



Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com An EEO Employer

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND

6 C.

Memorandum

To: Jeff Oliver and Jeanine Clancy
From: Keith Pilgrim and Len Kremer
Subject: Sweeney Lake TMDL
Date: August 12, 2009
Project: 23/27 051
c: Ron Leaf

This memorandum is being provided to you to fulfill your request for additional information (letter dated July 30, 2009) regarding the draft Sweeney Lake TMDL report.

Table 6.5 TP Removal of Existing Watershed BMPs: 1) "The City would like to review the list of Existing Treatment Device Removal Used for Table 6.5 to confirm the number and locations of existing BMPs."

Provided below is a table (Table 1) listing all of the treatment devices used to model storm water treatment for the Sweeney Lake TMDL. Each device name corresponds to a pond or rainwater garden in the attached map. The ponds are designated as "SP" for Sweeney Ponds while watersheds are designated "SL" for Sweeney Lake Watershed. All of the treatment devices modeled were storm water treatment ponds with the exception of one rainwater garden (SP33).

Section 8.2.2 Internal Loading-Subheading 'Chemical Treatment' The City would like additional information on the Ramsey-Washington alum dosing plant. Specific information desired includes the effectiveness of the BMP and on-going operational and maintenance costs.

The Ramsey-Washington alum dosing plant, located just upstream of Tanners Lake has been operating since 1998. The construction and engineering and design cost for the facility was \$676,000, adjusted to current construction costs it is estimated that a similar facility would cost \$1,020,000. Approximately 30,000 gallons of alum is used each year, costing approximately \$30,000 to \$40,000 depending upon the cost of alum. General maintenance costs have been estimated to range from \$5,000 to \$10,000 per year

To: Jeff Oliver and Jeanine Clancy
From: Keith Pilgrim and Len Kremer
Subject: Sweeney Lake TMDL
Date: August 12, 2009
Project: 23/27 051
c: Ron Leaf

and includes staff costs to operate the facility, equipment repair (e.g., new dosing pumps, control panel repairs), and cleaning of the mixing chamber sump. Spent alum floc removal is the primary maintenance cost and has ranged from \$25,000 a year when direct discharge to the sanitary sewer is conducted to as high as \$100,000 a year when the alum floc is disposed in a landfill.

The alum dosing system has achieved an average of 68 percent total phosphorus removal since it began operating in 1998 (performance ranges from 53 to 83 percent). Annually the system removes approximately 97 kg of phosphorus from storm water (assumes an average flow rate of 1.5 cfs, inflow total phosphorus concentrations of 309 ug/L, and 120 days of operation).

To: Jeff Oliver and Jeanine Clancy
 From: Keith Pilgrim and Len Kremer
 Subject: Sweeney Lake TMDL
 Date: August 12, 2009
 Project: 23/27 051
 c: Ron Leaf

Table 1. Treatment devices used in stormwater treatment modeling for the Sweeney Lake TMDL.
 Phosphorus removal (lbs) and efficiency (%) are for June 1 through September 30, 2004.

Model Device (pond and rainwater gardens)	TP Removed (lbs)	TP load removal efficiency (%)
SP1	0.8	55.1
SP2	8.3	49.2
SP6	1.7	29.6
SP7	5.0	54.8
SP9	1.3	53.7
SP15	8.4	44.8
SP16	7.0	22.0
SP17	13.4	37.7
SP18	9.6	27.7
SP19	20.6	25.9
SP20	4.3	42.6
SP21	2.8	40.5
SP22	2.6	35.1
SP24	0.8	17.4
SP25	5.8	24.6
SP26	3.9	41.5
SP27	1.1	63.8
SP28	1.3	50.6
SP29	6.6	45.5
SP30	6.7	48.0
SP31	2.2	55.3
SP34	4.3	39.8
SP36	1.4	45.9
SP12	1.3	27.6
SP37	3.4	54.3
SP38	1.6	30.4
SP41	1.2	52.5
SP14	8.2	42.2
SP42	12.0	45.5
SP43	1.1	21.3
SP44	1.1	23.5
SP3	33.9	43.3
SP4	6.6	19.2
SP5	9.0	28.5
SP8	37.3	19.3
SP10	9.2	6.6
SP11	13.1	7.9
SP13	28.7	15.8
SP23	69.2	10.6
SP32	2.3	56.7
SP33	0.2	47.4
SP39	0.8	52.1
SP40	1.3	47.7
SP35	80.2	9.0