Item 6I.
BCWMC 6-19-14

Bassett Creek Watershed Management Commission
Watershed Tour
May 29, 2014

1:00 Depart from Golden Valley City Hall

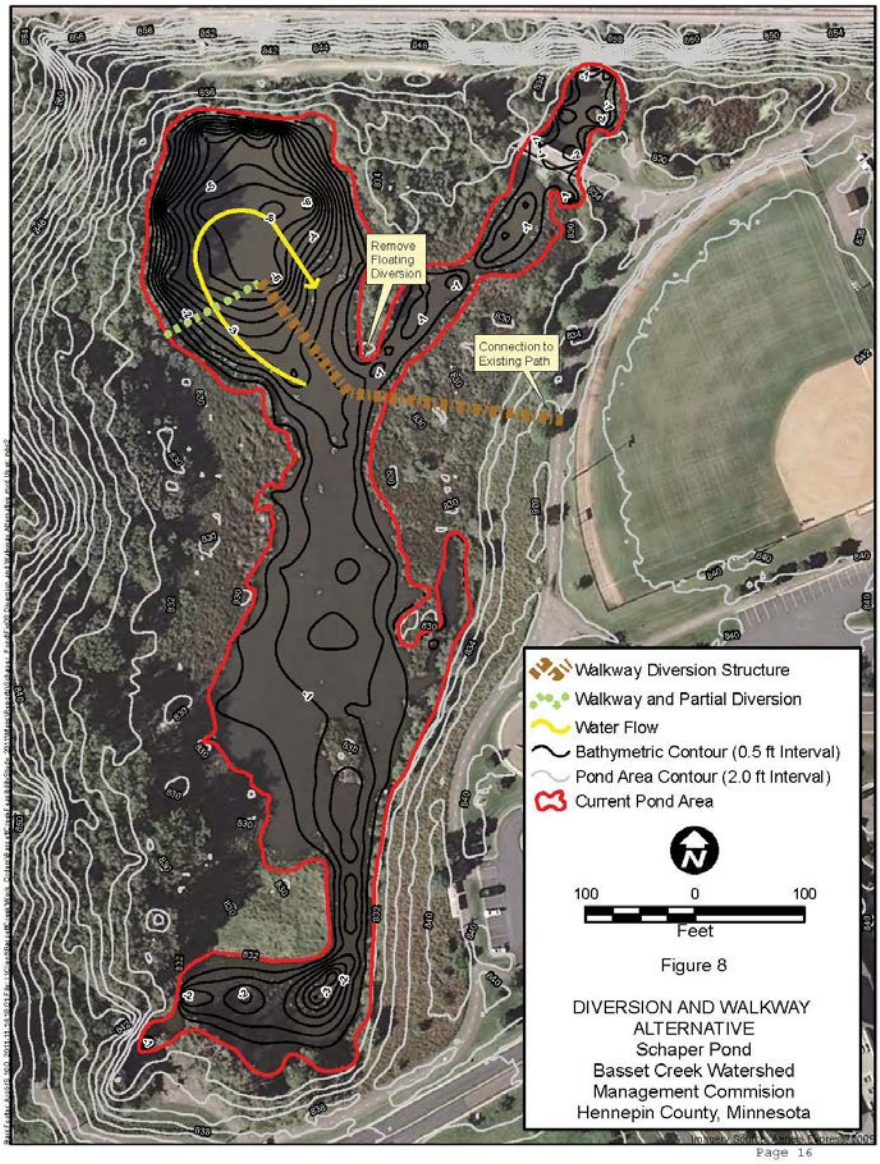
1:10 Schaper Pond Diversion Project – Stop #1

Schaper Pond is a DNR public water wetland through which the Sweeney Branch of Bassett Creek flows before emptying into Sweeney Lake. The Schaper Pond Diversion Project is on the Commission's Capital Improvement Program for 2014. The project was identified as a primary option for reducing phosphorus in Sweeney Lake in the Lake's Total Maximum Daily Load (TMDL) implementation plan.

The 2012 feasibility study for this project recommended construction of a diversion structure within Schaper Pond to direct more of the stormwater from the south of the pond to the larger and deeper northwest lobe of the pond where more treatment could be provided. The feasibility study found that the project could remove an estimated 81 – 156 pounds of phosphorus during the summer months (June through September) each year.

The Commission ordered the project in September 2013. The estimated project cost is $612,000; $78,000 will be paid from the Commission's Closed Project Account and $534,000 will be paid from funds received from a county watershed-wide tax levy.

The Commission is currently in discussions with the MPCA and MDNR about mitigation measures that may be needed and the impact of the project on Golden Valley's stormwater permit.



1:45 Wirth Lake Outlet Structure – Stop #2

The Implementation Plan for the *Wirth Lake Total Maximum Daily Load Study* (MPCA, 2010) included a project to modify the outlet structure at Wirth Lake to prevent flow from Bassett Creek to Wirth Lake during periods of high water.

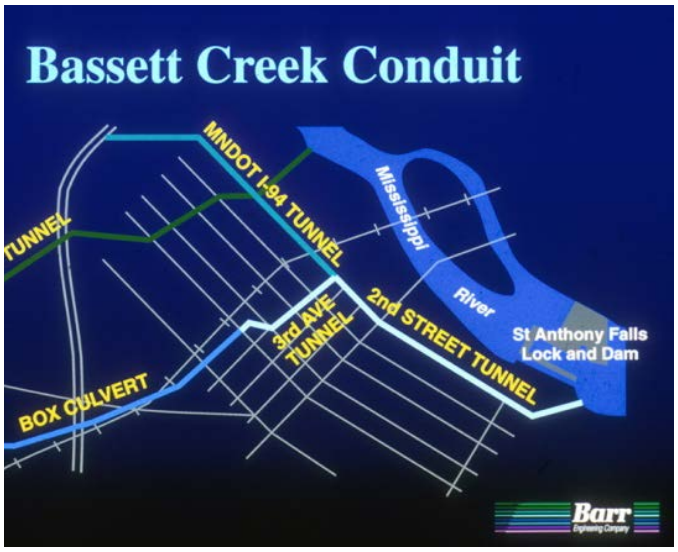
The outlet modification was estimated to reduce phosphorus loading to the lake by an average of 55 pounds per year (*Wirth Lake Excess Nutrients Total Maximum Daily Load Report*, MPCA, 2010). The existing stone-faced concrete culvert that once served as a roadway crossing in addition to the Wirth Lake outlet was constructed several decades ago. Although the roadway was removed, the culvert was left in place. A timber weir was built onto this concrete culvert in the 1970's to help maintain lake elevations and to help prevent rough fish from entering the lake. On behalf of the BCWMC, the City of Golden Valley replaced the outlet structure during the fall of 2012. The project included replacing the timber weir with a new concrete weir structure that incorporates two check valves to prevent the flow of Bassett Creek into Wirth Lake. The valves were placed inside the existing culvert to be out of sight of park users. The project was constructed by G.F. Jedlicki Inc. for approximately $90,000.

During construction, fall 2012

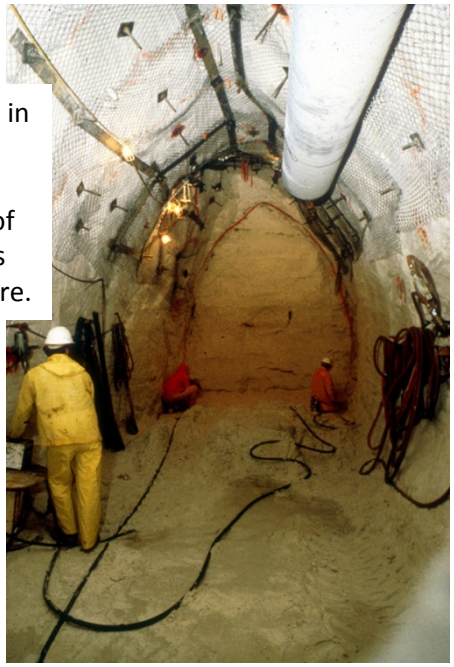
Wirth Lake Outlet Structure, June 2013

2:25 Bassett Creek Tunnel Entrance – Stop #3

From the entrance where we stand today, the Bassett Creek tunnel (conduit) carries the stream 2.4 miles underground, entering the Mississippi River below St. Anthony Falls. The design and construction of the tunnel was a cooperative project of the Minnesota Department of Transportation (MnDOT), the City of Minneapolis and the BCWMC. The tunnel was constructed in three segments (see diagram): the Second Street tunnel section, the Third Avenue tunnel section, and finally, the double box culvert section. The BCWMC's share of the total cost of constructing the three reaches of the tunnel in 2013 dollars was $75 million - most of which was provided by the Federal Water Resources Development Act.



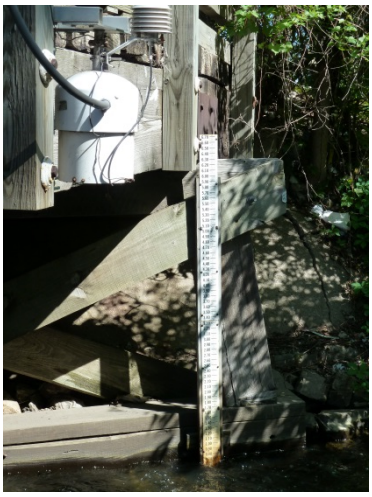
The Second Street tunnel, completed in 1978, is one mile in length with a 12-foot diameter equivalent arch. This section was constructed by MnDOT in a sandstone layer up to 80 feet below Second Street. It was designed to drain Interstates 394 and 94 along with parts of the City of Minneapolis and the Bassett Creek watershed.



The Third Avenue Tunnel, completed in 1990, is 0.3 miles long with a 13-foot diameter equivalent arch that was constructed by the U.S. Army Corps of Engineers, also in the sandstone. This reach includes a 35 foot drop structure.

The double box culvert (each measuring 11x11 feet) is 1.1 miles long and was completed in 1992 by the Corps of Engineers.

2:55 Watershed Outlet Monitoring Program (WOMP) Station – Stop #4



This monitoring station is part of the Metropolitan Council's Watershed Outlet Monitoring Program (WOMP) and has been operating since 2000. The BCWMC is the local cooperator for this station, providing the labor and some data analysis. The Met Council provides some reimbursement of labor costs, all laboratory analysis expenses, purchase and maintenance of the equipment, and logistical coordination. Water samples are collected here during snowmelt and rain events (10 – 15 composite samples per year), and monthly during periods of base flow conditions (when there is no runoff from rain or snowmelt). Samples are analyzed for bacteria, nutrients, solids, temperature, and conductivity. These data allow agencies to track trends in water quality and understand the effects of storm water runoff on water quality.

Water *quantity* measurements are collected continuously at the station, providing important data on the flow rate and volume of water passing the point. These data are useful in hydrologic modeling and other studies. See attached lab analysis sheet and trend analysis report.

Crystal Lake Treatment Plant – Presentation on bus

The Crystal Lake Flocculation Treatment Plant is located in Lakeview Terrace Park along the southern shore of Crystal Lake in Robbinsdale, just outside the BCWMC boundaries. It was constructed in 2011 and began operating in 2012 to help address the high levels of nutrients (phosphorus) in the lake and was identified in to help meet nutrient reductions required in the Crystal Lake Total Maximum Daily Load. The project uses standard drinking water technology to treat lake water to very high standards. It operates by withdrawing water from the lake (shallow or deep water intakes) and chemically treating this water with alum in a clarifier tank to bind the phosphorus as a floc. The floc settles to the bottom of the tank while the clean water flows over a weir and is discharged directly back into the lake or through a series of ponds in the park. The floc which concentrates at the bottom of the clarifier is discharged into the sanitary sewer system at pre-determined intervals through an automated valve.

Adjacent to the clarifier is the control building which contains the chemicals and the controls for the process. Two bulk storage tanks hold the alum and buffering solution. From the bulk storage tanks, chemicals are pumped into day tanks and then fed into the clarifier at rates based on the testing of the phosphorus concentrations of the influent.

Watershed Outlet Monitoring Program Field Notes and LAB SUBMISSION sheet

Grab Sample

Stream Name: **BASSETT_CR**	Project Number: **7103-99-01**
Sampling Point (river mile): **1_9**	Field Crew:
Cross-Section[1]: Right Bank – Mid - Left Bank	**Sample Depth**[2]: Fixed - Top - Bottom

[1] **Circle** cross-sectional location of sample collection point as determined by facing downstream.
[2] **Circle** sample depth: **Fixed =** Automatic Sampler Intake, **Surface** = Sampler Dipped into Stream Surface, **Top** = 1-meter from Surface, **Bottom** = 1-meter from Bottom; **Other =** Depth in 1-meter increments.

Required Grab Sample Data	(all times expressed at CDST)	**(*5 on keypad)**
Sample Start Date: / / **14**	Start Time (24 hr):	Campbell Start Day No:
Sample End Date[1]: / / **14**	End Time[1] (24 hr):	Campbell End Day No[1]:
Stream Stage (ft):	Bubbler reading, upon arrival _____ Reference Stage : _____	Stage from Bubbler after purge _____ SR-50_____
Flow (based upon reference stage)	_____ CFS	Type of Reading: **Gaged** -or- **Datalogger**

[1]End Date/Time/Campbell Day will be the same as Start Date/Time/Campbell Day.

Optional Grab Sample Data --- Measured From: Stream __x_ Sample Container _____ Datalogger _____	
Water Temperature (^{o}C):	Transparency Tube (cm):
Conductivity (μmhos/cm):	Dissolved O2 (before 0900):

Oakton 410 _____ Sonde _____ Calibration check before and after ? Y/N

Laboratory Analyses

Check each analysis requested. Ice sample and submit within 24 hours of collection.

LENGTHY FIELD HOLDING TIME		SHORTER FIELD HOLDING TIME
WINTER SAMPLES ONLY (DEC. – MARCH)	☒ **Total Phosphorus plus TKN (NUT-AV)**	☒ **Total & Volatile Suspended Solids (TSSVSS-GF)** [7 DAYS]
☒ **Total Magnesium (Mg-MSV)** [180 days]	[28 DAYS]	
WINTER SAMPLES ONLY (DEC. – MARCH)	☒ **Nitrate & Nitrite Nitrogen (N_N-AV)**	☒ **Turbidity (TRB-NTRUN2)**
☒ **Total Calcium (CA-MSV)** 180 days]	[28 DAYS]	[24 hrs]
☒ **Dissolved Phosphorus (P-AV Filt)**	☒ **Total Ammonia Nitrogen (NH3N-AV)**	☒ **Ortho-phosphate (Ortho_P-AV**)
[28 DAYS]	[28 DAYS]	[24 HRS]
☒ **Total Chem. Oxygen Demand (COD-A2)**	☒ **Total Hardness (HARD-HL)**	☒ **E.COLI – MPNT** E. Coli [4 hours]
[28 DAYS]	[30 DAYS]	
☒ **Total Chlorides (CL-AV)** [28 DAYS]	☒ **Total Alkalinity (ALK-AV)**	☒ **Chlorophyll A (CLA-TR-C)** [8 hrs.] keep sample dark and cold
	[14 DAYS]	
☒ **Total Sulfates (SO4 – N)**	☒ **Total Organic Carbon TOC (TOC-WO FILT.)**	☐ **Dissolved Oxygen (DOX)** [before 0900] hrs.] **Winkler Test kit** keep sample dark and cold
[28 DAYS]		

Reference Stage Check (tape down)

Expected Total = 12.03
minus tape down of _____

Equals Correct Stage:

Purge and Reset Bubbler? Yes / No

In-stream Conductivity probe adjusted to match the Oakton? Y / N

Datalogger reading _____

Oakton reading _____

OTHER OBSERVATIONS

Wind:
calm / light / moderate / strong?

Cloud Cover (%):
_____

Precip: (none-light –moderate-heavy)

Precip. Type: rain / snow / sleet

LAB PHONE: 651-602-8293 (call before delivery) **USE BACK OF FORM FOR FIELD COMMENTS**

Watershed Outlet Monitoring Program Field Notes and LAB SUBMISSION sheet

Composite Sample

Stream Name: **BASSETT_CR**	Project Number: **7103-99-01**
Sampling Point (river mile): **1_9-ARF**	Field Crew:

Required Composite Sample Data		
Sample Start Date: / / **14**	Start Time (24 hr):	Campbell Start Day No:
Sample End Date[1]: / / **14**	End Time[1] (24 hr):	Campbell End Day No:
Total Sampled Volume (ft^3):		
Sample Volume Increment (ft^3):		

[1] Total Sampled Volume = total cubic feet of water passing the monitoring station between the first and last samples in the flow composited event

Optional Composite Sample Data	**(Take measurement from sample container)**
Conductivity (μmhos/cm):	Transparency Tube:

Oakton 410 meter - always calibrate before and after; check stream conductivity and adjust to Oakton value when visiting the site.

Laboratory Analyses

Check each analysis requested. Ice sample and submit within eight hours after collection of last sample.

LENGTHY FIELD HOLDING TIME

WINTER SAMPLES ONLY (DEC. – MARCH)

☐ **Total Calcium (CA-MSV)**

WINTER SAMPLES ONLY (DEC. – MARCH)

☐ **Total Magnesium (Mg-MSV)**

☒ **Total Phosphorus plus TKN (NUT-AV)** [28 DAYS]

☒ **Dissolved Phosphorus (P-AV FILT)** [28 DAYS]

☒ **Total Chem. Oxygen Demand (COD-A2)** [28 DAYS]

☒ **Total Chlorides (CL-AV)** [28 DAYS]

☒ **Total Sulfates (SO4 – N)** [28 DAYS]

☒ **Nitrate & Nitrite Nitrogen (N_N-AV)** [28 DAYS]

☒ **Total Ammonia Nitrogen (NH3N-AV)** [28 DAYS]

☒ **Total Hardness (HARD-HL)** [30 DAYS]

☒ **Total Alkalinity (ALK-AV)** [14 DAYS]

☒ **Total Organic Carbon TOC (TOC-WO FILT.)**

SHORTER FIELD HOLDING TIME

☐ **Turbidity (TRB-NTRUN2)** [24 HRS FROM END TIME OF COMPOSITE]

☐ **Ortho-phosphate (Ortho_P-AV)** [24 HRS]

☒ **Total & Volatile Suspended Solids (TSSVSS-GF)** [7 DAYS]

Notes: Calculate correct stage

Expected Total 12.03'

(minus) Tape Down - _____

Correct Stage =

BUBBLER READING upon arrival =

RESET BUBBLER? **Y / N**

SR-50 reading =

Harmonic mean of flow from in this composite = _____ cfs

(storm data lines only)

FLUX date = _____

(date when sampling is half-way done)

Comments (describe event):

LAB PHONE: 651-602-8293. Submit E.coli as grab to accompany composite delivery. Use separate Grab Sample Lab Sheet.

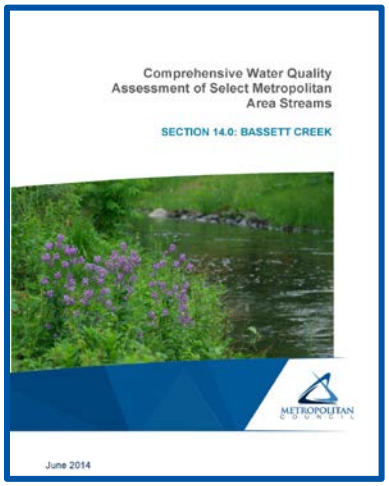
Bassett Creek Watershed Outlet Monitoring Program: Data Assessment Overview

Contacts: Emily Resseger - emily.resseger@metc.state.mn.us
Karen Jensen - karen.jensen@metc.state.mn.us

The Bassett Creek monitoring station was installed by Metropolitan Council – Environmental Services (MCES) in March 2000.

Located 1.9 miles from Mississippi River confluence.

Funded by MCES and Clean Water Land and Legacy Amendment funds.

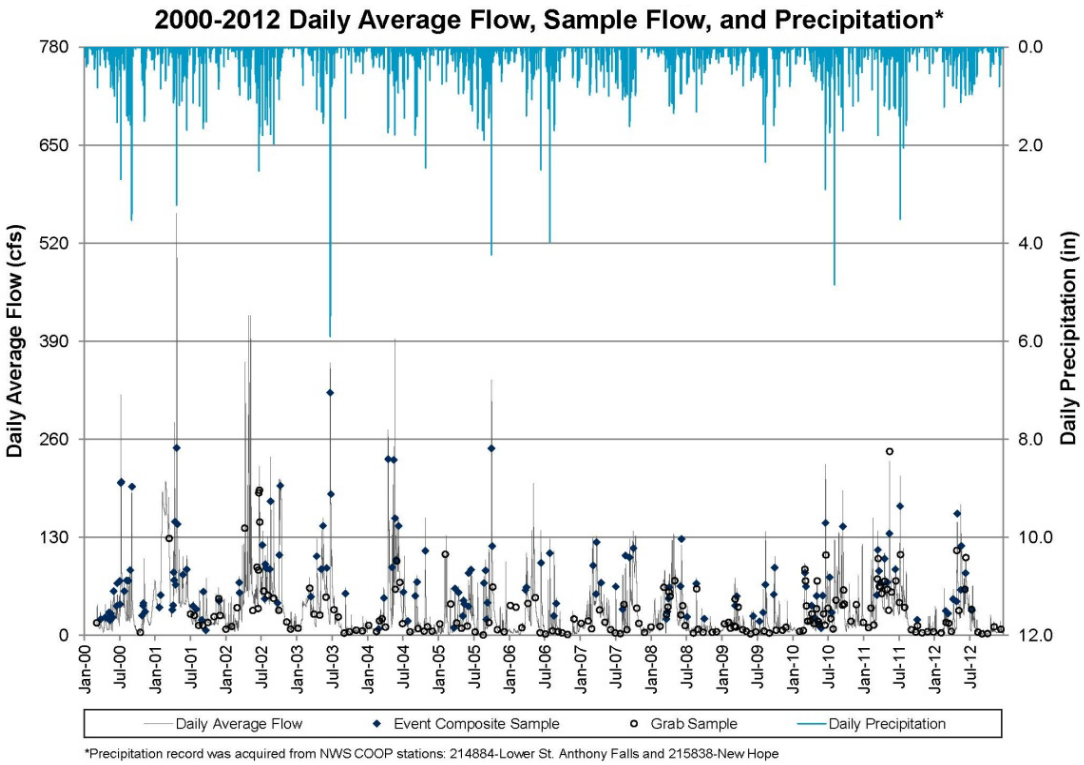


In June 2014, MCES will be finalizing a comprehensive assessment of historical data collected by MCES on 21 metropolitan area streams. Bassett Creek is included in the report. Some general results include:

- Nutrient and sediment concentrations in Bassett Creek have shown a downward trend during period 2000 – 2012.
- Nutrient and sediment concentrations in Bassett Creek are lower than representative streams in the Minnesota River and St. Croix River watersheds. Chloride concentrations in Bassett Creek are the highest of all streams monitored by MCES.
- Groundwater modeling analysis by MCES indicates that the entire length of Bassett Creek and some watershed lakes, including Medicine Lake, are potentially vulnerable to groundwater withdrawals.

2003 – 2012 Median Annual Values

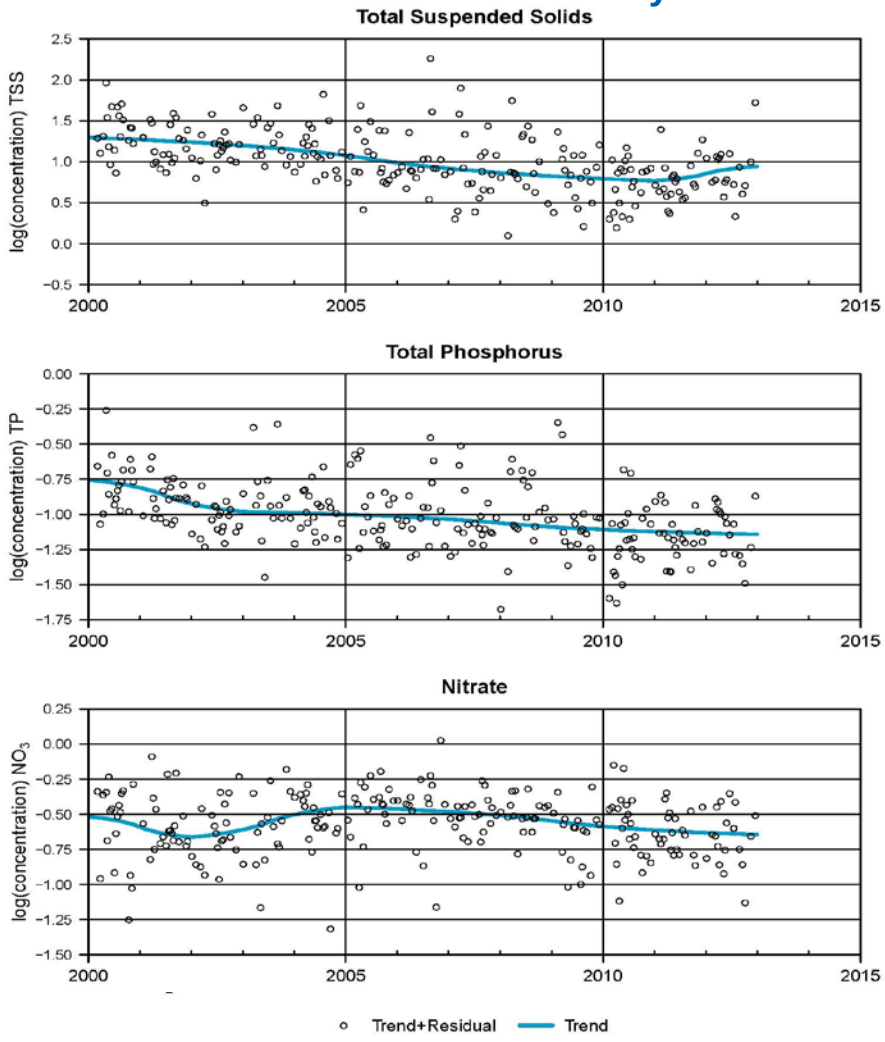
	Bassett Creek	Sand Creek (Minnesota River Watershed)	Browns Creek (St. Croix River Watershed)
Total suspended sediment	37 mg/l; 77 lb/acre	340 mg/l; 490 lb/acre	51 mg/l; 170 lb/acre
Total phosphorus	0.15 mg/l; 0.33 lb/acre	0.53 mg/l; 0.7 lb/acre	0.16 mg/l; 0.51 lb/acre
Nitrate	0.38 mg/l; 0.8 lb/acre	4.9 mg/l; 5.8 lb/acre	0.9 mg/l; 2.8 lb/acre
Chloride	140 mg/l; 266 lb/acre	36 mg/l; 46 lb/acre	20 mg/l; 66 lb/acre



MCES and their partners have been monitoring Bassett Creek streamflow, precipitation, and water chemistry.

2000 – 2012 Stream Chemistry Trends

As part of the Comprehensive Water Quality Assessment of Select Metropolitan Area Streams, MCES performed statistical trend assessment using concentration and flow data to look for long-term changes in sediment (total suspended solids), phosphorus (total phosphorus), and nitrogen (nitrates).



3:35 2011 Stream Restoration Site, Golden Valley – Stop #5

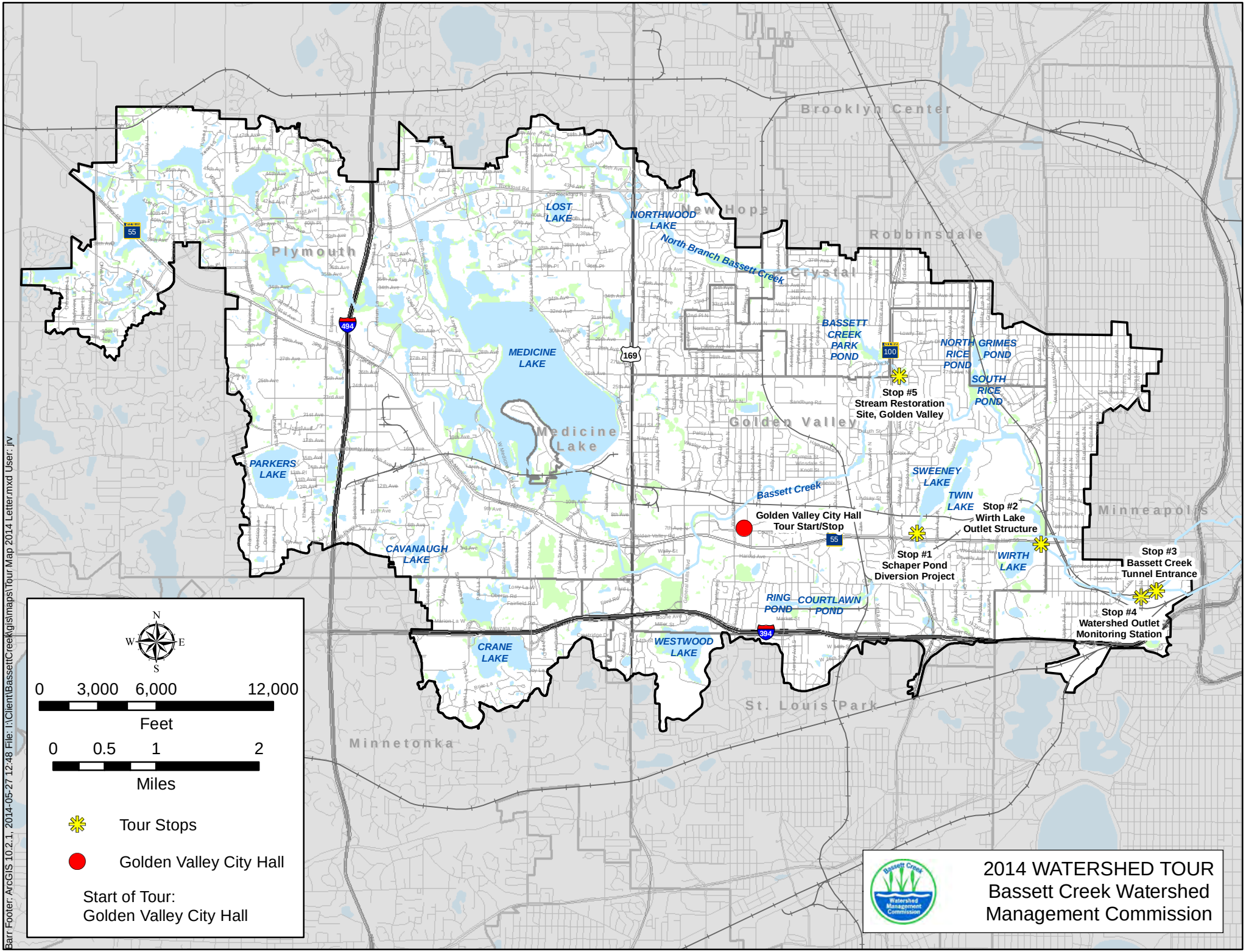
This stream restoration project was part of the 2011 watershed tour, just after construction was completed. The project restored the main stem of Bassett Creek from the Golden Valley - Crystal boundary (just upstream of Highway 100) to Regent Avenue in Golden Valley. The eroded banks were sloped and stabilized with rock and vegetation along approximately 1,320 feet.

Funding for this project came from Hennepin County and the Clean Water Fund ($135,000), the Minnesota Board of Water and Soil Resources and the Clean Water Fund ($147,750), and Bassett Creek WMC ($353,350) for a total of $636,100.

Eroded conditions, preconstruction

During construction, 2011

Two years post-construction, 2013


Brooklyn Center
New Hope
Robbinsdale
Crystal
Plymouth
Golden Valley
Medicine Lake
Minneapolis
St. Louis Park
Minnetonka
LOST LAKE
NORTHWOOD LAKE
North Branch Bassett Creek
MEDICINE LAKE
BASSETT CREEK PARK POND
NORTH RICE POND
GRIMES POND
SOUTH RICE POND
Stop #5
Stream Restoration
Site, Golden Valley
PARKERS LAKE
SWEENEY LAKE
Bassett Creek
TWIN LAKE
Stop #2
Wirth Lake
Outlet Structure
Golden Valley City Hall
Tour Start/Stop
Stop #1
Schaper Pond
Diversion Project
WIRTH LAKE
Stop #3
Bassett Creek
Tunnel Entrance
CAVANAUGH LAKE
RING POND
COURTLAWN POND
Stop #4
Watershed Outlet
Monitoring Station
CRANE LAKE
WESTWOOD LAKE
494
55
169
100
394
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E
S
0 3,000 6,000 12,000
Feet
0 0.5 1 2
Miles
Tour Stops
Golden Valley City Hall
Start of Tour:
Golden Valley City Hall
2014 WATERSHED TOUR
Bassett Creek Watershed
Management Commission
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