Item 5A. BCWMC 1-17-19

Appendix A

Minneapolis Park and Recreation Board Preferred Master Plan Alternatives

BRYN MAWR PARK



LOCATION AND HISTORY

Bryn Mawr Meadows Park is located just north of I-394 in its namesake neighborhood. It is a large park with many athletic fields and diamonds. Bryn Mawr takes its name from John Oswald's farm, which once occupied that region of the city. Bryn Mawr means "great hill" in Welsh. As early as the 1860s, Oswald grew tobacco on his farm and also produced fruit wines there. Oswald was a commissioner on the first park board created by the legislature in 1883. In 1910 Oswald's heir offered to sell part of Oswald's estate to the park board, but Theodore Wirth's assessment of the property at the time was that it did not offer any "special advantage" except as part of a parkway to connect The Parade and Loring Park to Glenwood (Wirth) Park through Bassett's Creek Valley. He stated that compared with other needs in the park system it was of "little importance." Nevertheless, in 1911 the park board purchased 39 acres (leaving out the far western end that would have connected Bryn Mawr to Glenwood Park) without a promise to improve the land. The cost of the purchase was assessed on property in the neighborhood.

The first suggestions for improvement of the land were made in 1915 when Wirth recommended converting the land into an equestrian center, complete with horse-riding park and polo grounds. The park board did build a baseball field in 1922, but never moved ahead with the equestrian center. In 1929 Wirth presented a plan to improve the 39 acres of "almost useless" land. The plan included the improvement of Bassett's Creek from Glenwood to Bryn Mawr. The Bassett's Creek Valley land was acquired in 1934.

The first building constructed at Bryn Mawr was a combined toilet building and storage shed to serve the athletic fields in 1953. In addition about 7,000 yards of clay were removed from the playing field areas and replaced with a good grade of back fill. A small part of Bryn Mawr was lost to freeway construction in 1966, but freeways ultimately resulted in the enlargement of the park. Seven athletic fields at The Parade were lost due to freeway expansion and the park board replaced some of that loss by expanding Bryn Mawr and building more playing fields there. Important renovations were made to Bryn Mawr's playing fields in 1992. Bryn Mawr was connected to the Luce Line bicycle trail in 2005, which connected paths from Wirth Park with the Cedar Lake Trail and links to downtown Minneapolis.

EXISTING CONDITIONS AND CHARACTER

Bryn Mawr Park today is bounded by active rail lines on the north and southeast, the freeway to the south, and Morgan Avenue to the west. It is one of the city's primary athletic complexes, along with Northeast, Bossen Field, Lake Nokomis, and Nieman. As such, it is home to 12 ball diamonds of varying quality, lighting, and sizes. Most are arranged so their outfields overlap, so not all can be utilized at once. Several soccer fields can also be found here, and cricket is avidly played—though the pitches overlap ball diamonds, paths, and trees. Batting cages used by cricket players are located in the northeastern portion of the park. A large parking lot adjacent to Morgan and Laurel serves the entire site, but parking spills out onto surrounding streets.

Near the center of the park is a grouping of more neighborhood oriented facilities: wading pool, play ground, and basketball and tennis courts. A restroom and storage building in this area also serves as a warming house for the significant broomball program at this park. In winter, the lighted ball diamonds near the warming room are flooded for broomball rinks.

Trails wind throughout the park, but it is difficult to make interconnected walking loops. The Luce Line passes through the northern portion of the park and connects to an overpass of the railroad, which then connects to the Cedar Lake Trail. Another connection to the Cedar Lake Trail (albeit rather convoluted) passes under I-394, up a helix ramp and along the freeway, then down to the trail.

A variety of trees are scattered throughout the park, some large, though overall the park is an open field. A more forested hillside is found in the eastern end of the park, where it comes to a point between railroads. In general, the park tends to be wet, and some fields are hard to keep from getting regularly soggy. For this reason and to improve Bassett's Creek water quality, the Bassett's Creek Watershed Management District is collaborating with MPRB and the City of Minneapolis on a feasibility study for a major stormwater management facility in the park. That study took place in concert with the NSAMP planning effort, to ensure environmental and recreational goals are aligned.

THE PROPOSED DESIGN

The design for Bryn Mawr seeks to recalibrate the balance between neighborhood amenities and city-wide athletic facilities. This is a profound change for the park, and will undoubtedly take place over many years and implementation phases. The primary change is to reduce the number but improve the quality of ball diamonds in the park. Six diamonds are arranged at the outer edge of the park, with outfields facing the railroad and freeway. The diamonds would have outfields that do not overlap, and, in order to accommodate the current softball program at the park, at least four of them are lit. In the outfields are full-size soccer fields. A new cricket pitch overlaps the northernmost diamond, but its entire extent is free of ball infields, trees, and pathways. By moving these fields to the outer edge of the park, they will have a reduced impact on neighbors.

On the inner half of the park (nearer Morgan), a new arrangement of neighborhood focused amenities will both buffer the athletics from the neighborhood and provide enhanced options for non-athletic park use. These amenities center around a large grassy oval open for picnicking and impromptu play. A new and unique park building curves around the eastern edge of the oval. This small glassy conservatory-like building will provide for extended year-round use of the park and offer a unique facility in the area. It also

integrates closely with other park amenities, and allows for a phased approach to implementation. A new play area is located within the building footprint and could be built prior to the building construction. At the other end of the building, a basketball court could also be at first outdoors and then enclosed. In between, a vegetated, open area creates a lush atmosphere in winter for relaxing, play, reading, or indoor winter picnicking. It will also serve as the warming house for broomball and expanded free skating on the oval, which is flooded and lit in winter. At the play end of the building is an outdoor nature play area with water, possibly with spray jets and misters and running rivulets. Perhaps a large garage door at that end of the building could connect indoor and outdoor in summer. Perhaps the building is built in stages. Perhaps everything happens at once, creating a truly one-of-a-kind amenity for the park system. This conservatory is one of the four "big moves" identified in this plan and as such can only be implemented through significant collaboration, including financial. This new building cannot be implemented with MPRB funding alone, but will need investment from other community or private interests. It is for this reason that the play area and basketball court, which are critical elements of the park, can be built in place regardless of building implementation.

The parking lot is relocated farther into the park, between the athletic fields and conservatory. This location moves this heavy use away from adjacent neighbors, while still allowing visibility from Morgan Avenue. Access to the park remains at the intersection of Morgan and Laurel, though MPRB will take a more active role in traffic calming and management activities in the neighborhood.

NOTE: The final recommendation of the Community Advisory Committee requested that the public comment period no the NSAMP document be used to explore an alternative parking lot and access option. Under this option park access enters directly from Cedar Lake Road immediately adjacent to Morgan Avenue. A long entry drive connects to a parking lot near the northern edge of the park. The conservatorylike building sits just south of the parking lot, between the lot and the oval of lawn. A single bicycle training area occupies the easternmost portion of the park. The primary concern with this arrangement is the new entrance from Cedar Lake Road, which is extremely close to Morgan Avenue and may not be allowed by the City of Minneapolis due to clear intersection safety issues. This alternate concept would also slightly enlarge the lawn oval and reduce the size of the building.

A major stormwater feature including narrow channels and larger open ponds, all with naturalized edges, winds through the park between the conservatory and parking lot and near Morgan Avenue. This feature helps keep fields dry and improves water quality entering Bassett's Creek. By surrounding the conservatory, it contributes to a seamless indooroutdoor experience in both summer and winter. The remainder of the non-sport area includes open air picnic shelters, paths through groves of trees, and naturalized landscapes.

Though the Luce Line no longer passes through the park, trails at the northern end of Bryn Mawr still connect to Bassett's Creek Park and on to Wirth Park. New trails connect throughout the park, creating a variety of walking loops of varying distances. Fitness stations create a training circuit through the park. Mountain bike training areas in the northern and eastern forested sections of the park create another unique draw to the park. The intent of these areas is to provide beginner options for learning the sport, and areas to practice tricks and stunts. These new bike play areas connect to Wirth Park's many mountain biking options via the Luce Line Trail.

By shifting the balance between athletics and other activities in the park, Bryn Mawr will actually be used more frequently. With the reduction in ball diamonds, the current programs can still be accomplished—on higher quality facilities—while allowing space for exciting new developments. Parking and access may remain an issue without a perfect solution, but it is important to recognize that most Minneapolis parks—even athletic fields—are located within neighborhoods and surrounded by lowdensity residential areas. The proposed design mitigates some impact and encourages greater neighborhood use by moving athletics farther into the park and creating green buffers with neighborhood benefit.

CONNECTIONS BETWEEN PARKS

Though the Luce Line Trail is proposed to no longer pass through Bryn Mawr, a proposed trail connection from the northern corner of the park links to that trail, which travels westward through Bassett's Creek Valley to Wirth Park. City of Minneapolis proposed bikeway facilities on Cedar Lake Road connect northeasterly to Harrison Park and the trails along Van White Boulevard and southwesterly to Wirth Park via the I-394 frontage road.

KNOWN LAND USE AND COORDINATION ISSUES

No known land use issues exist at Bryn Mawr Park.



EXISTING CONDITIONS: BRYN MAWR PARK



PROPOSED/PLAN: BRYN MAWR PARK



PROPOSED ALTERNATE PLAN: BRYN MAWR PARK

PROCESSES

	I		
	1: General Input	2: Initial Concepts	3: The Preferred Concept
	Spring-Fall 2017	Winter 2018	Now
	Input themes prior to initial concepts	Input themes on initial concepts	Key elements of the concept
aquatics	Wading pool is in poor condition and needs upgrade	Water play areas need shade	New water play / nature play area in community zone near building
play	Play areas in poor condition	Support for play structure with climbing wall	New water play / nature play area in community zone near building New play area with climbing within possible conservatory building (indoor year-round play)
athletics	Community and work group generally field there are too many ball diamonds in the park Ball diamonds are in poor condition, though they are important for recreational leagues	Community tended to prefer concept with fewer ball diamonds Baseball fields (at western end) are not used, consider removing them	Number of ball diamonds reduced to 6 from 13: elimination of three baseball, no overlapping outfields on 6 diamonds, lighting on at least 4 diamonds, all diamonds located along I- 394 side of site
	Need for improved facilities for field sports like soccer and cricket	Need more soccer and multi-use fields, ideally with lighting	Large and youth soccer fields overlap softball outfields, allowing for lighted fields
		Support for one large field to accommodate Australian rules football and cricket	New large-scale multi-use field (cricket and Australian football)
courts	no comments	Need basketball hoops	New basketball court located adjacent to or inside conservatory building
winter	Desire for general skating for the community in addition to broomball rinks	no comments	Broomball and skating relocated to large grass oval. Lighting designed to be extreme cut-off to light only the ice. New opportunity for ice skating near building and neighborhood. <i>RELOCATION OF ALL ICE ACTIVITIES TO BASSETT'S CREEK PARK IS BEING CONSIDERED DURING THE PUBLIC COMMENT PERIOD.</i>

PROCESSES

		1	
	1: General Input	2: Initial Concepts	3: The Preferred Concept
	Spring-Fall 2017	Winter 2018	Now
	Input themes prior to initial concepts	Input themes on initial concepts	Key elements of the concept
landscape	Desire for more varied natural environment, including groves, forests, wetlands,a nd grasslands, to enhance character of park	Water feature generally supported, along with other naturalized areas and tree plantings Maintain large open green area for unprogrammed play (neighborhood- focused)	New stormwater wetland and ponds incorporated into design as natural habitat and to help keep fields dry Existing forested area near Morgan retained, new trees planted throughout park New large open oval near neighborhood, and associated picnic lawn with shelters
	Interest in winter use indoor facility, like a conservatory: something unique for this park	General support for a conservatory- like building, once understood by the community Concern about placement of conservatory building in viewshed of neighbors	New glassy conservatory-like building to serve as indoor play area, seating/gathering area among tropical gardens, and warming/storage area for winter and summer sports
other	Desire for more walking trail loops throughout park	Like walking path around outside of diamonds Opposition to additional parking at	Extensive walking loops throughout park TWO ACCESS AND PARKING OPTIONS ARE BEING
	Significant concern about parking, traffic, and after-hours adult use of park	western end of park Remaining concern about parking access from Morgan/Laurel, including suggestions to move entrance to Van White or diectly off Cedar Lake Road Support for the bike park and	CONSIDERED DURING THE PUBLIC COMMENT PERIOD: 1) Parking moved farther into interior of park and shielded from neighbors by building and natural areas; entrance retained off Morgan/Laurel. 2) Parking located at the northerly edge of the park, with acess from Cedar Lake Road on a driveway parallel to Morgan. New mountain bike trails and training area along northern
		mountain bike trails	edge of park and in eastern woods

COST ESTIMATE

Park Name	Asset Type	Project	201 CO	9 ESTIMATED ST/PROJECT	NOTES
Bryn Mawr	Play	Nature Play area with some water (mini splash pad)	\$	806,809	
Bryn Mawr	Play	Traditional Play Structure in new container (possibly indoor, if building implemented)	\$	806,809	
Bryn Mawr	Athletics	Athletic Field renovation: 6 premier diamonds (at least 4 lit) with fields in outfield, additional multi- use field space for cricket	\$	5,278,694	
Bryn Mawr	Courts	Basketball Court (1) (possibly indoor if building implemented)	\$	123,394	
Bryn Mawr	Landscape	Naturalized areas	\$	249,636	
Bryn Mawr	Landscape	Stormwater management water feature	\$	-	To be implemented by Bassett's Creek Watershed
Bryn Mawr	Landscape	New parking lot	\$	923,183	
Bryn Mawr	Landscape	Open Lawn with lit skating and broom ball in winter	\$	631,209	
Bryn Mawr	Other	Adult Fitness Stations	\$	47,459	
Bryn Mawr	Other	Conservatory-like Building	\$		Final building design and size not determined under NSAMP; will require collaboration for implementation
Bryn Mawr	Other	Group picnic shelters	\$	208,821	
Bryn Mawr	Other	New walking paths	\$	2,095,805	
Bryn Mawr	Other	Bicycle Training Track (2)	\$	949,187	
Bryn Mawr	Other	Miscl. signs, trees, furniture	\$	223,436	
Bryn Mawr		TOTAL	\$	12,344,444	

OPERATIONS ESTIMATE

BRYN MAWR						
		Total Per Unit	\triangle		\triangle	
FACILITIES		Operations Cost	Qty		Cost	
Wading Pool	\$	15,000	-1	\$	(15,000)	
Splash Pad	\$	35,000	1	\$	35,000	
Nature Play	\$	7,500	1	\$	7,500	
Adult Fitness	\$	2,500	1	\$	2,500	
Multi-use Diamond	\$	20,000	-7	\$	(140,000)	
Tennis Court	\$	1,500	-2	\$	(3,000)	
Half Court Basketball	\$	1,000	-1	\$	(1,000)	
Skating Rink	\$	30,000	1	\$	30,000	
Bicycle Facilitiy/Training Track	\$	5,000	2	\$	10,000	
Group Shelter	\$	4,000	2	\$	8,000	
Difference			\$	(66,000)		

Appendix B

Site Topographic Survey





0 100 200

SURVEY LEGEND

∆ ♥ ⊡	SURVEY MONUMENT FOUND IRON PIPE GPS CONTROL POINT VERTICAL BENCHMARK CONTROL HUB \ LATH
0	POWER POLE LIGHT POLE HYDRANT
	GATE VALVE
*	DECIDUOUS TREE
Õ	SANITARY MANHOLE
© ⊡	STORM SEWER MANHOLE
\boxtimes	ELECTRICAL BOX
Ε	COMMUNICATIONS BOX
⊕⊖⊕⊕	MONITORING WELL SOIL BORING STAFF GAGE PIZOMETER

x	FENC FENC BACK FLOW CENT
GAS OE	GAS OVER
UE	UNDE
——— UT ———	UNDE
V CATV	UNDE
—— FO ——	FIRE

_____ CĂ' SAN SS SS CW CW PW _____ 800 ____ ____ 801 ____

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DPERTY LINE ICE LINE XK OF CURB LINE W LINE NTER LINE

AS LINE VERHEAD ELECTRIC UNDERGROUND ELECTRIC UNDERGROUND TELEPHONE UNDERGROUND TV FIBER OPTIC LINE SANITARY SEWER LINE STORM SEWER LINE CITY WATER IRRIGATION SYSTEM DATHYMETRIC POINTS

BATHYMETRIC POINTS MAJOR CONTOUR MINOR CONTOUR WATER'S EDGE GRID LINES

BASIS OF DRAWING FILE:

DATE OF SURVEY: 09-2017

ORIGIN/DATE OF BASE: 09-2017

COORDINATE SYSTEM: HENNEPIN COUNTY HORIZONTAL DATUM: NAD83(2011) REF. VRS VERTICAL DATUM: NAVD88 REF. VRS

ADDITIONAL FILE INFORMATION:

BRYN	MAWR	MEADOWS
MINNE	APOLIS,	MINNESOTA
U	TILITY S	

23/27-0	051.41
CLIENT PROJECT	No.
DWG. No.	REV. N

09-2017

Appendix C

Preliminary Geotechnical Report

Preliminary Geotechnical Engineering Report Bryn Mawr Meadows Water Quality Improvement Project

Minneapolis, Minnesota

Prepared for Bassett Creek Watershed Management Commission

May 2018



Preliminary Geotechnical Engineering Report Bryn Mawr Meadows Water Quality Improvement Project

Minneapolis, Minnesota

Prepared for Bassett Creek Watershed Management Commission

May 2018

Preliminary Geotechnical Engineering Report Bryn Mawr Meadows Water Quality Improvement Project

May 2018

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- Appendix A Soil Boring Logs
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Certifications

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

DRAFT FOR REVIEW

May 09, 2018

Robert H. Osburn, PE Minnesota License No. #: 46194

Date

1.0 Introduction

Barr Engineering Company, under authorization and contract with Bassett Creek Watershed Management Commission (BCWMC), is completing a feasibility study for the Bryn Mawr Meadows Water Quality Improvement Project, which includes wetland delineations, geotechnical borings, topographic survey, tree survey, cultural resources and endangered species reviews. This report describes the preliminary geotechnical investigation and testing performed, presents the results of this work, and provides information about site conditions and preliminary geotechnical analyses for design and constructability.

The Bryn Mawr Meadows Water Quality Improvement Project is a proposed BCWMC capital improvement project that incorporates stormwater best management practices (BMP) in the Bryn Mawr park area. The proposed project will treat stormwater runoff from surrounding residential areas that currently flows untreated into Bassett Creek. The improvement project will reconfigure the park area and likely include new parking areas, pavilions, picnic shelters, and and possibly a warming house for a skating area.

1.1 Site Location

Bryn Mawr Meadows Park is located at 601 Morgan Avenue South in the city of Minneapolis, Minnesota. The water quality improvement project area includes the Bryn Mawr Meadows Park, residential areas to the west, with connection to Bassett Creek to the north through the City of Minneapolis vehicle impound lot. The impound lot is the site of the former Irving Avenue Dump, a closed Minnesota state superfund site, where dump debris and contaminated soil remains. Based on review of the Hennepin County Environmental Data Access Tool, environmental contamination associated with the Bryn Mawr Park property has not been identified, but the site was filled in during the early 1900's and the content and source of the fill is unknown.

The topography of Bryn Mawr Park slopes down from towards Basset Creek from an elevation of approximately 820 to 810 feet.

1.2 Site Geology

A review of regional geology and geotechnical borings indicates the site conditions generally consist of approximately 6 to 14 feet of fill materials immediately below the topsoil. The fill predominantly consists of sand and clay with various amounts of gravel and organic material.

The underlying native soils consist of organic and lacustrine fat clays underlain by glacial till (Meyer and Hobbs, 1989). The lacustrine deposits consist of fine-grained sediment with organic-rich layers and in places overlain by muck or peat.

Glacial till soils were encountered below the lacustrine deposits and extended to the termination depth of the geotechnical borings. The glacial till soils generally consisted of lean clay with sand and sandy lean clay with varying amounts of sand and gravel. Layers of glacial outwash consisting of sand with varying fines content were also encountered in all of the geotechnical borings within the glacial till.

The upper bedrock unit of the site is generally considered Middle Ordovician age sandstone of the St. Peter Sandstone formation (Hennepin County, 1989). The bedrock surface, which was not encountered during drilling operations, is estimated to be 200 to 250 feet below existing grade and generally dips from southeast to northwest across the project Site.

The Quaternary hydrogeology map (Hennepin County, 1989) for Hennepin County's water-table system indicates that the project site is located near the edge of the surficial/bedrock aquifer contact. This contact represents the approximate surface outline for the elevation where groundwater in the soils intersect with bedrock groundwater. The groundwater contour lines show gradually decreasing total head with an eastward flow gradient towards the Mississippi River. During this investigation, groundwater was generally encountered at depths of approximately 3 to 6 feet below existing grade. Localized shallow groundwater flow is likely influenced by Bassett Creek, located north of the park. Based on the available information to date, groundwater is anticipated to be a factor in the design and construction of any stormwater infrastructure.

1.3 Previous Investigation

No previous geotechnical engineering reports associated with the Bryn Mawr park area were known or provided at the time of this report.

2.0 Geotechnical Exploration Methods

The preliminary geotechnical investigation consisted of geotechnical borings, standard penetration tests (SPT) and split spoon sampling, undisturbed soil sampling, and laboratory testing. Figure 1 shows the plan location of all geotechnical borings completed for the project and Table 1 summarizes the associated GPS coordinates and elevations. The primary site investigation and laboratory testing was conducted in March and April of 2018, respectively.

The boring locations were staked and identified in the field by Barr staff with the use of a handheld GPS unit with the accuracy of approximately 15 to 20 feet.

2.1 Field Work

2.1.1 Geotechnical Borings

A total of four geotechnical borings were completed as part of this preliminary geotechnical investigation (Figure 1). Each boring was completed along the proposed stormwater infrastructure or within the footprint of other proposed infrastructure for the project area. Geotechnical boring SB1 was extended to a depth of approximately 75 feet below existing grade, while the remaining three borings (SB2, SB3, and SB4) were extended to a depth of approximately 100 feet.

Under subcontract to Barr, the geotechnical borings were completed by STS Enterprises, LLC (STS) of Maple Plain, Minnesota. A buggy-tired drill rig was used to conduct the geotechnical borings using hollow stem auger and mud rotary drilling techniques. Standard penetration tests (SPTs) were performed as the geotechnical borings were advanced in accordance with ASTM D1586. Standard penetration tests were completed at 2.5 foot intervals to a depth of 15 feet below existing grade, and then at 5 foot intervals to the termination depths of the borings. Penetration resistances measured in blows-per-foot (bpf), otherwise known as the SPT N value, provide an empirical means of estimating the soil relative density, consistency, and strength. Three-inch diameter thinwall samples were collected at selected locations in accordance with ASTM D1587.

During drilling, Barr field staff screened fill soils for signs of environmental impacts, including odors, discoloration, sheen, and headspace organic vapors using a photoionization detector (PID) equipped with a 10.6 eV lamp. Field screening indicated that PID readings were less than 10 ppm and in the range of background readings. No sheen, odors or discoloration indicative of petroleum or chemical impacts were observed. PID readings from the preliminary investigation are provided in Table 2.

All samples were sealed in the field in order to preserve the in-situ moisture content. Samples were delivered to Soil Engineering Testing Inc. (SET) in Bloomington, Minnesota for laboratory testing. Copies of the geotechnical boring logs are included as Appendix A to this report.

2.2 Laboratory Testing

A program of general laboratory testing was performed by SET to aid in characterizing the soil properties. The results of the laboratory tests can be found in Appendix B.

- Moisture content tests were performed in accordance with ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass"
- Dry unit weight tests were performed in accordance with ASTM D7263, "Standard Test Methods for Laboratory Determination of Density (Unit Weight) of Soil Specimens"
- Atterberg Limit tests in accordance with ASTM D4318, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"
- Sieve analysis in accordance with ASTM D422, "Standard Test Method for Particle-Size Analysis of Soils"
- Consolidation tests in accordance with ASTM D2435, "Standard Test Methods for One Dimensional Consolidation of Soil Using Incremental Loading"
- Unconsolidated-undrained triaxial compressive strength tests in accordance with ASTM D2850, "Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils"
- Soil pH tests in accordance with ASTM D4972 "Standard Test Method for pH of Soils"
- Determination of chloride and sulfate content of soils in accordance with EPA Method 9056A "Determination of Inorganic Anions by Ion Chromatography"

3.0 Results

Section 2 describes the field and laboratory investigation procedures. Section 3 presents the data from testing and investigation and provides further analysis of these results.

3.1 Soil Stratigraphy

The results of the geotechnical borings (Appendix A) and laboratory tests (Appendix B) were compiled to obtain an understanding of the stratigraphy of the study area.

The existing conditions, as determined from field data, consist of fill materials overlying organic and lacustrine clays, and underlain by glacial till soils. Bedrock was not encountered during the preliminary geotechnical investigation.

Topsoil was encountered in four borings with thicknesses ranging from 1 to 2 feet. The topsoil encountered was classified as lean clay with varying amounts of organics in accordance with the Unified Soil Classification System (USCS).

3.1.1 Fill or Possible Fill

A portion of the project area is covered by an asphalt pavement parking area (near soil boring SB3) and bituminous trails. The remaining project area is pervious grass fields. Fill was encountered in all four soil borings completed during this investigation. The fill was generally observed from immediately below the pavement or topsoil to depths ranging from 6 to 14 feet below existing grade. The greatest depths of fill were noted within and around the existing parking area. The SPT *N* values ranged between 1 and 12 bpf within the fill soils. The SPT *N* values are not considered a reliable measure of fill relative density and consistency, due to the potential variability in which the material may have been placed.

The fill as observed in the borings consists of poorly graded sand with silt, clayey sand, and lean clay with various amounts of gravel and organic inclusions. Debris was not encountered in the preliminary borings. Laboratory testing was not completed on the fill soils.

3.1.2 Lacustrine Soil

3.1.2.1 Organic Clays

Organic clay soils were encountered below the fill materials in borings SB2 and SB3. The thickness of the organic clay soils ranged from approximately 7 to 14 feet (where encountered).

The SPT *N* value results ranged from weight of hammer to 2 bpf. These results indicate that the organic clays typically have a very soft consistency. Pocket penetrometer values were typically less than 0.25 tsf. The organic clay soils had moisture contents ranging from 85 to 147 percent.

3.1.2.2 Fat Clays

Fat clays soils (lacustrine soils) were encountered below the organic clays or fill soils and extended to depths of 28 to 53 feet below existing grade based on the soil borings. The thickness generally increased from south to north across the project site.

The SPT *N* value results ranged from less than 1 to 2 bpf. These results indicate that the fat clays typically have a very soft consistency. Pocket penetrometer values were typically less than 0.25 tsf.

A total of 10 moisture content tests were run on soil samples collected from the borings. The soil had moisture contents ranging from 51 to 90 percent with an average of 79 percent, indicating the soils are generally in a wet condition. Two Atterberg limits tests were conducted on selected samples from the borings. Results indicate the fat clays have liquid limits ranging from 117 to 121 percent and plastic limits ranging from 27 to 30 percent. These results correspond to plasticity indices varying between 90 and 91 percent, classifying the soils as fat clay (CH) in accordance with the Unified Soil Classification System (USCS). Three dry unit weight tests were conducted and results ranged from 49 to 57 pcf. Two laboratory UU triaxial compressive strength test results on a Shelby tube samples collected from various depths indicated undrained shear strengths of 280 and 390 psf.

3.1.3 Glacial Till

Glacial till soils were encountered below the lacustrine fat clays. The glacial till was largely comprised of poorly graded sand with silt (SP-SM; likely associated with glacial outwash layers within the till), clayey sand (SC), and sandy lean clay to lean clay (CL), though fat clay (CH) was also present on a limited basis.

The SPT *N* values in the glacial till ranged between 5 to over 50 bpf, indicating loose to dense relative density and medium stiff to hard consistency. Pocket penetrometer values ranged from less than 0.25 to 3 tsf.

A total of 10 moisture content tests were run on samples of the glacial till collected from the borings. The till had moisture contents ranging from 15 to 36 percent, with an average of 25 percent, indicating the soils are generally in a moist to wet condition. Two Atterberg limits tests were conducted on selected samples from the borings. Results indicate the glacial till soils have liquid limits ranging from 49 to 55 percent and plastic limits ranging from 19 to 33 percent. These results correspond to plasticity indices varying between 16 and 36 percent, classifying the soils as lean clay (CL) and fat clay (CH) in accordance with the Unified Soil Classification System (USCS). Grain size analyses was performed on one sample collected in boring SB2. The percent fines (percent by weight passing the number 200 sieve) was approximately 13 percent in the sample tested. Two dry unit weight tests were conducted on samples of glacial till and results ranged from 85 to 86 pcf. Two laboratory UU triaxial compressive strength test results on a Shelby tube samples collected from various depths indicated undrained shear strengths of 1,160 and 1,220 psf.

3.2 Groundwater Conditions

Groundwater was observed in each of the four borings completed as part of this preliminary geotechnical investigation at depths between 3 and 6 feet below existing grade. The shallowest groundwater encountered at soil boring (SB4) was at a depth of 3 feet. Groundwater levels encountered during the field investigation are summarized in Table 3.

Many factors contribute to water level fluctuations, such as heavy rainfall events, dry periods, etc., and the measurements noted during this investigation may not represent the long term groundwater levels present at the site. It is the responsibility of the designer to prepare a foundation design that takes into account the groundwater level.

3.3 Chemical Testing

Chemical tests, consisting of soil pH, soluble chlorides, and soluble sulfates, were performed on two soil samples. Soil samples were composites of soil collected between 5 and 10 feet below existing grade to represent the characteristics of the potential backfill material along proposed stormwater infrastructure. The results of the chemical tests indicate that the materials have a pH level ranging from 6.8 to 7.3. The soils contain from 49 to 66 mg/kg soluble chloride (dry weight) and less than 50 to 55 mg/kg soluble sulfate (dry weight). Chemical test results are included in Appendix B and summarized in Table 4.

3.4 Shear Strength

3.4.1 Undrained Shear Strength

The undrained shear strength of the cohesive soils was estimated from SPT results, field pocket penetrometers, and laboratory unconsolidated-undrained (UU) triaxial compressive strength tests.

A number of pocket penetrometer tests were conducted on split-spoon samples collected during drilling with the results shown on the boring logs (Appendix A). Pocket penetrometer values in the lacustrine clays ranged from less than 0.25 to 0.5 tsf. In glacial till soils, pocket penetrometer measurements ranged from less than 0.25 to 3 tsf.

The UU triaxial compressive strength test results on four samples collected from soil boring locations indicate undrained shear strengths range from 280 to 390 and 1,160 to 1,220 psf for lacustrine clay and glacial till soils, respectively. Laboratory strength test results are summarized in Table 5 and provided in Appendix B.

3.4.2 Drained Shear Strength

Granular soils were encountered in each soil boring. The shear strength of these soils was estimated through correlations from SPT results (NAVFAC, 1982) collected at 2½- and 5-foot intervals during sampling in the boreholes. The lowest average SPT value obtained for a cohesionless soil (excluding fill) was SPT = 15 at soil boring SB2. An average SPT value of 15 in clayey sand correlates to a friction angle of approximately 32 degrees (Das, 2007).

The drained shear strength of the cohesive soils was estimated from a relationship of plasticity index to friction angle for normally consolidated, saturated clays (Coduto, et al., 2011). The lacustrine fat clays had a maximum plasticity index of 91 correlating to a minimum friction angle of 21 degrees. The drained shear strength of the clayey glacial till soils was not directly measured. However, it is estimated at 26 degrees based on correlations to the plasticity index (maximum value of 36) from Terzaghi et al. (1996). In all cases, the drained shear strength of cohesive soil was based on the maximum plasticity index for each layer resulting in a lower bound friction angle.

3.5 Consolidation Testing

Compressibility characteristics of soil at the site were evaluated during the preliminary geotechnical investigation through consolidation testing on two samples of lacustrine clay collected from the soil borings. The tests were performed according to ASTM D2435 using the incremental loading test procedure. The void ratio versus effective stress relationship results are included in Appendix B.

Table 6 summarizes the consolidation test results in terms of the preconsolidation pressure, compression index C_r , recompression index C_r , and initial void ratio e_o . The test results indicated that the samples had preconsolidation pressures ranging from 0.5 to 0.67 tons per square foot (tsf), corresponding to overconsolidation ratios (OCRs) ranging from approximately 1 to 1.2 (normally consolidated to slightly overconsolidated). The initial void ratio of the samples ranged from 2.547 to 2.892. The calculated compression index ranged from 0.98 to 1.20, while the recompression index ranged from 0.27 to 0.36.

4.0 Evaluation and Analysis

Results of the field and laboratory investigation have been presented in Section 3. Based on these results, Section 4 provides analysis, conclusions and recommendations for the design and construction of potential building foundations, stormwater infrastructure, as well as general construction considerations.

4.1 Final Grades

Proposed final grades were not available at the time of this report, however it is anticipated that only minor grade changes would occur across the park area.

4.2 Building Support

Building details for the picnic shelters, warming house, and pavilions, including size, location, structural loading, and configuration, were not provided at the time of this report.

4.2.1 Subgrades

Pending further investigation and later phases of design, the above grade structures will likely need to be supported on deep foundations with a structural slab. Limited, if any, subgrade improvement will be necessary for pile caps and structural slabs.

If grade-support is determined to be feasible, foundations and floor slabs should not be supported on topsoil, existing fill material, and any loose or soft native soils. All elements of existing structures (including foundations) or pavements within the proposed building footprints should be removed. Following removal of the unsuitable material and existing foundation elements (if any), it may be necessary to replace these soils/voids with compacted engineered fill material to attain final bottom-of-footing and bottom-of-slab grades. Any loose sands at the excavation bases should be surface compacted prior to footing construction or placement of compacted engineered fill.

4.2.2 Foundation Types

The results of this preliminary geotechnical evaluation indicate the presence of 6 to 14 feet of fill materials, some of which contains gravel and organics. Underlying the fill materials are very soft organic and lacustrine clays, followed by glacial till at estimated depths of approximately 30 to 60 feet below existing grade.

Based on the soils encountered in the borings and the results of the laboratory testing, it is recommended the proposed structures be supported on a deep foundation system with a structural slab. Shallow foundations or floor slabs could be considered, but will likely be subject to significant amounts of settlement over the life of the facility and this is generally undesirable.

Ultimately, the specific building details (size, location, structural loading and configuration) will dictate the type of foundations selected for final design. Once final design details are available, a final geotechnical investigation should be completed.

4.3 Stormwater Infrastructure

The stormwater sewers are anticipated to consist of PVC or HDPE pipe with diameters up to 48 inches. Manholes are anticipated to consist of concrete structures with an inner diameter of 6 feet or less. No additional details were provided regarding the stormwater infrastructure.

The results of the preliminary geotechnical investigation indicate that consideration could be given to supporting the stormwater infrastructure on existing or engineered fill and be designed to accommodate significant settlement. Further investigation, testing, and analysis, should be performed to design a system that is within the risk tolerance of the owner. Alternatively, the stormwater infrastructure could be supported on a deep foundation system which would significantly reduce the long-term settlement and likelihood for maintenance over time.

4.4 Parking Lot

The improvement project will likely include new parking areas. Traffic in the parking area is anticipated to consist of both passenger vehicles (standard-duty pavement) and occasional tractor trailers. A traffic frequency for the facility has not been provided. A medium duty pavement section has been assumed for preliminary purposes in this report.

4.5 Reuse of On Site Material

The existing clayey sand fill soils may be suitable for reuse as engineered fill, provided they are debris-free and free of organic material. Based on the color of fill encountered in the soil borings, organic material may be present at some locations in the fill, especially near the ground surface. Topsoil and existing fill that contain debris or organic material should not be reused as engineered fill.

4.6 Preliminary Design Parameters

The existing conditions, as determined from field data, consist of fill materials overlying organic and lacustrine clays, and underlain by glacial till soils. Subsurface profiles were developed for the purpose of preliminary geotechnical analysis to support preliminary design. The generalized soil profiles are provided in Table 7. Division of the layers was estimated based on visual classification by a geotechnical engineer, trends in SPT N-values, undrained shear strength from field tests, and laboratory test results.

A design value for the undrained shear strength of each clay layer was derived from the approximate lower bound of strength data from unconsolidated-undrained laboratory testing as well as field hand penetrometer tests within the corresponding layer. The drained shear strength for the sand layers were estimated from correlations with SPT results, relative density, and soil classification (NAVFAC, 1982). The drained shear strength of the cohesive and cohesionless soils were estimated from index property correlations as further described in Section 3.4.2. Moist unit weights for foundation and settlement analyses correspond to the average moist unit weight from laboratory testing.

For settlement analyses, the upper bound of consolidation coefficients and corresponding void ratio and preconsolidation pressures were matched to the clay layers of the generalized soil profile. For immediate settlement, the undrained modulus of elasticity was estimated from the overconsolidation ratio (OCR) and index properties of the clayey soils (Fang, 2007). The drained modulus of elasticity was estimated from correlations with SPT results (Fang, 2007).

Recommended soil parameters for use in preliminary design of foundations to support the building and stormwater infrastructure, including density and strength, are included in Table 7. Of the recommended design parameters, the majority follow directly from the stratigraphy, groundwater conditions, and laboratory test results presented in Section 3.0, while those for use in pile design follow from published references as listed in Table 7.

5.0 Preliminary Geotechnical Recommendations

Section 5.0 provides preliminary general recommendations for foundation construction. These recommendations should be updated as the proposed plans are finalized and additional geotechnical investigations are performed.

5.1 Subgrade Preparation

5.1.1 Excavations

Based on the results of the test borings completed as part of this preliminary geotechnical investigation, the excavation depths required to reach competent native soils suitable for support of the proposed construction range from 5.5 to 14 feet below existing grade. The anticipated excavation depths included in this report are based on the results of the preliminary soil borings completed across the project site and actual excavation depths will vary from the values presented in this report. Further, some of the material encountered in the borings was identified as possible fill and should be further evaluated prior to construction. Even if deemed to be native soil during excavations, the fill and possible fill material was generally in a loose state and is not suitable for direct foundation support. A geotechnical engineer should be present during excavation to observe and document that all excavations are extended to sufficient depths to remove all unsuitable material.

Estimated excavation depths should be considered the minimum necessary to provide a stable platform on which to spread and compact replacement backfill. Depending on construction conditions, excavations may have to be extended locally to remove wet, loose, soft, or otherwise unstable soils that become disturbed during the excavation process and lose strength.

5.1.2 Groundwater and Dewatering Considerations

The subsurface investigation indicates that shallow groundwater exists across the site (Section 3.2). Depending on the depth of excavations, the effects of groundwater may need to be incorporated into the design and construction of foundations and utilities. Temporary groundwater management could consist of a standard sump and pit for excavations less than 3 feet below existing grade. More aggressive dewatering systems consisting of well points, or similar, may be required if excavations deeper are necessary. Excavations that extend into one or more sand or silt layers below the groundwater table will likely require more aggressive dewatering.

The groundwater levels generally vary from 3 to 6 feet below existing grade. Based on the information collected as part of this preliminary geotechnical investigation, it is recommended that the foundation design and stormwater infrastructure account for the presence of groundwater at a depth of approximately 3 feet below existing grade. It is important to note that existing grade may not correlate to final grade.

5.2 Recommendations for Building Construction

Based on the soils encountered in the borings and the results of the laboratory testing, it is recommended that the proposed structures be supported on a deep foundation system with a structural slab. Depending on timing, building loads, final grades, and other factors, there is a slight possibility that ground improvement could be considered in order to support shallow foundations (see Section 5.2.2), although some risk of significant foundation settlement may still exist with this approach.

5.2.1 Shallow Foundations

Based on the soil borings, slabs on grade or shallow foundations will likely be subject to significant amounts of settlement over the life of the facility and this is generally undesirable. Due to the fact that loads and specific details regarding these foundation systems are not available at this time, it is recommended that the designers evaluate the feasibility of shallow foundations during final geotechnical design.

5.2.2 Ground Improvement Considerations

5.2.2.1 Surcharge

The long-term settlement can be partially reduced, though not completely eliminated, by surcharging the building area over an extended period of time, then removing the surcharge prior to final grading and construction. The amount of settlement to occur after surcharging the soils beneath the proposed embankment will be dependent on the height and duration of the surcharge. It should be noted that the surcharge duration would likely require multiple years to remove enough long term consolidation to make a shallow foundation system viable.

5.2.2.2 Lightweight Fill

The building footprint could be excavated and subgrade soils could be replaced with lightweight fill, such as tire chips or geofoam. The lightweight fill will reduce the increase in stress exerted on the soils at depth developed by the building. The lighter weight of the tire chips or geofoam will lower the increase in stress applied to the highly compressible soils at depth. The shallow groundwater and buoyancy of the lightweight fill would need to be considered if this design approach was implemented.

5.2.2.3 Vertical Wick Drains

When the rate of settlement beneath a surcharge is too low, the installation of vertical wick drains (also known as prefabricated vertical drains or vertical strip drains) can help expedite the consolidation process. Vertical wick drains typically consist of a central plastic core, which functions as a free-draining water channel, surrounded by a thin geotextile filter jacket. Vertical drains introduce a preferential (shorter) drainage path and should penetrate through the highly compressible layer(s). The spacing of wick drains will influence the rate of consolidate, where closely spaced drains will speed up the consolidation process. Depending on the surcharge height and wick drain spacing, this approach can reduce the surcharge duration from years to months.

5.2.3 Deep Foundations

In the absence of structural loads, specific recommendations for axial and lateral pile capacity cannot be provided. Closed end steel pipe piles with a diameter of 12-3/4-inch should be feasible for support of new buildings. Piles of this type and size are generally available and are commonly used for the anticipated design capacities.

The final geotechnical investigation should include deeper borings and laboratory testing to further characterize the subgrade soils at depth. The depth of borings will be dependent on final building design (size, structural loading and configuration).

5.2.3.1 Pile Capacity

A pile foundation system will develop capacity through a combination of end bearing and skin friction. Lateral capacity is also taken into consideration in the design.

Due to limited presence of debris in the fill material (and generally small debris), closed end steel pipe piles with a diameter of 12-³/₄-inch should be feasible for support of the building. The closed end of the pile should include a thickened steel plate (ideally 3/4-inch or greater) to protect against small debris in the fill and should be no larger in diameter than the outside pile diameter. Piles should be spaced no closer than three times the pile diameter (on center).

APILE 2015 was used to estimate the ultimate pile capacity in compression for the selected pile. APILE 2015 is a software program that can compute the axial capacity as a function of depth for driven piles in clay, sand, or mixed-soil profiles. Using the design parameters recommended in Table 7, the total pile capacity versus depth was calculated and are presented in Figures 4a and 4b. Total pile capacities are provided using the U.S. Federal Highway Administration (FHWA, 1993), U.S. Army Corps of Engineers (USACE, 1993), and American Petroleum Institute (API, 1993) design methods. If an alternative pile is selected for the project, Barr should be notified so that the analysis can be revised.

Note that the values presented in Figures 4a and 4b are ultimate capacities and an appropriate factor of safety must be applied for design purposes. In the absence of load testing, a factor of safety of 3 is recommended, however this may be reduced with specialty testing (PDA/CAPWAP or static load tests). It is recommended that a limited scope of pile load testing (e.g., two to three piles) should be performed during construction to verify capacity. The pile installation contractor should be prepared to demonstrate that their proposed hammer will provide sufficient energy to drive the piles without causing inadvertent damage during installation.

5.2.3.2 Downdrag

Settlement of the ground in a downward direction relative to the pile will create a force that acts as an additional downward load on the pile (i.e., downdrag). Because the organic and fat clay layers are thick in some portions of the site and subject to settlement over the full depth, the magnitude of the downdrag force can be substantial.

The downdrag force is a function of design pile load and length which are unavailable at the time of this report. When the individual pile loads and lengths become finalized, the downdrag analysis should be completed.

5.2.3.3 Resistance to Uplift

Design of piles for uplift should be based on a combination of the skin friction and the weight of the pile. As is standard, skin friction should not be assumed to contribute to uplift resistance throughout the frost zone and the weight of the pile should be taken as the buoyant weight at depths below the water table. It is recommended that the skin friction contributing to uplift resistance should be taken as 75 percent of the skin friction used in compression (FHWA, 1999) applied to account for the potential loss of lateral earth pressure in uplift

5.2.3.4 Settlement

Due to the fact that individual pile loads are not available, it is recommended that settlement of the soils under foundation loading be evaluated during final design. Elastic settlement will be governed by the section properties of the piles, which should be sized accordingly to accommodate the anticipated structural loading. Long-term pile settlement is a function of pile load and can be estimated using the computer software program APILE 2015 during final design.

The calculated pile top deflection should consider both dead and downdrag loading (Section 5.2.1.3).

5.2.3.5 Exterior Slabs

It is anticipated that exterior slabs will not be structurally supported. This practice will lead to long-term settlement of the slabs, though it is much less costly than pile support. The total settlement of exterior slabs exerting an applied bearing pressure of 150 psf is estimated to range from 3 to 6 inches over the first 20 years. Additional settlement will occur beyond the initial 20 years of facility operation. Other options, such as the use of lightweight fill beneath slabs could be considered to limit long term settlement, but the applicability of this method will be limited by the presence of shallow groundwater.

Exterior slabs founded on soil should be supported by engineered fill with the further caveat that the material should not be prone to frost heave as discussed below. Poorly graded sand with silt is typically considered moderately frost susceptible. The silty sand is considered highly frost susceptible. Saturation and freezing of these soils could potentially cause unfavorable heaving of the slabs to occur. There are several options to reduce the risk of frost heave beneath exterior slabs.

The risk of frost heave can be reduced by placing a minimum of 2 ½ inches of extruded polystyrene foam insulation beneath the slabs and extending the insulation approximately 5 feet beyond the slabs as per the insulation manufacturer's recommendations. A leveling course consisting of 12 inches of clean sand with less than 5 percent fines content is generally required to seat the insulation panels. Granular fill with a minimum thickness of 12 inches is recommended to be placed over the panels to protect them during and after construction. The practice of using insulation may have long-term implications if the insulation shears due to long-term settlement of the slab.

Another method of reducing frost heave is to remove the frost-susceptible soils to below the frost depth and replace with non-frost-susceptible material. Sands with less than 5 percent passing the number 200 sieve are considered non frost-susceptible. This approach would include significant landfill disposal cost as it is assumed that all excavated fill materials would need to be transported off-site to a landfill due to the presence of environmental contaminants and the limitations to keep this soil on-site under the project grading constraints. With this method, a drain system may be required in clayey subgrades to prevent pooling water within the sand from below the foundation, though this scenario is not anticipated in the fill soils based on the borings completed for the project site.

5.3 Stormwater Infrastructure

The results of the preliminary geotechnical investigation indicate that the stormwater infrastructure may be placed on a deep foundation system or designed to accommodate settlement as further discussed in Section 5.3.2.

5.3.1 Excavation and Backfill

It is recommended that utility trench backfill placed below the parking lot or greenspaces be compacted to a minimum of 100 percent of the standard Proctor maximum dry density in the upper 3 feet and to minimum of 95 percent of the standard Proctor maximum dry density below the upper 3 feet.

For utility trenches, it is recommended that granular bedding should be placed 4 to 6 inches below pipes (depending on pipe diameter) and conform to the requirements of Mn/DOT Standard Specification 3149.2 F (Mn/DOT, 2017). Note this specification only allows 10 percent fines, which likely requires this material to be imported to the project site.

5.3.2 Foundations

Due to the inherent variable nature of the existing fill materials and subgrade variation along the stormwater alignment, there is some risk of undesirable performance of utilities over the life of the facility. Grade raises are not currently anticipated along the stormwater infrastructure and therefore settlement will be limited to secondary consolidation. Secondary consolidation is defined as volume change that occurs under constant effective stress after all excess pore-water pressure is dissipated. Secondary consolidation typically represents 10 to 20 percent of the overall settlement and significant creep may be associated with organic soils. Preliminary estimates of secondary consolidation are estimated to range from 2 to 4 inches over the first 20 years.

It is recommended that the civil engineer either design the system using steeper slopes and flexible piping to accommodate the settlement or support the system on deep foundations to limit total and differential settlement. The owner should understand and be accepting of this risk prior to final design and construction of the project.

Alternatively, the underground utilities may be placed on a deep foundation system. The pile capacity can be calculated using the methods outlined in Section 5.2.2.1 and the design parameters provided in Table 7. The total pile capacities versus depth were calculated for a pipe pile with a diameter of 12-3/4 inches and
results are presented in Figures 4a and 4b. Considerations for settlement, downdrag, and construction are provided in Section 5.2.2. If deep foundations proposed, the civil engineer should further evaluate the use of PVC or HDPE conduit in the context of potential downdrag forces that may develop from settlement in between in the pile supports. It is likely that more rigid pipe will be necessary to tolerate the stresses that develop in between pile supports.

5.4 Pavements

It is recommended that all topsoil and existing fill be removed from proposed pavement areas. The resulting exposed subgrade should be scarified and moisture conditioned to within 2 percent of optimum moisture and re-compacted to a minimum of 95 percent of the modified Proctor maximum dry density.

If deeper deposits (in excess of 3 feet deep) of existing granular fill are encountered, it may be possible for these soils to remain in place provided the risk of potential settlement, cracking, and distress of the overlying pavement is acceptable to the BCWMC.

5.4.1 Fill

Where fill is required to raise grade in pavement areas, it is recommended to consist of a granular mineral soil with no more than 30 percent passing the number 200 sieve. To reduce the amount of potential frost heave, the fill beneath the aggregate base and within 3 feet of the pavement surface should consist of a sand subbase with no more than 5 percent passing the number 200 sieve. The excavation should be oversized a minimum of 1 foot beyond the perimeter of pavement areas for each foot of fill required to reach final subgrade elevation. A final geotechnical investigation should be performed to determine specific material and compaction requirements for pavement design and support.

5.4.2 Preliminary Design Sections

For feasibility level discussions, a preliminary pavement design section is provided. This should be further evaluated and final recommendations should be provided in a final geotechnical investigation and report.

For the anticipated subgrade and assumed traffic, the pavement section could consist of 4 inches of bituminous surface over 8 inches of gravel base.

6.0 Report Qualifications

6.1 Variations in Subsurface Conditions

6.1.1 Material Viability

The recommendations provided in this report are based on the results of limited quantity of geotechnical borings and testing. It is not standard engineering practice to retrieve material samples from borings continuously with depth, and therefore strata boundaries and thicknesses must be inferred to some extent. Strata boundaries may also be gradual transitions, and can be expected to vary in depth, elevation and thickness away from the boring locations. Although strata boundaries can be determined with continuous sampling, the boundaries apparent at boring locations likely vary away from each boring.

Variations in subsurface conditions present between borings may not be revealed until additional exploration work is completed or construction commences. If any such variations are revealed, our recommendations should be re-evaluated. Such variations could increase construction costs, and a contingency should be provided to accommodate them.

6.1.2 Groundwater Variability

Groundwater measurements were made under the conditions reported within the report. It should be noted that the observation periods were short, and groundwater can be expected to fluctuate in response to rainfall, snowmelt, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

6.1.3 Precautions Regarding Changed Conditions

We have attempted to describe our understanding of the proposed construction to the extent it was reported to us by others. As we were given limited information, assumptions may have been made based on our experience with similar projects. If we have not correctly presented or interpreted the project details, we should be notified. New or changed information could render our evaluation, analyses, and recommendations invalid.

6.2 Limitations of Analysis

This report is for the exclusive use of the BCWMC. Without written approval by us, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

No established national standards exist for data retrieval and geotechnical evaluations. Barr Engineering Co. has used the methods and procedures described in this report. In performing its services, Barr Engineering Co. used that degree of care, skill, and generally accepted engineering methods and practices ordinarily exercised under similar circumstances and under similar budget and time restraints by reputable members of its profession currently practicing in the same locality. Reasonable effort was made to characterize the project site based on the site-specific field work, but there is always the possibility that conditions may vary from any of the locations at which testing was performed, and careful attention by qualified personnel should be undertaken during the time of construction to verify soil conditions. No warranty, expressed or implied, is made. The test results and recommendations provided herein are for preliminary design purposes and should not be relied upon for final design. Once final design details are available, a final geotechnical investigation should be completed.

7.0 References

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Tables

Table 1	
Preliminary Geotechnical Investigation Summa	ary

Investigation ID	Geographi	c NAD83	Elevation*	Geotechnical
Investigation iD	Latitude	Longitude	[feet]	Boring
SB1	44.97260	-93.30217	814.9	Х
SB2	44.97347	-93.30161	813.0	Х
SB3	44.97394	-93.30226	812.6	Х
SB4	44.97429	-93.30223	810.5	Х

*Elevation data from Hennepin County 1 Meter LiDAR (2011).

Table 2Summary of PID Readings

Investigation ID	Depth [ft]	PID Reading [ppm]		
	2-4	0.1		
SB1	4.5-6.5	0		
	7-9	0.5		
	2-4	6.7		
	4.5-6.5	9.1		
SB2	7-9	2.5		
	9.5-11.5	4.3		
	12-14	2.2		
	2-4	0.1		
	4.5-6.5	0.7		
SB3	7-9	0.1		
	9.5-11.5	0.8		
	12-14	1.4		
CD 4	2-4	0.1		
5B4	4-6	0.5		
	Mean	1 94		
Sta	Indard Deviation	27		
	Minimum	0		
	Maximum	9.1		

Table 3Summary of Groundwater Levels

Investigation ID	Depth to Groundwater During Drilling [feet]
SB1	5.6
SB2	5.5
SB3	5.5
SB4	3

Table 4Summary of Chemical Test Results

Investigation ID	Depth [ft]	рН	Soluble Chloride ¹	Soluble Sulfate ¹
			[mg/kg]	[mg/kg]
SB2	4.5-9	6.8	49	ND
SB4	6-10	7.3	66	55

¹Note that some of the test results were below the detection limit. Detection limit for chlorides = 10 mg/kg, sulfates = 50 mg/kg.

Table 5Summary of Laboratory Test Results

Investigation ID	Depth [ft]	USCS Classification	Moisture Content [%]	Dry Unit Weight [pcf]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Percent Passing #200 Sieve [%]	U-U Triaxial Compressive Strength [tsf]
	9.5-11.5	СН	89.2		117	27	90		
SB1	24-26	СН	50.6						
301	34-36	СН	31	86.1	55.0	19.0	36.0		1.160
	49-51	CL	16.9						
	19-21	OH	147.0						
	29-31	СН	72.5	56.6					
SB3	34-36	СН	89.3						
362	44-46	СН	72.8						
	54-56	SM						12.8	
	84-86	CL	19.3						
	12-14	OH	84.9						
	24-26	СН	86.2	50.0	121	30	91		0.390
	44-46	СН	82.1						
SP2	59-61	СН	27.4						
303	64-64.5	CL	25.8						
	69-71	CL	36	84.8					1.220
	74-76	CL	21.7						
	89-91	CL	15.3						
	8-10	СН	79.5						
	14-16	СН	89.8	48.8					0.280
SB4	29-31	СН	75.6						
	49-51	CL	24.6						
	69-71	CL	29.9		49	33	16		
	Total	Number of Tests	22	5	4	4	4	1	4
		Mean	57.6	65.3	85.5	27.3	58.3	12.8	0.763
	Sta	andard Deviation	35.0	18.7	38.8	6.0	38.1		0.496
		Minimum	15.3	48.8	49.0	19.0	16.0	12.8	0.280
		Maximum	147.0	86.1	121.0	33.0	91.0	12.8	1.220

Table 6Summary of Consolidation Test Results

Investigation ID	Depth [feet]	Void Ratio, e _o	Compression Index, C _C	Recompression Index, C _r	Overconsolidation Ratio, OCR
SB3	24-26	2.892	1.20	0.36	1.0
SB4	14-16	2.547	0.98	0.27	1.2

Table 7 Preliminary Geotechnical Design Profile

				Depth to		Undraine Cond	d Loading itions	Drained Cond	Loading itions	Consolidation Parameters				
Structure / Location	Investigation ID	Material	Depth to Top of Layer feet	Bottom of Layer feet	Effective Unit Weight pcf	Friction Angle ¹ degrees	Cohesion psf	Friction Angle ² degrees	Cohesion psf	Void Ratio, e _o	Overconsolidation Ratio, OCR	Compression Index, C _C	Recompression Index, C _r	
-		Fill (SC)	0	5.5	120	25	0	25	0	N/A	N/A	N/A	N/A	
	SB01	SP01	Organic and Fat Clays (OH/CH)	5.5	38	31.6	0	250	21	0	2.467	1	1.2	0.36
		Till	38	50	51.6	0	1100	26	0	0.398	1.8	0.08	0.01	
Stormwator			50	75	51.6	0	2000	26	0	N/A	N/A	N/A	N/A	
Litility Corridor		Cill	0	5	120	25	0	25	0	N/A	N/A	N/A	N/A	
ounty contact		1	5	10	57.6	25	0	25	0	N/A	N/A	N/A	N/A	
	SB02 / SB05 /	Organic and Fat Clays (OH/CH)	10	60	31.6	0	250	21	0	2.467	1	1.2	0.36	
	5504	Till	60	90	51.6	0	1100	26	0	0.398	1.8	0.08	0.01	
		111	90	100	51.6	32	0	32	0	N/A	N/A	N/A	N/A	

1. The drained shear strength of cohesionless soils were estimated from NAVFAC Design Manual 7.1.

2. The drained shear strength of the cohesive and cohesionless soils were estimated from Coduto, et al., 2011 and Terzaghi et al., 1996.

Figures







Geotechnical Boring

Feasibility Study Area

LiDAR Ground Surface Elevation Contours (Spring/Fall 2011)

- 10 ft Contour
- 2 ft Contour



SITE TOPOGRAPHY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 2





Geotechnical Boring

Feasibility Study Area

Surficial Geology

- Qnd: New Ulm Formation, Twin Cities Member
- Qni: New Ulm Formation, Icecontact Stratified Deposit
- Qp: Quaternary Peat and Muck
- Qwc: Langdon Terrace, Clay Facies
- Qwl: Langdon Terrace



SITE SURFICIAL GEOLOGY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 3



Figure 4a: Ultimate Pile Capacity vs. Depth for 12-3/4-inch Diameter Close-Ended Pipe Pile (Boring SB1)



Figure 4b: Ultimate Pile Capacity vs. Depth for 12-3/4-inch Diameter Close-Ended Pipe Pile (Borings SB2, SB3, and SB4)

Appendix A

Soil Boring Logs

		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minnearolis MD 55435						LOG OF BORING SB1
BAI	RR	Telephone: 952-832-2600						Sheet 1 of 2
Project: Job No. Locatior Coordin Datum	: n: ates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97260° Long: -93.30217° NAD83	Surf Drill San Con	ace ing l plin	Elev Metho g Me	ation: od: thod:)epth	8 H S	314.9 ft HSA/MRO Split Spoon, Thinwall Tube 76.0 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft © NATURAL DRY DENSITY (pcf) ★ 10 20 30 40 REC% RQD % ◆ 80 100 120 20 40 60 80 100 120 SHEAR STRENGTH, tsf WATER CONTENT (%) × Qp/2 PL LL
	-0-	Surface Elev.: 814.9 ft	1.17.1					0 2,5 5 20 40 60
- - 810 <u>-</u> -	- - - 5 - -	Top Solic (CE): dark brown; mozen to molst; with said, frace organics. §13.9 ft FILL (SC): fine to medium grained; dark brown; moist; very loose to medium dense; trace black organics. §09.4 ft FAT CLAY (CH): dark gray: wet: very soft to soft		X	1 2 3	100 100 100	12 4	
-	_			Х	4	100	1 [
805- - -	10-			X	5	100	WH	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
- - 800- - -	- 15- -			X	6 7	100 100	WH WH	
- - 795- - -	20	791.9 ft		X	8	100	WH	
- 790 - -	25 - -	FAT CLAY (CH): dark gray; wet; very soft; trace silt. 23.0ft 786.9 ft		X	9	100	WH (50.6
- 785 -	- 30- -	FAT CLAY (CH): dark gray; wet; medium stiff to stiff; 28.0ft trace to with sand.		X	10	100	5 [(
- - 780- - -	- 35 -	776.0.#			11	100		0.58 1 8 6.1 55
- - 775 - -	40	SANDY LEAN CLAY (CL): dark gray; wet; stiff to hard. 38.0ft		X	12	100	9	9 0.75
- 770 - -	45- - - -			X	13	100	10	0.625
765		49': trace gravel.		X	14	100	24	
760-	55-	Continued Next Page	./ ./ / /		-	0	ke F	
Date Bo Date Bo Logged Drilling Drill Rig	oring S pring C By: Contra :	tarted. 3/22/18 / :55 am Water Levels (ft) ompleted: 3/22/18 1:00 pm PJH3 actor: STS Enterprises, LLC CME 750	5.5		() () V	(emai 2011) Veath	кs: E). her: О	vercast, 32F

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		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minneanolis, MN 55435						LOG OF BORING SB1
BA	RR	Telephone: 952-832-2600						Sheet 2 of 2
Project: Job No. Locatio Coordir Datum:	n: nates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97260° Long: -93.30217° NAD83	Surf Drill Sarr Corr	ing ing ing inplin	Elev Meth g Me	ation: od: ethod: Depth	: 8 	314.9 ft HSA/MRO Split Spoon, Thinwall Tube 76.0 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft \textcircled{O} 10 20 30 40 REC% RQD % \blacklozenge 20 40 60 80 80 100 120 SHEAR STRENGTH, tsf O Qu/2 \bigcirc Qp/2 O PL LL O 18 2.5 5 20 40 60
-	-55-	SANDY LEAN CLAY (CL): dark gray; wet; stiff to hard. (Continued)		X	15	100	18	
- - 755 - -	60			X	16	100	16	
- 750-	65-			X	17	100	32	
-		746.9 ft						
- 745	70-	SANDY LEAN CLAY (CL): dark brown; wet; hard; trace 68.0ft to with gravel.		×	18	40	50/ 3"	50/3" >>@
 740 		741.9 ft CLAYEY SAND (SC): fine to medium grained; dark 73.0ft brown; saturated; medium dense. 738.9 ft 738.9 ft 76.0tt		X	19	100	15	15
		Bottom of Boring at 76.0 feet 76.0ft						
1								
Date Bo Date Bo Logged Drilling	oring S oring C By: Contra	tarted: 3/22/18 7:55 am ompleted: 3/22/18 1:00 pm PJH3 ctor: STS Enterprises, LLC	5.5		F (Rema 2011	rks: El).	evation data from Hennepin County 1 Meter LiDAR
Drill Rig	g:	CMÉ 750			v	Veath	ner: O	vercast, 32F

M'GINTPROJECTS\2327006141_BRYN MAWR GEOTECH PRELIM.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

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		Barr Engineering Company 4300 MarketPointe Drive Suite 200						LOG OF BORING SB2
BAI	RR	Telephone: 952-832-2600						Sheet 1 of 2
Project: Job No. Locatior Coordin	: n: ates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97347° Long: -93.30161°	Surf Drill San	face ing l nplin	Elev Meth g Me	ation: od: ethod:	: 8 ;	313.0 ft HSA/MRO Split Spoon, Thinwall Tube
Datum:		NAD83	Con	nple	tion [Depth	: ^	101.0 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft $\textcircled{0}$ 10203040NATURAL DRY DENSITY (pcf) \bigstar RQD % \blacklozenge 8010020406080SHEAR STRENGTH, tsfWATER CONTENT (%) \times
		Surface Elev.: 813.0 ft						
- - 810- - 	- - - 5 -	TOPSOIL (CL): brown; frozen to moist; with sand; trace organics. §12.0 ft FILL (SC): fine to medium grained; brown to dark gray; wet; very loose to loose; trace gravel.			1 2 3	100 50 100	8	
-	-							
805	- - 10				4 5	75 75	1 2	
- 800-	-	700.0 ft		$\overline{\mathbb{N}}$	6	75	2	
-	- 15— -	13.9': 1 inch clay seam; black discoloration; trace organics. OBGANIC CLAY (OH); gray to dark gray; wet; very soft:		X	7	100	1[
795	20-	trace to with shells; trace sand; trace organics.		X	8	100	1 [
- - 790 -	-							
- - - 785-	25— - -	785.0 ft		X	9	100	2 [
-	30-	FAT CLAY (CH): dark gray; wet; very soft. 28.0ft			10	100		56.6 72.5
780	35-			X	11	100	WH	<pre></pre>
- 775 -				M	40	100		
- - 770-	40			Δ	12	100	WR	
-	45- - -	765.0 ft		X	13	100	WH	72.8
765	- 50- -	FAT CLAY (CH): dark gray; wet; very soft; trace silt. 48.0ft		X	14	100	WH	
760- - -	- - 55-	760.0 ft SILTY SAND (SM): fine to medium grained; dark gray; 53.0ft saturated; medium dense; trace gravel. Continued Next Page		X				
Date Bo Date Bo Logged Drilling Drill Rig	ring S ring C By: Contra	tarted: 3/20/18 8:20 am ompleted: 3/20/18 3:00 pm PJH3 ctor: STS Enterprises, LLC CME 750	.6	. 1	F (2	Rema 2011	rks: E).	Jevation data from Hennepin County 1 Meter LiDAR
L					V	veatr	iei: Si	HUW, ZYF

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		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minnearchic MN 55435						LOG OF BORING SB2
BA	RR	Telephone: 952-832-2600						Sheet 2 of 2
Project: Job No. Location Coordir Datum:	n: nates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97347° Long: -93.30161° NAD83	t Surf Drill San Con	face ing nplin nple	Elev Meth Ig Me tion I	ation: od: ethod: Depth	: 8 	313.0 ft HSA/MRO Split Spoon, Thinwall Tube I01.0 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft 10 20 30 40 REC% RQD % ← (pcf) ★ 20 40 60 80 80 100 120 SHEAR STRENGTH, tsf WATER CONTENT (%) × Qp/2 PL LL 0 12 25 5 20 40 60
-	-55-	SILTY SAND (SM): fine to medium grained; dark gray; saturated: medium dense: trace gravel. (Continued)		X	15	100	12	
755	60-	_755.0 ft SANDY LEAN CLAY (CL): dark gray; wet; stiff. 58.0ft		X	16	100	10	10 0.75
750— — —	- 65- -				17	100		
	70-	69': trace gravel.		X	18	50	11	0.7 9
740	- - 75-	740.0 ft CLAYEY SAND (SC): fine to medium grained; dark gray; 73.0ft saturated; loose to medium dense; trace gravel.		X	19	100	8	8
735	80-	720.0.4		X	20	50	17	
730	- 85	SANDY LEAN CLAY (CL): dark gray; wet; very stiff; trace83.0ft gravel.		X	21	25	19	
725— — —	- 90- -	CLAYEY SAND (SC): fine to medium grained; dark gray; 88.0ft saturated; medium dense to dense.		X	22	50	16	
720 	- - 95 -	94': color change to dark brown; fine grained.		X	23	75	20	20
715	- - 100-	712.0 ft Rottom of Boring et 101.0 feet 101.0 fe		X	24	0	40	40
		Bollom of Boring at 101.0 feet 101.0ft						
Data Pr	pring S	tarted: 2/20/19.8-20 am Water Lavala (4)			-	Dome	rke: E	
Date Bo Date Bo Logged Drilling	oring S bring C By: Contra	ictor: STS Enterprises, LLC CMF 750	5.6		(2011	iks. E).	evalion data from mennepin County T Meter LIDAK
	,				١	Veath	ner: Sr	now, 29F

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		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minneapolis, MN 55435						LOG OF BORING SB3
BAI	RR	Telephone: 952-832-2600						Sheet 1 of 2
Project: Job No. Locatior Coordin	: n: ates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97394° Long: -93.30226° NAD83	t Sur Drill San	face ling nplir	e Elev Meth ng Me	vation: lod: ethod: Depth	3 	812.6 ft HSA/MRO Split Spoon, Thinwall Tube 101.0 ft
Datum.		NABOO					•	STANDARD PENETRATION
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	TEST DATA N in blows/ft (a)10203040REC%DENSITYRQD % \blacklozenge (pcf) \star 20406080SHEAR STRENGTH, tsfWATER CONTENT (%) \times Qp/2PLLL
_	-0	Surface Elev.: 012.01L	1.1.12.	*				0 2,5 5 20 40 60
- 810 -	-	Progenics. 1.0ft §11.6 ft / ¬FILL (CL): dark brownish gray; frozen to moist; stiff; trace 4.0ft		X	1 2	100 50	9	9
I ₹	5 -	808.6 ft		\mathbb{X}	3	75	6	
805	- - 10-	FILL (SC): fine to coarse grained; black to brown; wet; very loose to loose; trace organics; trace silt. 5.5': 2 inch seam of clay; black discoloration; trace broanies		X	4	100	2	2/ © /
-	-	805.1 ft		Å	5	100	WH	
800 - -	- - 15-	ORGANIC CLAY (OH): light gray; wet; very soft; trace sand; trace shells; trace organics. 798.6 ft /14.0ft			6 7	100 100	WH WH	<1 >>> (0) (1) (2) (2) (2) (2) (2) (2) (2) (3) (4) (4) (5) (4) (5) (5) (5) (5) (5) (5) (5) (5
795-	-	FAT CLAY (CH): gray; wet; very soft.						
	20			X	8	100	WH	
/90	 25				9	95	0	50.0 30 13 195 86.2
785 - -	- - 30-			X	10	100	WH	<1 ©
780-	-							
- - - 775-	35— - -			X	11	100	WH	
	40- -			X	12	65	WR	l <1 (0) (0)
770	- - 45-			\mathbf{V}	13	75	WR	<1
- - 765-	2							
	50- -			X	14	75	WR	
760	55-	Continued Next Page		X			<pre></pre>	
Date Bo Date Bo Logged Drilling Drill Rig	oring S oring C By: Contra :	tarted: 3/21/18 7:55 am ompleted: 3/21/18 2:05 pm PJH3 actor: STS Enterprises, LLC CME 750	5.5		F (Remai 2011)	rks: E).	Elevation data from Hennepin County 1 Meter LiDAR
L					1	veal	101. U	viciuaal, 241

		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minneapolis MN 55435						LOG OF BORING SB3
BA	RR	Telephone: 952-832-2600						Sheet 2 of 2
Project: Job No. Location Coordir Datum:	n: nates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97394° Long: -93.30226° NAD83	t Surf Drill San Con	face ing nplir nple	Elev Meth ng Me tion I	vation: od: ethod: Depth	: 8 	312.6 ft HSA/MRO Split Spoon, Thinwall Tube 101.0 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft $\textcircled{0}$ 10203040REC%NATURAL DRY DENSITY (pcf) \star 20406080SHEAR STRENGTH, tsfWATER CONTENT (%) \times UQ/2Qu/2Qu/220406090
-	-55-	FAT CLAY (CH): gray; wet; very soft. (Continued)		×	15	75	WR	
755— - - -	60-	754.6 ft LEAN CLAY (CL): gray to dark gray; wet; very soft to soft; trace silt; trace sand.		Х	16	100	3	3 Teg 0.25 27.4
750— - - -	65-	749.6 ft SANDY LEAN CLAY (CL): dark gray to dark brown; wet; 63.0ft very stiff; trace to with gravel.		X	17 18	84 100	13	
745 	70-				19	90		84.8 0161 36
740	75-			X	20	15	17	
735— - - -	80-			X	21	10	16	
730— - - -	- 85			X	22	100	16	16 1.38
725	90-			X	23	75	17	
720	- 95- -	714.6 ft		X	24	100	17	
/15		CLAYEY SAND (SC): fine to coarse grained; dark gray to 98.0ft dark brown; saturated; medium dense; trace to with gravel. 1/01.0ft Bottom of Boring at 101.0 feet		X	25	85	23	
Date Br	oring S	tarted: 3/21/18 7:55 am Water Levels /ft\				Rema	rke: ⊑	
Date Bo Logged Drilling Drill Rig	oring C By: Contra	actor: STS Enterprises, LLC CME 750	5.5		(2011 Veath). ner: O	vercast, 24F

		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minneanolis, MN 55435						LOG OF BORING SB4
BA	RR	Telephone: 952-832-2600						Sheet 1 of 2
Project: Job No. Location Coordin Datum:	: n: ates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97429° Long: -93.30223° NAD83	Surf Drill San Con	face ing l nplin	Elev Metho g Me	ation: od: ethod: Depth	: 8 	310.5 ft HSA/MRO Split Spoon, Thinwall Tube 100.5 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft (\textcircled{O})10203040REC%RQD % (\textcircled{O})DENSITY (pcf) *20406080100120SHEAR STRENGTH, tsfWATER CONTENT (%) ×Qp/2PLLLL100120
810-	-0-	TOPSOIL (CL): brown; frozen to moist; with sand; trace	<u> </u>	in,	1	100		
- - - 805- - - -	5	organics. 808.5 ft FILL (SP-SM): fine to coarse grained; brown; moist; very loose; trace gravel. 806.5 ft FILL (CL): brown to dark brown; moist; soft; with silt. 804.5 ft FAT CLAY (CH): grav to brownish grav: wet: very soft			2 3 4 5	 30 50 80 80 	2 3 2 2	
800-	10-			M	6	85	WHW	
-	-				7	85	، ح WHw	Ω (1) (2)
	- 15				8	100	0	48.8 14 14
- 790- -	20			X	9	90	WH	I (1) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
- - 785- - -	25- - -			X	10	95	WH (
- - 780- -	- 30- -			X	11	95	WH (75.6
- - 775 -	- 35 -			X	12	95	WH	21 29 20 20
	- 40 -			X	13	95	WH (
- - 765- -	- 45 -	763.5 ft		X	14	95	2	2 69 0.25
- - 760- -	- - 50- - -	LEAN CLAY (CL): gray; moist to wet; medium stiff; trace 47.0ft to with sand; sporadic thin layers of sand.		X	15	95	6	
	-	756.5 ft						\ 16
Detc D	55-	Continued Next Page 54.011	1.1.1.5	1)	den E	
Date Bo Date Bo Logged Drilling	oring S oring C By: Contra	carred: 3/19/18 9:00 am Water Levels (ft) pompleted: 3/19/18 5:15 pm Umage: CJS ctor: STS Enterprises, LLC	8.0		F (1)	kema 2011)	rкs: Е).	Ievation data from Hennepin County 1 Meter LiDAR
	J.				V	Veath	ner: O	vercast, 35F

		Barr Engineering Company 4300 MarketPointe Drive Suite 200 Minnoandis, MM, 55435						LOG OF BORING SB4
BA	RR	Telephone: 952-832-2600						Sheet 2 of 2
Project: Job No. Location Coordin Datum:	: n: iates:	Bryn Mawr Meadows Water Quality Improvement 23270051.41 Minneapolis, MN Lat: 44.97429° Long: -93.30223° NAD83	t Surf Drill Sam Com	ing ing ing inplin	Elev Meth Ig Me tion [ation: od: hod: Depth	: 8 : 1	310.5 ft HSA/MRO Split Spoon, Thinwall Tube 100.5 ft
Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Graphic Log Samples Sample No. % Recovery SPT, N value			SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft \textcircled{o} 10203040REC%DENSITY (pcf) \star DENSITY (pcf) \star 20406080SHEAR STRENGTH, tsf \bigcirc Qu/2WATER CONTENT (%) \times 016255204060
755-	- 55	CLAYEY SAND (SC): fine to medium grained; gray to		X	16	90	16	
- - 750-	- - 60-	751.5 ft LEAN CLAY (CL): gray; moist to wet; stiff. 59.0ft		X	17	93	9	9 For 0.3(5
- - 745- -	- 65 -	746.5 ft SANDY LEAN CLAY (CL): gray; moist to wet; stiff to very 64.0ft stiff; trace gravel.		X	18	60	17	0.75
- - 740 -	- - 70- -				19	38		33 49 21.2 21.2
- 735- -	- - 75- -			X	20	65	20	
- - 730- -	- - 80- - -			M	21	0	10	
- - 725 -	- 85- -			M	22	0	19	
- - 720- -	- 90- -	721.5 ft POORLY GRADED SAND WITH SILT (SP-SM): fine to 89.0ft medium grained; brown; wet to saturated; medium dense to dense.		X	23	90	19	
- - 715 -	- 95- -	94': trace gravel.		X	24	20	30	
- - 710-	- - 100-	710.0 ft 99.5': 6 inch seam of clayey sand. Bottom of Boring at 100.5 feet		X	25	100	40	
Date Bo Date Bo Logged Drilling Drill Ric	oring S oring C By: Contra J:	tarted: 3/19/18 9:00 am ompleted: 3/19/18 5:15 pm CJS actor: STS Enterprises, LLC CME 750	3.0	<u> </u>	F (Remai 2011)	l rks: E).	evation data from Hennepin County 1 Meter LiDAR
Ľ					۷	Veath	ner: O	vercast, 35F

Appendix **B**

Laboratory Test Results

	Wat	er Conte	nt Test S	ummary	(ASTM:D	02216)		
Project:			Bryn	Mawr			Job:	<u>11348</u>
Client			Barr Enginee	ring Company	/		Date:	4/4/2018
		Sar	nple Informat	ion & Classifi	cation			
Boring #	SB-01	SB-01	SB-01	SB-02	SB-02	SB-02	SB-02	SB-03
Sample #								
Depth (ft)	9.5-11	24-26	49-51	19-21	34-36	44-46	84-86	12-14
Туре	Bag	Bag	Bag	Bag	Bag	Bag	Bag	Bag
Material Classification	Fat Clay (CH)	Fat Clay (CH)	Clayey Sand w/gravel (SC)	Sapric Peat w/shells (PT)	Fat Clay (CH)	Fat Clay (CH)	Sandy Lean Clay (CL)	Organic Clay (OH/PT)
Water Content (%)	89.2	50.6	16.9	147.0	89.3	72.8	19.3	84.9
		Sar	nple Informat	ion & Classifi	cation	-		-
Boring #	SB-03	SB-03	SB-03	SB-03	SB-04	SB-04	SB-04	SB-04
Sample #								
Depth (ft)	44-46	59-61	74-76	89-91	8-10	29-31	49-51	69-71
Туре	Bag	Bag	Bag	Bag	Bag	Bag	Bag	Bag
Material Classification	Fat Clay (CH)	Fat Clay (CH)	Fat Clay w/sand (CH)	Clayey Sand w/a little gravel (CL)	Fat Clay (CH)	Fat Clay (CH)	Lean Clay w/sand seams (CL/CH)	Fat Cay w/sand and trace of gravel (CH)
Water Content (%)	82.1	27.4	21.7	15.3	79.5	75.6	24.6	21.2
		Sar	nple Informat	ion & Classifi	cation			
Boring #	SB-03	SB-04						
Sample #								
Depth (ft)	64-64.5	69-71						
Туре	TWT	TWT						
Material Classification	Clayey Sand w/gravel (SC/GC)	Sandy Lean Clay w/a trace of gravel (CL)						
Water Content (%)	25.8	29.9						
		Sar	nple Informat	ion & Classifi	cation			
Boring #								
Sample #								
Depth (ft)								
Туре								
Material Classification								
Water Content (%)								

9530	Jamoe	Ave.	South
99990	James	AVC	South



Bloomington, MN 55431

		Labo	oratory Te	est Summ	ary		
Project:			Bryn Mawr			Job:	<u>11348</u>
Client:		<u>Barr B</u>	Engineering Co	mpany		Date:	<u>4/5/18</u>
		Samp	le Information	n & Classifica	tion		
Boring #	SB-2						
Sample #							
Depth (ft)	29-31						
Type or BPF	TWT						
Classification	Fat Clay (CH)						
		Water Co	ontent, Dry De	ensity (ASTM:	:D7263)		
Water Content (%)	72.5						
Dry Density (pcf)	56.6						
		Samp	le Information	n & Classifica	tion		
Boring #							
Sample #							
Depth (ft)							
Type or BPF							
Classification							
		Water Co	Dontent, Dry De	ensity (ASTM:	:D7263)		
Water Content (%)							
Dry Density (pcf)							
		Samp	le Information	n & Classifica	tion		
Boring #							
Sample #							
Depth (ft)							
Type or BPF							
Classification							
		Water Co	ontent, Dry De	ensity (ASTM	:D7263)	·	
Water Content (%)							
Dry Density (pcf)							



Bloomington, MN 55431

Laboratory Test Summary										
Project:	Job:	<u>11348</u>								
Client:	Client: Barr Engineering Company									
Sample Information & Classification										
Boring #	SB-01	SB-01	SB-03	SB-04						
Sample #										
Depth (ft)	9.5-11	34-36	24-26	69-71						
Sample Type	Bag	тwт	тwт	тwт						
Material Classification	Fat Clay (CH)	Fat Clay w/lenses and laminations of silty sand (CH)	Fat Clay (CH)	Sandy Lean Clay w/a trace of gravel (CL)						
			Atterberg Lin	nits (ASTM:D₄	4318)					
Liquid Limit	117	55	121	40						
Blastia Limit	07	10	20							
Plasticity Index	27	36	91	16						
				10	I	1	<u> </u>			
		Sa	ample Inform	ation & Classi	ification					
Boring #										
Sample #										
Depth (ft)										
Sample Type										
Material Classification										
Atterberg Limits (ASTM:D4318)										
Liquid Limit										
Plastic Limit										
Plasticity Index										

ESTING, INC.

L

Bloomington, MN 55431














			рН Т	`esting S	ummary Sheet	t (ASTM:D4972)		
Project:	Bryn Mawr						Job:	11348
Client:	Barr Engineering	Company					Date:	4/5/2018
В	oring / Location	Sample	Sample Type	Depth (ft)	pН	Visual Classification		
	SB-2		Bags	4.5-9	6.8	Silty Sand w/gravel (SM/SC-SM)	
	SB-4		Bags	6-10	7.3	Fat Clay (CH)		
		9530 -	James Ave South		E OIL NGINEERING ESTING, INC	G Bioomington, MN 55431		



ANALYTICAL REPORT March 30, 2018



Soil Engineering Testing, Inc.

Sample Delivery Group: Samples Received: Project Number:

L980646 03/27/2018 11348 Bryn Mawr

Report To:

Description:

John Whelan 9530 James Ave. South Bloomington, MN 55431

Entire Report Reviewed By: John V Haulins

John Hawkins Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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3 4

7 8

9

10

*
¹ Cp
² Tc
³ Ss

² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

Cp: Cover Page
Tc: Table of Contents
Ss: Sample Summary
Cn: Case Narrative
Sr: Sample Results
SB-2 L980646-01
SB-4 L980646-02
Qc: Quality Control Summary
Wet Chemistry by Method 9056A
GI: Glossary of Terms
Al: Accreditations & Locations
Sc: Sample Chain of Custody

SDG: L980646 DATE/TIME: 03/30/18 12:21

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

*

Ср

Tc

Ss

Cn

Sr

Qc

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Sc

			Collected by	Collected date/time	Received date/time
SB-2 L980646-01 Solid				03/26/18 15:00	03/27/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Wet Chemistry by Method 9056A	WG1090610	1	03/29/18 15:02	03/29/18 18:40	MAJ
			Collected by	Collected date/time	Received date/time
SB-4 L980646-02 Solid				03/26/18 15:00	03/27/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Wet Chemistry by Method 9056A	WG1090610	1	03/29/18 15:02	03/29/18 18:53	MAJ

SDG: L980646 DATE/TIME: 03/30/18 12:21 **PAGE**: 3 of 10

CASE NARRATIVE

*

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John Hawkins Technical Service Representative

SDG: L980646 DATE/TIME: 03/30/18 12:21 PAGE: 4 of 10

SAMPLE RESULTS - 01

*

Ср

Тс

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Chloride	48.7		10.0	1	03/29/2018 18:40	<u>WG1090610</u>
Sulfate	ND		50.0	1	03/29/2018 18:40	WG1090610

³ Ss
4
[⁺] Cn
⁵Sr
6
[°] Qc
7
[′] Gl
⁸ Al
⁹ Sc

SDG: L980646 DATE/TIME: 03/30/18 12:21

Collected date/time: 03/26/18 15:00

SAMPLE RESULTS - 02 L980646

<u>پو</u>

Ср

²Tc

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Chloride	66.2		10.0	1	03/29/2018 18:53	WG1090610
Sulfate	54.6		50.0	1	03/29/2018 18:53	WG1090610

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc

SDG: L980646

DATE/TIME: 03/30/18 12:21 PAGE: 6 of 10

WG1090610

Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L980646-01,02

(MB) R3297737-1 03/2	/B) R3297737-1 03/29/18 16:53								
	MB Result	MB Qualifier	MB MDL	MB RDL	2				
Analyte	mg/kg		mg/kg	mg/kg	Tc				
Chloride	0.999	J	0.795	10.0					
Sulfate	1.75	J	0.570	50.0	3 55				

L980648-01 Original Sample (OS) • Duplicate (DUP)

)S) L980648-01 03/29/18 19:07 • (DUP) R3297737-4 03/29/18 19:47										
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits				
Analyte	mg/kg	mg/kg		%		%				
Chloride	62.3	70.1	1	11.8		15				

L981123-01 Original Sample (OS) • Duplicate (DUP)

L981123-01 Original	_981123-01 Original Sample (OS) • Duplicate (DUP)									
OS) L981123-01 03/29/18 21:48 • (DUP) R3297737-5 03/29/18 22:28										
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	9			
Analyte	mg/kg	mg/kg		%		%	50			
Chloride	60.2	71.8	1	17.6	J3	15				
Sulfate	77.4	64.1	1	18.7	P1	15				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3297737-2 03/29/18 17:06 • (LCSD) R3297737-3 03/29/18 17:20											
	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits	
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%	
Chloride	200	205	206	102	103	80.0-120			0.612	15	
Sulfate	200	208	210	104	105	80.0-120			0.815	15	

DATE/TIME: 03/30/18 12:21



Ср

Cn

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GI

GLOSSARY OF TERMS

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Ss

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Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.
Qualifior	Description

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

SDG: L980646

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE. * Not all certifications held by the laboratory are applicable to the results reported in the attached report. * Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshire
Arkansas	88-0469	New Jersey-NELAP
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina ¹
Georgia	NELAP	North Carolina ³
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky ¹⁶	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	AI30792	Tennessee ¹⁴
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas ⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico ¹	n/a
New York	11742
North Carolina	Env375
North Carolina ¹	DW21704
North Carolina ³	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee ¹⁴	2006
Texas	T 104704245-17-14
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA
· · · · · · · · · · · · · · · · · · ·	

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Soil Engineering Testing, Inc.

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



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L980646

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03/30/18 12:21

	-		Billing Inform	ation:	100				Anal	lysis / Cor	ntainer	/ Preser	rvative	-	-	chain of	A T	00
oil Engineering Testin 530 James Ave. South boomington, MN 55431	1	John Whe 9530 Jame Blooming	lan Is Ave. South Ion, MN 5543	Pres Chk										E A.B	<u>k</u> E	SC TENCES MANAGES		
oject Down WHELTE			Email To: Julielom	City/State Collected:	e en en estes	ung-	rem									12065 Le Mount J Phone: I Fax: 615	ebanon Rd uliet, TN 3713 615-758-5858 600-767-5859 6-758-5859	
escription: 5240 MAN hone: 952-884-6833 ext: 952-884-6923	Client Project #	348		Lab Project #										2		L# Tal	G	28
ollected by (print):	Site/Facility ID	#	12500	P.O. #						10					Acctn	Acctnum: SOIENGBMN		
Collected by (signature): Collected by (signature): Rush? (Lab MUST Be Same Day		(Lab MUST Be Notified) e Day Five Day t Day 5 Day (Rad Only) p Day 10 Day (Rad Only)		Quote # Date Results Needed		No. of	FINE	1-41.125		-				-		Preio TSR: PB: Shipt	gin: 341 - John ped Via:	Hawkins
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntr	35	J		13		a.		_			Remarks	Sample # (lab only)
58-7		55	4.5-9	3/26/18	15:00	1	X	X				1		-		-		102
58-4		55	6-10	1	+	1	*	X										
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Matrix: is - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay	Remarks:									pH Temp Flow Other			np	1	COC Se COC Si Bottle Correct	al Prese gned/Acc s arrive t bottle	Present/Intact: MP Y and/Accounte: arsive intact: bottles used:	
WW - Wastewater DW - Drinking Water OT - Other	Samples returned via: UPSFedExCourier			Tracking #			+276 0145			9548			VOA Zero Headapade:YY					
Relinquished by: (Signature)	>	Date:	6/18	Time: Received by: (Sig				A.M.	- AND	Trip Blank Received: Yes //No/ HCL / MeoH TBR				If prese	If preservation required by Login: Date/Time			
Relinquished by : (Signature)	Date:		and the second	Time:	Received by: (Sig			sture)		Temp: C Batties Alectives						Conditize		
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Appendix D

Wetland Delineation Report



Wetland Delineation Report

Bryn Mawr Meadows Water Quality Improvement Project

Prepared for Bassett Creek Watershed Management Commission

March 2018

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

Wetland Delineation Report

March 2018

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- Figure 7 Wetland Delineation (Wetlands 1 & 4)
- Figure 8 Wetland Delineation (Wetlands 2a, 2b, & 3)

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- Appendix B Site Photographs

1.0 Introduction

Bassett Creek Watershed Management Commission (BCWMC) is submitting a Wetland Delineation Report as part of a feasibility study for the Bryn Mawr Meadows Water Quality Improvement Project. The feasibility study area is approximately 64 acres and includes Bryn Mawr Meadows Park (Park) and other Minneapolis Park & Recreation Board (MPRB) properties; a portion of the Minneapolis Impound Lot maintained by the Minneapolis Public Works Department; a linear railroad section of property owned by Burlington Northern Inc. and Chicago & Northwestern railroad companies (Railroad); and other privately owned commercial and industrial properties. The feasibility study area is located in Section 28 of Township 29 North, Range 24 West, Minneapolis, Hennepin County, Minnesota (**Figure 1**).

On October 20, 2017 Barr field delineated five wetlands (Wetlands 1, 2a, 2b, 3 and 4) within the Park. Portions of the feasibility study area located north of the railroad tracks were not investigated during the 2017 site visit. A portion of Bassett Creek is located along the northern boundary of the feasibility study area and was delineated by Barr on November 25, 2015 as a part of a separate study that examined the feasibility of restoring Bassett Creek stream reaches damaged by erosion or affected by sedimentation (Barr, 2016).

This Wetland Delineation Report was 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 wetland boundaries and determined wetland types within the feasibility study area of the Park and along the south side of the Railroad on October 20, 2017.

This report includes a general environmental information section (Section 2.0), descriptions of the delineated wetlands (Section 3.0), and a discussion of regulations and the administering authorities (Section 4.0). The Tables section includes the precipitation data. The Figures section includes the Project Location Map, Topography Map, National Wetland Inventory (NWI), Public Waters Inventory (PWI), Soil Survey Map, and the Wetland Delineation Maps. **Appendix A** includes Wetland Data Forms, and **Appendix B** includes site photographs.

2.0 General Environmental Setting

2.1 Site Description

The feasibility study area is located on property owned by the MPRB, Minneapolis Public Works Department, Burlington Northern Inc. and Chicago & Northwestern railroad companies, and other commercial and industrial properties. The feasibility study area is made up of maintained grassed recreational areas that contain interlinking walking paths and parking area to the south; broadleaf deciduous forest lands along the Railroad corridor, Bassett Creek, and within portions of city and private property to the north; and paved parking impoundment area on the northeast end. Medium density housing is located to the west and north of the feasibility study area, and commercial/industrial area is located to the south and east (**Figure 1**).

2.2 Topography

The majority of the feasibility study area maintains a flat topography in recreational and parking lot areas. Forested areas located in the central and northern regions of the feasibility study area have more moderate undulations with steeper slopes along ditches adjacent to Railroad bed and leading into Bassett Creek and wetland areas (**Figure 2**).

2.3 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 29N North, Range 24 West, Section 28.

In 2017, antecedent moisture conditions were within the normal range based on precipitation for the three months prior to the October 20, 2017 site visit. These data were obtained from a provisional value derived from radar-based estimates (**Table 1**). The warm season, annual, and water year totals have varied between normal and wet for the six years prior to 2017 (**Table 2**).

2.4 National Wetland Inventory

The National Wetland Inventory (NWI) has identified one riverine wetland (Bassett Creek) along the northern boundary of the feasibility study area (**Figure 3**). This portion of Bassett Creek within the feasibility study area was also delineated by Barr on November 25, 2015 (Barr, 2016).

2.5 Water Resources

The Minnesota Department of Natural Resources (MnDNR) Public Waters Inventory (PWI) has identified Bassett Creek as a public water watercourse (**Figure 4**). Bassett Creek is identified by the Minnesota Pollution Control Agency (MPCA) as an impaired water because of the presence of chlorides and fish bioassessment results, with aquatic life as its affected use. Fecal Coliform is also noted as a pollutant with aquatic recreation as the affected use.

2.6 Soil Resources

Soil information located within the feasibility study area and in surrounding areas was obtained from the Natural Resources Conservation Service SSURGO Database (USDA, 2017b) (**Figure 5**). Six soil map units were identified within the feasibility study area:

- Urban land-Bygland, map >25, complex, 1 to 6 percent slopes (D28B)
- Urban land-Lester complex, 2 to 18 percent slopes (L52C)
- Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes (U1A)
- Udorthents, wet substratum, 0 to 2 percent slopes (U2A)
- Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes, rarely flooded (U5A)
- Urban land-Udorthents (cut and fill land) complex, 0 to 6 percent slopes (U6B)

Other soil map units in areas surrounding the feasibility study area include:

- Seelyeville and Markey soils, ponded, 0 to 1 percent slopes (D16A)
- Urban land-Duelm complex, 0 to 2 percent slopes (D31A)
- Urban land-Dorset complex, 8 to 18 percent slopes (D33C)
- Sandberg loamy coarse sand, 6 to 30 percent slopes (D8E)
- Urban land-Lester complex, 18 to 35 percent slopes (L52E)
- Urban land-Moon complex, 2 to 8 percent slopes (L53B)
- Urban land-Dundas complex, 0 to 3 percent slopes (L54A)
- Urban land-Malardi complex, 0 to 8 percent slopes (L55B)
- Udorthents (cut and fill land), 0 to 6 percent slopes (U3B)
- Urban land-Udipsamments (cut and fill land) complex, 0 to 2 percent slopes (U4A)
- Water (W) (identified on the soil survey map but not a soil unit)

There are no hydric soils mapped within the feasibility study area. Seelyeville and Markey soils, ponded is the only hydric soil map unit located in the vicinity of the feasibility study area, approximately 0.12 miles away.

3.0 Wetland Delineation

3.1 Wetland Delineation and Classification Methods

Wetlands within the feasibility study area were delineated and classified during a site visit on October 20, 2017. 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 (**Figures 6, 7 & 8**).

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 each 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 Version 8.1 of the Natural Resources Conservation Service (NRCS) Field Indicators of Hydric Soils in the United States guide (USDA, 2017a). 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 or sampling location, 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**.

3.2 Wetland Descriptions

Five wetlands were delineated within the feasibility study area of the Park and along the Railroad. See **Figure 6** for an overview of the five delineated wetlands. Wetlands 1 and 4 are depicted in greater detail on **Figure 7**, and Wetlands 2a, 2b and 3 are depicted in greater detail on **Figure 8**. Areas within the feasibility study area located north of the Railroad were not investigated for wetlands during the site visit on October 20, 2017. Descriptions and assessments of each wetland are provided below, with representative photographs in **Appendix B**.

Prior to the site visit aerial photos were reviewed to determine if areas within the Park or Railroad had wetland signature. Areas that appeared to have hydrophytic or drowned out vegetation were investigated in the field along with areas that appeared to be inundated or saturated. Most of the areas that were field investigated due to the appearance of wetland signature were dry with dead vegetation. Surface soils in these areas were mostly clays with coarse sandy clay subsoils, so the appearance of wetland signature is likely indicative of temporary ponding after a rain event. Also, vegetation observed in these areas is

dominated by Kentucky bluegrass that appears to be regularly manicured. See Photos 11 and 12 in **Appendix B** which are representative of two wetland signature areas investigated on October 20, 2017.

It is acknowledged that the feasibility study area was likely wetland during pre-settlement times. Residential development began in the 1920's and continued to the 1950's, with urban features developed atop fill. An urbanized setting is now the normal state of the feasibility study area, and wetlands were delineated based on the current setting and field conditions.

3.2.1 Wetland 1

Wetland 1 is a 0.05 acre Type 2/3 (PEMB/C), wet meadow/shallow marsh located in the southwest section of the Park in a flat area utilized for sporting activities such as baseball and soccer (**Figure 7**). Wetland 1 is dominated by narrow-leaf cattail (*Typha angustifolia*), common duckweed (*Lemna minor*), Kentucky bluegrass (*Poa pratensis*), and blunt spikerush (*Eleocharis obtusa*). Hydrology within Wetland 1 ranges from surface saturation in the wet meadow community to 3 inches of inundation in the shallow marsh community. Surrounding uplands in this area and throughout the Park are dominated by Kentucky bluegrass.

Primary indicators of hydrology at Wetland Sample Point 1 (1-W) included high water table (A2) and saturation (A3). Secondary indicators of hydrology included geomorphic position (D2) and a positive FAC-Neutral test (D5).

Soils mapped at 1-W and throughout Wetland 1 were identified as Udorthents, wet substratum, 0 to 2 percent slopes (U2A). Sampled soils were black N2.5/0 clay loams with 10 percent grayish brown 10YR 5/2 depletions down to 18 inches. At 18 inches soils transitioned to very dark gray 10YR 3/1 clays with 10 percent dark yellowish brown 10YR 3/4 redox concentrations down to 28 inches. The hydric soil indicator at 1-W was determined to be depleted dark surface (F7).

The transition to upland was defined by the lack of hydrology indicators. Dominant vegetation at Upland Sample Point 1 (1-U) was mown Kentucky bluegrass, which has a wetland status of facultative making it hydrophytic. Soils identified at 1-U were hydric with a redox dark surface indicator (F6).

3.2.2 Wetlands 2a & 2b

Wetland 2a (0.06 acre) and Wetland 2b (0.20 acre) are Type 4 (PEMFd) deep marsh ditches located in the north-central portion of the feasibility study area and are directly connected via a culvert (**Figure 8**). Both wetlands were inundated from 6 to 24 inches and had a dominance of common duckweed. Eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsyvanica*), and European buckthorn (*Rhamnus cathartica*) were present along upland areas adjacent to both wetlands. One representative sample transect was collected for both wetlands because they are hydrologically connected and have the same wetland types.

Primary indicators of hydrology observed at Wetland Sample Point 2B (2B-W) 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 2B-W were identified as Udorthents, wet substratum, 0 to 2 percent slopes (U2A). Soils mapped throughout Wetland 2 were made up of both Udorthents, wet substratum, 0 to 2 percent slopes (U2A), mostly on the southern side; and Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes, rarely flooded (U5A), mostly on the northern side. Sampled soils at 2B-W were black 10YR 2/1 sandy clay loams down to 8 inches. Matrix color starting at 8 inches became very dark gray 10YR 3/1 down to 27 inches. Sandy loam textures with 30 percent 10YR 3/4 redox concentrations occurred between 8 and 15 inches, and loamy sand textures occurred between 15 and 27 inches without redox features. The hydric soil indicator at 2B-W is redox dark surface (F6).

The transition to upland was defined by the lack of hydrology and hydric soil indicators. Dominant vegetation at Upland Sample Point 2B (2B-U) was European buckthorn in both the herbaceous layer and the shrub layer, which has a status of facultative in the Midwest region making it hydrophytic.

3.2.3 Wetland 3

Wetland 3 is a narrow 0.06 acre Type 2/3 (PEMB/Cd), fresh wet meadow/shallow marsh ditch located along the eastern edge of the feasibility study area (**Figure 8**). Wetland 3 is dominated by common duckweed and reed canary grass (*Phalaris arundinacea*). At the time of the site visit, Wetland 3 was inundated with 3 to 8 inches of water and is approximately 5 to 10 feet wide. Surrounding uplands are dominated by a shrub and herbaceous layer of European buckthorn and green ash (*Fraxinus pennsylvanica*) trees.

Primary indicators of hydrology observed at Wetland Sample Point 3 (3-W) were surface water (A1), 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 3-W were identified as Udorthents, wet substratum, 0 to 2 percent slopes (U2A). Soils mapped throughout Wetland 3 were made up of mostly Udorthents, wet substratum, 0 to 2 percent slopes (U2A), with a small portion of Wetland 3 on the northwest side mapped as Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes (U1A). Soils were not sampled for Wetland 3 since it is a narrow channel along the edge of the Park that may contain buried utilities.

The transition to upland was defined by the lack of hydrology. Dominant vegetation at Upland Sample Point 3 (3-U) was European buckthorn in both the herbaceous layer and the shrub layer, which has a status of facultative in the Midwest region making it hydrophytic.

3.2.4 Wetland 4

Wetland 4 is a 0.11 acre Type 3 (PEMCd), shallow marsh located along the southeastern edge of the feasibility study area (**Figure 7**). Wetland 4 is dominated by narrow-leaf cattail, reed canary grass, lakebank sedge (*Carex lacustris*), and common duckweed. At the time of the site visit, Wetland 4 was inundated with 2 to 12 inches of water and is approximately 1 to 5 feet wide. Surrounding uplands are made up of gravel pathway, and dominated by Kentucky bluegrass, common dandelion (*Taraxacum officinale*) and great plantain (*Plantago major*).

Primary indicators of hydrology observed at Wetland Sample Point 4 (4-W) were surface water (A1), 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 4-W and throughout Wetland 4 were identified as Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes (U1A). Soils were not sampled for Wetland 4 since it is a narrow channel along the edge of the Park that may contain buried utilities.

The transition to upland was defined by the lack of hydrology indicators. Dominant vegetation at Upland Sample Point 4 (4-U) was European buckthorn in both the herbaceous layer and the shrub layer, which has a status of facultative in the Midwest region making it hydrophytic.

4.0 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 Minneapolis and the Minnesota Department of Natural Resources (DNR) respectively. The USACE, the City of Minneapolis, 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. The MnDNR and the USACE may also be present at the TEP meeting if requested.

5.0 References

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Tables

Table 1Antecedent Moisture Conditions Prior to October 20, 2017 Site VisitBryn Mawr Water Quality Improvement ProjectBassett Creek Watershed Management Commission

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:								
County: Ramsey	Township Number: 29N							
Township Name: unnamed	Range Number: 24W							
Nearest Community: Calhoun Beach	Section Number: 28							

Aerial photograph or site visit date:

Friday, October 20, 2017

Score using 1981-2010 normal period

(value are in inches)	first prior month: September 2017	second prior month: August 2017	third prior month: July 2017			
estimated precipitation total for this location:	1.44R*	6.65R*	3.22R*			
there is a 30% chance this location will have less than:	2.3	3.56	2.76			
there is a 30% chance this location will have more than:	3.96	5.04	5.22			
type of month: dry normal wet	dry	wet	normal			
monthly score	3 * <mark>1</mark> = 3	2 * <mark>3</mark> = 6	1 * 2 = 2			
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)	11 (normal)					

* A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.

Table 2

Precipitation in Comparison to WETS Data Bryn Mawr Water Quality Improvement Project Bassett Creek Watershed Management Commission

Precipitation data for target wetland location:County: RamseyTownship Number: 29NTownship Name: unnamedRange Number: 24WNearest Community: Calhoun BeachSection Number: 28

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)								

						Perio	d-of-Reco	rd Summa	ry Statis	tics					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.52	0.48	1.10	1.70	2.54	3.09	2.34	2.51	1.95	1.24	0.70	0.56	16.19	26.06	26.05
70%	1.03	1.12	2.01	2.99	4.20	5.33	4.67	4.48	3.73	2.64	1.87	1.36	21.25	32.24	31.94
mean	0.88	0.88	1.65	2.44	3.61	4.44	3.81	3.67	3.04	2.23	1.54	1.04	18.57	29.17	29.24
	1981-2010 Summary Statistics														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.54	0.42	1.39	2.20	2.65	3.41	2.76	3.56	2.30	1.37	1.09	0.70	18.06	30.23	28.44
70%	1.21	0.97	2.10	3.12	4.14	5.29	5.22	5.04	3.96	3.62	2.22	1.58	22.22	34.84	36.66
mean	0.91	0.79	1.91	2.87	3.62	4.55	4.46	4.23	3.43	2.63	1.88	1.25	20.29	32.52	32.33
	Year-to-Year Data														
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
2017	0.92	0.79	0.75	3.75	6.31	3.47	3.22R*	6.65R*	1.44R	5.59R*			21.09		35.61
2016	0.33	0.87	1.89	4.00	1.84	4.04	4.68	10.03	5.40	3.14	2.76	2.41	25.99	41.39	42.40
2015	0.33	0.31	0.71	2.28	4.54	3.91	6.72	3.04	3.69	2.77	4.32	2.23	21.90	34.85	28.90
2014	1.07	1.32	0.77	6.61	3.90	10.26	2.95	2.61	2.23	1.22	1.13	1.02	21.95	35.09	37.99
2013	0.86	1.19	1.96	4.52	5.45	7.19	4.11	2.16	1.24	4.15	0.63	1.49	20.15	34.95	32.51
2012	0.60	1.84	1.60	3.14	8.97	3.56	5.01	1.61	0.37	1.32	0.95	1.56	19.52	30.53	28.84
2011	0.98	1.12	2.51	3.21	5.00	4.62	7.05	4.05	0.63	0.97	0.26	0.91	21.35	31.31	36.24
2010	0.66	0.78	0.89	2.21	2.72	6.70	4.79	6.85	6.10	1.92	1.77	3.38	27.16	38.77	40.77
2009	0.56	1.17	1.64	1.74	0.35	3.24	1.23	6.61	0.58	6.07	0.53	2.47	12.01	26.19	21.89
2008	0.16	0.56	2.02	4.11	2.50	3.66	2.06	2.41	2.14	1.77	1.39	1.61	12.77	24.39	26.64
2007	0.74	1.62	3.66	2.07	3.03	1.90	2.35	6.56	5.65	4.95	0.11	1.96	19.49	34.60	31.33
2006	1.03	0.39	1.78	3.77	2.99	3.50	2.61	7.12	2.80	0.56	1.06	2.13	19.02	29.74	34.20
2005	1.36	1.12	1.22	2.83	3.31	5.28	3.22	4.16	6.18	5.10	1.72	1.39	22.15	36.89	33.99
2004	0.53	1.63	2.30	3.00	6.10	3.48	4.31	1.37	4.69	3.67	1.11	0.53	19.95	32.72	30.48
2003	0.38	0.90	1.78	2.79	5.95	7.82	1.91	0.50	1.96	0.91	1.18	0.98	18.14	27.06	28.61
2002	0.50	0.62	2.13	3.78	3.32	8.48	5.55	6.08	3.89	4.25	0.07	0.30	27.32	38.97	39.17
2001	1.34	1.48	1.09	7.48	5.68	5.31	2.28	2.43	4.13	1.00	3.13	0.69	19.83	36.04	38.16
2000	1.00	1.16	1.22	1.31	4.35	3.95	6.92	3.83	3.35	1.22	4.15	1.57	22.40	34.03	28.92
1999	1.51	0.33	2.00	3.69	6.89	5.21	5.51	3.78	3.02	0.65	0.81	0.37	24.41	33.77	36.77
1998	1.53	0.62	3.58	2.22	4.40	4.69	2.82	4.71	1.04	2.68	1.66	0.49	17.66	30.44	28.82

* A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.

Figures





PROJECT LOCATION MAP Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC FIGURE 1



----- Public Water Inventory Watercourses

LiDAR Ground Surface Elevation Contours (Spring/Fall 2011)

 \sim 10 ft Contour

-+---+ Railroad



TOPOGRAPHY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC FIGURE 2



----- Public Water Inventory Watercourses

Wetlands (MN DNR NWI East Central Update)

- Freshwater Emergent WetlandFreshwater Forested/Shrub Wetland
 - Freshwater Pond

Riverine

500 1,000 Feet

NATIONAL WETLANDS INVENTORY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC





- ----- Public Water Inventory Watercourses
 - Sublic Water Inventory Basins



PUBLIC WATERS INVENTORY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC





Soils Hydric Status





Feasibility Study Area



SOIL SURVEY Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 5





Wetland Boundaries

Feasibility Study Area



WETLAND DELINEATION SITE OVERVIEW Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 6
Barr Footer: ArcGIS 10.4.1, 2018-01-18 10:38 File: I:\Client\BassettCreek\Work_Orders\2017\Bryn_Mawt\Maps\Wetland_Delineation\Figure 7 - Wetland Delineation Map (Wetlands 1 & 4).mxd User: rcs2







WETLAND DELINEATION WETLANDS 1 & 4 Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 7







WETLAND DELINEATION WETLANDS 2a, 2b & 3 Feasibility Study for Bryn Mawr Meadows Water Quality Improvement Project BCWMC

FIGURE 8

Appendix A

Wetland Data Forms

Project/Site:	<u>Bryn Mav</u> Improver	<u>wr Wate</u> nent Pr	<u>er Quality</u> oject		Applicant/C	Owner:	BCWMC	2	City/County.	<u>Minnea</u> pin	polis/Henne	State:	<u>MN</u>	Sampling Date:	<u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>			Township:	<u>24</u>		Range:	<u>28</u>	Sampling Point:	<u>1-U</u>
Land Form:	<u>Flat</u>				Local Relie	ef: <u>Non</u>	<u>1e</u>		Slope %:	<u>0</u>	Soil Map U	nit Name.	<u>Udorth</u>	ients, wet sub, 0 t	<u>o 2% slopes</u>
Subregion (LRR)): <u>M</u>				Latitude:	<u>497</u>	9754		Longitude:	<u>475979</u>		Datum:	<u>UTM Na</u>	<u>d 83 Zone 15N</u>	
Cowardin Classii	fication:	<u>Uplar</u>	nd		Circular 39	Classif	fication:	<u>Upland</u>			Маррес	I NWI Cla	ssification	<u>Upland</u>	
Are climatic/hydro	ologic cond	litions o	n the site ty	pical for this	time of yea	r?	<u>Yes</u>	(If no, expla	ain in remarks	s)	Eggers	& Reed (orimary):	Upland	
Are vegetation	No	Soil	No	Hydrology	No	significa	antly dist	urbed?	Are "normal	Ye Yes"	<u>s</u> Eggers	& Reed (:	secondary	/): <u>N/A</u>	
Are venetation	No	Soil	No	Hydrology	No	naturalli	v nrohlen	natic?	present?	.00	Eggers	& Reed (i & Rood (i	ertiary): quaternari	$\frac{N/A}{N}$	
And vegetation	110	501	110	i iyarology	110	natarang	y problem	iune:			Lygers	a need (quaternar	y). <u>18// X</u>	

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

Hydrophytic vegetation present? Hydric soil present?	<u>Yes</u> Yes	General Remarks (explain any
Indicators of wetland hydrology present?	<u>No</u>	answers if needed):
Is the sampled area within a wetland?	No	If yes, optional Wetland Site ID: Upland

	Tree Stratum	(Plot Size:	<u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum		<u>20%</u> 0	<u>50%</u> 0
1. 2. 3.							Herb Stratum Woody Vine Stratum		20 0	50 0
4.				0			Dominance Test Worksheet:			
	Sanling/Shrub Stratum	(Plot Size:	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:		1 (A)	
1.		(11010120.	<u>1011</u> /	0			Total Number of Dominant Species Across All Strata:		1 (B)	
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC:	100.00	0% (A/B)
4. 5.				0			Prevalence Index Worksheet:			
		(51.1.0)	Total Cover:	<u>0</u>			Total % Cover of:	X 1	Multiply by:	0
	<u>Herb Stratum</u>	(Plot Size:	<u>5 ft</u>)	· ۱			OBL Species	 		0
1.	Poa pratensis			70	Yes	FAC	FACW Species	, <u>^</u> 2		0
2.	Plantago major			10	No	FAC	FAC Species80	, X 3	2	40
3.	Taraxacum officinale			10	NO	FACU	FACU Species 20	X 4		80
4.	Trifolium pratense			10	NU	FACU	UPL Species 0	X 5		0
5.				0			Column Totals: 100	(A)	3	20 (B)
6.				0			Prevalence Index	= B/A =	3.	20
7.				0			Hydrophytic Vegetation Indicator	<u>s</u> .		
8.			T 1 1 0	0			No. Denid Teet for Under	<u>s.</u> In the Verente	Han	
			Total Cover:	<u>100</u>			NO Rapid Test for Hydrop	nylic vegela	llion	
	Woody Vine Stratum	(Plot Size:	<u>30 ft</u>)				No Prevalence Index < 2)% 0 [4]		
1.				0			No Morphological Adapta	/['] ations [1] (nr	ovide sunnr	ortina data
2.				0			in vegetation remarks	or on a sepa	arate sheet)	n ing data
			Total Cover:	<u>0</u>			No Problematic Hydroph	tic Vegetatio	on [1] (Expla	in)
% E	are Ground in Herb Stratum	:	_	% Sphagnu	m Moss Cove	r:	[1] Indicators of hydric soil & wetland l disturbed or problematic.	iydrology musi	t be present, u	inless
Veg	etation Remarks: (include p	hoto numbers	s here or on a separate	sheet)			Hydrophytic vegetation present?	Yes		

ofile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indic.DepthMatrixRedox Features(inches)Color (moist)%Type [1]Loc [.0 - 1010YR 2/19510YR 3/45CM10 - 1610YR 3/41007.5YR 4/42CM5GY 5/1 gley2CM	cators).
Depth Matrix Redox Features (inches) Color (moist) % Type [1] Loc [. 0 - 10 10YR 2/1 95 10YR 3/4 5 C M 10 - 16 10YR 3/4 100 - - - - - M - 10YR 2/1 86 7.5YR 4/4 2 C M - - 5GY 5/1 gley 2 C M	
0 - 10 10YR 2/1 95 10YR 3/4 5 C M 10 - 16 10YR 3/4 100 7.5YR 4/4 2 C M - - 5GY 5/1 gley 2 C M	[2] Toyturo Domarka
10 - 10 10YR 2/1 95 10YR 3/4 5 C M 10 - 16 10YR 3/4 100	
16 10 10 10 100	1 sandy clay loam
	A clay/sand mix
	1
- <u>10YR 4/3</u> <u>10</u> C M	1
-	
	Indicators for Brahlamatic Lludria Saila [2].
Histic Epipedon (A2) Sandy Redox (S5)	Dark Surface (S7)
J BIACK HISTIC (A3)	Iron-Manganese Masses (F12)
Hydrogen Sulfide (A4)	Very Shallow Dark Surface (TF12)
Stratified Layers (A5)	Uther (explain in soil remarks)
2 cm Muck (A10) Depleted Matrix (F3)	
Depleted Below Dark Surface (A11)	
Thick Dark Surface (A12)	[2] Indicators of hydrophytic variation and watland hydrolo
Sandy Mucky Mineral (S1) Redox Depressions (F8)	must be present, unless disturbed or problematic.
estrictive Layer (if present): Type: Depth (inches):	Hydric soil present? <u>Yes</u>
YDROLOGY	
/etland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply)	Secondary Indicators (minimum of two required)
Vetland Hydrology Indicators: Trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6)
/etland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply)] Surface Water (A1) Water-Stained Leaves (B9)] High Water Table (A2) Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Drainage Patterns (B10)
/etland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply)] Surface Water (A1) Water-Stained Leaves (B9)] High Water Table (A2) Aquatic Fauna (B13)] Saturation (A3) True Aquatic Plants (B14)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2)
/etland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply)] Surface Water (A1) Water-Stained Leaves (B9)] High Water Table (A2) Aquatic Fauna (B13)] Saturation (A3) True Aquatic Plants (B14)] Water Marks (B1) Hydrogen Sulfide Odor (C1)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Cravfish Burrows (C8)
Vetland Hydrology Indicators: Trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3)	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)
Vetland Hydrology Indicators: trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4)	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)
/etland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4)	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)
Vetland Hydrology Indicators: trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Thin Muck Surface (C7)	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) EAC-Neutral Test (D5)
Vetland Hydrology Indicators: trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Iron Deposits (B5) Thin Muck Surface (C7)	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)
Vetland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Gauge or Well Data (D9)	 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)
Idetland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Inundation Visible on Aerial Imagery (B7) Gauge or Well Data (D9) Sparsely Vegetated Concave Surface (B8) 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)
Vetland Hydrology Indicators: rimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Gauge or Well Data (D9) Sparsely Vegetated Concave Surface (B8) 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)
Vetland Hydrology Indicators: Trimary Indicators (minimum of one required; check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Gauge or Well Data (D9) Sparsely Vegetated Concave Surface (B8) Other (explain in remarks) Tield Observations: Surface Water Depth (inches):	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) Indicators of wetland hydrology present? No Describe Recorded Data:
Wetland Hydrology Indicators: Primary Indicators (minimum of one required: check all that apply) Surface Water (A1) Water-Stained Leaves (B9) High Water Table (A2) Aquatic Fauna (B13) Saturation (A3) True Aquatic Plants (B14) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Gauge or Well Data (D9) Sparsely Vegetated Concave Surface (B8) Other (explain in remarks) "ield Observations: Surface Water Depth (inches): Yuter table present? Water Table Depth (inches):	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) Indicators of wetland hydrology present? No Describe Recorded Data:

Project/Site:	<u>Bryn Mav</u> Improver	<u>wr Wate</u> nent Pr	<u>er Quality</u> roject		Applicant/Ow	vner: <u>BCWMC</u>	City/County: Min	<u>nneapol</u> 1	<u>is/Henne</u> State: <u>MN</u> S	ampling Date: <u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>		Range: <u>28</u> S	ampling Point: <u>1-W</u>
Land Form:	<u>Depress</u>	ion			Local Relief:	Concave	Slope %: <u>1</u>	Sc	oil Map Unit Name: Udorther	nts, wet sub, 0 to 2% slopes
Subregion (LRR,	<u>): M</u>				Latitude:	<u>4979758</u>	Longitude: 4759	<u>978</u>	Datum: UTM Nad	83 Zone 15N
Cowardin Classi	fication:	<u>PEM</u>	<u>B/C</u>		Circular 39 C	Classification: <u>Type 2/3</u>			Mapped NWI Classification:	Upland
Are climatic/hydr	ologic cond	litions c	n the site ty	pical for this	time of year?	<u>Yes</u> (If no, expla	ain in remarks)		Eggers & Reed (primary):	Fresh (Wet) Meadow
Are vegetation	No	Soil	No	Hydrology	No s	ignificantly disturbed?	Are "normal	<u>Yes</u>	Eggers & Reed (secondary):	Shallow Marsh
0			_	5 55	—	0 9	nrosont?		Eggers & Reed (tertiary):	<u>N/A</u>
Are vegetation	No	Soil	No	Hydrology	<u>No</u> na	aturally problematic?	presenti		Eggers & Reed (quaternary):	<u>N/A</u>

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

Hydrophytic vegetation present?	<u>Yes</u> Vos	General Remarks (explain any	
Indicators of wetland hydrology present?	Yes	answers if needed):	
Is the sampled area within a wetland?	Yes	lf yes, optional Wetland Sit	te ID: Wetland 1

	Tree Stratum	(Plot Size:	<u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum Saaling/Shub Stratum		<u>20%</u> 0	<u>50%</u> 0
1.				0			Herb Stratum		23	57.5
2. 3				0			Woody Vine Stratum		0	0
4.				0			Dominance Test Worksheet:			
	Sanling/Shruh Stratum	(Dlot Sizo:	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:		3 (A)	
1.		(FIUL SIZE.	<u>1511</u>)	0			Total Number of Dominant Species Across All Strata:		3 (B)	
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC:	100.00	% (A/E	3)
4. 5.				0			Prevalence Index Worksheet:			
			Total Cover:	<u>0</u>			Total % Cover of:		Multiply by	1
	Herb Stratum	(Plot Size:	<u>5 ft</u>)				OBL Species 100	X 1	1	00
1.	Typha angustifolia			40	Yes	OBL	FACW Species 5	X 2		10
2.	Eleocharis obtusa			30	Yes	OBL	FAC Species 10	Х З		30
3.	Lemna minor			30	Yes	OBL	FACU Species 0	X 4		0
4.	Poa pratensis			10	No	FAC	UPL Species 0	X 5		0
5.	Echinochloa crus-galli			5	No	FACW	Column Totalo: 115	(A)	1	40 (B)
6.				0			Prevalence Index =	R/A =	1	22
7.				0			Hydrophytic Venetation Indicators		•	
8.				0			No. Danid Test for Undersh		itaa	
			Total Cover:	<u>115</u>			Yes Rapid Test for Hydroph	ylic vegetat %	1011	
	<u>Woody Vine Stratum</u>	(Plot Size:	<u>30 ft</u>)				Ves Prevalence Index < 3.0	° [1]		
1.				0			No Morphological Adaptati	1'1 ions [1] (nrc	wide sunn	orting data
2.				0			in vegetation remarks c	r on a sepa	rate sheet)	on in ig data
			Total Cover:	<u>0</u>			No Problematic Hydrophyt	ic Vegetatio	n [1] (Expla	ain)
% B	are Ground in Herb Stratum	Ľ	-	% Sphagnu	ım Moss Cove	er:	[1] Indicators of hydric soil & wetland hy disturbed or problematic.	drology must	be present, u	ınless
Veg	etation Remarks: (include p	hoto number.	s here or on a separate	sheet)			Hydrophytic vegetation present?	<u>Yes</u>		

SOIL						Sampling	P0IIII:
Profile Description: (Describe to the depth need	ded to doo	cument the indicator or co	nfirm the	e abscence	of indicators	5).	
(inches) Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
1 0 - 18 N 2 5/0	90 1	10YR 5/2	10	D	M	clav loam	
2 18 - 28 10YR 3/1	90 1	10YR 3/4	10	C	M	clay	
3							
4							
5							
6	educed M	Matrix, MS=Masked Sand G	irains	[2] Location	n: PL=Pore I	Lining, M=Matrix.	
Hydric Soil Indicators: (applicable to all LRRs, u	unless oth	herwise noted)			Inc	dicators for Problematic Hydric S	oils [3]:
Histosol (A1)		Sandy Glev	ed Matrix	x (S4)		Coast Prairie Redox (A16)	
Histic Enipedon (A2)		Sandy Red	ox (S5)	. ()		Dark Surface (S7)	
$\square Black Histic (A3)$		Stripped M	atrix (S6)			Iron-Manganese Masses (E12)	
Hvdrogen Sulfide (A4)			kv Miner	al (F1)		Very Shallow Dark Surface (TE12)
Stratified Lavers (45)		Loamy Gle	ved Matri	x (F2)		Other (explain in soil remarks)	, ,
$\square 2 \text{ cm Muck (A10)}$		Denleted M	atrix (F3))		earor (oxprain in son remains)	
Depleted Below Dark Surface (A11)		Redox Dark	k Surface	(F6)			
$\Box \text{ Thick Dark Surface (A12)}$		Depleted D	ark Surfa	(F7)			
Sandy Mucky Mineral (S1)		Redax Den	ressions	(F8)	[3]	Indicators of hydrophytic veget	ation and wetland hydrology
		Кейбх Бер	103310113	(10)	mı	ust be present, unless disturbed	or problematic.
5 cm Mucky Peat or Peat (S3)							
5 cm Mucky Peat or Peat (S3)							
Scm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:		Depth	(inches)):		Hydric soil present?	Yes
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks:		Depth	(inches)):		Hydric soil present?	Yes
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks:		Depth	(inches)):		Hydric soil present?	Yes
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: HYDROLOGY		Depth	(inches)):		Hydric soil present?	Yes
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: HYDROLOGY Wetland Hydrology Indicators:		Depth	(inches)):		Hydric soil present?	Yes
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one required; cl	heck all th	Depth	(inches)):		Hydric soil present?	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one required; cl Surface Water (A1) 	heck all th	Depth	(inches)):	<u>Se</u>	Hydric soil present? condary Indicators (minimum of Surface Soil Cracks (B6)	Yes two required)
□ 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: IYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one required; cl Surface Water (A1) Image: Mater Table (A2)	heck all th		(inches)):	<u>Se</u>	Hydric soil present? condary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10)	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E	(inches)):		Hydric soil present? econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2)	Yes two required)
□ 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo	(inches) (B9) 114) r (C1)):		Hydric soil present? econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8)	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizosphere:	(inches) (B9) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C):	Se	Hydric soil present? Econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (B Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced	(inches) (B9) (B9) (14) r (C1) s on Livin Iron (C4)):	<u>Se</u>	Hydric soil present? Econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1)	Yes two required) ry (C9)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction	(inches) (B9) (B9) (C1) s on Livin Iron (C4) i n Tilled): g Roots (C3, Soils (C6)	Se Se []] 	Hydric soil present? Econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2)	Yes two required) ry (C9)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th		(inches) (inches) (B9) (14) r (C1) s on Livin, Iron (C4) i in Tilled 7)): g Roots (C3, Soils (C6)	Se Se 	Hydric soil present? econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	Yes two required) ry (C9)
 □ 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C: Gauge or Well Data (F)	(inches) (inches) (B9) (14) r (C1) r (C1) s on Livin, lron (C4) i n Tilled 7) (9)): g Roots (C3, Soils (C6)	<u>Se</u>	Hydric soil present? econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C) Gauge or Well Data (E Other (explain in remain	(inches) (inches) (B9) (14) r (C1) s on Livin, Iron (C4) i in Tilled 7) 09) rks)): Ig Roots (C3, Soils (C6)	Se Se 1 1 1 1 1 1 1 1 1 1 1 1 1	Hydric soil present? Accondary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	Yes two required)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C.) Gauge or Well Data (E Other (explain in remain	(inches) (B9) (B9) (C1) s on Livin (C1) s on Livin (C1) s on Livin (C1) (C1) (C2) (C2) (C2) (C2) (C2) (C2) (C2) (C2): g Roots (C3, Soils (C6)) Se	Hydric soil present? Econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	Yes two required) ry (C9)
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: IPUDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one required; cl Surface Water (A1) Water 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) Field Observations: 	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C.) Gauge or Well Data (E Other (explain in rema Surface Water Depth (inc	(inches) (inches) (B9) (14) r (C1) s on Livin, Iron (C4) i in Tilled 7) (C4) rks) :hes):): g Roots (C3, Soils (C6)		Hydric soil present? Accondary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5) Indicators of wetland hydrol Describe Recorded Data:	Yes two required) ry (C9) pgy present? Yes
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C: Gauge or Well Data (E Other (explain in rema Surface Water Depth (incher	(inches) (inches) (B9) (14) r (C1) s on Livin, lron (C4) in Tilled 7) 99) rks) :hes): es):): g Roots (C3, Soils (C6))	Hydric soil present? Hydric soil present? Hydric soil present? Hydric soil present? Hydric soil present? Call the solution of the solutio	Yes two required) ry (C9) pgy present? Yes
 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one required; cl Surface Water (A1) Surface Water (A1) 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) Field Observations: Surface water present? Water table present? 	heck all th	Depth hat apply) Water-Stained Leaves Aquatic Fauna (B13) True Aquatic Plants (E Hydrogen Sulfide Odo Oxidized Rhizospheres Presence of Reduced Recent Iron Reduction Thin Muck Surface (C: Gauge or Well Data (E Other (explain in remains Surface Water Depth (inches Saturation Depth (inches)	(inches) (B9) (14) (C1) (C1) (C1) (C1) (C1) (C1) (C1) (C1): Ig Roots (C3, Soils (C6) 11 0) Se	Hydric soil present? Econdary Indicators (minimum of Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Image Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5) Indicators of wetland hydrol Describe Recorded Data:	Yes two required) ry (C9)

Project/Site:	<u>Bryn Ma</u> Improver	<u>wr Wate</u> ment Pr	er Quality oject		Applicant/	Owner: <u>BCWN</u>	<u>//C</u>	City/County:	<u>Minneapo</u> pin	olis/Henne	State:	<u>MN</u>	Sampling Date:	<u>10/20/17</u>
Investigator(s):	BKB				Section:	<u>29</u>		Township:	<u>24</u>		Range:	<u>28</u>	Sampling Point:	<u>2B-U</u>
Land Form:	<u>Toeslop</u>	<u>e</u>			Local Reli	ief: <u>Concave</u>		Slope %:	1 5	Soil Map Ui	nit Name	: <u>See S</u>	ummary Remark	<u>s</u>
Subregion (LRR,): <u>M</u>				Latitude:	<u>4980179</u>		Longitude:	<u>476344</u>		Datum:	<u>UTM Na</u>	d 83 Zone 15N	
Cowardin Classi	fication:	<u>Uplar</u>	nd		Circular 39	9 Classification:	<u>Upland</u>			Mapped	NWI Cla	ssificatior	<u>Upland</u>	
Are climatic/hydr	ologic cona	litions o	n the site t	ypical for this	time of yea	ar? <u>Yes</u>	(If no, expl	ain in remarks	;)	Eggers a	& Reed (primary):	Deep Marsl	<u>1</u>
Are vegetation	No	Soil	No	Hydrology	No	significantly di	sturbed?	Are "normal	Yes	Eggers a	& Reed (secondar	/): <u>N/A</u>	
					<u></u>			nresent?	es	Eggers a	& Reed (tertiary):	<u>N/A</u>	
Are vegetation	No	Soil	No	Hydrology	No	naturally proble	ematic?	present:		Eggers a	& Reed (quaternar	<u>y): N/A</u>	

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

Hydrophytic vegetation present?	Yes	General Remarks	-Soil Map Unit Name: Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes, rarely flooded.
Hydric soil present?	No	(explain any	
Indicators of wetland hydrology present?	<u>No</u>	answers ir needed):	
Is the sampled area within a wetland?	No	lf yes, optional Wetla	tland Site ID: Upland

	Tree Stratum	(Plot Size: <u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	<u>50/20 Thresholds:</u> Tree Stratum	<u>20</u>	<u>)%</u> 0	<u>50%</u> 0
1. 2. 3.				0			Saping/Shrub Stratum Herb Stratum Woody Vine Stratum		3 1 0	7.5 2.5 0
4.				0			Dominance Test Worksheet:			
	Sanling/Shruh Stratum	(Plot Size: 15 ft	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:	2	(A)	
1.	Rhamnus cathartica	(11013)20. <u>1311</u>	/	15	Yes	FAC	Total Number of Dominant Species Across All Strata:	2	(B)	
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC:	100.00%	(A/B)	
4. 5				0			Prevalence Index Worksheet:			
υ.			Total Cover:	<u>15</u>			Total % Cover of:	Muli	tiply by:	
	Herb Stratum	(Plot Size: <u>5 ft</u>)				OBL Species 0	X 1		0
1.	Rhamnus cathartica		,	5	Yes	FAC	FACW Species0	X 2		0
2.				0			FAC Species 20	Х З	6	60
3.				0			FACU Species 0	X 4		0
4.				0			UPL Species 0	X 5		0
5. 7				0			Column Totals: 20	(A)	(60 (B)
0. 7				0			Prevalence Index =	B/A =	3.0	00
7. 8				0			Hydrophytic Vegetation Indicators:			
0.			Total Cover:	5			No Rapid Test for Hydroph	ytic Vegetation		
	Woody Vine Stratum	(Plot Size: 30 ft)	2			Yes Dominance Test is >509	%		
1		(,	0			Yes Prevalence Index ≤ 3.0	[1]		
2				0			No Morphological Adaptati	ons [1] (provide	e suppoi	rting data
2.			Total Cover:	0			No Problematic Hydrophyti	ic Vegetation [1	1 (Explai	n)
% E	are Ground in Herb Stratum	ı: <u>95</u>		– % Sphagnu	m Moss Cove	r:	[1] Indicators of hydric soil & wetland hyd disturbed or problematic.	drology must be p	resent, ur	nless
Veg	etation Remarks: (include p	hoto numbers here	e or on a separate :	sheet)			Hydrophytic vegetation present?	Yes		

				Sampling Point:	
rofile Description: (Describe to the depth n	eeded to a	document the indicator or confirm the abscence of	f indicators).	
Depth Matrix	%	Redox Features	1 oc [2]	Taxtura	Pomarks
	100		LUC [2]		Remarks
10 - 18 10YR 3/2	90	10YR 3/4 10 C	M	sandy loam	
18 - 30 10YR 3/2	98	10YR 3/4 2 C	M	loamy sand	
<u> </u>					
·					
Type: C=Concentration, D=Depletion, RN	1=Reduced	I Matrix, MS=Masked Sand Grains [2] Location	: PL=Pore L	ining, M=Matrix.	
dric Soil Indicators: (applicable to all LRR	s, unless?	otherwise noted)	Ind	licators for Problematic Hydric Soils [3]:	
Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)	
Histic Epipedon (A2)		Sandy Redox (S5)		Dark Surface (S7)	
Black Histic (A3)		Stripped Matrix (S6)		Iron-Manganese Masses (F12)	
Hydrogen Sulfide (A4)		🔲 Loamy Mucky Mineral (F1)		Very Shallow Dark Surface (TF12)	
Stratified Layers (A5)		Loamy Gleved Matrix (F2)		Other (explain in soil remarks)	
2 cm Muck (A10)		\square Depleted Matrix (F3)			
Depleted Below Dark Surface (A11)		Redox Dark Surface (E6)			
Thick Dark Surface (A12)		Depleted Dark Surface (F7)			
Sandy Mucky Minoral (S1)			[3]	Indicators of hydrophytic vegetation and	d wetland hydrolog
		Kedux Depressions (ro)	mu	ist be present, unless disturbed or proble	ematic.
estrictive Layer (if present): Type:		Depth (inches):	_	Hydric soil present? <u>No</u>	
oil Remarks:					
YDROLOGY					
DROLOGY					
DROLOGY (etland Hydrology Indicators: rimary Indicators (minimum of one required	l; check al	I that apply)	Sec	condary Indicators (minimum of two requ	uired)
'DROLOGY etland Hydrology Indicators: imary Indicators (minimum of one required Surface Water (A1)	l; check al	I that apply) Water-Stained Leaves (B9)	<u>Sec</u>	condary Indicators (minimum of two requ Surface Soil Cracks (B6)	uired)
/DROLOGY (etland Hydrology Indicators: rimary Indicators (minimum of one required] Surface Water (A1) 1 High Water Table (A2)	l; check al	I that apply) U Water-Stained Leaves (B9) Aguatic Fauna (B13)	<u>Sec</u>	condary Indicators (minimum of two requ Surface Soil Cracks (B6) Drainage Patterns (B10)	uired)
(DROLOGY Tetland Hydrology Indicators: rimary Indicators (minimum of one required] Surface Water (A1)] High Water Table (A2)] Saturation (A3)	l; check al	I that apply) Uthat apply) Kater-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14)		condary Indicators (minimum of two requ Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2)	uired)
YDROLOGY fetland Hydrology Indicators: rimary Indicators (minimum of one required] Surface Water (A1)] High Water Table (A2)] Saturation (A3)] Water Marks (B1)	l; check al	I that apply) Uater-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14) Hydrogen Sulfide Odor (C1)		condary Indicators (minimum of two requ Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Cravfish Burrows (C8)	uired)
<i>(DROLOGY)</i> <i>(etland Hydrology Indicators:</i> <i>imary Indicators (minimum of one required</i> <i>Surface Water (A1)</i> <i>High Water Table (A2)</i> <i>Saturation (A3)</i> <i>Water Marks (B1)</i> <i>Sediment Denocits (B2)</i>	l; check al	I that apply) Utater-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14) Hydrogen Sulfide Odor (C1) Ovidized Rhizospheres on Living Poots (C2)		condary Indicators (minimum of two requ Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imagony (C0)	uired)
<i>(DROLOGY)</i> <i>(etland Hydrology Indicators:</i> <i>rimary Indicators (minimum of one required</i> <i>) Surface Water (A1)</i> <i>) High Water Table (A2)</i> <i>) Saturation (A3)</i> <i>) Water Marks (B1)</i> <i>) Sediment Deposits (B2)</i> <i>) Drift Deposits (B2)</i>	l; check al	I that apply) Utater-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres on Living Roots (C3)		condary Indicators (minimum of two requ Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9)	uired)
 <i>(DROLOGY</i> <i>(etland Hydrology Indicators: rimary Indicators (minimum of one required</i> <i>) Surface Water (A1)</i> <i>) High Water Table (A2)</i> <i>) Saturation (A3)</i> <i>) Water Marks (B1)</i> <i>) Sediment Deposits (B2)</i> <i>) Drift Deposits (B3)</i> 	l; check al	I that apply) Uater-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)		condary Indicators (minimum of two requ 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)	uired)
 /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required] Surface Water (A1)] High Water Table (A2)] Saturation (A3)] Water Marks (B1)] Sediment Deposits (B2)] Drift Deposits (B3)] Algal Mat or Crust (B4) 	l; check al	I that apply) 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)		condary Indicators (minimum of two requ 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)	uired)
YDROLOGY fetland Hydrology Indicators: rimary Indicators (minimum of one required] 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)	1; check al	I that apply) 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)		condary Indicators (minimum of two requ 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)	uired)
 /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required] 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) 	l; check al	I that apply) 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)		condary Indicators (minimum of two requ 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)	uired)
 <i>(DROLOGY</i> etland Hydrology Indicators: imary Indicators (minimum of one required 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) 	l; check al	I that apply) 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)		condary Indicators (minimum of two requ 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)	uired)
 /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required 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) eld Observations: 	l; check al	I that apply) 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)		condary Indicators (minimum of two requ 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) Indicators of wetland hydrology press	uired) sent? <u>No</u>
YDROLOGY (etland Hydrology Indicators: rimary Indicators (minimum of one required] 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) reld Observations: urface water present?	l; check al	I that apply) 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)		condary Indicators (minimum of two requ 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) Indicators of wetland hydrology press Describe Recorded Data:	uired)
YDROLOGY fetland Hydrology Indicators: rimary Indicators (minimum of one required 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) field Observations: urface water present? Vater table present?	l; check al	I that apply) 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) Surface Water Depth (inches): Water Table Depth (inches):		condary Indicators (minimum of two requ 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) Indicators of wetland hydrology press Describe Recorded Data:	uired) sent? <u>No</u>
 /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required] 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) eld Observations: urface water present? ater table present? ituration present? (includes capillary fringentiation of the second second	1; check al 1; check al 1; check al 1; check al 1; check al 1; check al 1; check al 1; check al 1; check al 1; check al 1; ch	I that apply) 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) Surface Water Depth (inches): Water Table Depth (inches): Saturation Depth (inches):		condary Indicators (minimum of two requ 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)	uired) sent? <u>No</u>
/DROLOGY ietland Hydrology Indicators: imary Indicators (minimum of one required 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) eld Observations: urface water present? ater table present? uturation present? (includes capillary fringenetic) icorded Data: Aerial Photo	l; check al l; check al c l; check al l; check al l; check al l; check al l; check al l; c	I that apply) 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) Surface Water Depth (inches): Water Table Depth (inches): Saturation Depth (inches): 20	See 	condary Indicators (minimum of two requestions) 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) Indicators of wetland hydrology press Describe Recorded Data:	uired) sent? <u>No</u>

Project/Site:	Bryn Mav Improver	<u>wr Wate</u> nent Pr	er Quality roject		Applicant/	Owner: <u>BCWMC</u>	City/County: Minneap pin	<u>oolis/Henne</u> State: <u>MN</u>	Sampling Date: <u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>	Range: <u>28</u>	Sampling Point: <u>2B-W</u>
Land Form:	<u>Hillslope</u>	<u>!</u>			Local Reli	ief: <u>Concave</u>	Slope %: <u>2</u>	Soil Map Unit Name: See Su	mmary Remarks
Subregion (LRR,): <u>M</u>				Latitude:	<u>4980173</u>	Longitude: 476343	Datum: UTM Nac	<u>183 Zone 15N</u>
Cowardin Classi	fication:	PEM	Fd		Circular 3	9 Classification: <u>Type 4</u>		Mapped NWI Classification:	<u>Upland</u>
Are climatic/hydr	ologic cond	litions c	n the site t	ypical for this	time of yea	ar? <u>Yes</u> (If no, expl	ain in remarks)	Eggers & Reed (primary):	Deep Marsh
Are vegetation	No	Soil	No	Hydrology	No	significantly disturbed?	Are "normal Yes	Eggers & Reed (secondary)): <u>N/A</u>
0			_	5 55		5 5	nresent?	Eggers & Reed (tertiary):	<u>N/A</u>
Are vegetation	No	Soil	No	Hydrology	No	naturally problematic?	prosona	Eggers & Reed (quaternary): <u>N/A</u>

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

Hydrophytic vegetation present?	Yes	General Remarks	-Soil Map Unit Name: Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes, rarely flooded.
Hydric soil present?	<u>Yes</u>	(explain any	Watlands 2A and 2B are separated by a culvert. A sample point was not collected for Wetland 2A
Indicators of wetland hydrology present?	<u>Yes</u>	answers in needed).	-weitanus zA and zb are separated by a curvert. A sample point was not conected for weitand zA.
Is the sampled area within a wetland?	<u>Yes</u>	lf yes, optional Wetla	and Site ID: Wetland 2B

VEGETATION

1. 2.	<u>Tree Stratum</u>	(Plot Size:	<u>30 ft</u>)	Absolute <u>% Cover</u> 0 0	Dominant Species?	Indicator Status	50/20 Thresholds: Tree Stratum Sapling/Shrub Stratum Herb Stratum Woody Vine Stratum	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
3.				0			Dominance Test Worksheet	
4.			Total Cover	0			Number of Dominant Species	
	Sapling/Shrub Stratum	(Plot Size:	15 ft)	<u> </u>			That Are OBL, FACW or FAC:	1 (A)
1.		(1.101.01201	<u>, , , , , , , , , , , , , , , , , , , </u>	0			Total Number of Dominant Species Across All Strata:	1 (B)
2. 3				0			Percent of Dominant Species	(A/B)
4.				0			That Are OBE, FACW of FAC:	
5.				0			Prevalence Index Worksheet:	
			Total Cover:	<u>0</u>			Total % Cover of:	Multiply by:
	<u>Herb Stratum</u>	(Plot Size:	<u>5 ft</u>)				OBL Species X 1	15
1.	Lemna minor			15	Yes	OBL	FACW Species 0 X 2	0
2.	Rhamnus cathartica			2	No	FAC	FAC Species <u>2</u> X 3	6
3.				0			FACU Species 0 X 4	0
4.				0			UPL Species 0 X 5	0
5.				0			Column Totals: 17 (A)	21 (B)
0. 7				0			Prevalence Index = B/A =	1.24
7. 8				0			Hydrophytic Vegetation Indicators:	
0.			Total Cover:	17			Yes Rapid Test for Hydrophytic Veg	etation
	Woody Vine Stratum	(Plot Size:	30 ft)	<u>17</u>			Yes Dominance Test is >50%	
1	<u></u>	(, ,	0			Yes Prevalence Index ≤ 3.0 [1]	
2				0			No Morphological Adaptations [1]	(provide supporting data
-			Total Cover:	Δ 			No Problematic Hydrophytic Veget	ation [1] (Explain)
% E	Bare Ground in Herb Stratum	n: <u>98</u>	<u> </u>	– % Sphagnu	m Moss Cove	r:	[1] Indicators of hydric soil & wetland hydrology n disturbed or problematic.	nust be present, unless
Veg	etation Remarks: (include p	hoto numbers	s here or on a separate	sheet)			Hydrophytic vegetation present? Yes	
Sar	nnle point 2B-W/was positione	near the edo	e of the inundated portio	nWetland 2B	Duckwood wa	as prosent on the	• surface of the water as well as areas that were r	not inundated surrounding

Sample point 2B-W was positioned near the edge of the inundated portionWetland 2B. Duckweed was present on the surface of the water as well as areas that were not inundated surrounding the borehole.

						Sampling Po	int:
ofile Description: (Describe to the depth need	led to doci	ment the indicator or con	ifirm th	ne abscence o	of indicators,).	
(inches) Color (moist)	<u> </u>	Redox Color (moist)	Featur	Type [1]	Loc [2]	Texture	Romarks
	100		/0	Type[1]	LUC [2]		Reillarks
8 - 15 10YR 3/1	70 10		30			sandy ciay loam	
15 - 27 10YR 3/1	100	11(3)+			101	loamy sand	
-							
·							
Type: C=Concentration, D=Depletion, RM=Re	educed Ma	trix, MS=Masked Sand Gra	ains	[2] Location	: PL=Pore L	ining, M=Matrix.	
dric Soil Indicators: (applicable to all LRRs, ι	Inless oth	erwise noted)			Ind	icators for Problematic Hydric Soil	s [3]:
Histosol (A1)		🗌 Sandy Gleye	ed Matri	ix (S4)		Coast Prairie Redox (A16)	
Histic Epipedon (A2)		Sandy Redo:	x (S5)			Dark Surface (S7)	
Black Histic (A3)		Stripped Mat	trix (S6,)		Iron-Manganese Masses (F12)	
Hydrogen Sulfide (A4)		Loamy Muck	y Mine	ral (F1)		Very Shallow Dark Surface (TF12)	
Stratified Layers (A5)		Loamv Gleve	ed Matr	rix (F2)		Other (explain in soil remarks)	
2 cm Muck (A10)		Depleted Ma	atrix (F ?	3)		(- [
Depleted Below Dark Surface (A11)		Redox Dark	Surface	∽ (F6)			
Thick Dark Surface (A12)		Depleted Da	ork Surf	ace (F7)			
Sondy Myoky Minoral (S1)					[3]	Indicators of hydrophytic vegetation	on and wetland hydrolog
Sanuy Mucky Mineral (ST)			35510115	6 (F8)	mu	st be present, unless disturbed or	problematic.
estrictive Layer (if present): Type:		Depth (inches	s):	_	Hydric soil present?	Yes
vil Remarks:							
ÍDROLOGY							
etland Hydrology Indicators:							
imary Indicators (minimum of one required; ch	heck all the	at apply)			Sec	condary Indicators (minimum of tw	o required)
Surface Water (A1)	[☐ Water-Stained Leaves ((B9)			Surface Soil Cracks (B6)	
High Water Table (A2)	ſ	Aquatic Fauna (B13)				Drainage Patterns (B10)	
Saturation (A3)	ſ	True Aquatic Plants (B1	(A)			Dry Season Water Table (C2)	
Water Marke (P1)	ſ		ر ب (1)			Cravifich Purrows (C9)	
Sodimont Doposito (B2)	l			na Dooto (C2)		Caynsh burlows (Co)	(00)
	l			, NUCIS (C3)			(C9)
Drift Deposits (B3)	l	Presence of Reduced In	on (C4,)		Stunted or Stressed Plants (D1)	
, Algal Mat or Crust (B4)	l	Recent Iron Reduction in	n Tillea	l Soils (C6)	✓	Geomorphic Position (D2)	
	ſ	Thin Muck Surface (C7)			\checkmark	FAC-Neutral Test (D5)	
Iron Deposits (B5)							
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7)	[Gauge or Well Data (D9	?)				
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8)	[Gauge or Well Data (D9) Other (explain in remark	7) (S)				
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8) eld Observations:	[Gauge or Well Data (D9) Other (explain in remark	9) ks)			Indicators of wetland hydrolog	y present? <u>Yes</u>
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8) eld Observations: vrface water present?	[(Gauge or Well Data (Ds Other (explain in remark Surface Water Depth (inch	9) ks) 1es):			Indicators of wetland hydrolog	y present? <u>Yes</u>
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8) eld Observations: Irface water present? ater table present?		Gauge or Well Data (DS Other (explain in remark Surface Water Depth (inch Water Table Depth (inches)	9) ks) nes): ş):	10		Indicators of wetland hydrolog Describe Recorded Data:	y present? <u>Yes</u>
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8) eld Observations: Irface water present? ater table present? turation present? (includes capillary fringe)		Gauge or Well Data (DS 0ther (explain in remark Surface Water Depth (inches Water Table Depth (inches): Saturation Depth (inches):	9) ks) nes): s):	<u> </u>		Indicators of wetland hydrolog Describe Recorded Data:	y present? <u>Yes</u>
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8) Id Observations: rface water present? rter table present? turation present? (includes capillary fringe) corded Data: Aerial Photo Mo	 	Gauge or Well Data (DS Other (explain in remark Surface Water Depth (inches) Saturation Depth (inches): Vell Stream Gauge	9) ks) nes): s): : F	10 5 Previous Insp	ections	Indicators of wetland hydrolog Describe Recorded Data:	y present? <u>Yes</u>

Project/Site:	<u>Bryn Mav</u> Improver	<u>wr Wate</u> nent Pr	<u>er Quality</u> roject		Applicant/Ow	ner: <u>BCWMC</u>	City/County: Mir pin	nneapoli: L	<u>s/Henne</u> State:	<u>MN</u> Sa	ampling Date: <u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>		Range:	<u>28</u> S	ampling Point: <u>3-U</u>
Land Form:	<u>Hillslope</u>	<u>!</u>			Local Relief:	<u>Concave</u>	Slope %: <u>3</u>	So	il Map Unit Name.	<u>Udorther</u>	its, wet sub, 0 to 2% slopes
Subregion (LRR,): <u>M</u>				Latitude:	<u>4979969</u>	Longitude: <u>4764</u>	4 <u>33</u>	Datum:	UTM Nad	<u>33 Zone 15N</u>
Cowardin Classi	fication:	<u>Uplar</u>	nd		Circular 39 C	Classification: Upland			Mapped NWI Cla	ssification:	<u>Upland</u>
Are climatic/hydr	ologic cond	litions o	n the site t	ypical for this	time of year?	<u>Yes</u> (If no, expla	ain in remarks)		Eggers & Reed (orimary):	Upland
Are vegetation	No	Soil	No	Hvdroloav	No s	ianificantly disturbed?	Are "normal	<u>Yes</u>	Eggers & Reed (secondary):	<u>N/A</u>
				J · · · JJ		5	nresent?		Eggers & Reed (i	tertiary):	<u>N/A</u>
Are vegetation	No	Soil	No	Hydrology	<u>No</u> na	aturally problematic?	present		Eggers & Reed (quaternary):	<u>N/A</u>

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

Hydrophytic vegetation present?	Yes	General Remarks
Hydric soil present?	NA	(explain any
Indicators of wetland hydrology present?	No	answers in needed):
Is the sampled area within a wetland?	<u>No</u>	If yes, optional Wetland Site ID:

	Tree Stratum	(Plot Size:	<u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum		<u>20%</u> 0	<u>50%</u> 0
1. 2. 3.				0			Herb Stratum Woody Vine Stratum	_ 	2.4 0	6 0
4.				0			Dominance Test Worksheet:			
	Sanling/Shrub Stratum	(Plot Size:	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:		2 (A)	
1.	Rhamnus cathartica	(11010120.	<u>1511</u>)	15	Yes	FAC	Total Number of Dominant Species Across All Strata:		2 (B)	
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC:	100.00%	6 (A/B)	
4. 5.				0			Prevalence Index Worksheet:			
			Total Cover:	<u>15</u>			Total % Cover of:	٨	fultiply by:	
	Herb Stratum	(Plot Size:	<u>5 ft</u>)				OBL Species 0	X 1		0
1.	Rhamnus cathartica			10	Yes	FAC	FACW Species 2	X 2		4
2.	Laportea canadensis			2	No	FACW	FAC Species 25	ХЗ		75
3.				0			FACU Species 0	X 4		0
4.				0			UPL Species 0	X 5		0
5.							Column Totals:27	(A)		79 <mark>(B)</mark>
0. 7							Prevalence Index = I	B/A =	2.	93
8.				0			Hydrophytic Vegetation Indicators:			
			Total Cover:	12			No Rapid Test for Hydrophy	ytic Vegetati	on	
	Woody Vine Stratum	(Plot Size:	<u>30 ft</u>)	12			Yes Dominance Test is >50%	6		
1				0			Yes Prevalence Index ≤ 3.0 [[1]		
2.				0			No Morphological Adaptation	ons [1] (prov r on a senar.	/ide suppo ate sheet)	rting data
			Total Cover:	<u>0</u>			No Problematic Hydrophyti	c Vegetatior	[1] (Explai	'n)
% E	are Ground in Herb Stratum		_	% Sphagnu	m Moss Cove	r:	[1] Indicators of hydric soil & wetland hyd disturbed or problematic.	irology must b	e present, u	nless
Veg	etation Remarks: (include p	hoto numbers	s here or on a separate	sheet)			Hydrophytic vegetation present?	<u>Yes</u>		

SOIL		Sampling Poir	nt:
Profile Description: (Describe to the depth nee	ded to document the indicator or confirm the abscence of i	indicators).	
Depth Matrix	Redox Features	- fal	
(inches) Color (moist)	% Color (moist) % Type [1]	Loc [2]	Remarks
·			
·			
·			
1] Type: C=Concentration, D=Depletion, RM=F	Reduced Matrix, MS=Masked Sand Grains [2] Location:	PL=Pore Lining, M=Matrix.	
ydric Soil Indicators: (applicable to all LRRs,	unless otherwise noted)	Indicators for Problematic Hydric Soils	[3]:
] Histosol (A1)	Sandy Gleyed Matrix (S4)	🗌 Coast Prairie Redox (A16)	
Histic Epipedon (A2)	Sandy Redox (S5)	Dark Surface (S7)	
Black Histic (A3)	Stripped Matrix (S6)	☐ Iron-Manganese Masses (F12)	
] Hydrogen Sulfide (A4)	Loamy Mucky Mineral (F1)	\Box Very Shallow Dark Surface (TE12)	
$\exists \text{ Stratified Layers } (\Delta 5)$	Loamy Claved Matrix (E2)	Other (avriain in soil remarks)	
$\begin{array}{c} 2 \text{ cm } Muck (\Delta 10) \end{array}$	Depleted Matrix (F2)		
Depleted Bolow Dark Surface (A11)			
Thick Dark Surface (A12)			
	$\Box Depleted Dark Surface (F7)$	[3] Indicators of hydrophytic vegetation	n and wetland hydrology
Sandy Mucky Mineral (ST)	Redox Depressions (F8)	must be present, unless disturbed or p	roblematic.
Restrictive Laver (if present): Type :	Denth (inches).	Hydric soil present?	NA
		—	
Soil Remarks: Soils were not sampled for Wetla	and 3 since it is a narrow channel along the edge of the Bryn Ma	awer Meadows Park property that may have burie	ed utilities.
YDROLOGY			
Vetland Hydrology Indicators:			
rimary Indicators (minimum of one required; c	check all that apply)	Secondary Indicators (minimum of two	required)
Surface Water (A1)	Water-Stained Leaves (B9)	Surface Soil Cracks (B6)	
High Water Table (A2)	Aquatic Fauna (B13)	Drainage Patterns (B10)	
$\begin{bmatrix} \text{Saturation} & (A3) \end{bmatrix}$	$\Box True Aquatic Plants (B14)$	$\square Dry Season Water Table (C2)$	
Water Marks (R1)	Hydrogen Sulfide Odor (C1)	$\square Crayfish Burrows (C8)$	
Sodimont Doposite (P2)	Ovidized Bhizespheres on Living Poets (C2)		20)
			<i>.</i> 7)
	Presence of Reduced Iron (C4)	\Box Sume or Stressed Plants (D1)	
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)	
Iron Deposits (B5)	Thin Muck Surface (C7)	✓ FAC-Neutral Test (D5)	
Inundation Visible on Aerial Imagery (B7)	Gauge or Well Data (D9)		
Sparsely Vegetated Concave Surface (B8)	Other (explain in remarks)		
ield Observations:		Indicators of wetland hydrology	present? <u>No</u>
Surface water present?	Surface Water Depth (inches):	Describe Recorded Data:	
Vater table present?	Water Table Depth (inches):		
Saturation present? (includes capillary fringe)	Saturation Depth (inches):		
Recorded Data: 🛛 Aerial Photo 🗔 N	Ionitoring Well 🔲 Stream Gauge 🦳 Previous Inspec	tions	
Recorded Data: Aerial Photo M Hydrology Remarks: No primary indicators of b	Ionitoring Well Stream Gauge Previous Inspec	tions	

Project/Site:	Bryn Mav Improver	<u>vr Wate</u> nent Pr	<u>er Quality</u> roject		Applicant/Ow	vner: <u>BCWMC</u>	City/County: Mir pin	nneapolis, I	<u>/Henne</u> State:	<u>MN</u> Sa	ampling Date: <u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>		Range:	<u>28</u> S	ampling Point: <u>3-W</u>
Land Form:	Toeslop	<u> </u>			Local Relief:	Concave	Slope %: <u>0</u>	Soil	Map Unit Name:	Udorther	its, wet sub, 0 to 2% slopes
Subregion (LRR,): <u>M</u>				Latitude:	<u>4979968</u>	Longitude: <u>4764</u>	<u>436</u>	Datum:	UTM Nad 8	<u>33 Zone 15N</u>
Cowardin Classi	fication:	PEM	B/Cd		Circular 39 C	Classification: <u>Type 2/3</u>		Ι	Mapped NWI Cla	ssification:	<u>Upland</u>
Are climatic/hydr	ologic cond	itions o	n the site ty	pical for this	time of year?	<u>Yes</u> (If no, expla	ain in remarks)	l	Eggers & Reed (orimary):	Fresh (Wet) Meadow
Are vegetation	No	Soil	No	Hvdroloav	No s	ianificantly disturbed?	Are "normal	<u>Yes</u>	Eggers & Reed (s	secondary):	Shallow Marsh
				J · · · JJ		5	nresent?	l	Eggers & Reed (l	ertiary):	<u>N/A</u>
Are vegetation	No	Soil	No	Hydrology	<u>No</u> na	aturally problematic?	present	1	Eggers & Reed (quaternary):	<u>N/A</u>

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

Hydrophytic vegetation present?	<u>Yes</u>	General Remarks	
Hydric soil present?	Yes	(explain any	
Indicators of wetland hydrology present?	Yes	answers if needed).	
Is the sampled area within a wetland?	<u>Yes</u>	lf yes, optional Wetland Site	ID: Wetland 3

	Tree Stratum	(Plot Size:	<u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum Sapling/Shrub Stratum	<u>20%</u> <u>50%</u> 0 0
1.				0			Herb Stratum	$\frac{0}{2}$ $\frac{0}{5}$
2. 3.				0			Woody Vine Stratum	0 0
4.				0			Dominance Test Worksheet:	
	Sanling/Shruh Stratum	(Plot Size	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:	1 (A)
1.		(1 101 3120.	<u>1011</u>)	0			Total Number of Dominant Species Across All Strata:	1 (B)
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC: 100.	00% (A/B)
4. 5.				0			Prevalence Index Worksheet:	
			Total Cover:	<u>0</u>			Total % Cover of:	Multiply by:
	Herb Stratum	(Plot Size:	<u>5 ft</u>)				OBL Species <u>10</u> X 1	10
1.	Lemna minor			10	Yes	OBL	FACW Species 0 X 2	0
2.				0			FAC Species 0 X 3	0
3.				0			FACU Species <u>0</u> X 4	0
4.				0			UPL Species 0 X 5	0
5.				0			Column Totals:10 (A)	10 (B)
0. 7				0			Prevalence Index = B/A =	1.00
7. 8				0			Hydrophytic Vegetation Indicators:	
0.			Total Cover:	10			Yes Rapid Test for Hydrophytic Vege	etation
	Woody Vine Stratum	(Plot Size:	30 ft)	10			Yes Dominance Test is >50%	
1			,	0			Yes Prevalence Index ≤ 3.0 [1]	
2				0			No Morphological Adaptations [1] (provide supporting data
2.			Total Cover:	0			No Problematic Hydrophytic Vegeta	parate sneet) ition [1] (Explain)
% E	Bare Ground in Herb Stratum		_	- % Sphagnu	ım Moss Cove	er:	[1] Indicators of hydric soil & wetland hydrology mu disturbed or problematic.	ust be present, unless
Veg	ietation Remarks: (include p	hoto numbers	s here or on a separate	sheet)			Hydrophytic vegetation present? Yes	

Profile Description: (Describe to the depth needed to document the indicator or confirm the abscence of indicators). Depth Matrix Redox Features (inches) Color (moist) % Type [1] Loc [2] 1.	Texture Remarks Image: Constraint of the second
Depth Matrix Redox Features (inches) Color (moist) % Type [1] Loc [2] 1.	Texture Remarks Image: Constraint of the second
Implementation X Color (molsty) X Type [1] Edd [2] 1.	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
1. - 2. - 3. - 4. - 5. - 6. - (1) Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, N Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted) Indicators Histosol (A1) Sandy Gleyed Matrix (S4) Coast F Histic Epipedon (A2) Sandy Redox (S5) Dark SU Black Histic (A3) Stripped Matrix (S6) Iron-Ma Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1) Very SF Stratified Layers (A5) Loamy Gleyed Matrix (F2) ✓ Other (e 2 cm Muck (A10) Depleted Matrix (F3) ✓ Other (e Depleted Below Dark Surface (A11) Redox Dark Surface (F6) [3] Indicator must be pr Thick Dark Surface (A12) Depleted Dark Surface (F7) [3] Indicator must be pr Sandy Mucky Mineral (S1) Redox Depressions (F8) [3] Indicator must be pr	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
2. -	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
4. -	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
5. -	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
6.	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, N Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted) Indicators Histosol (A1) Sandy Gleyed Matrix (S4) Coast F Histic Epipedon (A2) Sandy Redox (S5) Dark Su Black Histic (A3) Stripped Matrix (S6) Iron-Ma Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1) Very St Stratified Layers (A5) Depleted Matrix (F2) Other (e 2 cm Muck (A10) Depleted Matrix (F3) Very St Depleted Below Dark Surface (A11) Redox Dark Surface (F6) [3] Indicator must be pr Sandy Mucky Mineral (S1) Redox Depressions (F8) [3] Indicator must be pr	M=Matrix. for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
Hydric Soil Indicators: (applicable to all LRRs, unless otherwise noted) Indicators Histosol (A1) Sandy Gleyed Matrix (S4) Coast F Histic Epipedon (A2) Sandy Redox (S5) Dark Su Black Histic (A3) Stripped Matrix (S6) Iron-Matrix (S6) Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1) Very St Stratified Layers (A5) Loamy Gleyed Matrix (F2) Other (etal Coast (F2)) 2 cm Muck (A10) Depleted Matrix (F3) Very St Depleted Below Dark Surface (A11) Redox Dark Surface (F6) (f1) Thick Dark Surface (A12) Depleted Dark Surface (F7) (f3) Indicator must be pr Sandy Mucky Mineral (S1) Redox Depressions (F8) (f3) Indicator must be pr	for Problematic Hydric Soils [3]: Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
Histosol (A1) Sandy Gleyed Matrix (S4) Coast F Histic Epipedon (A2) Sandy Redox (S5) Dark Su Black Histic (A3) Stripped Matrix (S6) Iron-Ma Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1) Very St Stratified Layers (A5) Loamy Gleyed Matrix (F2) Other (e 2 cm Muck (A10) Depleted Matrix (F3) Other (e Depleted Below Dark Surface (A11) Redox Dark Surface (F6) [3] Indicator must be pr Sandy Mucky Mineral (S1) Redox Depressions (F8) [3] Indicator must be pr	Prairie Redox (A16) urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
Histic Epipedon (A2) Sandy Redox (S5) Dark Su Black Histic (A3) Stripped Matrix (S6) Iron-Ma Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1) Very St Stratified Layers (A5) Loamy Gleyed Matrix (F2) Other (e 2 cm Muck (A10) Depleted Matrix (F3) Other (e Depleted Below Dark Surface (A11) Redox Dark Surface (F6) Thick Dark Surface (A12) Depleted Dark Surface (F7) Sandy Mucky Mineral (S1) Redox Depressions (F8) [3] Indicate must be pressions (F8) [3] Indicate must be pressions (F8)	urface (S7) anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
□ Black Histic (A3) □ Stripped Matrix (S6) □ Iron-Matrix (S6) □ Hydrogen Sulfide (A4) □ Loamy Mucky Mineral (F1) □ Very SH □ Stratified Layers (A5) □ Loamy Gleyed Matrix (F2) ✓ Other (a) □ 2 cm Muck (A10) □ Depleted Matrix (F3) ✓ Other (a) □ Depleted Below Dark Surface (A11) □ Redox Dark Surface (F6) ✓ □ Thick Dark Surface (A12) □ Depleted Dark Surface (F7) [3] Indicate must be pr □ Sandy Mucky Mineral (S1) □ Redox Depressions (F8) [3] Indicate must be pr	anganese Masses (F12) hallow Dark Surface (TF12) 'explain in soil remarks)
□ Hydrogen Sulfide (A4) □ Loamy Mucky Mineral (F1) □ Very SI □ Stratified Layers (A5) □ Loamy Gleyed Matrix (F2) ✓ Other (# □ 2 cm Muck (A10) □ Depleted Matrix (F3) ✓ Other (# □ Depleted Below Dark Surface (A11) □ Redox Dark Surface (F6) ✓ □ Thick Dark Surface (A12) □ Depleted Dark Surface (F7) [3] Indicate must be pr □ Sandy Mucky Mineral (S1) □ Redox Depressions (F8) [3] Indicate must be pr	hallow Dark Surface (TF12) 'explain in soil remarks)
 Stratified Layers (A5) Loamy Gleyed Matrix (F2) Other (in the content of the content of	explain in soil remarks)
2 cm Muck (A10) Depleted Matrix (F3) Depleted Below Dark Surface (A11) Redox Dark Surface (F6) Thick Dark Surface (A12) Depleted Dark Surface (F7) Sandy Mucky Mineral (S1) Redox Depressions (F8)	
 Depleted Below Dark Surface (A11) Redox Dark Surface (F6) Thick Dark Surface (A12) Depleted Dark Surface (F7) Sandy Mucky Mineral (S1) Redox Depressions (F8) Indicate must be pressions (F8) 	
Thick Dark Surface (A12) Depleted Dark Surface (F7) Sandy Mucky Mineral (S1) Redox Depressions (F8) Form Marke Dept (S2)	
Sandy Mucky Mineral (S1) Redox Depressions (F8) [3] Indicate must be pr Sandy Mucky Mineral (S1) Redox Depressions (F8) must be pr	
	ors of hydrophytic vegetation and wetland hydrology resent, unless disturbed or problematic.
□ 5 cm mucky Peat or Peat (S3)	
Restrictive Layer (if present): Type: Depth (inches):	Hydric soil present? Yes
Soil Remarks: Soils were not sampled for Wetland 3 since it is a narrow channel along the edge of the Bryn Mawer Meadows Par	rk property that may have buried utilities. However Aquic
conditions are assumed based on the dominance of obligate vegetation and primary indicators of hydrology.	
IYDROLOGY	
Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required; check all that apply) Secondary	y Indicators (minimum of two required)
✓ Surface Water (A1) Water-Stained Leaves (B9) Surface	e Soil Cracks (B6)
✓ High Water Table (A2) ☐ Aquatic Fauna (B13) ☐ Drainaç	ge Patterns (B10)
✓ Saturation (A3) True Aquatic Plants (B14) Dry-Sea	ason Water Table (C2)
Water Marks (B1) Hydrogen Sulfide Odor (C1) Crayfisl	h Burrows (C8)
Sediment Deposits (B2) Oxidized Rhizospheres on Living Roots (C3) Saturat	tion Visible on Aerial Imagery (C9)
Drift Deposits (B3)	d or Stressed Plants (D1)
Algal Mat or Crust (B4)	prohic Position (D2)
□ Iron Deposits (B5) □ Thin Muck Surface (C7) ▼ FAC-Net	eutral Test (D5)
Loundation Vicible on Aerial Imagony (P.7)	
Sparsely Vegetated Concave Surface (B8) Other (explain in remarks)	
Field Observations:	icators of wetland hydrolody present? Yes
Field Observations: Indi Surface water present? Surface Water Depth (inches): 6 Des Des	cators of wetland hydrology present? <u>Yes</u> scribe Recorded Data:
Field Observations: Indi Surface water present? Surface Water Depth (inches): 6 Water table present? Water Table Depth (inches): 0	cators of wetland hydrology present? <u>Yes</u> scribe Recorded Data:
Field Observations: Indi Surface water present? Surface Water Depth (inches): 6 Des Water table present? Water Table Depth (inches): 0 0 Saturation present? (includes capillary fringe) Saturation Depth (inches): 0 0	ccators of wetland hydrology present? <u>Yes</u> scribe Recorded Data:

Project/Site:	<u>Bryn Mav</u> Improver	<u>wr Wate</u> nent Pr	<u>er Quality</u> roject		Applicant/	Owner: <u>BCWMC</u>	City/County: Minneap	olis/Henne State: <u>MN</u>	Sampling Date: <u>10/20</u>	<u>0/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>	Range: <u>28</u>	Sampling Point: <u>4-U</u>	
Land Form:	<u>Flat</u>				Local Rel	lief: <u>None</u>	Slope %: 0	Soil Map Unit Name: <u>S</u>	ee Summary Remarks	
Subregion (LRR)	: <u>M</u>				Latitude:	<u>4979705</u>	Longitude: 476122	Datum: <u>UT</u>	<u>M Nad 83 Zone 15N</u>	
Cowardin Classif	fication:	<u>Uplar</u>	nd		Circular 3	39 Classification: Upland		Mapped NWI Classific	ation: Upland	
Are climatic/hydro	ologic cond	litions o	n the site ty	pical for this	time of yea	ear? <u>Yes</u> (If no, exp	lain in remarks)	Eggers & Reed (prima	ary): <u>Upland</u>	
Are vegetation	No	Soil	No	Hydrology	No	significantly disturbed?	Are "normal Yes	Eggers & Reed (seco	ndary): <u>N/A</u>	
Are vegetation	No	Soil	No	Hydrology	No	naturally problematic?	present?	Eggers & Reed (tertia	<i>ry):</i> <u>N/A</u>	
Are vegetation	110	3011	110	тушоюуу	110	naturany problematic?		Lyyers a Reeu (quali	sinary). <u>INIA</u>	

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

Hydrophytic vegetation present?	Yes	General Remarks
Hydric soil present?	NA	(explain any
Indicators of wetland hydrology present?	No	answers ii needed):
Is the sampled area within a wetland?	<u>No</u>	If yes, optional Wetland Site ID:

	Tree Stratum	(Plot Size:	<u>30 ft</u>)	<u>Absolute</u> <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum	<u>20%</u> <u>50%</u> 0 0	
1. 2. 3.				0			Herb Stratum Woody Vine Stratum	$ \begin{array}{c} 0 \\ 6 \\ 0 \end{array} $ $ \begin{array}{c} 0 \\ 15 \\ 0 \end{array} $	
4.				0			Dominance Test Worksheet:		
	Sanling/Shrub Stratum	(Plot Size [,]	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:	1 (A)	
1.		(1101 3120.	<u>1511</u>)	0			Total Number of Dominant Species Across All Strata:	1 (B)	
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC:	100.00% (A/B)	
4. 5.				0			Prevalence Index Worksheet:		
			Total Cover:	<u>0</u>			Total % Cover of:	Multiply by:	
	Herb Stratum	(Plot Size:	<u>5 ft</u>)				OBL Species 0 X		
1.	Poa pratensis			20	Yes	FAC	FACW Species <u>0</u> X	2 0	
2.	Taraxacum officinale			5	No	FACU	FAC Species 25 X	3 75	
3.	Plantago major			5	No	FAC	FACU Species 5 X	4 20	
4.				0			UPL Species 0 X	5 0	
5.				0			Column Totals: 30 (A	() 95 (B)	
6. 7				0			Prevalence Index = B/A	= 3.17	
γ. Q				0			Hydrophytic Vegetation Indicators:		
0.			Total Cover:	20			No Rapid Test for Hydrophytic	Vegetation	
	Woody Vine Stratum	(Plot Size:	30 ft)	<u>30</u>			Yes Dominance Test is >50%		
1	woody whic Stratam	(11010120.	<u></u>)				No Prevalence Index ≤ 3.0 [1]		
1. 2				0			No Morphological Adaptations	[1] (provide supporting data	
Ζ.			Total Covor:	0			In vegetation remarks or on	a separate sheet)	
			Total Cover.	<u>U</u>				syelalion [1] (Expiain)	
% E	% Bare Ground in Herb Stratum: % Sphagnum Moss Cover:				r:	[1] Indicators of hydric soil & wetland hydrology must be present, unless disturbed or problematic.			
Veg	etation Remarks: (include p	hoto numbers	here or on a separate	sheet)			Hydrophytic vegetation present?	Yes	
Rer	naining area is gravel pathway								

OIL		Sampling F	Point:			
Profile Description: (Describe to the depth need	ed to document the indicator or confirm the abscence of i	indicators).				
Depth Matrix	Redox Features	- <u>fol</u>				
(inches) Color (moist)	% Color (moist) % Type [1] [Loc [2] Texture	Remarks			
-						
] Type: C=Concentration, D=Depletion, RM=R6	educed Matrix, MS=Masked Sand Grains [2] Location: H	PL=Pore Lining, M=Matrix.				
vdric Soil Indicators: (applicable to all LRRs, u	nless otherwise noted)	Indicators for Problematic Hydric Sc	ils [3]:			
Histosol (A1)	Sandy Gleyed Matrix (S4)	Coast Prairie Redox (A16)				
] Histic Epipedon (A2)	Sandy Redox (S5)	Dark Surface (S7)				
Black Histic (A3)	Stripped Matrix (S6)	Iron-Manganese Masses (F12)				
Hydrogen Sulfide (A4)	Loamy Mucky Mineral (F1)	Very Shallow Dark Surface (TF12)				
Stratified Lavers (A5)	Loamy Gleved Matrix (F2)	Other (explain in soil remarks)				
2 cm Muck (A10)	Depleted Matrix (E3)					
Depleted Below Dark Surface (A11)	\square Reday Dark Surface (E6)					
Thick Dark Surface (A12)						
Sandy Mucky Minoral (S1)	Depicted Dark Sunace (F7)	[3] Indicators of hydrophytic vegeta	ion and wetland hydrology			
		must be present, unless disturbed o	r problematic.			
h cm Mucky Doot or Doot (SC)						
」 5 cm Mucky Peat or Peat (S3)						
5 cm Mucky Peat or Peat (S3)						
□ 5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type:	Depth (inches):		NA			
Soil Remarks: Soils were not sampled for Wetlar	Depth (inches):	Hydric soil present? awer Meadows Park property that may have bu	NA uried utilities.			
S cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Soil Remarks: Soils were not sampled for Wetlar	Depth (inches):	Hydric soil present? awer Meadows Park property that may have bu	<u>NA</u> iried utilities.			
S cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Soil Remarks: Soils were not sampled for Wetlar YDROLOGY	Depth (inches):		<u>NA</u> iried utilities.			
5 cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar YDROLOGY /etland Hydrology Indicators:	Depth (inches):	Hydric soil present?	<u>NA</u> iried utilities.			
estrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar /DROLOGY fetland Hydrology Indicators: rimary Indicators (minimum of one required; ch	Depth (inches):	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t	NA iried utilities. wo required)			
5 cm Mucky Peat or Peat (S3) estrictive Layer (if present): Type: pil Remarks: Soils were not sampled for Wetlar YDROLOGY (etland Hydrology Indicators: rimary Indicators (minimum of one required; cf Surface Water (A1)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Ma meck all that apply) Water-Stained Leaves (B9)	Hydric soil present? awer Meadows Park property that may have buSecondary Indicators (minimum of tSurface Soil Cracks (B6)	<u>NA</u> iried utilities. wo required)			
5 cm Mucky Peat or Peat (S3) estrictive Layer (if present): Type: pil Remarks: Soils were not sampled for Wetlar /DROLOGY (etland Hydrology Indicators: rimary Indicators (minimum of one required; cf Surface Water (A1) High Water Table (A2)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Ma beck all that apply) Water-Stained Leaves (B9) Aquatic Fauna (B13)	Hydric soil present?awer Meadows Park property that may have bu <u>Secondary Indicators (minimum of t</u> Surface Soil Cracks (B6) Drainage Patterns (B10)	NA uried utilities. wo required)			
 <i>b</i> cm Mucky Peat or Peat (S3) <i>estrictive Layer (if present): Type:</i> <i>oil Remarks:</i> Soils were not sampled for Wetlar <i>YDROLOGY</i> <i>Yelland Hydrology Indicators:</i> <i>rimary Indicators (minimum of one required; ch</i> <i>Surface Water (A1)</i> <i>High Water Table (A2)</i> <i>Saturation (A3)</i> 	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater. meck all that apply) Water-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2)	NA iried utilities. wo required)			
5 cm Mucky Peat or Peat (S3) estrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar YDROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required; cf Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Ma beck all that apply) Water-Stained Leaves (B9) Aquatic Fauna (B13) True Aquatic Plants (B14) Hydrogen Sulfide Odor (C1)	Hydric soil present? awer Meadows Park property that may have be Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8)	NA uried utilities.			
b cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: YDROLOGY (Vetland Hydrology Indicators: rimary Indicators (minimum of one required; ch Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2)		Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager	<u>NA</u> iried utilities. wo required) y (C9)			
Som Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Type:	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater beck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1)	<u>NA</u> Iried utilities. No required)			
Som Mucky Peat or Peat (S3) Testrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar YDROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required; cf Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Alaal Mat or Crust (B4)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater beeck all that apply) Aquatic Fauned 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)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2)	NA uried utilities. wo required) y (C9)			
Som Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Toil Remarks: Soils were not sampled for Wetlar YDROLOGY Vetland Hydrology Indicators: Primary Indicators (minimum of one required; ch Surface Water (A1) Sufface Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater beeck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have be Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	NA Iried utilities. No required) y (C9)			
Som Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: Soils were not sampled for Wetlar YDROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required; cf Surface Water (A1) Guidater Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater beck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have but Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	<u>NA</u> Iried utilities. No required)			
5 cm Mucky Peat or Peat (S3) estrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar YDROLOGY //etland Hydrology Indicators: rimary Indicators (minimum of one required; ch 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)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater beeck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	NA uried utilities.			
b cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar YDROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required; ch 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)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater. neck all that apply) Quarter 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)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5)	NA Iried utilities. wo required) y (C9)			
S cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Pestrictive Layer (and present): Secondary (and present): YDROLOGY Vetland Hydrology Indicators: Yuman Patter And Hydrology Indicators: Inigh Water Table (A2) Saturation (A3) 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) Inich Observations:	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater meck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have bu	<u>NA</u> rried utilities. wo required) y (C9) gy present? <u>No</u>			
5 cm Mucky Peat or Peat (S3) Restrictive Layer (if present): Type: Soil Remarks: Soils were not sampled for Wetlar YDROLOGY Vetland Hydrology Indicators: Primary Indicators (minimum of one required; ch 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) Tield Observations: Surface water present?	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater-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)	Hydric soil present? awer Meadows Park property that may have bu Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5) Indicators of wetland hydrolo Describe Recorded Data:	NA uried utilities. wo required) y (C9) gy present? <u>No</u>			
S cm Mucky Peat or Peat (S3) Pestrictive Layer (if present): Type: Foil Remarks: Soils were not sampled for Wetlar YDROLOGY Vetland Hydrology Indicators: trimary Indicators (minimum of one required; ch 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) ield Observations: furface water present? Vater table present?	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater heck all that apply) 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)	Hydric soil present? awer Meadows Park property that may have but Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5) Indicators of wetland hydrolo Describe Recorded Data:	NA Iried utilities. No required) y (C9) gy present? <u>No</u>			
5 cm Mucky Peat or Peat (S3) estrictive Layer (if present): Type: oil Remarks: Soils were not sampled for Wetlar /DROLOGY 'etland Hydrology Indicators: rimary Indicators (minimum of one required; cf] 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) eld Observations: urface water present? 'aturation present? (includes capillary fringe)	Depth (inches): and 4 since it is a narrow channel along the edge of the Bryn Mater heck all that apply) Quartic Fauna (B13) 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) Water Table Depth (inches): Saturation Depth (inches):	Hydric soil present? awer Meadows Park property that may have but Secondary Indicators (minimum of t Surface Soil Cracks (B6) Drainage Patterns (B10) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imager Stunted or Stressed Plants (D1) Geomorphic Position (D2) FAC-Neutral Test (D5) Indicators of wetland hydrolo Describe Recorded Data:	NA <pre>iried utilities.</pre>			

Project/Site:	<u>Bryn Mav</u> Improver	<u>wr Wate</u> nent Pr	er Quality roject		Applicant/	Owner: <u>BCWMC</u>	City/County: Minneapo pin	olis/Henne State: MN	Sampling Date: <u>10/20/17</u>
Investigator(s):	<u>BKB</u>				Section:	<u>29</u>	Township: <u>24</u>	Range: <u>28</u>	Sampling Point: <u>4-W</u>
Land Form:	Toeslop	<u>e</u>			Local Reli	ief: <u>Concave</u>	Slope %: <u>1</u>	Soil Map Unit Name: <u>Se</u>	<u>ee Summary Remarks</u>
Subregion (LRR,): <u>M</u>				Latitude:	<u>4979705</u>	Longitude: 476127	Datum: UTN	VI Nad 83 Zone 15N
Cowardin Classi	fication:	<u>PEM</u>	Cd		Circular 39	9 Classification: <u>Type 3</u>		Mapped NWI Classific	ation: Upland
Are climatic/hydr	ologic cond	litions o	n the site t	ypical for this	time of yea	ar? <u>Yes</u> (If no, expl	ain in remarks)	Eggers & Reed (prima	ry): <u>Shallow Marsh</u>
Are vegetation	No	Soil	No	Hydrology	No	significantly disturbed?	Are "normal Yes	Eggers & Reed (secor	ndary): <u>N/A</u>
0				, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_	5 5	nrosont?	Eggers & Reed (tertiar	ry): <u>N/A</u>
Are vegetation	No	Soil	No	Hydrology	No	naturally problematic?	present:	Eggers & Reed (quate	ernary): <u>N/A</u>

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

Hydrophytic vegetation present? Hydric soil present?	<u>Yes</u> Yes	General Remarks (explain any	Soil Map Unit: Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes
Indicators of wetland hydrology present?	Yes	answers in neeueu).	
Is the sampled area within a wetland?	<u>Yes</u>	lf yes, optional Wetla	and Site ID: Wetland 4

	Tree Stratum	(Plot Size:	<u>30 ft</u>	<u>Absolute</u>) <u>% Cover</u>	<u>Dominant</u> <u>Species?</u>	<u>Indicator</u> <u>Status</u>	50/20 Thresholds: Tree Stratum Sanling/Shrub Stratum	<u>20%</u> <u>50%</u> 0 0
1. 2.				0			Herb Stratum	<u>6</u> <u>15</u>
3.				0			Woody Vine Stratum	0 0
4.				0			Dominance Test Worksheet:	
	Sapling/Shrub Stratum	(Plot Size:	Total Cover:	<u>0</u>			Number of Dominant Species That Are OBL, FACW or FAC:	4 (A)
1.		(1.101.01201		0			Total Number of Dominant Species Across All Strata:	4 (B)
2. 3.				0			Percent of Dominant Species That Are OBL, FACW or FAC: 100.0	1 0% (A/B)
4. 5.				0			Prevalence Index Worksheet:	
			Total Cover:	<u>0</u>			Total % Cover of:	Multiply by:
	Herb Stratum	(Plot Size:	<u>5 ft</u>)			OBL Species X 1	25
1.	Typha angustifolia			15	Yes	OBL	FACW Species <u>5</u> X 2	10
2.	Phalaris arundinacea			5	Yes	FACW	FAC Species 0 X 3	0
3.	Carex lacustris			5	Yes	OBL	FACU Species 0 X 4	0
4.	Lemna minor			5	Yes	OBL	UPL Species 0 X 5	0
5.				0			Column Totalo 30 (A)	35 (B)
6.				0			Column Totals: Co	
7.				0			Hydrophytic Vegetation Indicators:	1.17
8.				0				
			Total Cover:	<u>30</u>			Yes Rapid Test for Hydrophytic Veget	ation
	Woody Vine Stratum	(Plot Size:	<u>30 ft</u>)			$\frac{1}{100} \frac{1}{100} \frac{1}$	
1.				0			No Morphological Adaptations [1] (r	rovide supporting dat:
2.				0			in vegetation remarks or on a sep	arate sheet)
			Total Cover:	<u>0</u>			No Problematic Hydrophytic Vegetat	ion [1] (Explain)
% E	Bare Ground in Herb Stratum	<u>.</u>	_	% Sphagnu	ım Moss Cove	er:	[1] Indicators of hydric soil & wetland hydrology mus disturbed or problematic.	st be present, unless
Veg	etation Remarks: (include p	hoto number	s here or on a separate	e sheet)			Hydrophytic vegetation present? Yes	

SOIL						Sampling Po	pint:	
Profile Description: (Describe to the depth nee	ded to de	ocument the indicator or o	confirm t	he abscence	of indicators,).		
Depth Matrix	0/	Rec	dox Feat	ures	1 [0]	Testere	Dementer	
(Incries) Color (moist)	%	Color (moist)	%	Type [1]	LOC [2]	Texture	Remarks	
1								
2								
4 -								
5								
6								
[1] Type: C=Concentration, D=Depletion, RM=F	Reduced	Matrix, MS=Masked Sand	Grains	[2] Locatior	n: PL=Pore L	ining, M=Matrix.		
Hydric Soil Indicators: (applicable to all LRRs,	unless o	therwise noted)			Ind	icators for Problematic Hydric Soi	ls [3]:	
Histosol (A1)		🗌 Sandy Gl	leyed Mai	trix (S4)		Coast Prairie Redox (A16)		
Histic Epipedon (A2)		Sandy Re	edox (S5)			Dark Surface (S7)		
Black Histic (A3)		Stripped	Matrix (S	6)		Iron-Manganese Masses (F12)		
Hydrogen Sulfide (A4) Loamy Mucky Mineral (F1)						Very Shallow Dark Surface (TF12)		
Stratified Layers (A5)		\checkmark	Other (explain in soil remarks)					
2 cm Muck (A10)		Depleted	Matrix (F	3)				
Depleted Below Dark Surface (A11)		🗌 Redox Da	ark Surfa	ce (F6)				
Thick Dark Surface (A12)		Depleted	Dark Su	face (F7)				
Sandy Mucky Mineral (S1)		🗌 Redox De	epression	ns (F8)	[3] mu	Indicators of hydrophytic vegetati ist be present, unless disturbed or	on and wetland hydrology problematic	
5 cm Mucky Peat or Peat (S3)					ma	st be present, unless distarbed of	problematic.	
Restrictive Layer (if present): Type:		Dept	th (inche	es):		Hydric soil present?	Yes	
Soil Remarks: Soils were not sampled for Wetla	and 4 sind	e it is a narrow channel alo	ing the ea	lge of the Bryn	Mawer Mead	lows Park property that may have bu	ried utilities. However Aquic	
conditions are assumed based o	n the dor	ninance of obligate vegetati	ion and p	rimary indicato	ors of hydrolog	у.		
HYDROLOGY								
Wetland Hydrology Indicators:								
Primary Indicators (minimum of one required; o	heck all	that apply)			Sec	condary Indicators (minimum of tw	vo required)	
Surface Water (A1)		Water-Stained Leave	es (B9)			Surface Soil Cracks (B6)		
✔ High Water Table (A2)		🗌 Aquatic Fauna (B13,)			Drainage Patterns (B10)		
Saturation (A3)		True Aquatic Plants	(B14)			Dry-Season Water Table (C2)		
Water Marks (B1)		Hydrogen Sulfide Od	dor (C1)			Crayfish Burrows (C8)		
Sediment Deposits (B2)		Oxidized Rhizospher	res on Liv	ring Roots (C3,)	Saturation Visible on Aerial Imagery	(C9)	
Drift Deposits (B3)		Presence of Reduce	d Iron (C	4)		Stunted or Stressed Plants (D1)		
Algal Mat or Crust (B4)		Recent Iron Reduction	on in Tille	d Soils (C6)	 ✓ 	Geomorphic Position (D2)		
☐ Iron Deposits (B5)		Thin Muck Surface (C7)	¥ * * *		FAC-Neutral Test (D5)		
Investigation Visible on April Imagen (D7)		Gauge or Well Data	, (D9)		L.			
Sparsely Vegetated Concave Surface (B8)		Other (explain in ren	narks)					
Field Observations:						Indicators of wetland hydrolog	y present? <u>Yes</u>	
Surface water present?	✓	Surface Water Depth (i	nches):	8		Describe Recorded Data:		
Water table present?	✓	Water Table Depth (inc	hes):	0				
Saturation present? (includes capillary fringe)	✓	Saturation Depth (inch	es):	0				
Recorded Data: Aerial Photo N	Ionitorin	g Well 🦳 Stream Gaud	ge 🗖	Previous Ins	pections			
Hydrology Remarks:		···		- 1				

Appendix B

Site Photographs

Appendix B Bryn Mawr Meadows Water Quality Improvement Project Wetland Delineation Site Photos - October 20, 2017



Photo 1: Wetland 1 facing northwest. Hydrology contributing to this wetland appears to be originating from an exposed pipe causing water to pool in this low area which is creating shallow marsh community.



Photo 2: Wetland 1 facing east. Most of the wet meadow portion of Wetland 1 is saturated to the surface and dominated by mown Kentucky bluegrass.



Photo 3: Non-vegetated upland ditch area adjacent to railroad bed. This area eventually leads into Wetland 2a located approximately 650 feet ESE from this point. This is a typical view of upland areas adjacent to the railroad bed.



Photo 5: Wetland 2b facing east-southeast. Dominant vegetation present at the time of the site visit was common duckweed. Wetland 2b was inundated between 6 and 24 inches. Wetlands 2a & 2b are ditch wetlands separated by a culvert.



Photo 4: Wetland 2a facing west. Most of the 6-12 inches of surface water in Wetland 2a is covered by leaves, but dominant vegetation present at the time of the site visit was common duckweed. Wetlands 2a & 2b are ditch wetlands separated by a culvert.



Photo 6: Wetland 3 facing southwest. Wetland 3 is a narrow ditch wetland (between 5-10 feet wide) dominated by common duckweed, and reed canary grass. Wetlands 3 and 4 are low spots within the same ditch.

Appendix B Bryn Mawr Meadows Water Quality Improvement Project Wetland Delineation Site Photos - October 20, 2017



Photo 7: Typical view of upland ditch located between Wetland 3 and Wetland 4. Area is mostly not vegetated but does harbor European buckthorn in the herbaceous and shrub layers in some areas.



Photo 8: Wetland 4 facing southeast at the narrowest point (approximately 12 inches wide). Common duckweed is dominant in this location and is inundated approximately 2 inches. Wetlands 3 and 4 are low spots within the same ditch.



Photo 9: Wetland 4 facing northeast at the widest point (approximately 4 feet wide). Duckweed, lakebank sedge, reed canary grass, and cattail are all dominant at this location and is inundated approximately 12 inches.



Photo 10: Wetland 4 facing southeast. Culvert reveals one potential source of hydrology for Wetland 4.



Photo 11: Area that occasionally becomes inundated after a rain event located southwest side of Bryn Mawr Meadow Park.



Photo 12: Area that occasionally becomes inundated after a rain event located northeast side of Bryn Mawr Meadow Park.

Appendix E

Opinion of Cost

PREPARED BY: BARR ENGINEERING COMPANY

ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Bryn Mawr Meadows Park Water Quality Project LOCATION: Minneapolis, MN PROJECT #: 23/27-0051.41 OPINION OF COST - SUMMARY

	SHEET:	1	OF		1
	BY:	JPP		DATE:	10/10/2018
	CHECKED BY:	MAK		DATE:	10/10/2018
	APPROVED BY:	KAL		DATE:	10/10/2018
ISSUED:	For BCWMC Review			DATE:	10/10/2018
ISSUED:				DATE:	
ISSUED:				DATE:	
ISSUED:				DATE:	

Engineer's Opinion of Probable Project Cost Concept 1 - Northwest Neighborhood Diversion

			ESTIMATED			
Item. No.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	ITEM COST	NOTES
A	MOBILIZATION/DEMOBILIZATION (5%)	LS	1	\$13,500.00	\$13,500.00	1,2,3,4,5,6,7
В	EROSION AND SEDIMENT CONTROL	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
С	TRAFFIC CONTROL	LS	1	\$2,000.00	\$2,000.00	1,2,3,4,5,6,7
D	EXCAVATION, HAUL AND DISPOSE	TON	4,000	\$25.00	\$100,000.00	1,2,3,4,5,6,7
E	15" PE STORM SEWER	LF	300	\$40.00	\$12,000.00	1,2,3,4,5,6,7
F	CATCH BASIN	EA	7	\$2,000.00	\$14,000.00	1,2,3,4,5,6,7
G	60" DIAMETER OUTLET STRUCTURE WITH WEIR, OVERFLOW GRATE ON PILES	LS	1	\$20,000.00	\$20,000.00	1,2,3,4,5,6,7
Н	30" PE OUTLET PIPE	LF	150	\$120.00	\$18,000.00	1,2,3,4,5,6,7
I	CONNECT TO EXISTING STRUCTURE	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
J	BITUMINOUS PAVEMENT PATCH, FULL DEPTH	SF	3,000	\$4.00	\$12,000.00	1,2,3,4,5,6,7
К	CONCRETE CURB AND GUTTER	LF	300	\$20.00	\$6,000.00	1,2,3,4,5,6,7
L	SITE RESTORATION	AC	2.0	\$4,500.00	\$9,000.00	1,2,3,4,5,6,7
	CONSTRUCTION SUBTOTAL				\$209,000.00	1,2,3,4,5,6,7,8
	CONSTRUCTION CONTINGENCY (30%)				\$63,000.00	1,5,8
	ESTIMATED CONSTRUCTION COST				\$272,000.00	1,2,3,4,5,6,7,8
	PLANNING, ENGINEERING & DESIGN (30%)				\$82,000.00	1,2,3,4,5,8
	ESTIMATED TOTAL PROJECT COST				\$354,000.00	1,2,3,4,5,7,8
		-20%			\$284,000.00	5,7,8
		30%			\$461,000.00	5,7,8

Notes

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¹ Limited Design Work Completed (10 - 15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Field Investigation Completed.

⁵ This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

⁶ No costs included for soil correction or overexcavation.

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include maintenance, monitoring or additional tasks following ⁸ Estimate costs are reported to nearest thousand dollars.

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PREPARED BY: BARR ENGINEERING COMPANY

ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Bryn Mawr Meadows Park Water Quality Project LOCATION: Minneapolis, MN PROJECT #: 23/27-0051.41 OPINION OF COST - SUMMARY

	SHEET:	1	OF		1
	BY:	JPP	[DATE:	10/10/2018
	CHECKED BY:	MAK	[DATE:	10/10/2018
	APPROVED BY:	KAL	[DATE:	10/10/2018
ISSUED:	For BCWMC Review		[DATE:	10/10/2018
ISSUED:			[DATE:	
ISSUED:			[DATE:	
ISSUED:			[DATE:	

Engineer's Opinion of Probable Project Cost Concept 2 - Penn Pond Low Flow Diversion

			ESTIMATED			
Item. No.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	ITEM COST	NOTES
А	MOBILIZATION/DEMOBILIZATION (5%)	LS	1	\$20,600.00	\$20,600.00	1,2,3,4,5,6,7
В	EROSION AND SEDIMENT CONTROL	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
С	TRAFFIC CONTROL	LS	1	\$2,000.00	\$2,000.00	1,2,3,4,5,6,7
D	EXCAVATION, HAUL AND DISPOSE	TON	9,500	\$25.00	\$237,500.00	1,2,3,4,5,6,7
E	12" PE STORM SEWER	LF	130	\$40.00	\$5,200.00	1,2,3,4,5,6,7
F	60" DIAMETER OUTLET STRUCTURE WITH WEIR, OVERFLOW GRATE ON PILES	LS	1	\$20,000.00	\$20,000.00	1,2,3,4,5,6,7
G	30" PE OUTLET PIPE	LF	150	\$120.00	\$18,000.00	1,2,3,4,5,6,7
н	CONNECT TO EXISTING STRUCTURE	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
I	BITUMINOUS PAVEMENT PATCH, FULL DEPTH	SF	400	\$4.00	\$1,600.00	1,2,3,4,5,6,7
J	CONCRETE CURB AND GUTTER	LF	20	\$40.00	\$800.00	1,2,3,4,5,6,7
К	SITE RESTORATION	AC	2.0	\$4,500.00	\$9,000.00	1,2,3,4,5,6,7
	CONSTRUCTION SUBTOTAL				\$317,000.00	1,2,3,4,5,6,7,8
	CONSTRUCTION CONTINGENCY (30%)				\$95,000.00	1,5,8
	ESTIMATED CONSTRUCTION COST				\$412,000.00	1,2,3,4,5,6,7,8
	PLANNING, ENGINEERING & DESIGN (30%)				\$124,000.00	1,2,3,4,5,8
	ESTIMATED TOTAL PROJECT COST				\$536,000.00	1,2,3,4,5,7,8
		-20%			\$429,000.00	5,7,8
		30%			\$697,000.00	5,7,8

Notes

¹ Limited Design Work Completed (10 - 15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Field Investigation Completed.

⁵ This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

⁶ No costs included for soil correction or overexcavation

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include maintenance, monitoring or additional tasks following constuction.

⁸ Estimate costs are reported to nearest thousand dollars.

PREPARED BY: BARR ENGINEERING COMPANY

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Engineer's Opinion of Probable Project Cost

Concept 3 - Northwest Neighborhood Diversion and Penn Pond Low Flow Diversion

			ESTIMATED			
Item. No.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	ITEM COST	NOTES
A	MOBILIZATION/DEMOBILIZATION (5%)	LS	1	\$30,500.00	\$30,500.00	1,2,3,4,5,6,7
В	EROSION AND SEDIMENT CONTROL	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
С	TRAFFIC CONTROL	LS	1	\$2,000.00	\$2,000.00	1,2,3,4,5,6,7
D	EXCAVATION, HAUL AND DISPOSE	TON	13,500	\$25.00	\$337,500.00	1,2,3,4,5,6,7
E	15" PE STORM SEWER	LF	300	\$40.00	\$12,000.00	1,2,3,4,5,6,7
F	12" PE STORM SEWER	LF	130	\$40.00	\$5,200.00	1,2,3,4,5,6,7
G	CATCH BASIN	EA	7	\$2,000.00	\$14,000.00	1,2,3,4,5,6,7
Н	60" DIAMETER OUTLET STRUCTURE WITH WEIR, OVERFLOW GRATE ON PILES	LS	1	\$20,000.00	\$20,000.00	1,2,3,4,5,6,7
I	30" PE OUTLET PIPE	LF	150	\$120.00	\$18,000.00	1,2,3,4,5,6,7
J	CONNECT TO EXISTING STRUCTURE	LS	1	\$1,000.00	\$1,000.00	1,2,3,4,5,6,7
К	BITUMINOUS PAVEMENT PATCH, FULL DEPTH	SF	3,400	\$4.00	\$13,600.00	1,2,3,4,5,6,7
L	CONCRETE CURB AND GUTTER	LF	320	\$20.00	\$6,400.00	1,2,3,4,5,6,7
М	SITE RESTORATION	AC	2.0	\$4,500.00	\$9,000.00	1,2,3,4,5,6,7
	CONSTRUCTION SUBTOTAL				\$470,000.00	1,2,3,4,5,6,7,8
	CONSTRUCTION CONTINGENCY (30%)				\$141,000.00	1,5,8
	ESTIMATED CONSTRUCTION COST				\$611,000.00	1,2,3,4,5,6,7,8
	PLANNING, ENGINEERING & DESIGN (30%)				\$183,000.00	1,2,3,4,5,8
	ESTIMATED TOTAL PROJECT COST				\$794,000.00	1,2,3,4,5,7,8
ESTIMATED ACCURACY RANGE		-20%			\$636,000.00	5,7,8
		30%			\$1,033,000.00	5,7,8

Notes

BARR

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