7Q₁₀. (The low flow 7Q₁₀ is the lowest mean flow for seven consecutive days having a statistical recurrence interval of ten years.) The same rule calls for using the low flow 30Q₁₀ to calculate the ammonia-nitrogen (NH₃-N) effluent limit to protect against NH₃-N toxicity. The low flow 7Q₁₀ approximates the lowest 1 to 1.5 percentile of flows, while the corresponding value for the low flow 30Q₁₀ is the lowest 2 to 2.5 percentile.

During times of low flow in the receiving water, Princeton’s dilution factor will be low enough that a secondary (25 mg/L CBOD₅) quality can not be justified. For this discharger the seasons with the lowest dilution factors are summer and winter. Therefore a more stringent CBOD₅ effluent limit of 15 mg/L is recommended for these two seasons. To ensure that the effluent is low in oxygen consuming substances a NH₃-N effluent limit that is more stringent than that needed to protect against NH₃-N toxicity was also recommended for summer and winter.

A brief explanation of how CBOD₅ effluent levels and NH₃-N effluent limitations are linked is helpful. In terms of wastewater treatment design the degree of NH₃-N and CBOD₅ removal is linked through bacteria population growth dynamics. If too much carbonaceous “food” (represented CBOD₅) is available for the carbonaceous organisms, then the faster growing carbonaceous organisms will out-compete the nitrogenous organisms and the decay of NH₃-N will not be optimal. Due to this dynamic, in order to consistently meet a stringent (less than 3 mg/L in summer and /or less than 5 mg/L in winter) NH₃-N effluent limitation the level of CBOD₅ has to also be very low. Because of this population dynamic a more stringent NH₃-N effluent limit results in less adverse impact on the environment, since it results not only in less NH₃-N toxicity but less of an overall oxygen demand.
Historically, the real-world instances when an effluent’s strength is likely at the permit’s published limits are during times of high flow into the wastewater treatment plant. At such times the flow in the receiving water will also be high. This results in both a high dilution ratio and the effluent therefore having minimal impact on the receiving water.

Unlike conservative pollutants, CBOD₅ and NH₃-N do not persist, they decay. The resulting oxygen demand from this temperature influenced decay is especially noticeable in summer. Then the effluent’s combined oxygen demand is at its highest due to the warm summer receiving water temperatures. This DO demand is high, but short lived at summer temperatures. Summer stream studies done by the MPCA in the 1970s and 1980s showed that during times of low dilution factors the point of lowest DO in a river averages only 1.8 miles downstream of a discharge with a standard deviation of 1.3 miles.

Graphs B1 and B2 show the estimated summer impact on un-ionized NH₃-N and net oxygen demand due to different effluent levels as compared to background conditions. The impacts are shown in “bands” of values rather as lines. This was done to show the deviation inherent in the analytical tests.

At this point it is worthwhile to inject some information on how effluent limits dictate wastewater treatment plant design. Sewage treatment plants are designed to meet their published permit limits at influent flows up to their design average wet weather flow. This wet weather flow is the design intake flow that occurs when the ground is saturated with water and heavy precipitation has occurred. This condition happens more frequently near the end of the treatment plant’s design life. With normal growth rates this event usually occurs twenty to thirty years into the future. The consequence of designing to meet this wet weather permit requirement results in the actual effluent being better than the published permit conditions during times of low dilution in the receiving water and during most of the facility’s life. This is because lower flow entering the treatment plant translates into more retention time in the treatment units to promote both decay and settling, along with additional aeration capacity used to maintain healthy biological conditions.

These graphs predict receiving water conditions not at the start-up of the proposed wastewater treatment plant, but at the end of the proposed wastewater treatment plant’s design life. At that future time the influent flow has increased to its design average dry weather flow.

These graphs show worst case conditions for 7.1 mg/L and 3.0 mg/L permit effluent NH₃-N conditions. The 7.1 mg/L NH₃-N value is the effluent limit that just protects against NH₃-N toxicity. This effluent limit is not recommended, it is presented for comparison purposes. The 3.0 mg/L value is the recommended permit limit. In the “real world” the 3.0 mg/L value will rarely be exceeded due to the reasons just discussed. Based on a survey of nitrifying Minnesota wastewater treatment plants the median summer (50th percentile) NH₃-N effluent value was 0.3 mg/L. The impact of the 0.3 mg/L value was also examined in the graphs.

The first graph examines summer NH₃-N toxicity at the point of complete mixing of both the discharge and the river. Beyond this point the NH₃-N concentration drops as decay occurs. In all cases the NH₃-N toxicity standard for the Rum River is protected. Understandably the more stringent effluent limit applied the better the water quality is.

The second graph deals with oxygen consuming substances in summer. Again the point of complete mixing between the discharge and the river is examined. As mentioned earlier in this part, these concentrations will return to background levels in two to three miles.
The oxygen consuming substances in an effluent consists of NH$_3$-N and CBOD$_5$. These two pollutants were combined into a single value to represent their oxygen consuming strength. The 7.1 and 3.0 mg/L NH$_3$-N values were paired with a 15 mg/L “permit” CBOD$_5$ effluent limit. This review’s recommended monthly mean effluent limit is 15 mg/L CBOD$_5$, 3.0 mg/L NH$_3$-N and a minimum 5.0 mg/L of DO. As stated earlier the two pairs of comparisons using highest NH$_3$-N values represent worst case conditions. The same survey of nitrifying Minnesota wastewater treatment plants showed that such facilities produce a 50th percentile CBOD$_5$ strength of 3.0 mg/L. This value was paired with the 0.3 mg/L 50th percentile NH$_3$-N value to simulate a likely “real world” condition.

Note that for the 3.0 mg/L CBOD$_5$ and 0.3 mg/L NH$_3$-N condition there is a net decease in the concentration of oxygen demanding substances in the river. Initially this seems counterintuitive. The reason for this decrease is the 5.0 mg/L minimum concentration of dissolved oxygen in the effluent. This value was deducted from the amount of oxygen consuming substances in the effluent. As the flow in the river drops the impact of this source of additional dissolved oxygen becomes more important and the net concentration of oxygen consuming substances drops.

Princeton’s proposed treatment plant will have either sand or fabric polishing filters. These filters will remove additional particulate pollutants. The nitrifying treatment plants that made up the survey of nitrifying wastewater treatment plants did not include facilities with filters or phosphorus removal. Since the proposed facility will have this additional treatment the strength of the effluent will probably be better than the 3.0 mg/L CBOD$_5$ value used in the second graph.

These graphs show that on a “real-life” (50th percentile) operational basis there is a reasonable justification to believe that the adverse impact on water quality will be so minimal that it would be hard to quantify that impact even at the targeted low flow 7Q$_{10}$ and 30Q$_{10}$ in this receiving water.
Graph B1

**Short Term Summer Un-Ionized Ammonia-Nitrogen (NH₃-N) Concentrations in the Rum River as a Result of Various Effluent Concentrations and Taking the Deviation in the Analytical Test into Account**

The Class 2B, Water Quality Standard for Ammonia-Nitrogen Toxicity is 0.04 mg/L

- 7.1 mg/L Impact Band
- 3.0 mg/L Impact Band
- 0.3 mg/L (50th Percentile) Impact Band

Notes for Graph: This graph shows predicted receiving water conditions at the end of the proposed wastewater treatment plant’s design life, that is to say when the influent flow has increased to its design average dry weather flow. With normal growth rates this event usually occurs twenty to thirty years in the future.

This graph also shows worst case conditions for 7.1 mg/L and 3.0 mg/L permit effluent NH₃-N conditions. This is because sewage treatment plants are designed to meet their permit limits up to their design average wet weather flow. This is the design flow that occurs when the ground is saturated with water and heavy precipitation has occurred. This condition occurs more frequently near the end of the treatment plant’s design life. The consequence of meeting this wet weather design requirement results in the effluent being better than the permit conditions during times of low dilution in the receiving water and during most of the facility’s life. This is because there will be more retention in the treatment units and additional aeration capacity to maintain healthy biological conditions in the treatment units at lower treatment plant flows.
Notes for Graph: This graph shows predicted receiving water conditions at the end of the proposed wastewater treatment plant’s design life, that is to say when the influent flow has increased to its design average dry weather flow. With normal growth rates this event usually occurs twenty to thirty years in the future. Since the proposed treatment plant will have both phosphorus removal and filtration for effluent polishing the actual 50th percentile CBOD₅ strength will likely be under 3.0 mg/L.

This graph also shows worst case conditions for 7.1 mg/L and 3.0 mg/L permit effluent NH₃-N conditions. This is because sewage treatment plants are designed to meet their permit limits up to their design average wet weather flow. This is the design flow that occurs when the ground is saturated with water and heavy precipitation has occurred. This condition occurs more frequently near the end of the treatment plant’s design life. The consequence of meeting this wet weather design requirement results in the effluent being better than the permit conditions during times of low dilution in the receiving water and during most of the facility’s life. This is because there will be more retention in the treatment units and additional aeration capacity to maintain healthy biological conditions in the treatment units at lower treatment plant flows.
Overview

The purpose of this memorandum is to provide you with an assessment of the need for a phosphorus (P) effluent limit and the basis for such recommendation for the reissuance of National Pollution Discharge Elimination System (NPDES) permit MN00224538 authorizing a new surface water discharge from the city of Princeton WWTP. Because of the location and nature of the discharge, several laws and water designations must be considered when determining an appropriate phosphorus effluent limit. At the location of the discharge the Rum River is a restricted outstanding value resource water (ORVW-R). This reach is also designated as a Minnesota Wild and Scenic River for its recreational and scenic qualities. Further downstream, effluent will flow to Lake Pepin, a lake impaired for eutrophication due to excess phosphorus. In 2003 the city of Princeton proposed a new expanded discharge directly to the Rum River. By 2005 the Minnesota Court of Appeals remanded this permit and identified necessary conditions for future permit issuance in the decision document. Due to the ORVW-R and Wild and Scenic River designation of the receiving water, the court stated that the MPCA must:

1) establish the existing water quality of the Rum River.
2) impose necessary requirements and restrictions on Princeton’s proposed WWTP to protect that quality.

The following water quality and phosphorus assessment will address both conditions as they pertain to phosphorus effluent limits.

Background

In 1961 Princeton built a stabilization pond to treat wastewater effluent to the Rum River. Because of soil conditions, most effluent leaked or infiltrated through the pond walls. On November 5th 1984, when the Rum River was designated an ORVW, the facility had an average wet weather design flow (AWWDF) of 0.284 mgd; referred to as the nondegradation design flow. At 0.284 mgd and an estimated total phosphorus (TP) effluent concentration of 2 mg/L, the facility would have discharged 784 kg of phosphorus annually to the Rum River. The 2 mg/L concentration represents an estimated value for the Princeton ponds. The value is used by MPCA staff when actual pond concentration data is not available. Although, it is understood that Princeton did not actually discharge directly to the Rum River. In 1994 the original pond was expanded to 0.635 mgd to create an oxidation ditch and infiltration basin. Because there is no direct discharge to the Rum River, the facility, in theory, contributes no phosphorus mass to the
Rum River. Data is insufficient to estimate the quantity, direction, and quality of leaking wastewater effluent. Ground water TP from surrounding wells is frequently above 2 mg/L and has been reported at level greater than 8 mg/L. Therefore, it is likely that some effluent reaches the Rum River despite the fact that there is no monitored surface water discharge.

Princeton is proposing to expand the current WWTP to an AWWDF of 1.905 mgd to accommodate for future growth. Princeton is requesting a discharge to the Rum River again. This expanded facility will include biological phosphorus removal (Bio-P), dual media filtration, and ultraviolet disinfection. The annual mass of phosphorus discharged to the Rum River will depend on the P limit discussed below.

**Baseline Water Quality – Rum River**

The Rum River extends from the outlet of Mille Lacs Lake and flows through the cities of Milaca, Princeton, Cambridge, Isanti, and finally Anoka before it flows into the Mississippi River upstream of Lake Pepin. To characterize the Rum River, we looked at all available data from 1958 to 2008. A survey of available data on the Rum River shows that water quality gradually changes as it flows downstream (Figure 1). Note that many of these averages are based on 4 or 5 summers of data. Summer average TP at the outlet of Mille Lacs Lake is 39 μg/L and increases to 165 μg/L at Anoka. The largest increase in TP occurs between Princeton and Isanti, and much of this can be attributed to effluent from the Cambridge WWTP.

**Figure 1:** Summer average (June – September) total phosphorus (TP) in the Rum River. The shaded region represents the interquartile range of TP for minimally impacted streams in the NCHF ecoregion.

Rum River water quality data were collected by both the MPCA and City of Princeton from August 2005 through September 2008 at the Minnesota Highway 95 Bridge (site EDA_S004-409). Previous analyses of water quality at Princeton used a long term water quality dataset further downstream near Isanti (site EDA_S000-043). Because the Cambridge WWTP and other nonpoint sources are between Princeton and the Isanti site, it is difficult to estimate the water quality of the Rum River at Princeton by simply subtracting the Cambridge WWTP TP load from the dataset. For this reason, we believe that the data collected near the Hwy 95 Bridge in Princeton best characterizes baseline water quality conditions in the Rum River at the point of the outfall. FLUX load estimating computer software was used to estimate phosphorus concentrations due to the lack of data during low flow conditions. Concentrations of total
chlorophyll (Chl-T) were estimated using regression equations developed by Heiskary and Markus (2001). Chl-T was not estimated for non-summer periods because in-stream conditions including temperature and light are not optimal for algal production. Flow calculations on the Rum River were based on regression analysis of data collected at USGS station 05286000 at St. Francis, MN (1939-present) and a partial record station (USGS 05286000) near Spencer Brook, MN, located less than 10 miles downstream of Princeton.

Currently, summer water quality in the Rum River at Princeton is generally within or below the interquartile range for minimally impacted streams in the North Central Hardwood Forest ecoregion (NCHF; Figure 1). Biotic habitat at Isanti and St. Francis is regarded as good (MPCA 2003). Estimates based on current records serve as the most appropriate record of ORVW baseline water quality because we have no records of Rum River water quality at Princeton in 1984 at the time of ORVW designation. The one in ten year low flow summer (122Q10) and average summer flow in the Rum River at Princeton is 55 and 431 cubic feet per second (cfs), respectively (Table 1). During 122Q10 flow conditions, estimated TP and Chl-T are 64 and 8 μg/L, and summer average total TP and Chl-T are 78 and 14 μg/L, respectively (Table 1). Overall, average summer TP is below the 50th percentile and low flow TP is below the 25th percentile for minimally impacted streams in the NCHF ecoregion. Under 90th percentile high flow conditions TP is estimated to be 115 μg/L. Because Chl-T regression equations were not developed for high flow conditions, high flow Chl-T was not estimated. In addition to water quality, an MPCA study in 2003 provides a biological assessment of the lower Rum River at Isanti and St. Francis. At these locations, which typically have higher TP and Chl-T levels than at Princeton, there is a moderate mix of benthic and sestonic algae and the DO flux is considered moderate. Overall, Fish index of biological integrity (IBI) and qualitative habitat evaluation index (QHEI) scores at these sites range from 63 to 77 and 60 to 78, respectively (MPCA 2003). These study results demonstrate that biotic habitat is good at Isanti and St. Francis and it is assumed to be equal or higher at Princeton.

Overall, average summer TP is below the 50th percentile and low flow TP is below the 25th percentile for minimally impacted streams in the NCHF ecoregion. Under 90th percentile high flow conditions TP is estimated to be 115 μg/L. Because Chl-T regression equations were not developed for high flow conditions, high flow Chl-T was not estimated. In addition to water quality, an MPCA study in 2003 provides a biological assessment of the lower Rum River at Isanti and St. Francis. At these locations, which typically have higher TP and Chl-T levels than at Princeton, there is a moderate mix of benthic and sestonic algae and the DO flux is considered moderate. Overall, Fish index of biological integrity (IBI) and qualitative habitat evaluation index (QHEI) scores at these sites range from 63 to 77 and 60 to 78, respectively (MPCA 2003). These study results demonstrate that biotic habitat is good at Isanti and St. Francis and it is assumed to be equal or higher at Princeton.

Table 1: Baseline Rum River water quality at Princeton, MN. Rum River data were collected at the Minn Hwy 95 bridge in Princeton from 2005-2008.

<table>
<thead>
<tr>
<th></th>
<th>TP (μg/L)</th>
<th>Chl-T (μg/L)*</th>
<th>Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Low Flow</td>
<td>64</td>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td>Summer Average</td>
<td>78</td>
<td>14</td>
<td>431</td>
</tr>
<tr>
<td>Summer High Flow</td>
<td>115</td>
<td></td>
<td>1211</td>
</tr>
</tbody>
</table>

*Chl-T estimated from TP values by regression equation (Heiskary and Markus 2001).

**Minnesota Wild and Scenic River Designation**

The Rum River is designated as a Minnesota Wild and Scenic River by the Minnesota Department of Natural Resources. Minnesota Wild and Scenic Rivers are divided into three categories: recreational, scenic, and wild. At the location of the proposed outfall, the Rum River is designated as scenic, but not recreational or wild. Scenic rivers are those rivers that exist in a free-flowing state and with adjacent lands that are largely undeveloped. Construction from the proposed project is not expected to result in substantial riparian development or interfere with the existing free flowing state of the river. Furthermore, the proposed phosphorus effluent limit, explained below, will maintain other designated uses of the Rum River.
**ORVW-R Designation**

The Rum River is designated as an ORVW-R from the Mille Lacs CSAH 9 bridge upstream of Princeton to the T 31 N -- T 32 N line on the southern border of the Anoka County fairgrounds. Minnesota Rule 7050.0180 states that the policy of the agency is to maintain the existing high quality in some ORVW waters by prohibiting or stringently controlling new or expanded discharges from either point or nonpoint sources. This rule also states that no person may cause or allow a new or expanded discharge of any sewage, industrial, or other waste to an ORVW-R, unless there is not a prudent and feasible alternative to the discharge.

**Phosphorus Rule 7053.0255**

According to Minn. R. 7053.0255, subp. 3, item A, new or expanded facilities expected to discharge greater than the 817 kg-P/yr. “de minimus level” are required to meet a 1.0 mg/L phosphorus limit. Without a limit, the proposed outfall is expected to exceed 817 kg-P/yr. However, subp. 3, item B explains the basis for more restrictive phosphorus limits (see rule language below).

If a phosphorus effluent limit is required under item A, removal of nutrients from all wastes must be provided to the fullest practicable extent wherever sources of nutrients are considered to be actually or potentially detrimental to preservation or enhancement of the designated water uses.

In response to this section of the law and the decision of the Appellate court, a more restrictive water quality based effluent limit (WQBEL) is explored in the section below.

**Limit Simulations**

As requested by the court, water quality resulting from a variety of P effluent limits was estimated to determine the necessary phosphorus limits to protect the existing water quality in the Rum River. Baseline and limit scenario estimates were characterized by a mean value and a coefficient of variation (CV) range (Table 2, Figures 2 & 3, Appendix A). Through personal communication with MPCA scientist, Steve Heiskary, we determined that an appropriate CV range for TP and Chl-T estimates was 15% and 20%, respectively. It is important to note that all new effluent to the Rum River will result in some increase in river TP and Chl-T unless TP is discharged at or below the baseline water quality (0.064 - 0.115 mg-P/L). This, however, is technically infeasible. Therefore, our goal is to identify feasible limit scenarios resulting in biologically insignificant and immeasurable changes in water quality. An appropriate limit scenario will have an estimated TP or Chl-T CV range that intersects or overlaps the baseline range.

The tables below list the anticipated increase in TP and Chl-T in the Rum River immediately downstream of the Princeton WWTP outfall under a variety of river and facility flow conditions and phosphorus limits (Table 2). TP effluent limits were simulated by adding increments of TP mass to the baseline river water quality. The given daily mass values correspond to a concentration and the facility operating at AWWDF during average or high flow conditions or average dry weather design flow (ADWDF) during low flow conditions. During a one in 10 year low flow summer, inflow and infiltration in the collection system is limited. Therefore, we assumed that the facility would have a discharge equal to or less than the ADWDF which is 1.635 mgd. We conservatively assumed the facility would be operating at AWWDF during
average and high flow conditions. Figures 2, 3, and Appendix A show a graphical depiction of
table 2 data and include the CV for each estimate. It is important to note that prior to operating at
full capacity, actual water quality impacts will be smaller than estimated.

Table 2: Estimated total phosphorus (TP) and total chlorophyll (Chl-T) concentrations in the Rum River
downstream of the proposed Princeton WWTP at various effluent concentrations.

<table>
<thead>
<tr>
<th></th>
<th>WWTP Baseline</th>
<th>WWTP 1.0 mg/L</th>
<th>WWTP 0.5 mg/L</th>
<th>WWTP 0.3 mg/L</th>
<th>WWTP 0.1 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ug/l (+/-)</td>
<td>ug/l (+/-) Δ</td>
<td>ug/l (+/-) Δ</td>
<td>ug/l (+/-) Δ</td>
<td>ug/l (+/-) Δ</td>
</tr>
<tr>
<td>TP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Flow*</td>
<td>64 10</td>
<td>93 14 29</td>
<td>79 12 14</td>
<td>73 11 9</td>
<td>67 10 3</td>
</tr>
<tr>
<td>Summer Average**</td>
<td>77.7 12 86 13 9</td>
<td>82 12 4</td>
<td>80.3 12 2.6</td>
<td>79 12 1</td>
<td></td>
</tr>
<tr>
<td>High Flow**</td>
<td>115 17 118 18 3</td>
<td>117 17 2</td>
<td>116 17 1</td>
<td>115 17 0</td>
<td></td>
</tr>
<tr>
<td>Chl-T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Flow*</td>
<td>8 2</td>
<td>21 4 13</td>
<td>15 3 6</td>
<td>12 2 4</td>
<td>9 2 1</td>
</tr>
<tr>
<td>Summer Average**</td>
<td>14 3 18 4 4</td>
<td>16 3 2</td>
<td>15 3 1</td>
<td>15 3 0</td>
<td></td>
</tr>
</tbody>
</table>

Δ = change from baseline in ug/l, Low Flow = 122Q10, High Flow = 90th percentile high flow
(+/-) = variability of estimate based on coefficient of variation, 15% for TP, 20% for Chl-T
* Facility operating at Average Dry Weather Design Flow
** Facility operating at Average Wet Weather Design Flow

Among the estimates, several important patterns can be observed. The proposed facility will
have the greatest impact on Rum River water quality during low flow summers. Therefore, it is
important to set TP limits that are protective of river water quality during this period. During
average or high flow conditions, little to no measurable river water quality change is expected to
occur, regardless of the estimated TP effluent concentration (Figures 2 & 3). In contrast, during
low flow conditions river TP and Chl-T values are low, but limit scenarios demonstrate that point
sources have a much greater impact on water quality.

At ADWDF and 1.0 mg/L the proposed facility is estimated to increase Chl-T more than 2.5
times during a low flow summer. Simulated impacts (at 1.0 mg-P/L) are much less during
average and high flow conditions, demonstrated by CV ranges that overlap with baseline
conditions. Algal growth during the non-summer period is minimized by light and temperature
restrictions, and therefore, Chl-T is not expected to exceed baseline conditions under any flow or
concentration scenario. In summary, a 1.0 mg/L phosphorus effluent limit during the non-
summer period will not result in an exceedance of the narrative nutrient standard
(Minn.R.7050.0150) and would be sufficient to maintain existing water quality. During the
summer, when low flow conditions are possible and algal growth responds to increases in TP, a
1.0 mg/L phosphorus effluent limit is not appropriate.

Under low flow conditions at 0.3 mg-P/L and ADWDF the proposed facility will result in an
estimated TP and Chl-T increase of only 9 and 4 μg/L, respectively. Notice that the lower-bound
0.3 mg/L simulated Chl-T range intersects the upper-bound baseline range (10 μg/L; Figure 3).
Again, we assume that as estimates of variability intersect or overlap, estimated differences in
mean TP or Chl-T are biologically insignificant, immeasurable, and therefore, do not represent a
change in the existing water quality. It appears that a 0.3 mg/L phosphorus effluent limit during
summer months is protective of the existing water quality, especially during the critical low flow
condition.
Figure 2: Baseline and estimated Rum River phosphorus concentrations resulting from various WWTP effluent concentrations in mg-P/L. Whiskers represent the coefficient of variation (CV = 15%).

Figure 3: Baseline and estimated Rum River chlorophyll-t (Chl-T) concentrations resulting from various WWTP effluent phosphorus concentrations in mg/L. Whiskers represent the coefficient of variation (CV = 20%).

In consideration of the limits discussed above we recommend that the proposed Princeton WWTP be given a 5 month (May-September) 0.3 mg/L monthly average phosphorus effluent limit. During the remaining 7 months we recommend a monthly average 1.0 mg/L phosphorus effluent limit. The city should be informed that alternative effluent limits for phosphorus may be considered in the future as needed to protect the Mississippi River and Lake Pepin.

Lake Pepin and Federal Regulations

Lake Pepin, a lake on the Mississippi River near Lake City, Minnesota, is downstream of the aforementioned discharge. Lake Pepin was placed on the 2002 MPCA CWA Section 303(d) TMDL list of impaired waters due to excess nutrients which impede swimming in the lake. Phosphorus is the primary nutrient responsible for excess algal growth in Lake Pepin. Federal regulation [40 CFR 122.44 (d) (1) (i)] restricts mass increases from expanding NPDES permitted facilities upstream of impaired waters. This regulation also requires a WQBEL for existing
facilities that cause or contribute to a downstream impairment. In an effort to protect the receiving waters from degradation, the agency will not allow permitted mass increases in phosphorus loading upstream of Lake Pepin until the completion of the lake Pepin TMDL. Once a TMDL is established for Lake Pepin, additional controls or limits may be required.

Discharge from the proposed Princeton WWTP will represent a small fraction of the annual load to Lake Pepin during a low flow year (Table 3). Based on modeling by Limnotech (Lake Pepin TMDL modeling consultant), the load during a 1 in 10 year low flow summer is 2,099,247 kg/yr. The potential annual load of phosphorus from the Princeton WWTP (1,862 kg-P/yr.) represents 0.040% of the annual P load to Lake Pepin. We modeled that there would be no measurable impact or shift in trophic status on Lake Pepin (Table 4). We conclude that the proposed discharge does not “cause or contribute” to the excess nutrient impairment in Lake Pepin. Thus, the agency is not required to do a WQBEL for this permit issuance.

Table 3. Percent load contribution from the Princeton WWTP to Lake Pepin during a 1 in 10 low flow year.

<table>
<thead>
<tr>
<th>Description</th>
<th>Flow (mgd)</th>
<th>Maximum Load (kg)</th>
<th>% Load to Lake Pepin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Facility (AWWDF)</td>
<td>1.905</td>
<td>329</td>
<td>1,533</td>
</tr>
</tbody>
</table>

Table 4. Modeled trophic status response of Lake Pepin during a 1 in 10 low flow year to various loading scenarios from the Princeton WWTP.

<table>
<thead>
<tr>
<th>Description</th>
<th>Flow (mgd)</th>
<th>TP Load (kg/yr)</th>
<th>Modeled Lake Pepin Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TP (μg/L)</td>
<td>Chl-a (μg/L)</td>
</tr>
<tr>
<td>Proposed Facility (AWWDF)</td>
<td>1.905</td>
<td>1,862</td>
<td>185</td>
</tr>
<tr>
<td>Existing Facility* (seepage basin)</td>
<td>0.000</td>
<td>0.0</td>
<td>185</td>
</tr>
</tbody>
</table>

*Assumes no phosphorus is reaching the Rum River through ground water.

Because the Princeton WWTP did not directly discharge to the Rum River when Lake Pepin was listed as an impaired water in 2002, the proposed facility is also considered a new discharge upstream of an impaired water. In consideration of 40 CFR 122.4(d), the agency will require that all new permitted phosphorus mass be offset through a pre-TMDL phosphorus trade. In anticipation of this, Princeton has agreed to purchase permitted load at a ratio of 1.2 to 1 from the Metropolitan Council for Environmental Services (MCES) Metro WWTP. In payment MCES has requested that Princeton implement nonpoint source best management practice techniques that will reduce annual phosphorus at a ratio of 2 to 1. To clarify, if Princeton is authorized to discharge 1,862 kg-P/yr, they will need to purchase 2,234 kg-P/yr in offsets from MCES. In turn, MCES is requiring Princeton to purchase these offsets with non-point source BMPs that will reduce 4,468 kg-P/yr. Phosphorus credits will be owned by Princeton for the length of the contract or until the Lake Pepin TMDL is completed and waste load allocations will be established.

Over time, reductions in non-point source phosphorus will result in less sedimentary phosphorus and thereby, limit internal phosphorus loading in Lake Pepin. We believe that overall annual reductions in TP can be achieved if nonpoint BMPs are regularly maintained. However, if BMP maintenance is discontinued after the length of this contract, we do not expect sustained annual TP reductions to the Rum River or to Lake Pepin. If the proposed facility is completed, the Lake
Pepin TMDL will determine an appropriate waste load allocation to achieve water quality goals in Lake Pepin.

Summary

In consideration of the Appellate Court requirements and both state and federal laws, we recommend a monthly average (May – September) 0.3 mg/L (329 kg) total phosphorus effluent limit in combination with a 1.0 mg/L (1,533 kg) total phosphorus effluent limit during the remaining months of the year. Again, we believe that this limit is practicable and will be sufficient to maintain the existing water quality and designated water uses in the Rum River throughout the life of the permitted facility. Pre-TMDL trading will be used to offset and reduce the permitted load to Lake Pepin prior to TMDL completion. When completed, The Lake Pepin TMDL will give a waste load allocation to the Princeton WWTP. At this time, additional controls or limits may be required to achieve water quality goals in Lake Pepin.

References


Minnesota Pollution Control Agency. 2003 Establishing relationships among in-stream nutrient concentrations phytoplankton and periphyton abundance and composition, fish and macroinvertebrate indices, and biochemical oxygen demand in Minnesota USA Rivers. St. Paul, Minnesota; Minnesota Pollution Control Agency. 98p
Addendum

The following figure demonstrates that a 0.3 mg/L phosphorus effluent limit is sufficient to keep the mean river estimate within the current river baseline range. Under summer medium and high flow conditions, a 1 mg/L phosphorus limit is sufficient. During non-summer periods, light and temperature restrictions limit algal growth. The baseline range is represented by a 15% coefficient of variation from the mean value.
Sources of mercury pollution and the methylmercury contamination of fish in Minnesota

Reducing mercury contamination of Minnesota’s surface waters and the fish they produce is a high priority for the Minnesota Pollution Control Agency (MPCA).

Mercury contamination of fish in Minnesota is a well-documented problem. Because of this contamination, the Minnesota Department of Health advises people to restrict their consumption of sport fish from Minnesota lakes and rivers (for more information, go to: www.health.state.mn.us/divs/eh/fish/index.html).

Where does the mercury come from?

With some exceptions, almost all of the mercury that contaminates Minnesota’s lakes, rivers, and fish comes from the air. Mercury can be carried great distances on wind currents before it is deposited on our land and surface waters. As a result, about 90 percent of the mercury deposited from the air in Minnesota comes from other states and countries. Coincidentally, about 90 percent of Minnesota’s mercury emissions are deposited on other states and countries. These facts are critical to developing solutions to the mercury problem, and make it impossible for Minnesota to solve this problem by acting alone.

Most of the mercury in the environment originates from human activities, including burning coal to produce electricity, processing taconite, and using mercury in products, such as fluorescent lights, dental fillings, and some types of thermostats and switches. Mercury is used also in manufacturing processes.
And, about a third of mercury in the environment comes from naturally occurring sources, such as minerals in rocks and volcanic eruptions elsewhere in the world.

**Trends in mercury emissions**

MPCA staff estimates that total annual mercury emissions in Minnesota declined significantly from 1990 to 2005. During this period, it is estimated that total annual mercury emissions declined 72 percent, from 11,300 pounds to 3,175 pounds, mostly due to the discontinued use of mercury in products and mandated controls on the incineration of solid waste.

Sediment cores from lakes in Minnesota and elsewhere show slight declines in atmospheric deposition of Mercury relative to a peak in the 1970s and 1980s. There is some evidence that concentrations of mercury in fish have also declined, but not to the point of eliminating concerns about fish consumption. Nonetheless, it is encouraging that efforts to reduce the use and release of mercury to the environment appear to have resulted in measurable environmental improvement.

![Graph showing Minnesota mercury emissions from purposeful uses](image)

**How mercury comes to contaminate fish**

Aquatic bacteria convert some of the mercury that falls from the air onto our lakes and other water bodies to methylmercury, a very potent neurotoxin. Zooplankton pick up the methylmercury as they filter the water, and when these microscopic animals are eaten by small fish, the methylmercury is incorporated in their flesh. These small fish are eaten by increasingly larger fish. The concentration of methylmercury increases at each step in the aquatic food chain, and is highest in large walleye, northern pike, and other predatory fish. It is the methylmercury in these large, predatory fish that poses the greatest threat to human health. Fetuses, nursing infants, children under age 15, and people who rely on fish for much of their diet are most at risk from
this potent neurotoxin, which can hamper the normal development of the central nervous system. In adults, exposure to methylmercury can result in damage to the nervous system and organs.

**Minnesota’s plan for reducing mercury in surface waters and fish**

Mercury impairments currently account for two-thirds of the 2004 list of the surface waters in Minnesota that do not meet the federal standards for water quality. When the MDH fish consumption advisory is more restrictive than one meal per week, the water body is considered to be impaired.

MPCA scientists calculate that mercury emissions will have to be reduced 93 percent from 1990 levels for fish mercury levels to be reduced to safe levels. The MPCA has established a goal of reducing Minnesota mercury emissions by 93 percent, to 789 pounds per year, and is working with the U.S. Environmental Protection Agency to address out-of-state sources. Eventually, the level of mercury in Minnesota’s water bodies should be lowered enough that the fish in them can be eaten once a week.

**What we do is only part of the solution.**

The problem of mercury contamination in Minnesota will not be solved until the United States and other countries greatly reduce mercury releases from coal fired power plants, products, mining and manufacturing. Even when all these sources of mercury are eliminated, the one-third of the mercury that comes from natural sources will remain, and people will likely need to continue to monitor their fish consumption due to this naturally occurring mercury.

The MPCA is a national leader in reducing mercury emissions, and it is working with other states and the federal government to agree to a solution that will address the problem. The agency also is urging the federal government to discuss the mercury problem and solutions with other countries, with the goal of establishing international mercury-reduction commitments. In the meantime, the MPCA will work with Minnesota sources of mercury emissions to continue to reduce their releases to demonstrate that reductions are feasible.

The MPCA is working with schools in Minnesota to remove the mercury from them and to educate students and staff about the dangers to health that mercury poses. Visit the MPCA’s Web site at [www.pca.state.mn.us/programs/mercuryfree/index.html](http://www.pca.state.mn.us/programs/mercuryfree/index.html) to learn more about the Mercury-Free Zone Program.

**For more information**

To learn how Minnesota’s departments of Health, Natural Resources, and Agriculture work with the MPCA in monitoring levels of mercury and other contaminants in fish from Minnesota water bodies, see the fact sheet, *Minnesota’s Fish Contaminant Monitoring Program*, at [www.pca.state.mn.us/publications/p-p2s4-05.pdf](http://www.pca.state.mn.us/publications/p-p2s4-05.pdf).

For more information about mercury pollution in Minnesota and how the MPCA is addressing the problem, contact Ned Brooks (phone 651-296-7242, e-mail ned.brooks@pca.state.mn.us).
Part D2
Minnesota Pollution Control Agency
Environmental Analysis and Outcomes Division

Statewide Mercury Total Maximum Daily Load (TMDL) Pollutant Reduction Plan

The U.S. Environmental Protection Agency approved Minnesota's Statewide Mercury Total Maximum Daily Load Pollutant Reduction Plan in March 2007. Since then, the MPCA has worked with stakeholders representing a broad range of interests to identify strategies and timelines that would be included in an implementation plan. The stakeholders' recommendations, completed in June 2008, are contained in the Strategy Framework for Implementing Minnesota's Statewide Mercury TMDL.

The impaired waters TMDL process consists of data collection and assessment, listing those waters not meeting water quality standards, developing a pollution reduction plan, implementing the plan, and then evaluating the implementation by collecting more data.

Mercury impairments make up two-thirds of the 2004 list of impaired waters for Minnesota. The mercury impairments on the list are mainly for fish tissue concentration exceedences, but also include water column mercury concentration exceedences.

The Statewide Mercury TMDL Plan

There is a strong connection between the Minnesota Department of Health Fish Consumption Advisory (FCA) and MPCA’s impairment determination. When the FCA limitation is more restrictive than one meal per week, the water body is impaired.

There are strong regional differences between northeastern (NE) Minnesota, dominated by forests and wetlands, and the rest of the state, with the NE having significantly higher mercury concentrations in fish.

Atmospheric deposition of mercury is uniform across the state and supplies more than 99.5% of the mercury getting into fish. Agency research has demonstrated that 70% of current mercury deposition in Minnesota comes from anthropogenic [people] sources and 30% from natural sources, such as volcanoes. There are no known natural sources in the state that emit mercury directly to the atmosphere.

There is a slight general downward trend in fish tissue mercury concentrations, but lakes still remain impaired. About 90% of the mercury deposition in the state originates from outside the state, so the first cut allocation is a 90% federal share and a 10% state share; the federal government will be responsible for meeting its reduction goal, developing schedules and meeting reasonable assurance requirements of the Clean Water Act (CWA).
The long-term goal of the mercury TMDL is for the fish to meet water quality standards; the approach for Minnesota’s share is mass reductions from state mercury sources. This mercury TMDL establishes that there needs to be a 93% reduction in state emissions from 1990 for the state to meet its share. Water point sources will be required to stay below one percent of the total load to the state and all but the smallest dischargers will be required to develop mercury minimization plans. Air sources of mercury will have a 93% emission reduction goal from 1990 levels. Air sources will be divided into three sectors: products, energy, and mining.
Discharger: Princeton  
Permit Number: MN0024538  
Outfall Number: SD001  
Date: April 2, 2009

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**Background**

The discharge is a proposed new discharge located on the Rum River, an Outstanding Resource Value Water (ORVW-R)-Restricted reach. The discharger has not been discharging directly from its ponds since the late 1980’s. No WET tests or priority pollutant scans exist for this facility. There is no low-level mercury data for the effluent of this facility. The designated discharge Dry Weather Design Flow (ADW) is 1.635, and the Wet Weather design flow (AWW) is 1.905 mgd. The Dry Weather design flow is used to calculate water quality-based effluent limits under critical low flow stream conditions. The low flow condition is defined by the once in ten year weekly average flow (7Q10), which is determined to be 11.1 mgd (17.2 cfs) near Princeton. The Wet Weather design flow is used for nondegradation evaluations applicable in Minnesota Rules 7050.0180. The dilution ratio is 7.8:1, combined effluent and river low flow to effluent flow at the ADW.

**Reasonable Potential for Chemical Specific Pollutants (40CFR122.44(d)(1))**

Federal regulations require MPCA to evaluate the discharge to determine whether the discharge has the reasonable potential to cause or contribute to a violation of water quality standards for a pollutant. The Agency must use acceptable technical procedures, accounting for variability (coefficient of variation, or CV), when determining whether the effluent causes, has the reasonable potential to cause, or contribute to an excursion of an applicable water quality standard. Projected effluent quality (PEQ) derived from effluent monitoring data is compared to Preliminary Effluent Limits (PELs) determined from mass balance inputs. Both determinations account for effluent variability. Where PEQ exceeds the PEL, there is reasonable potential to cause or contribute to a water quality standards excursion. When Reasonable Potential is indicated the permit must contain a water quality-based effluent limit (WQBEL) for that pollutant.

Since this is a new discharge, there is no effluent data available to derive PEQ values. However, mercury is known to be in municipal effluents and is primarily associated with total suspended solids (TSS) in the effluent. A new discharge that contains TSS is also expected to contain mercury. This discharger is subject to the requirements of the EPA approved state-wide mercury TMDL. There is sufficient capacity available in the waste load allocation portion of the TMDL to allow for this discharge.

The applicable numeric chronic water quality standard for mercury is 6.9 ng/l. The maximum standard is 2400 ng/l, and the FAV is 4900 ng/l. The background concentration of total mercury in the Rum River is 1.98 ng/l as a geometric mean, based on data collected from August 2005 to June 2006 (n=22).
Effluent Limitations based on the Mercury TMDL

Calculation of a water quality-based permit limitation (WQBEL) for mercury under the state-wide mercury TMDL—MPCA calculated a WQBEL for mercury based on the requirements and assumptions of the state-wide mercury TMDL. The WLA portion of the mercury TMDL assumes an allowable mass load based on an annual average discharge concentration of 5 ng/l multiplied by the design wet weather flow when there is no information available for a discharge. Since this discharge is new, there is no mercury discharge data available. Existing facilities in Appendix B of the mercury TMDL that are lacking data have been assigned a load based on the 5 ng/l annual average concentration and the design wet weather flow of the facility. The effluent limits in this case were calculated assuming the TMDL annual average effluent concentration (5 ng/l) is the same as the plant long term average. The waste load allocation is a 30-day allocation, and permit limits are calculated from that based on variability at an assumed coefficient of variation (CV) of 0.6, recommended in the EPA TSD (1991). The daily maximum limit is 15.6 ng/l, and the monthly average is 9.0 ng/l, based on sampling twice per month. The load calculated for the facility would be the product of the monthly average limit and the wet weather design flow:

\[(9 \text{ ng/liter})(1 \text{ mg/10}^6 \text{ ng})(1.905 \times 10^6 \text{ gallons/day})(3.785 \text{ liters/gal}) = 64.9 \text{ mg/day as a monthly average limit}\]

Calculation of the water quality-based effluent limit (WQBEL) for mercury under the TMDL

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>HG (ng/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant ADW design flow (mgd)</td>
<td>1.635</td>
</tr>
<tr>
<td>Receiving water 7Q10 design flow (mgd)</td>
<td>11.1</td>
</tr>
<tr>
<td>Waste Load Allocation - WLAcs</td>
<td>6.5*</td>
</tr>
<tr>
<td>Coefficient Of Variation (CV)</td>
<td>0.6</td>
</tr>
<tr>
<td>Long Term Average: LTA cs*</td>
<td>5.0</td>
</tr>
<tr>
<td>WQBEL: Daily Maximum</td>
<td>15.6</td>
</tr>
<tr>
<td>Monthly Average**</td>
<td>9.0</td>
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</tbody>
</table>

* based on annual average of 5 ng/l from mercury TMDL  
** twice/month sampling assumed

Nondegradation for Mercury

Nondegradation trigger – Mercury is known to be in municipal effluents and is primarily associated with total suspended solids (TSS) in the effluent. A new discharge that was not in existence as of the ORVW-restricted 1984 designation date that contains TSS, and therefore mercury, would meet the requirements of a new discharge in Minn. Rules 7050.0180. This new discharge triggers a nondegradation review and one has been provided by the city.

Nondegradation Review- The facility design will employ biological phosphorous removal with chemical backup, nitrification, and filters, which will achieve low total suspended solids concentrations. Mercury will be removed with the solids. These control measures and the socio-economic analyses are discussed in the full nondegradation review. MPCA staff is recommending a reduced TSS permit limit (10 mg/l monthly average) to further assure that mercury concentrations are minimized to the extent possible for a new discharge an ORVW. In addition a Mercury Pollutant Minimization Program (MMP) will be a permit requirement.
In this case the proposed facility represents a new discharge of mercury. The draft permit must contain effluent limits for mercury that preserves the existing high quality of the water, allowed as of the effective date of the ORVW-R designation (1984).

The inputs to the derivation of that effluent limit are contained in the table below. They are based on the assumptions that the effluent must be consistent with the distribution, central tendency value, and the variability of the river data in order to “preserve the existing high quality” of the receiving water. The distribution is assumed to be log (natural) normal; the central tendency is the geometric mean of all data (1.98 ng/l), including less than detect values as actual values; the variability is characterized as the coefficient of variation (CV) of the natural log transformed data. The resulting calculation provides for a daily maximum limitation of 7.3 ng/l, and a monthly average of 3.9 ng/l (see table below). The loading is based on the monthly average limit multiplied by the 30 day design average wet weather flow (AWW).

\[
(3.9 \text{ ng/liter})(1 \text{ mg/10}^6 \text{ ng})(1.905 \times 10^6 \text{ gallons/day})(3.785 \text{ liters/gal}) = 28.1 \text{ mg/day as a monthly average limit}
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<td>Receiving water 7Q10 design flow (mgd)</td>
<td>11.1</td>
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<tr>
<td>Background concentration</td>
<td>1.98</td>
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<td>Waste Load Allocation - WLacs</td>
<td>2.67*</td>
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<td>Long Term Average: LTA cs*</td>
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<tr>
<td>WQBEL: Daily Maximum</td>
<td>7.3</td>
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<tr>
<td>Monthly Average**</td>
<td>3.9</td>
</tr>
</tbody>
</table>

* assumes a 30-day WLA that meets LTA; mercury cs is a 30 day duration

**Final Mercury Effluent Limits**

The final limit for mercury in the permit is the more restrictive of limits based on either the TMDL or the nondegradation review. Since the nondegradation limit is lower, that limit becomes the final limit applicable in the permit (28.1 mg/day as a monthly average).

The permit should contain the monitoring requirements included under “existing municipal major facilities with reasonable potential” from the mercury strategy (March 2009). This includes a mercury pollutant minimization program (MMP).

**Reasonable Potential for Chronic Whole Effluent Toxicity (WET)**

As a new facility, there has been no previous WET testing. The following initial monitoring is recommended:

**WET PERMIT MONITORING /NO LIMITS/ TRIGGER to TRE**

2. Chronic Whole Effluent Toxicity (WET) Testing
2.1 The Permittee shall conduct quarterly chronic toxicity test batteries on Discharge SD001 beginning with commencement of discharge. The first quarter results are due by the end of the first calendar quarter following permit issuance.

2.2 Submit the first quarterly chronic test battery results.

2.3 Submit the second chronic test battery results.

2.4 Submit the third chronic test battery results.

2.5 Submit the fourth chronic test battery results.

2.6 Annual chronic test batteries shall be conducted in each succeeding year for the remainder of the permit. The first annual results are due one year from the date of the final quarter results and annually thereafter.

2.7 Submit annual chronic WET test battery results by one year from the due date of the final quarter results.

2.8 Submit annual chronic WET test battery results from the due date of the first annual results.

2.9 Submit annual chronic WET test battery results from the due date of the second annual results.

2.10 Submit annual chronic WET test battery results from the due date of the third annual results.

2.11 Any test that exceeds 7.8 TUc shall be re-tested according to the Positive Toxicity Result requirements that follow to determine if toxicity is still present above 7.8 TUc (RWC<12.8%).

Species and Procedural Requirements

2.12 Tests shall be conducted in accordance with procedures outlined in EPA-821-R-02-013 “Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms” - Fourth Edition (Chronic Manual), and any revisions to the Manual. Any test that is begun with an effluent sample that exceeds a total ammonia concentration of 5 mg/l shall use the carbon dioxide-controlled atmosphere technique to control pH drift.

2.13 Test organisms for each test battery shall include the fathead minnow (*Pimephales promelas*)-Method 1000.0 and Ceriodaphnia dubia-Method 1002.0.

2.14 Static renewal chronic serial dilution tests of the effluent shall consist of a control, 6, 12, 25, 50 and 100% effluent. A 12.8% Receiving Water Concentration (RWC) may be substituted for the 12% effluent concentration or provided in addition to the above dilution series.

2.15 All effluent samples shall be flow-proportioned, 24-hour composites. Test solutions shall be renewed daily from each fresh composite. Testing of the effluent shall begin within 36 hours of sample collection. Receiving water collected outside of the influence of discharge shall be used for dilution and controls.

2.16 Any other circumstances not addressed in the previous requirements or that require deviation from that which is specified in the previous requirements shall first be approved by the MPCA.

Quality Control and Report Submittals
2.17 Any test that does not meet quality control measures, or results that the Permittee believes reflect an artifact of testing shall be repeated within two weeks. These reports shall contain information consistent with the report preparation section of the Chronic Manual. The MPCA shall make the final determination regarding test validity.

**Positive Toxicity Test Result for WET**

2.18 Should a test exceed 7.8 TUc for whole effluent toxicity, the permittee shall conduct two repeat test batteries to be completed within thirty days after completion of the positive test. These tests will be used to determine if toxicity exceeding 7.8 TUc remains present, based on the average of the two repeat tests. If no toxicity is present above 7.8 TUc, the permittee shall return to the test frequency specified by the permit. If the repeat test batteries indicate toxicity above 7.8 TUc, the permittee shall submit for Agency review a plan for conducting a Toxicity Reduction Evaluation (TRE), and at a minimum provide quarterly reports regarding progress towards the identity, source, and any plans for the removal of the toxicity. The TRE shall be consistent with EPA guidance, or subsequent procedures approved by the Agency in attempting to identify and remove the source of the toxicity. Routinely scheduled chronic toxicity test batteries required in this permit section shall be suspended for the duration of the TRE. The return to routine testing is subject to successful completion of conformation testing, as determined by the Agency.

**Permit Re-opening for WET**

2.19 Based on the results of the testing, the permit may be modified to include additional toxicity testing and a whole effluent toxicity limit.

**3. Whole Effluent Toxicity Requirement Definitions**

3.1 “Chronic Toxicity Test” is a static renewal test conducted on an exponentially diluted series of effluent. The purpose is to calculate appropriate biological effect endpoints (NOEC/LOEC or IC25), specified in the referenced chronic manual (Item 6.1). A statistical effect level less than or equal to the Receiving Water Concentration (RWC) constitutes a positive test for chronic toxicity. The RWC equals the 12.8 percent effluent concentration, or 7.8 TUc.

3.2 “Chronic toxic unit (TUc)” is the reciprocal of the effluent dilution that causes no unacceptable effect on the test organisms by the end of the chronic exposure period.

*Priority Pollutants: Recommend the delta boilerplate*