



Stormwater Pond Total Suspended Solids /Total Phosphorus Effectiveness Evaluation Procedures

Purpose: These procedures outline the City’s stormwater pond effectiveness evaluation and schedule in accordance with the requirements of the MS4 NPDES/SDS General Stormwater Permit, MNR040000, effective August 1, 2013.

The MS4 general permit (Part III.D.6.d) requires the permittees to develop procedures and a schedule for the purpose of determining the Total Suspended Solids (TSS) and Total Phosphorus (TP) treatment effectiveness of all permittee owned/operated ponds constructed and used for the collection and treatment of stormwater. These procedures are not used to determine stormwater credits.

I. PROCEDURES

- a. Wet ponds are defined as constructed basins placed in the landscape to capture stormwater runoff. The pond is graded and outlet structures are designed in such a way that specified volumes of water are either held until displaced by future runoff or detained for a specified period of time. While the runoff is being held in the pond, sediment and associated pollutants settle to the bottom. Pollutants can also be removed from the stormwater through microbial, plant and algal biological uptake.¹
- b. Literature-based approach – The City will use a literature-based approach to assess stormwater pond effectiveness.
 - i. Pollutant removal percentages for stormwater pond BMPs. Values for TP and TSS include a range of values, from lowest to highest percent removal, observed in the literature.²
 1. TSS (Low-median-high): 60-84-90
 2. TP (Low-median-high): 34-50-73
- c. Evaluation- Staff will evaluate the pond’s design, construction and maintenance before assigning TSS and TP effectiveness. Staff will evaluate three factors before assigning effectiveness: design, construction and maintenance. Staff will use their best judgement when records or data is not available.

¹ Barr Engineering. *MIDS Subtask 2.2(1): Recommend Credits for MIDS Practices*. Memo to MIDS Workgroup. June 2011.

² *Pollutant Removal Percentages for Stormwater Pond BMPs*. Minnesota Pollution Control Agency, 15 July 2015. Web. 13 Sept. 2016.

- i. New ponds will be assigned an estimated effectiveness based on the design and construction of the pond. Ponds will be reevaluated during subsequent inspection cycles for reduced effectiveness.
- ii. Existing ponds that have reduced detention times due to sediment build up, but are receiving regular maintenance and still effectively functioning in removing sediment will be assigned median effectiveness.
 1. TSS – 84%
 2. TP – 50%
- iii. Existing ponds that have substantial reduction in detention times due to sediment build up (50%) and are receiving regular maintenance, but sediment removal is significantly diminished by the buildup, will be assigned low effectiveness.
 1. TSS – 60%
 2. TP – 34%
- iv. Existing ponds that have substantial reduction in detention times due to sediment build up such that there is no sediment removal after precipitation events will be assigned zero effectiveness.
- v. Existing ponds that that have been dredged to remove sediment build up and restored to original design parameters will be assigned their original expected effectiveness.
 1. TSS – 90%
 2. TP – 73%
- vi. In any situation above, staff may assign a lower pond effectiveness if they determine that the original design and/or construction and/or existing maintenance preclude the pond from effectively removing sediments. Assigned values can range anywhere from 0-90% for TSS and 0-73% for TP.
- vii. The City will assume that a constructed basin is properly designed, constructed, and maintained in accordance with the Minnesota Stormwater Manual in the year it was constructed. If staff determines that any of these assumptions are not valid pond effectiveness may be adjusted downward as outlined in paragraph I.c.vi above.
 1. Staff will use the Minnesota Stormwater Manual wiki - *Design Criteria for Stormwater Ponds* (http://stormwater.pca.state.mn.us/index.php/Design_criteria_for_stormwater_ponds) as a guide during pond evaluation. However, pond design has changed over the years and much of the sediment and nutrient removal effectiveness research was conducted on ponds that were built using different design criteria. The pond being evaluated by staff will compare the pond's design to the design parameters outlined in the literature. An example of such literature is William Walker's paper, "Phosphorus Removal by Urban Runoff Detention Basins."
 2. Staff will evaluate construction records to see if the actual pond construction deviated significantly from the engineer's design. This will

only be accomplished one time. As stated earlier, staff will use judgement when records do not exist or are inadequate.

3. Staff will complete a visual inspection to ensure that there is not significant sediment buildup, hydrologic short circuiting or repairs/maintenance needed that would affect sediment or nutrient removal effectiveness.

II. SCHEDULE - Pond effectiveness will be conducted in conjunction with the City’s stormwater pond inspection cycle. The initial effectiveness evaluation will start with the 2017 inspection cycle and completed in 2021. Ponds will be re-evaluated beginning in 2022.

2016	2017	2018	2019	2020
Emerson North	**Christensen	Wentworth	**Mud Lake	Edgewood
*Lily Lake	Golf Course	**Humboldt	Southview	Emerson South
	Stryker	Marthaler	Duck	*Thompson Lake

NOTE: The inspection cycle and pond effectiveness will be repeated in 2021.

* Lily and Thompson Lakes are lakes as reported on the **MS4 Pond, Lake, and Wetland Inventory Form** submitted to the MPCA. As such, they will not be evaluated for TSS/TP effectiveness.

** Mud Lake, Christensen Pond and Humboldt Pond are wetlands as reported on the **MS4 Pond, Lake, and Wetland Inventory Form** submitted to the MPCA. As such, they will not be evaluated for TSS/TP effectiveness.