Item 6A.
BCWMC 2-18-16

Appendix E
Plymouth Creek Restoration
Project DRAFT Feasibility Study

Wetland Delineation Report - DRAFT

Plymouth Creek Feasibility Study

Prepared for
Bassett Creek Watershed Management Commission

January 2016

Wetland Delineation Report - DRAFT

Plymouth Creek Feasibility Study

Prepared for
Basset Creek Watershed Management Commission

January 2016

4300 MarketPoint Drive, Suite 200
Minneapolis, MN 55435
Phone: 952.832.2600
Fax: 952.832.2601

Wetland Delineation Report

January 2016

Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

Basset Creek Watershed Management Commission (BCWMC) is submitting a Wetland Delineation Report as part of a study that examines the feasibility of restoring sites along Plymouth Creek reaches damaged by erosion or affected by sedimentation. The project area is located along several reaches of Plymouth Creek beginning at Plymouth Creek Park and continues between Fernbrook Lane North and Annapolis Lane North, Plymouth, Hennepin County, Minnesota. The project area is within Sections 16, 21 and 22 of Township 118 North, Range 21 West (**Figure 1**).

A field wetland delineation was conducted along the fringes of these stream reaches to include delineation of creek edges. Two wetland boundaries were delineated along the creek fringes and are depicted in **Figure 6**.

This Wetland Delineation Report has been prepared in accordance with the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual ("1987 Manual", USACE, 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE, 2010) and the requirements of the Minnesota Wetland Conservation Act (WCA) of 1991. Barr delineated the wetland boundaries and determined wetland types within the project area on September 22, 2015.

This report includes a project overview (Section 2.0), general environmental information (Section 3.0), descriptions of the delineated wetlands (Section 4.0), and a discussion of regulations and the administering authorities (Section 5.0). The Tables section includes the precipitation data. The Figures section includes the Site Location Map, Topography Map, National Wetland Inventory (NWI), Public Waters Inventory (PWI), Hydric Soils Map and the Wetland Boundary Map. **Appendix A** includes Wetland Data Forms, and site photographs are included in **Appendix B**.

2.0 Project Description

The entire Plymouth Creek project area (Error! Reference source not found.) extends approximately 2,800 feet from Annapolis Lane North on the downstream end to approximately 1,700 feet upstream of Fernbrook Lane North on the upstream end. The upstream boundary of the project area is a water-level-control structure (**Photo 1**). Originally known as the Central Park Pond Outlet, this structure runs under an access road that connects the Plymouth Creek Park parking lot on the north and the Plymouth Creek Center on the south.

The BCWMC Engineer walked the entire project area in September 2015 and identified sites with bank erosion, scour, and/or bank failure. Additional site visits were conducted in October and November 2015 to meet with stakeholders, check conceptual stabilization alternatives, and observe the creek during different flow conditions. Restoration/stabilization of the sites were considered critically important to meeting BCWMC goals and objectives cost effectively.

Stream bank erosion is a natural process that occurs at some rate on all alluvial channels, and the natural erosion rate can be accelerated by local and regional changes in land use and hydrology. The bank erosion and bank failures throughout the project area appear to be caused by a combination of natural stream erosion processes, problems associated with changing watershed hydrology, and effects of riparian land use. Of the 5,600 feet of stream bank in the project area, approximately 2,850 feet (more than half) showed some degree of erosion.

Stable stream channels are often said to be in a state of "dynamic equilibrium" with their watersheds, adjusting to changes in the watershed hydrology. It may take many years or decades for a stream to fully adjust to a rapid change in watershed hydrology. The use of best management practices (BMPs) helps reduce the impact of development projects on streams. Nonetheless, development and land use changes fundamentally change the hydrology of the watershed. These changes to hydrology often include increased magnitude and frequency of high-flow events, which subsequently increases erosion rates. In addition, the heavy use of golf course in the riparian area of Reaches 1 and 2 has decreased groundcover on the stream banks and adjacent wooded areas, increasing the potential for erosion.

3.0 General Environmental Setting

3.1 Site Description

The proposed project area is located within City of Plymouth property. The project area west of Fernbrook Lane North is bordered by medium density apartment property to the south and Plymouth Creek Park to the north and west. The project area located east of Fernbrook Lane North has medium density housing to the North and office building space to the south. Lands surrounding the project area are forested with deciduous trees (**Figure 1**).

3.2 Topography

The project area has moderately undulating to flat topography throughout and in most areas along Plymouth creek there is an abrupt topographic break leading into the creek due to erosion. Topography surrounding the project area further away is relatively flat (**Figure 2**).

3.3 Precipitation

Recent precipitation data were compared to historic data for evaluating annual and monthly deviations from normal conditions. Simulated precipitation data were obtained from the Minnesota Climatology Working Group, Wetland Delineation Precipitation Data Retrieval from a Gridded Database (http://climate.umn.edu/gridded_data/precip/wetland/wetland.asp) for wetlands in Hennepin County, Township 118 North, Range 22 West, Section 21.

In 2015, antecedent moisture conditions were within the normal range based on precipitation for the three months prior to the September 22, 2015 site visit. These data were obtained from NRCS climate station 215838, New Hope Weather Station (**Table 1**). The water year has varied between normal and wet for the past six years but fell mostly into the wet range from 2010 through 2015 (**Table 2**).

3.4 National Wetland Inventory

The National Wetland Inventory (NWI) Map has identified a portion of the Plymouth Creek Study Reach as riverine wetland located west of Fernbrook Lane North. It was identified as a riverine (R) wetland, lower perennial (L), with an unconsolidated bottom (UB) that has an intermittently exposed hydrologic regime (G) or an R2UBG riverine wetland. No other NWI wetlands were mapped within the Plymouth Creek Study Reach (**Figure 3**).

3.5 Water Resources

The Minnesota Department of Natural Resources (MnDNR) Public Waters Inventory (PWI) has identified Plymouth Creek as a public water inventory watercourse (**Figure 4**). Reaches of Plymouth Creek located within the project area were delineated along with two wetland fringe areas. Plymouth Creek is not identified by the Minnesota Pollution Control Agency (MPCA) as an impaired water.

3.6 Soil Resources

Soil information for the wetland evaluation area was obtained from the Soil Survey of Hennepin County, Minnesota (USDA, 1974). Three soil map units were identified within the project area along the Plymouth Creek reaches: Hamel overwash-Hamel complex, 1 to 4 percent slopes (L36A), Lester loam, 6 to 10 percent slopes, moderately eroded (L22C2) and Hamel-Glencoe depressional, complex, 0 to 3 percent slopes (L132A). The Hamel overwash-Hamel complex and Lester loam are mapped as predominately Non-Hydric. The Hamel-Glencoe depressional is mapped as predominately hydric (**Figure 5**).

4.0 Wetland Delineation

4.1 Wetland Delineation and Classification Methods

Wetlands within the site were delineated and classified during a site visit on September 22, 2015. The wetland delineation was established according to the Routine On-Site Determination Method specified in the U.S. Army Corps of Engineers Wetlands Delineation Manual (1987 Edition) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE, 2010).

The delineated wetland boundaries and sample points were surveyed using a Global Positioning System (GPS) with sub-meter accuracy (**Figure 6**).

Wetlands were classified using the U.S. Fish and Wildlife Service (USFWS) Cowardin System (Cowardin et al., 1979), the USFWS Circular 39 system (Shaw and Fredine, 1956), and the Eggers and Reed Wetland Classification System (Eggers and Reed, 1977).

Soil borings were placed in and around the wetland, to a depth of at least 20 inches below the ground surface where possible. Representative soil samples from each boring were examined for the presence of hydric soil indicators using the Natural Resources Conservation Service (NRCS) hydric soil indicators (Version 6.0). Soil colors (e.g., 7.5YR 4/2, etc.) were determined using a Munsell® soil color chart and noted on the Wetland Data Forms **Appendix A**.

Hydrologic conditions were evaluated at each soil boring, and this information was also noted on the Wetland Data Forms. The dominant plant species were identified, and the corresponding wetland indicator status of each plant species was determined and noted on the Wetland Data Forms (**Appendix A**). Photographs taken at the time of the site visit are provided in **Appendix B**.

4.2 Wetland Descriptions

Two wetlands were delineated within the project site. Descriptions and assessments of the wetland areas are provided below, with representative photographs in **Appendix B**.

4.2.1 Wetland 1

Wetland 1 is a Type 1 (PEMA), seasonally flooded basin within floodplain located on the right bank of Plymouth Creek within Plymouth Creek Park (**Figure 6**). The surrounding area has steep and abrupt slopes leading into Wetland 1. There is an upland island between Wetland 1 and Plymouth creek approximately 8 feet higher in elevation than the surface of the wetland. Flood waters may periodically enter the north end of Wetland 1 between the upland island and the adjacent forested uplands to the south, which flow through and back to Plymouth Creek further downstream.

Dominant plants within wetland 1 and at Wetland Sample Point 1-1 (SP 1-1 WET) was reed canary grass (*Phalaris arundinacea*, FACW). Sub-dominant species included green bulrush (*Scirpus atrovirens*, OBL), stinging nettle (*Urtica dioica*, FACW) and a species of sedge (*Carex sp*.) that could not be identified. Tree and shrub species were present within 30 feet of SP 1-1 WET but were not directly within the basin.

Primary indicators of hydrology that were observed were high water table (A2), and saturation (A3). Secondary indicators of hydrology present included geomorphic position (D2) and a positive FAC-Neutral test (D5).

Soils mapped at SP 1-1 WET and throughout Wetland 1 were identified as Lester loam, 6-10% slopes. Sampled soils were black at the surface with 2 percent redoximorphic concentrations down to 9 inches with sandy loam textures. Soils from 9 inches to 18 inches were dark grayish brown with 5 percent redoximorhic features and had fine sandy loam textures. At 18 inches soils transitioned to black and sandy mucky mineral textures down to 25 inches. The hydric soil indicator at SP 1-1 WET is sandy redox (S5).

The transition to upland was defined by the lack of vegetation, hydrology and hydric soil indicators. Dominant vegetation in upland areas consisted of sugar maple (*Acer saccharum*, FACU), common dandelion (*Taraxacum offcinale*, FACU) and a species of sedge.

4.2.2 Wetland 2

Wetland 2 is a Type 2 (PEMB), fresh meadow located on the left bank of Plymouth Creek approximately 300 feet downstream from Wetland 1 (**Figure 6**). Wetland 1 may occasionally flood during the growing season but in most year's water likely remains within 12 inches of the soil surface. Two sample points were taken within Wetland 1 along the same transect. Data from SP 2-1 WET-A was collected close to the wetland boundary and data from SP 2-1 WET-B was collected closer to the creek channel.

Reed canary grass and eastern cottonwood (*Populus deltoides*, FAC) is dominant at both SP 2-1 WET-A and SP 2-1 WET-B with a sub-dominance of water smartweed (*Persicaria amphibia*, OBL).

There were no primary indicators of hydrology observed within Wetland 2. Secondary indicators of hydrology present included geomorphic position (D2) and a positive FAC-Neutral test (D5).

Soils mapped at both sample locations and throughout Wetland 2 were identified as Lester loam, 6-10% slopes. Soils at SP 2-1 WET-A were very dark gray clay loams down to 8 inches and transitioned to dark grayish brown with 20 percent redoximorphic features down to 14 inches. From 14 to 20 inches soils

transitioned to more yellow hues that were dark gray. Textures were clay loam throughout the soil profile. The hydric soil indicator at SP 2-1 WET-A is redox dark surface (F6).

Soils at SP 2-1 WET-B were sandy clay and gleyed down to 15 inches with 2 percent redoximorphic concentrations. Soils transitioned to sand and dark gray colors with yellower hues from 15 to 25 inches. The hydric soil indicators at SP 2-1 WET-B are sandy gleyed matrix (S4) and sandy redox (S5).

The transition to upland was defined by the lack of vegetation, hydrology and hydric soil indicators. Dominant vegetation in upland areas consisted of sugar maple and European buckthorn (*Rhamnus cathartica*, FAC).

5.0 Regulatory Overview

The USACE regulates the placement of dredge or fill materials into wetlands that are located adjacent to or are hydrologically connected to interstate or navigable waters under the authority of Section 404 of the Clean Water Act. If the USACE has jurisdiction over any portion of a project, they may also review impacts to wetlands under the authority of the National Environmental Policy Act.

Filling, excavating, and draining wetlands are also regulated by the Minnesota Wetland Conservation Act (WCA), and the Minnesota Public Waters Inventory Program, which are administered by the City of Plymouth and the Minnesota Department of Natural Resources (DNR) respectively. The USACE, the City of Plymouth and the DNR should be contacted before altering any wetlands on the site. In addition, delineated wetland boundaries may be reviewed, if needed, by a Technical Evaluation Panel (TEP) consisting of representatives from the Minnesota Board of Water and Soil Resources, and Hennepin County, along with the City of Plymouth, DNR and USACE.

6.0 References

Cowardin, L.M., V. Carter, F.C. Golet, and R.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, FWS/OBS079/31, 103 pp.

Eggers, S.D. and Reed, D.M. 1997. *Wetland Plants and Plant Communities of Minnesota and Wisconsin.* U.S. Army Corps of Engineers, St. Paul District. St. Paul, Minnesota.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. *The National Wetland Plant List*: 2014 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42.

Shaw, S.P., and C.G. Fredine. 1956. Wetlands of the United States. U.S. Fish and Wildlife Service, Circular 39. 67pp.

U.S. Department of Agriculture, Natural Resources Conservation Service. 1974. *Soil Survey of Hennepin County, Minnesota*. Washington, D.C.

U. S. Department of Agriculture, Natural Resources Conservation Service. 2010. *Field Indicators of Hydric Soils in the United States, Version 7.0*. G.W. Hurt and L.M. Vasilas (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

U.S. Army Corps of Engineers. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region*. August 2010. Wetlands Regulatory Assistance Program.

U.S. Army Corps of Engineers. 1987. *1987 U.S. Army Corps of Engineers Wetland Delineation Manual*. Wetlands Research Program Technical Report Y-87-1 (on-line edition). Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Fish and Wildlife Service. 1956. *Wetlands of the United States Circular 39*. U.S. Government Printing Office, Washington, D.C.

Tables

Table 1
Antecedent Moisture Conditions Prior to September 22, 2015 Site Visit
Plymouth Creek Feasibility Study Wetland Delineation
Plymouth, MN

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:
County: Hennepin **Township Number**: 118N
Township Name: Plymouth **Range Number**: 22W
Nearest Community: Plymouth **Section Number**: 21

Aerial photograph or site visit date:
Tuesday September 22, 2015

Score using 1971-2000 normal period

(value are in inches)	first prior month: **August 2015**	second prior month: **July 2015**	third prior month: **June 2015**
estimated precipitation total for this location:	**3.6**	**7.02**	**3.56**
there is a 30% chance this location will have less than:	3.18	3.04	2.92
there is a 30% chance this location will have more than:	4.72	5.28	5.28
type of month: **dry** **normal** **wet**	**normal**	**wet**	**normal**
monthly score	**3 * 2 = 6**	**2 * 3 = 6**	**1 * 2 = 2**
multi-month score: 6 to 9 (**dry**) 10 to 14 (**normal**) 15 to 18 (**wet**)	14 (**normal**)		

Score using 1981-2010 normal period

(value are in inches)	first prior month: **August 2015**	second prior month: **July 2015**	third prior month: **June 2015**
estimated precipitation total for this location:	**3.6**	**7.02**	**3.56**
there is a 30% chance this location will have less than:	2.94	2.7	2.93
there is a 30% chance this location will have more than:	4.93	4.98	5.33
type of month: **dry** **normal** **wet**	**normal**	**wet**	**normal**
monthly score	**3 * 2 = 6**	**2 * 3 = 6**	**1 * 2 = 2**
multi-month score: 6 to 9 (**dry**) 10 to 14 (**normal**) 15 to 18 (**wet**)	14 (**normal**)		

Table 2
Precipitation in Comparison to WETS Data
Plymouth Creek Feasibility Study Wetland Delineation
Plymouth, MN

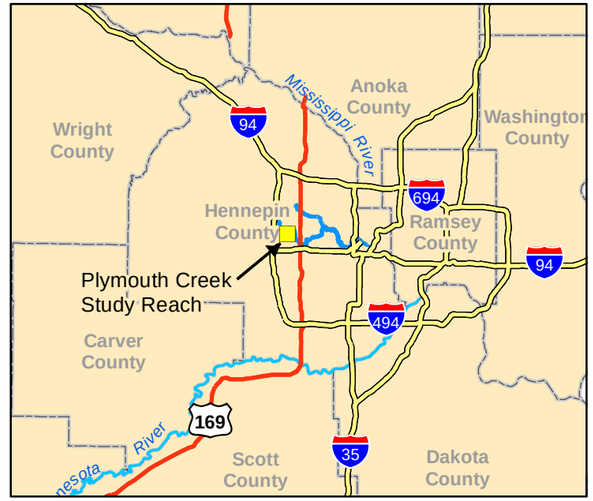
Precipitation data for target wetland location:

County: Hennepin **Township Number**: 118N
Township Name: Plymouth **Range Number**: 22W
Nearest Community: Plymouth **Section Number**: 21

Precipitation Totals are in Inches	
Color Key	**Multi-month Totals**:
total is in lowest 30th percentile of the period-of-record distribution	**WARM** = warm season (May thru September)
total is => 30th and <= 70th percentile	**ANN** = calendar year (January thru December)
total is in highest 30th percentile of the period-of-record distribution	**WAT** = water year (Oct. previous year thru Sep. present year)

Period-of-Record Summary Statistics															
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
30%	0.53	0.53	1.13	1.50	2.62	3.25	2.41	2.94	1.92	1.16	0.75	0.59	16.18	26.29	25.98
70%	1.07	1.24	1.95	2.76	4.28	5.66	4.50	4.44	3.75	2.65	1.92	1.31	20.94	32.47	32.04
mean	0.90	0.92	1.65	2.40	3.70	4.50	3.82	3.62	3.04	2.18	1.50	1.03	18.67	29.24	29.30
1971-2000 Summary Statistics															
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
30%	0.63	0.35	1.25	1.33	2.70	3.24	2.83	3.34	1.98	0.98	1.12	0.60	17.43	28.26	27.09
70%	1.13	0.98	1.96	2.62	4.03	5.53	4.89	4.84	3.28	2.80	2.24	1.28	20.78	32.84	33.70
mean	1.00	0.82	1.82	2.31	3.47	4.41	4.43	4.08	2.94	2.18	1.90	0.96	19.33	30.33	30.47
1981-2010 Summary Statistics															
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
30%	0.53	0.40	1.27	2.03	2.70	3.32	2.50	3.16	2.27	1.29	1.05	0.69	17.17	28.50	27.09
70%	1.06	0.91	1.96	2.84	4.08	5.44	4.41	4.91	3.73	3.35	2.02	1.45	21.56	34.09	34.04
mean	0.83	0.80	1.81	2.66	3.56	4.44	4.14	4.16	3.39	2.45	1.72	1.17	19.70	31.14	30.95
Year-to-Year Data															
Year	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
2015	0.38	0.34	0.67	1.84	4.44	3.56	7.02	3.60	3.76	2.84	-	-	22.38	-	28.86
2014	1.33	1.46	0.75	7.49	4.63	11.07	3.27	2.99	2.01	1.10	1.16	0.99	23.97	38.25	41.53
2013	0.65	1.17	1.89	4.05	5.17	7.78	4.72	1.53	1.45	4.37	0.58	1.58	20.65	34.94	32.40
2012	0.46	2.13	1.20	2.95	9.96	4.25	4.35	1.38	0.54	1.62	0.83	1.54	20.48	31.21	29.04
2011	0.92	0.96	1.57	3.00	6.50	4.13	6.45	3.64	0.60	0.94	0.16	0.72	21.32	29.59	34.81
2010	0.57	0.80	0.95	1.85	3.00	5.77	3.46	5.61	6.08	2.02	1.98	3.04	23.92	35.13	36.51
2009	0.43	0.91	1.92	1.18	0.49	3.80	0.89	6.62	0.87	5.62	0.60	2.20	12.67	25.53	21.26
2008	0.16	0.52	2.00	3.71	2.51	4.46	2.21	3.05	2.66	1.49	1.21	1.45	14.89	25.43	28.32
2007	0.71	1.29	3.31	2.37	3.22	1.30	2.02	6.86	4.96	5.24	0.09	1.71	18.36	33.08	30.45
2006	0.57	0.41	1.54	3.18	3.27	4.05	1.57	4.42	3.27	0.68	1.13	2.60	16.58	26.69	29.85
2005	1.31	0.88	1.23	2.47	3.50	6.25	2.47	3.08	6.59	4.60	1.61	1.36	21.89	35.35	32.81
2004	0.45	1.33	2.18	2.54	6.36	5.73	4.35	1.45	5.17	3.55	1.05	0.43	23.06	34.59	32.41
2003	0.22	0.92	1.62	2.77	4.66	6.73	2.36	0.47	2.52	0.92	1.13	0.80	16.74	25.12	26.26
2002	0.55	0.55	1.81	3.86	3.95	8.13	6.51	7.09	4.24	3.66	0.07	0.26	29.92	40.68	41.01
2001	1.25	1.25	0.89	7.93	5.27	5.07	2.51	3.17	3.46	0.87	2.86	0.59	19.48	35.12	36.01
2000	0.88	1.12	0.99	1.33	3.43	3.32	6.17	3.07	2.06	0.86	3.23	1.12	18.05	27.58	24.16
1999	1.19	0.32	1.54	3.12	6.57	5.31	4.49	4.06	2.33	0.66	0.81	0.32	22.76	30.72	33.69
1998	1.07	0.78	3.54	1.66	3.77	4.53	2.86	4.94	1.25	2.52	1.63	0.61	17.35	29.16	27.14
1997	1.60	0.26	1.39	1.04	1.73	2.62	9.74	4.54	2.86	1.95	0.57	0.22	21.49	28.52	36.05
1996	2.26	0.34	1.95	0.64	4.26	3.89	1.66	1.57	1.60	3.96	4.74	1.57	12.98	28.44	25.72

Figures



Legend

- Study Reach
- Streams

N

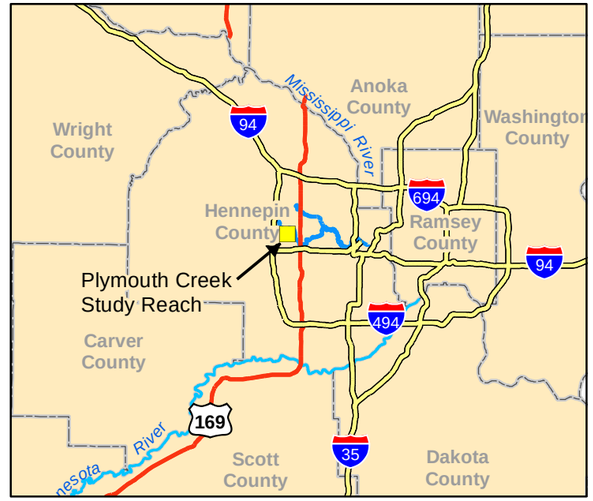
Feet
250 0 250 500

Meters
100 0 100

BARR

Figure 1

PROJECT LOCATION MAP
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission



Legend

- Study Reach
- Streams

N

Feet
250 0 250 500

Meters
100 0 100

BARR

Figure 1

PROJECT LOCATION MAP
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission

Legend

- Plymouth Creek
- Plymouth Creek Study Reach

Contours

- 10-Foot Contour
- 2-Foot Contour

N

Feet
400 0

Meters
100 0

BARR

Figure 2

TOPOGRAPHY MAP
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission

Legend

- Plymouth Creek
- Plymouth Creek Study Reach
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

N

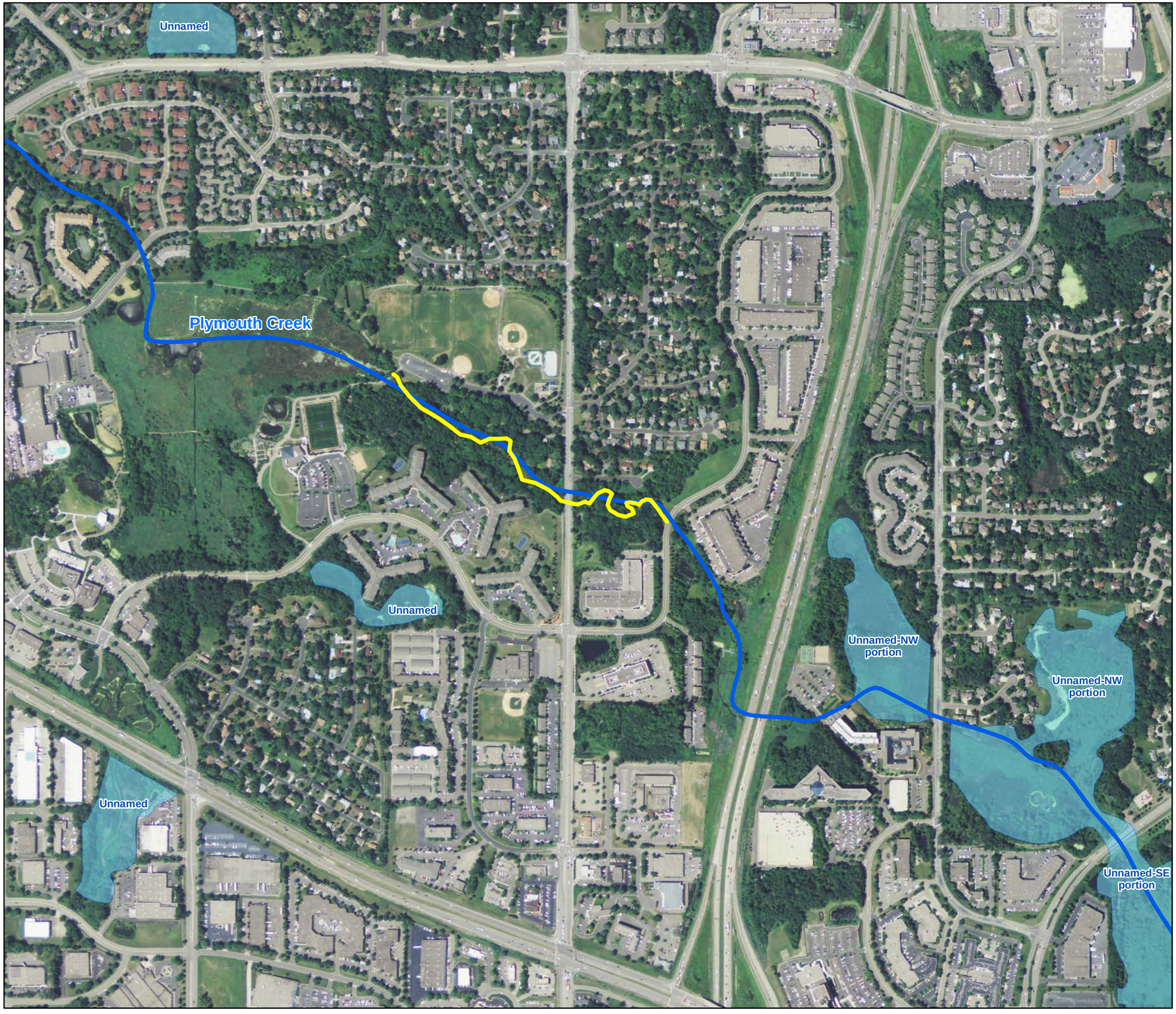
Feet
400 0

Meters
100 0

BARR

Figure 3

NATIONAL WETLAND INVENTORY
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission



Legend

- Plymouth Creek Study Reach
- Public Water Inventory Watercourses
- Public Water Inventory Basins

N

Feet
400 0 400 800

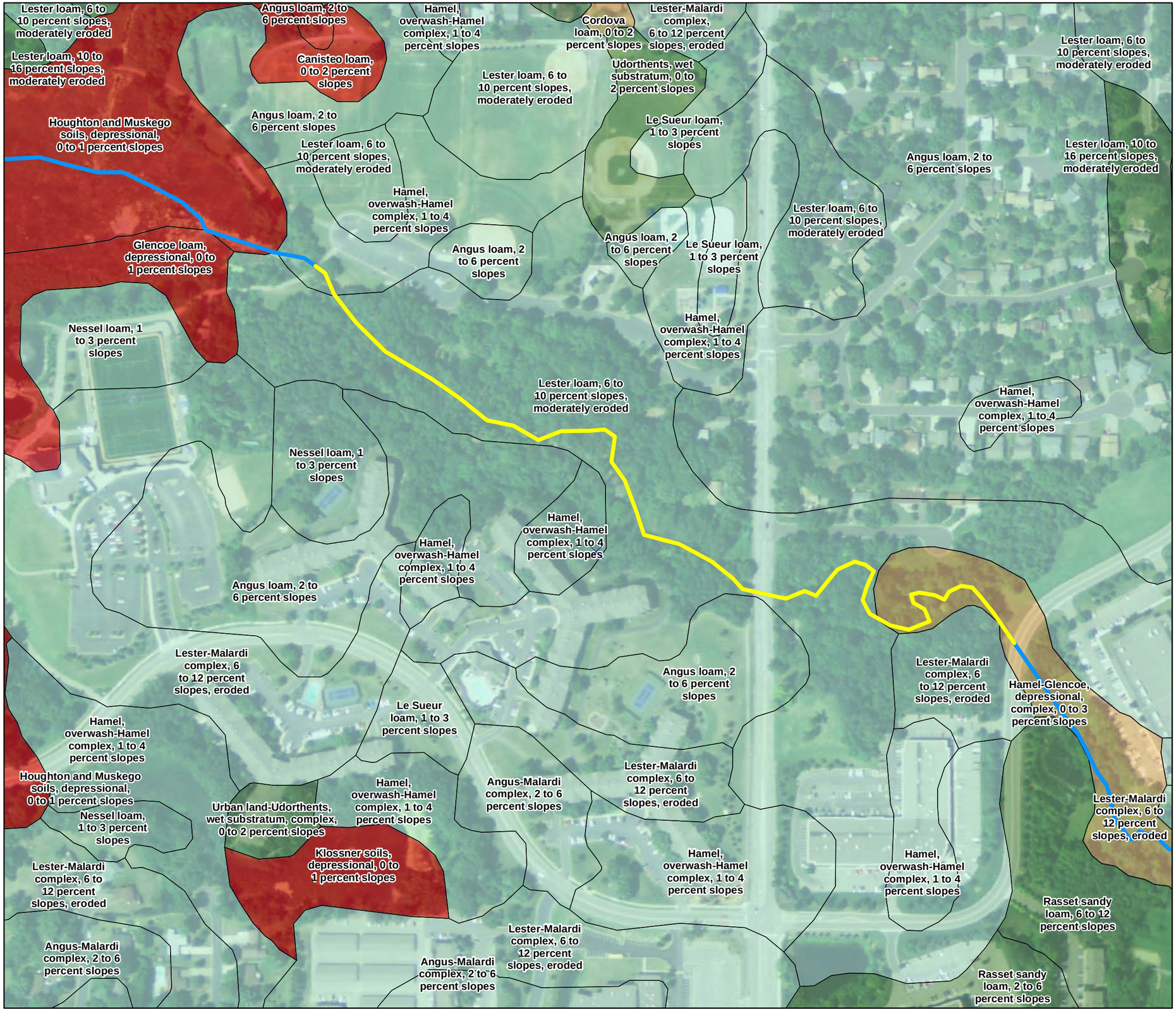
Meters
100 0 100 200

BARR

Figure 4

PUBLIC WATER INVENTORY
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission

Barr Footer: ArcGIS 10.3, 2016-01-21 11:28 File: I:\Client\BassettCreek\Work_Orders\2015\Plymouth Creek Feasibility Study\Maps\Plymouth Creek Wetland Delineation\Figure 4 - Public Waters Inventory_Plymouth Creek Delineation.mxd User: bkb



Legend

- Plymouth Creek Study Reach
- Plymouth Creek

Soils Hydric Rating

- Hydric
- Predominately Hydric
- Predominately Non-Hydric
- Non-Hydric

N

Feet

500 0

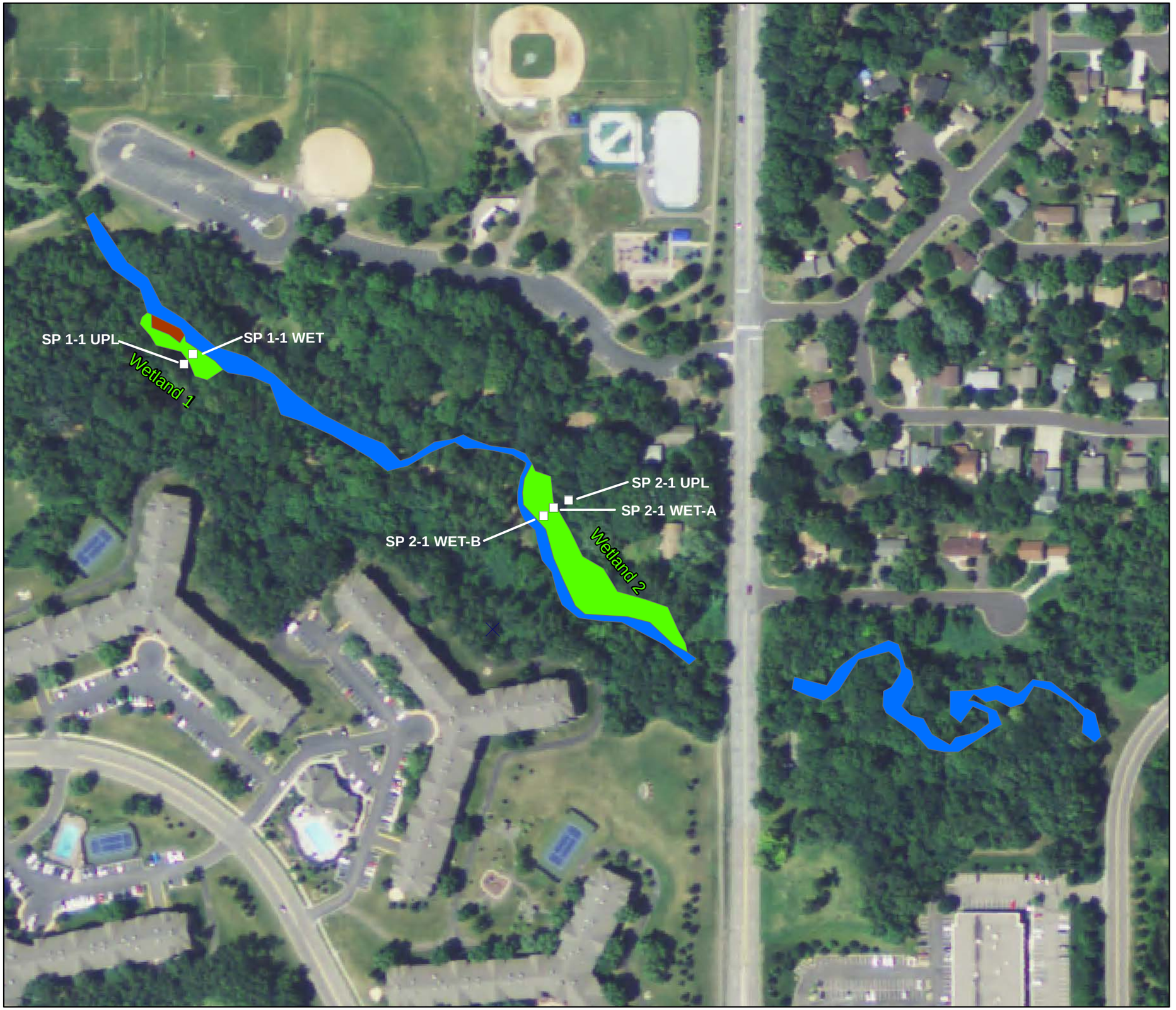
Meters

100 0

BARR

Figure 5

SOIL SURVEY
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission



Legend

Sample Points

Feature Type

- Creek
- Upland Island
- Wetland

N

Feet
100 0 100 200

Meters
50 0 50

BARR

Figure 6

WETLAND & CREEK DELINEATION
Plymouth Creek Feasibility Study
Wetland Delineation
Bassett Creek Watershed
Management Commission

Appendix A

Wetland Data Forms

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Plymouth Creek | Applicant/Owner: BCWMC | City/County: Plymouth/Hennepin | State: MN | Sampling Date: 10/16/15

Investigator(s): BKB | Section: 16 | Township: 118 | Range: 22 | Sampling Point: 1-1 UPL

Land Form: Footslope | Local Relief: None | Slope %: 2 | Soil Map Unit Name: Lester loam, 1 to 3 percent slopes

Subregion (LRR): M | Latitude: 4985548 | Longitude: 463337 | Datum: UTM Nad 83 Zone 15N Meters

Cowardin Classification: Upland | Circular 39 Classification: Upland | Mapped NWI Classification: Upland

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in remarks) | Eggers & Reed (primary): Upland

Are vegetation No Soil No Hydrology No significantly disturbed? | Are "normal circumstances" present? Yes | Eggers & Reed (secondary):

Are vegetation No Soil No Hydrology No naturally problematic? | Eggers & Reed (tertiary):

Eggers & Reed (quaternary):

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic vegetation present? No

Hydric soil present? No

Indicators of wetland hydrology present? No

Is the sampled area within a wetland? No

General Remarks (explain any answers if needed):

If yes, optional Wetland Site ID: Upland

VEGETATION

Tree Stratum (Plot Size: 30 ft)

		Absolute % Cover	Dominant Species?	Indicator Status
1.	Acer saccharum	25	Yes	FACU
2.		0		
3.		0		
4.		0		
	Total Cover:	25		

Sapling/Shrub Stratum (Plot Size: 15 ft)

1.	Acer saccharum	10	Yes	FACU
2.		0		
3.		0		
4.		0		
5.		0		
	Total Cover:	10		

Herb Stratum (Plot Size: 5 ft)

1.	Taraxacum officinale	15	Yes	FACU
2.	Carex sp.	10	Yes	
3.	Plantago major	5	No	FAC
4.	Trifolium pratense	5	No	FACU
5.	Cirsium arvense	2	No	FACU
6.	Arctium minus	2	No	FACU
7.	Solanum dulcamara	2	No	FAC
8.	Verbascum thapsus	1	No	UPL
	Total Cover:	42		

Woody Vine Stratum (Plot Size: 30 ft)

1.		0		
2.		0		
	Total Cover:	0		

% Bare Ground in Herb Stratum:

% Sphagnum Moss Cover:

Vegetation Remarks: (include photo numbers here or on a separate sheet)

50/20 Thresholds:	20%	50%
Tree Stratum	5	12.5
Sapling/Shrub Stratum	2	5
Herb Stratum	8.4	21
Woody Vine Stratum	0	0

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW or FAC: 0.00% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL Species	0	X 1	0	
FACW Species	0	X 2	0	
FAC Species	7	X 3	21	
FACU Species	59	X 4	236	
UPL Species	1	X 5	5	
Column Totals:	67	(A)	262	(B)

Prevalence Index = B/A = 3.91

Hydrophytic Vegetation Indicators:

- No — Rapid Test for Hydrophytic Vegetation
- No — Dominance Test is >50%
- No — Prevalence Index ≤ 3.0 [1]
- No — Morphological Adaptations [1] (provide supporting data in vegetation remarks or on a separate sheet)
- No — Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic vegetation present? No

1/25/2016 12:21:11 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

SOIL

Sampling Point: 1-1 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators).

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type [1]	Redox Features Loc [2]	Texture	Remarks
1.	0 - 11	10YR 2/1						Silt Loam	
2.	11 - 17	10YR 2/1	99	10YR 5/1	1	D	M	Sandy Loam	1% coarse depletions
3.	17 - 20	10YR 3/1	98	10YR 4/2	2	D	M	Sandy Loam	
4.	20 - 24	10YR 2/2	98	7.5 YR 3/4	2	C	M	Sandy Clay Loam	
5.	-								
6.	-								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (explain in soil remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): Type: _____ Depth (inches): _____ **Hydric soil present?** No

Soil Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (explain in remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ **Surface Water Depth (inches):** _____

Water table present? ☐ **Water Table Depth (inches):** _____

Saturation present? (includes capillary fringe) ☐ **Saturation Depth (inches):** _____

Indicators of wetland hydrology present? No

Describe Recorded Data:

Recorded Data: ☐ Aerial Photo ☐ Monitoring Well ☐ Stream Gauge ☐ Previous Inspections

Hydrology Remarks:

1/25/2016 12:21:12 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Plymouth Creek | Applicant/Owner: BCWMC | City/County: Plymouth/Hennepin | State: MN | Sampling Date: 10/16/15

Investigator(s): BKB | Section: 16 | Township: 118 | Range: 22 | Sampling Point: 1-1 WET

Land Form: Flat | Local Relief: None | Slope %: 0 | Soil Map Unit Name: Lester loam, 1 to 3 percent slopes

Subregion (LRR): M | Latitude: 4985553 | Longitude: 463342 | Datum: UTM Nad 83 Zone 15N Meters

Cowardin Classification: PEMA | Circular 39 Classification: Type 1 | Mapped NWI Classification: Upland

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in remarks) | Eggers & Reed (primary): Seasonally Flooded Basin

Are vegetation No Soil No Hydrology No significantly disturbed? | Are "normal circumstances" present? Yes | Eggers & Reed (secondary):

Are vegetation No Soil No Hydrology No naturally problematic? | Eggers & Reed (tertiary):

Eggers & Reed (quaternary):

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic vegetation present? Yes

Hydric soil present? Yes

Indicators of wetland hydrology present? Yes

Is the sampled area within a wetland? Yes

General Remarks (explain any answers if needed):

If yes, optional Wetland Site ID: Wetland 1

VEGETATION

	Tree Stratum (Plot Size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.	Ulmus americana	20	Yes	FACW
2.	Acer saccharum	5	Yes	FACU
3.		0		
4.		0		
	Total Cover:	25		
	Sapling/Shrub Stratum (Plot Size: 15 ft)			
1.	Rhamnus cathartica	1	No	FAC
2.		0		
3.		0		
4.		0		
5.		0		
	Total Cover:	1		
	Herb Stratum (Plot Size: 5 ft)			
1.	Phalaris arundinacea	60	Yes	FACW
2.	Scirpus atrovirens	15	No	OBL
3.	Urtica dioica	10	No	FACW
4.	Carex sp.	5	No	
5.		0		
6.		0		
7.		0		
8.		0		
	Total Cover:	90		
	Woody Vine Stratum (Plot Size: 30 ft)			
1.		0		
2.		0		
	Total Cover:	0		

% Bare Ground in Herb Stratum:

% Sphagnum Moss Cover:

Vegetation Remarks: (include photo numbers here or on a separate sheet)

50/20 Thresholds:	20%	50%
Tree Stratum	5	12.5
Sapling/Shrub Stratum	0.2	0.5
Herb Stratum	18	45
Woody Vine Stratum	0	0

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW or FAC: 66.67% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL Species	15	X 1	15	
FACW Species	90	X 2	180	
FAC Species	1	X 3	3	
FACU Species	5	X 4	20	
UPL Species	0	X 5	0	
Column Totals:	111	(A)	218	(B)

Prevalence Index = B/A = 1.96

Hydrophytic Vegetation Indicators:

- No — Rapid Test for Hydrophytic Vegetation
- Yes — Dominance Test is >50%
- Yes — Prevalence Index ≤ 3.0 [1]
- No — Morphological Adaptations [1] (provide supporting data in vegetation remarks or on a separate sheet)
- No — Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic vegetation present? Yes

1/25/2016 12:21:14 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

SOIL

Sampling Point: 1-1 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators).

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type [1]	Loc [2]	Texture	Remarks
1.	0 - 9	10YR 2/1	98	7.5YR 3/4	2	C	M	Sandy Loam	
2.	9 - 18	10YR 4/2	95	7.5YR 3/4	5	C	M	Fine Sandy Loam	
3.	18 - 25	N 2.5/0	100					Sandy Mucky Mineral	
4.	-								
5.	-								
6.	-								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains **[2] Location: PL=Pore Lining, M=Matrix.**

Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (explain in soil remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): **Type:** _____ **Depth (inches):** _____ **Hydric soil present?** Yes

Soil Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (explain in remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ **Surface Water Depth (inches):** _____

Water table present? ☑ **Water Table Depth (inches):** 8

Saturation present? (includes capillary fringe) ☑ **Saturation Depth (inches):** 0

Indicators of wetland hydrology present? Yes

Describe Recorded Data:

Recorded Data: ☐ Aerial Photo ☐ Monitoring Well ☐ Stream Gauge ☐ Previous Inspections

Hydrology Remarks:

1/25/2016 12:21:15 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Plymouth Creek | Applicant/Owner: BCWMC | City/County: Plymouth/Hennepin | State: MN | Sampling Date: 10/16/15

Investigator(s): BKB | Section: 21 | Township: 118 | Range: 22 | Sampling Point: 2-1 UPL

Land Form: Hillslope | Local Relief: Concave | Slope %: 3 | Soil Map Unit Name: Lester loam, 1 to 3 percent slopes

Subregion (LRR): M | Latitude: 4985472 | Longitude: 463549 | Datum: UTM Nad 83 Zone 15N Meters

Cowardin Classification: Upland | Circular 39 Classification: Upland | Mapped NWI Classification: Upland

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in remarks) | Eggers & Reed (primary): Upland

Are vegetation No Soil No Hydrology No significantly disturbed? | Are "normal circumstances" present? Yes | Eggers & Reed (secondary):

Are vegetation No Soil No Hydrology No naturally problematic? | Eggers & Reed (tertiary):

Eggers & Reed (quaternary):

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic vegetation present? No

Hydric soil present? No

Indicators of wetland hydrology present? No

Is the sampled area within a wetland? No

General Remarks (explain any answers if needed):

If yes, optional Wetland Site ID: Upland

VEGETATION

Tree Stratum (Plot Size: 30 ft)

		Absolute % Cover	Dominant Species?	Indicator Status
1.	Acer saccharum	90	Yes	FACU
2.		0		
3.		0		
4.		0		
	Total Cover:	90		

Sapling/Shrub Stratum (Plot Size: 15 ft)

1.	Rhamnus cathartica	20	Yes	FAC
2.		0		
3.		0		
4.		0		
5.		0		
	Total Cover:	20		

Herb Stratum (Plot Size: 5 ft)

1.	Acer saccharum	40	Yes	FACU
2.	Rhamnus cathartica	10	Yes	FAC
3.		0		
4.		0		
5.		0		
6.		0		
7.		0		
8.		0		
	Total Cover:	50		

Woody Vine Stratum (Plot Size: 30 ft)

1.		0		
2.		0		
	Total Cover:	0		

% Bare Ground in Herb Stratum:

% Sphagnum Moss Cover:

Vegetation Remarks: (include photo numbers here or on a separate sheet)

50/20 Thresholds:	20%	50%
Tree Stratum	18	45
Sapling/Shrub Stratum	4	10
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW or FAC: 50.00% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL Species	0	X 1	0	
FACW Species	0	X 2	0	
FAC Species	30	X 3	90	
FACU Species	130	X 4	520	
UPL Species	0	X 5	0	
Column Totals:	160	(A)	610	(B)

Prevalence Index = B/A = 3.81

Hydrophytic Vegetation Indicators:

- No — Rapid Test for Hydrophytic Vegetation
- No — Dominance Test is >50%
- No — Prevalence Index ≤ 3.0 [1]
- No — Morphological Adaptations [1] (provide supporting data in vegetation remarks or on a separate sheet)
- No — Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic vegetation present? No

1/25/2016 12:21:15 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

SOIL

Sampling Point: 2-1 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators).

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type [1]	Redox Features Loc [2]	Texture	Remarks
1.	0 - 8	10YR 2/1						Clay Loam	
2.	8 - 15	10YR 3/2						Clay	
3.	15 - 20	10YR 5/4	98	10YR 5/8	2	C	M	Sandy Clay Loam	
4.	-								
5.	-								
6.	-								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (explain in soil remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): Type: _____ Depth (inches): _____ **Hydric soil present?** No

Soil Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (explain in remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ **Surface Water Depth (inches):** _____

Water table present? ☐ **Water Table Depth (inches):** _____

Saturation present? (includes capillary fringe) ☐ **Saturation Depth (inches):** _____

Indicators of wetland hydrology present? No

Describe Recorded Data:

Recorded Data: ☐ Aerial Photo ☐ Monitoring Well ☐ Stream Gauge ☐ Previous Inspections

Hydrology Remarks:

1/25/2016 12:21:16 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Plymouth Creek | Applicant/Owner: BCWMC | City/County: Plymouth/Hennepin | State: MN | Sampling Date: 10/16/15

Investigator(s): BKB | Section: 21 | Township: 118 | Range: 22 | Sampling Point: 2-1 WET-A

Land Form: Flat | Local Relief: None | Slope %: 0 | Soil Map Unit Name: Lester loam, 1 to 3 percent slopes

Subregion (LRR): M | Latitude: 4985467 | Longitude: 463541 | Datum: UTM Nad 83 Zone 15N Meters

Cowardin Classification: PEMB | Circular 39 Classification: Type 2 | Mapped NWI Classification: Upland

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in remarks) | Eggers & Reed (primary): Fresh (Wet) Meadow

Are vegetation No | Soil No | Hydrology No | significantly disturbed? | Are "normal circumstances" present? Yes | Eggers & Reed (secondary):

Are vegetation No | Soil No | Hydrology No | naturally problematic? | Eggers & Reed (tertiary):

Eggers & Reed (quaternary):

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Indicators of wetland hydrology present? Yes
Is the sampled area within a wetland? Yes

General Remarks (explain any answers if needed):

If yes, optional Wetland Site ID: Wetland 2

VEGETATION

Tree Stratum (Plot Size: 30 ft)

		Absolute % Cover	Dominant Species?	Indicator Status
1.	Populus deltoides	15	Yes	FAC
2.		0		
3.		0		
4.		0		
	Total Cover:	15		

Sapling/Shrub Stratum (Plot Size: 15 ft)

1.		0		
2.		0		
3.		0		
4.		0		
5.		0		
	Total Cover:	0		

Herb Stratum (Plot Size: 5 ft)

1.	Phalaris arundinacea	100	Yes	FACW
2.		0		
3.		0		
4.		0		
5.		0		
6.		0		
7.		0		
8.		0		
	Total Cover:	100		

Woody Vine Stratum (Plot Size: 30 ft)

1.		0		
2.		0		
	Total Cover:	0		

% Bare Ground in Herb Stratum: | % Sphagnum Moss Cover:

Vegetation Remarks: (include photo numbers here or on a separate sheet)

50/20 Thresholds:	20%	50%
Tree Stratum	3	7.5
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW or FAC: 100.00% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL Species	0	X 1	0	
FACW Species	100	X 2	200	
FAC Species	15	X 3	45	
FACU Species	0	X 4	0	
UPL Species	0	X 5	0	
Column Totals:	115	(A)	245	(B)

Prevalence Index = B/A = 2.13

Hydrophytic Vegetation Indicators:

- No — Rapid Test for Hydrophytic Vegetation
- Yes — Dominance Test is >50%
- Yes — Prevalence Index ≤ 3.0 [1]
- No — Morphological Adaptations [1] (provide supporting data in vegetation remarks or on a separate sheet)
- No — Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic vegetation present? Yes

1/25/2016 12:21:17 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

SOIL

Sampling Point: 2-1 WET-A

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators).

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type [1]	Redox Features Loc [2]	Texture	Remarks
1.	0 - 8	10YR 3/1						Clay Loam	
2.	8 - 14	10YR 4/2	80	7.5YR 3/4	20	C	M	Clay Loam	
3.	14 - 20	5Y 4/1						Clay Loam	Gravelly
4.	-								
5.	-								
6.	-								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (explain in soil remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): Type: _____ Depth (inches): _____ **Hydric soil present?** Yes

Soil Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (explain in remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ **Surface Water Depth (inches):** _____

Water table present? ☐ **Water Table Depth (inches):** _____

Saturation present? (includes capillary fringe) ☐ **Saturation Depth (inches):** _____

Indicators of wetland hydrology present? Yes

Describe Recorded Data:

Soils were moist at 5 inches below ground surface

Recorded Data: ☐ Aerial Photo ☐ Monitoring Well ☐ Stream Gauge ☐ Previous Inspections

Hydrology Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Plymouth Creek | Applicant/Owner: BCWMC | City/County: Plymouth/Hennepin | State: MN | Sampling Date: 10/16/15

Investigator(s): BKB | Section: 21 | Township: 118 | Range: 22 | Sampling Point: 2-1 WET-B

Land Form: Flat | Local Relief: None | Slope %: 0 | Soil Map Unit Name: Lester loam, 1 to 3 percent slopes

Subregion (LRR): M | Latitude: 4985463 | Longitude: 463535 | Datum: UTM Nad 83 Zone 15N Meters

Cowardin Classification: PEMB | Circular 39 Classification: Type 2 | Mapped NWI Classification: R2UBG

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in remarks) | Eggers & Reed (primary): Fresh (Wet) Meadow

Are vegetation No Soil No Hydrology No significantly disturbed? | Are "normal circumstances" present? Yes | Eggers & Reed (secondary):

Are vegetation No Soil No Hydrology No naturally problematic? | Eggers & Reed (tertiary):

Eggers & Reed (quaternary):

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic vegetation present? 0
Hydric soil present? Yes
Indicators of wetland hydrology present? Yes
Is the sampled area within a wetland? Yes

General Remarks (explain any answers if needed):

If yes, optional Wetland Site ID: Wetland 2

VEGETATION

Tree Stratum (Plot Size: 30 ft)

		Absolute % Cover	Dominant Species?	Indicator Status
1.	Populus deltoides	10	Yes	FAC
2.		0		
3.		0		
4.		0		
	Total Cover:	10		

Sapling/Shrub Stratum (Plot Size: 15 ft)

1.		0		
2.		0		
3.		0		
4.		0		
5.		0		
	Total Cover:	0		

Herb Stratum (Plot Size: 5 ft)

1.	Phalaris arundinacea	100	Yes	FACW
2.	Persicaria amphibia	1	No	OBL
3.		0		
4.		0		
5.		0		
6.		0		
7.		0		
8.		0		
	Total Cover:	101		

Woody Vine Stratum (Plot Size: 30 ft)

1.		0		
2.		0		
	Total Cover:	0		

% Bare Ground in Herb Stratum: | **% Sphagnum Moss Cover:**

Vegetation Remarks: (include photo numbers here or on a separate sheet)

50/20 Thresholds:	20%	50%
Tree Stratum	2	5
Sapling/Shrub Stratum	0	0
Herb Stratum	20.2	50.5
Woody Vine Stratum	0	0

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW or FAC: 100.00% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species	1	X 1	1
FACW Species	100	X 2	200
FAC Species	10	X 3	30
FACU Species	0	X 4	0
UPL Species	0	X 5	0
Column Totals:	111 (A)		231 (B)

Prevalence Index = B/A = 2.08

Hydrophytic Vegetation Indicators:

- No — Rapid Test for Hydrophytic Vegetation
- Yes — Dominance Test is >50%
- Yes — Prevalence Index ≤ 3.0 [1]
- No — Morphological Adaptations [1] (provide supporting data in vegetation remarks or on a separate sheet)
- No — Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic vegetation present? 0

1/25/2016 12:21:18 PM

WETLAND DETERMINATION DATA FORM - Midwest Region

SOIL

Sampling Point: 2-1 WET-B

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators).

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type [1]	Redox Features Loc [2]	Texture	Remarks
1.	0 - 15	5GY 4/1 Gley	40	7.5 YR 3/4	2	C	M	Sandy Clay	
2.	0 - 15	10Y 3/1 Gley	60						
3.	15 - 25	5Y 4/1						Sand	
4.	-								
5.	-								
6.	-								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains **[2] Location: PL=Pore Lining, M=Matrix.**

Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☑ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (explain in soil remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): **Type:** _____ **Depth (inches):** _____ **Hydric soil present?** Yes

Soil Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (explain in remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ **Surface Water Depth (inches):** _____

Water table present? ☐ **Water Table Depth (inches):** _____

Saturation present? (includes capillary fringe) ☑ **Saturation Depth (inches):** 20

Indicators of wetland hydrology present? Yes

Describe Recorded Data:

Recorded Data: ☐ Aerial Photo ☐ Monitoring Well ☐ Stream Gauge ☐ Previous Inspections

Hydrology Remarks:

1/25/2016 12:21:19 PM

Appendix B

Site Photographs

Appendix B – Plymouth Creek Feasibility Study Wetland Delineation Site Photos

Photo 1 – September 22, 2015 Study Reach (West of Fernbrook Ln. N) Water-level-control structure at start of the survey within Plymouth Creek Park.	
Photo 2 – September 22, 2015 Study Reach (West of Fernbrook Ln. N) Bridge crossing and typical view of Plymouth Creek in this area.	
Photo 3 – September 22, 2015 Wetland 1 Facing southeast. This photo shows the eroded edge of Wetland 1 and saturated soils.	

Appendix B – Plymouth Creek Feasibility Study Wetland Delineation Site Photos

Photo 4 – September 22, 2015 Wetland 2 Facing northwest. The upland island is located on the right side of the photo.	
Photo 5 – September 22, 2015 Study Reach (West of Fernbrook Ln. N) Typical view of the stream reach between Wetlands 1 and 2	
Photo 6 – September 22, 2015 Wetland 2 Facing south at the north edge of Wetland 2. Wetland 2 is located on the left side of this photo.	

Appendix B – Plymouth Creek Feasibility Study Wetland Delineation Site Photos

Photo 7 – September 22, 2015 Wetland 2 Another view of wetland 2 facing southeast. Wetland 2 is dominated by reed canary grass.	
Photo 8 – September 22, 2015 Study Reach (East of Fernbrook Ln. N) This photo shows an undercut portion of stream channel, which is typical along many areas of Plymouth Creek.	
Photo 9 – September 22, 2015 Study Reach (East of Fernbrook Ln. N) Many areas within the stream reach east of Fernbrook Lane have snags that obstruct water flow