STORMWATER MANAGEMENT REPORT

for

Waunakee Library
Alloy Site Redevelopment

Village of Waunakee
Dane County, Wisconsin

September 7, 2017
CONCEPT STORMWATER MANAGEMENT PLAN

Prepared by:
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Prepared for:
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Madison, WI 53703

TABLE OF CONTENTS

1.0 INTRODUCTION

The proposed project is a new library building at the existing Waunakee Alloy Casting Corporation site located at 201 N. Madison Street in the Village of Waunakee, Dane County, WI. The project site is approximately 6 acres in size and is bounded by Six Mile Creek to the south, a residential alley and residential homes to the north, Madison Street to the west and Pleasant Drive and residential homes to the east. The basis of this report is based on the requirements of the Village of Waunakee and WisDNR Stormwater and Erosion Control Ordinance.

At the time of writing this report, additional borings are being secured on the south side of the creek for the alternate site design of a pedestrian bridge and parking lot.

2.0 DESIGN CRITERIA

The proposed site is currently split by Six Mile Creek. The north side of the creek will abide by the redevelopment stormwater standards while the south side will abide by new development standards. Those standards are discussed below.

Based on the Village and WisDNR ordinances and regulations for a redevelopment project the following items were taken into account for the design of the stormwater management facilities for this project:

1. Safe passage of the 100-year storm event.
2. 40% of total suspended solids removal for water quality.
3. Provide oil and grease control.
4. Size all storm sewer for the conveyance of the 10-year storm event.

Based on the Village and WisDNR ordinances and regulations for a new development the following items were taken into account for the design of the stormwater management facilities for this project:

1. Infiltration of 90% pre to post-development infiltration for the one year average annual rainfall.
2. Maintain pre to post-development peak flows for the 1, 2, 5, and 10-year storm events.
3. Safe passage of the 100-year storm event.
4. 80% of total suspended solids removal for water quality.
5. Provide oil and grease control.
6. Size all storm sewer for the conveyance of the 10-year storm event.

3.0 INFILTRATION

The north side of the project site is except from infiltration as it is a redevelopment site. The south side parking lot currently does not have infiltration design for it. We are awaiting soil borings in several areas in the south side of the creek. Upon completion of those borings, we will then appropriate the measures necessary to meet the infiltration requirements for the site.

The boring that were completed north of the creek show extremely high groundwater conditions at the site. Please see the appendix for results of the borings.

4.0 WATER QUALITY (TSS REMOVAL)

Three wet pond areas will be utilized throughout the site to meet the total suspended solids removal for the site. The site and wet pond areas were modeled in WinSLAMM with the following results:

East Wet Pond Area = 63% TSS Removal
West Wet Pond Area = 80% TSS Removal
South Wet Pond Area = 80% TSS Removal
Total Site TSS Removal = 70% TSS Removal

These results will be finalized once soil boring data is obtained for the site. A final stormwater management plan presenting this information will be provided to all approving authorities. Please see the Appendix for more information on the conservative assumptions made for the project.

5.0 PEAK FLOW

The north side of the development does not require peak flow control as it is a redevelopment site. The south side parking lot has ample space available to meet the required 1, 2, 10, and 100-year storms as required by the Village of Waunakee and the WisDNR. A final stormwater management plan will include the required calculations for peak flow control.

6.0 OIL & GREASE CONTROL

Oil and grease control will be required for the project site. Since the groundwater is too high to utilize bioretention areas for oil and grease control, control may be accomplished by an oil-water separator a the last manhole prior to the release to the wet ponds. A final decision will be made to ensure that the oil & grease control will be met.

7.0 EROSION CONTROL

A final erosion control plan will be provided at a later date. Erosion control items that will be used in the site will be:

STONE TRACKING PAD

SILT FENCE

INLET PROTECTION

SEDIMENT BASIN (BIORETNETION AREA POST CONSTRUCTION)

Inspections of the installed erosion control measures and best management practices must be performed weekly and within 24 hours after a precipitation event 0.5 inches or greater which results in runoff. Weekly written reports of all inspections conducted by or for the permittee must be maintained throughout the period of permit coverage by the City of Middleton and the State of Wisconsin.

8.0 PROJECT SCHEDULE

The project schedule is approximate and may completely depend on project approvals, contractor efficiency, and weather.

Demolition of Existing Site	Fall 2017
Start Construction	Spring 2018
Library Open	Spring 2019

9.0 MONITORING & MAINTENANCE

The Property Owner will maintain the facilities after construction is completed. A copy of the maintenance agreement will be included in the final stormwater management plan.

10.0 STORM SEWER SIZING

The proposed storm sewer will be modeled to convey the 10 year storm event.

APPENDIX A

Surface Water Data Viewer Map

Legend

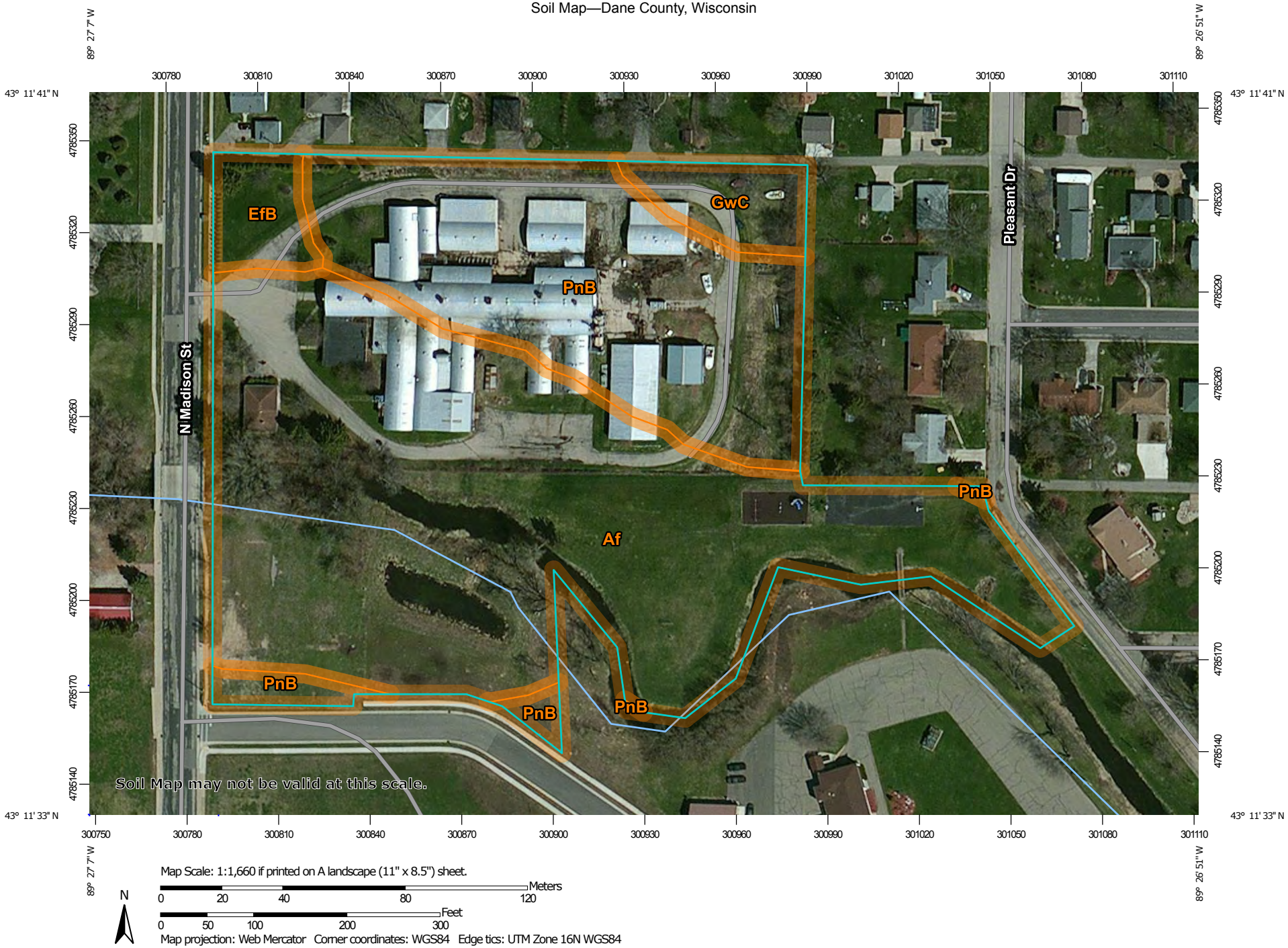
- County Boundary
- Cities, Towns & Villages
  - City
  - Village
  - Civil Town
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

0.1 0 0.03 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

1: 1,980



Map Scale: 1:1,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dane County, Wisconsin
Survey Area Data: Version 15, Sep 27, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

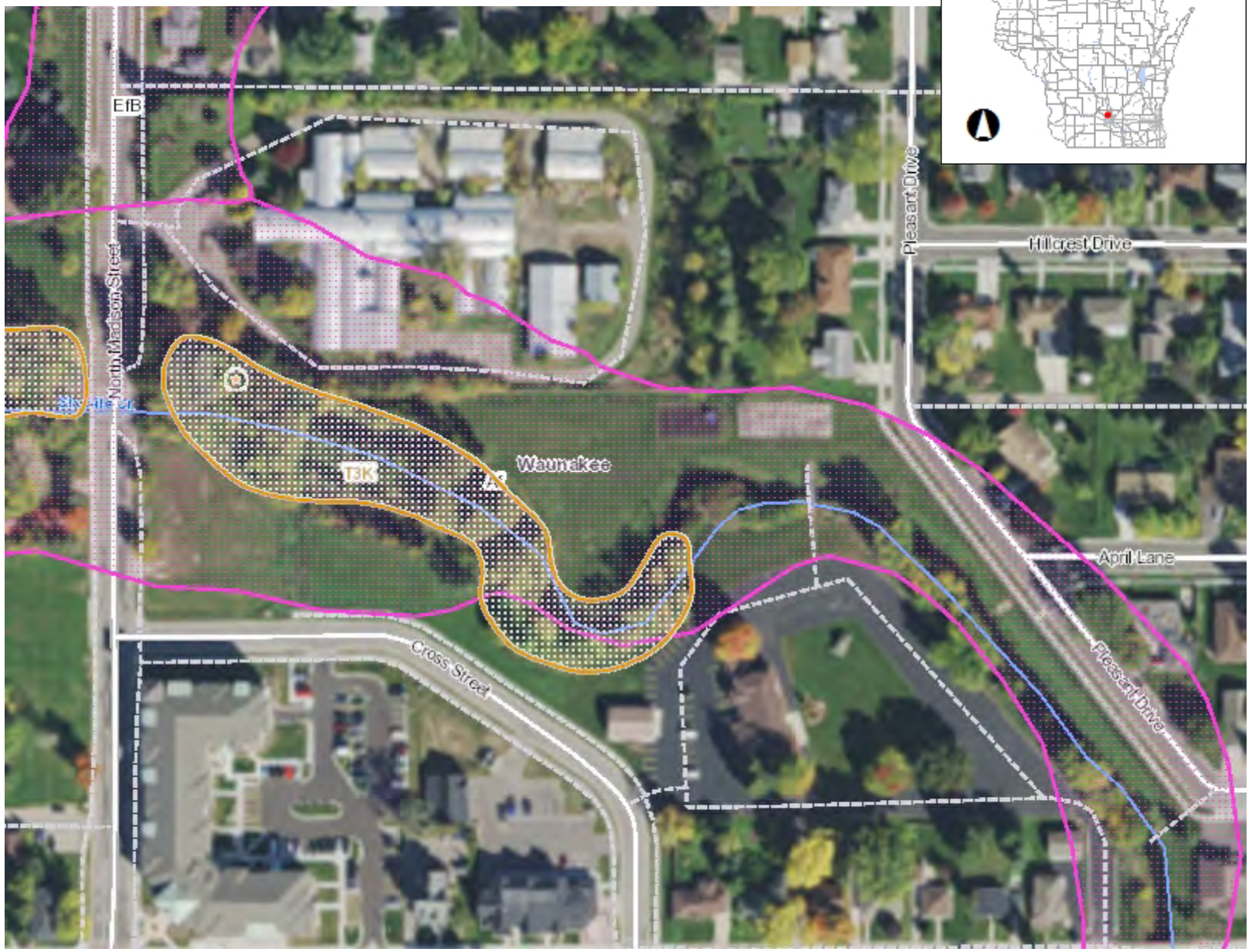
Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Dane County, Wisconsin (WI025)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Af	Alluvial land, wet	5.5	62.6%
EfB	Elburn silt loam, 0 to 3 percent slopes	0.3	3.4%
GwC	Griswold loam, 6 to 12 percent slopes	0.3	3.8%
PnB	Plano silt loam, till substratum, 2 to 6 percent slopes	2.7	30.2%
Totals for Area of Interest		**8.9**	**100.0%**

Surface Water Data Viewer Map



Legend

- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
- Filled Points
- Wetland Class Areas
  - Wetland
  - Upland
- Filled Areas
- NRCS Wetspots
- Wetland Indicators
- County Boundary
- Cities, Towns & Villages
  - City
  - Village
  - Civil Town
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
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- Intermittent Streams
- Lakes and Open water

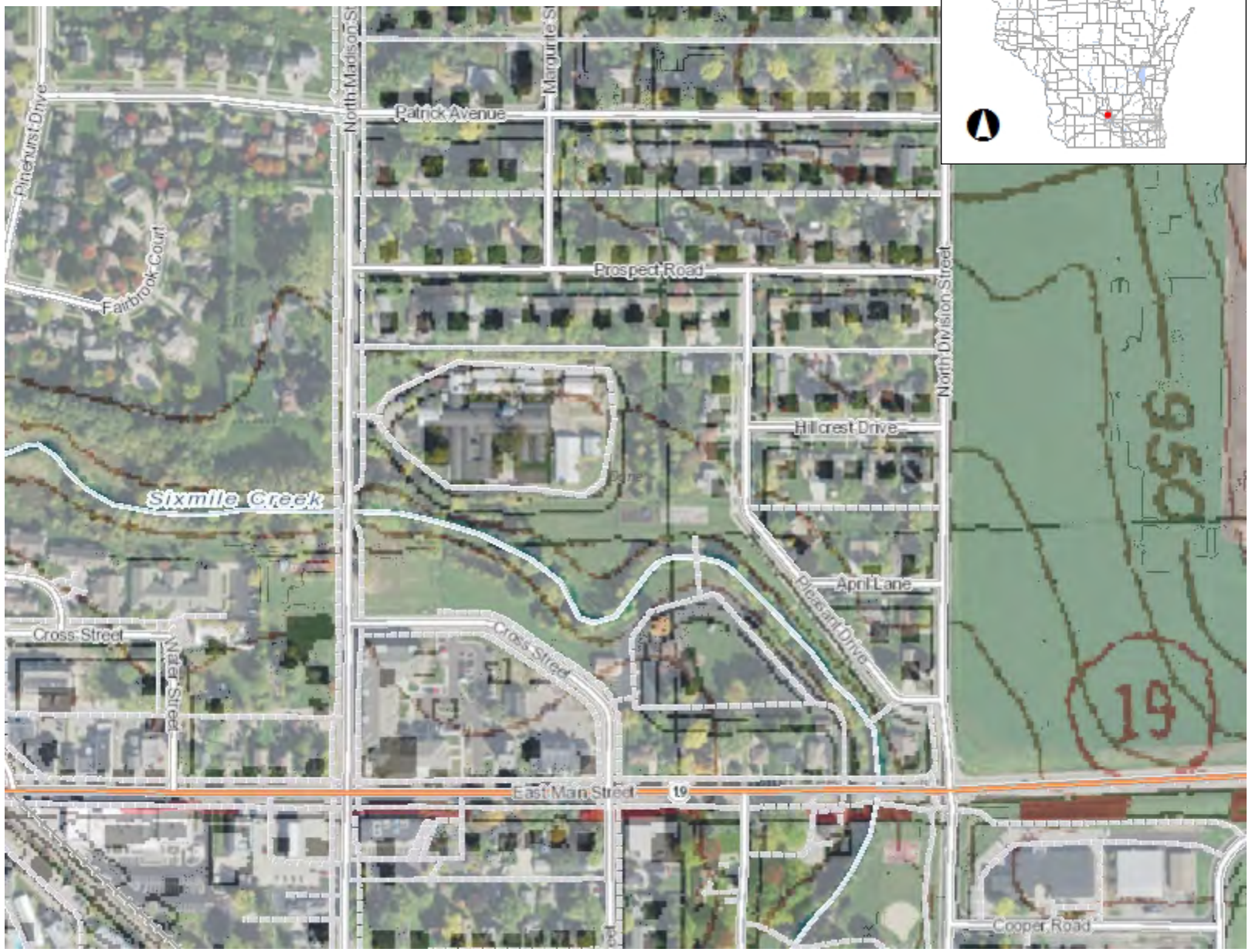
Notes

0.1 0 0.03 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

1: 1,980

Surface Water Data Viewer Map



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Notes

0.1 0 0.06 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

1: 3,960

APPENDIX B

Waunakee Library
SLAMM Data and Outputs

Data file name: P:\PROJECTS\2016\116.0144.30 OPN Waunakee Library\Stormwater\Waunakee Library Proposed Site.mdb
WinSLAMM Version 10.2.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 09-07-2017 Time: 15:17:43
Site information:
Waunakee Library

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Development CN
Pre Development	1.930	61
Total Area (ac)/Composite CN	1.930	61

LU# 1 - Commercial: 101 Total area (ac): 1.103
13 - Paved Parking 1: 0.494 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.058 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.551 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: 200 Total area (ac): 0.063
1 - Roofs 1: 0.063 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Commercial: 102 Total area (ac): 1.229
13 - Paved Parking 1: 0.274 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.164 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.720 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.071 ac. Source Area PSD File:

LU# 4 - Commercial: 100 Total area (ac): 0.411
1 - Roofs 1: 0.411 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Commercial: 103 Total area (ac): 0.548
1 - Roofs 1: 0.069 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.231 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.076 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.172 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 6 - Commercial: 201 Total area (ac): 0.159
1 - Roofs 1: 0.159 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 7 - Commercial: 202 Total area (ac): 0.802
13 - Paved Parking 1: 0.415 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.101 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.286 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 8 - Commercial: 203 Total area (ac): 0.404
31 - Sidewalks 1: 0.059 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.284 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.061 ac. Source Area PSD File:

LU# 9 - Commercial: 300 Total area (ac): 0.793

13 - Paved Parking 1: 0.533 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.015 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.206 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.039 ac. Source Area PSD File:

LU# 10 - Commercial: Green Roof Total area (ac): 0.095
45 - Large Landscaped Areas 1: 0.095 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Other Device CP# 1 (DS) - Green Roof TSS Removal
Fraction of drainage area served by device (ac) = 1.00
Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

Control Practice 2: Wet Detention Pond CP# 1 (DS) - West Wet Pond
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 4.8
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.33
2. Number of orifices: 1
3. Invert elevation above datum (ft): 4.8
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 7.3
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 5.8
Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0301	0.00	0.00
2	0.20	0.0301	0.00	0.00
3	4.00	0.0703	0.00	0.00

4	4.80	0.1208	0.00	0.00
5	7.80	0.1888	0.00	0.00

Control Practice 3: Wet Detention Pond CP# 2 (DS) - East Wet Pond
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 4.8
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.33
2. Number of orifices: 1
3. Invert elevation above datum (ft): 4.8

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 7.3

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 5.8

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0102	0.00	0.00
2	0.20	0.0102	0.00	0.00
3	4.00	0.0362	0.00	0.00
4	4.80	0.0753	0.00	0.00
5	7.80	0.1306	0.00	0.00

Control Practice 4: Wet Detention Pond CP# 3 (DS) - South Wet Pond
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 4.8
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.25
2. Number of orifices: 1
3. Invert elevation above datum (ft): 4.8

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 6.8

Waunakee Library
SLAMM Data and Outputs

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 6

Pond stage and surface area

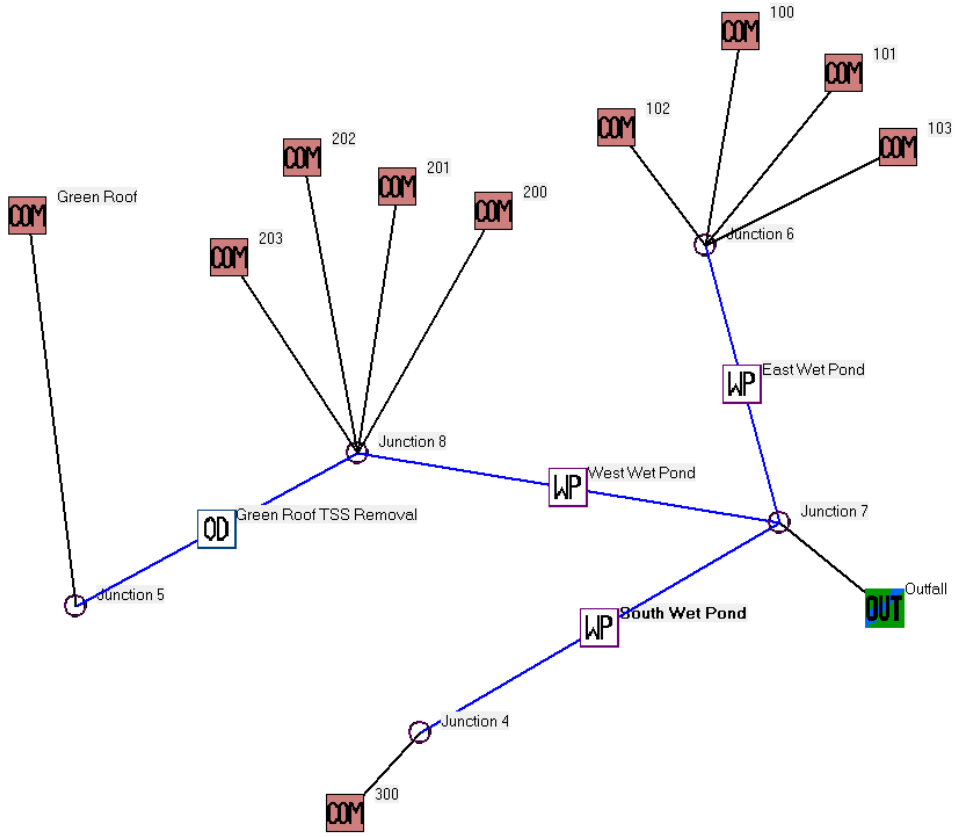
Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0130	0.00	0.00
2	0.20	0.0130	0.00	0.00
3	4.00	0.0370	0.00	0.00
4	4.80	0.0710	0.00	0.00
5	7.30	0.1200	0.00	0.00

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 5

Control Practice 4: Other Device CP# 1 (DS) - Green Roof TSS Removal

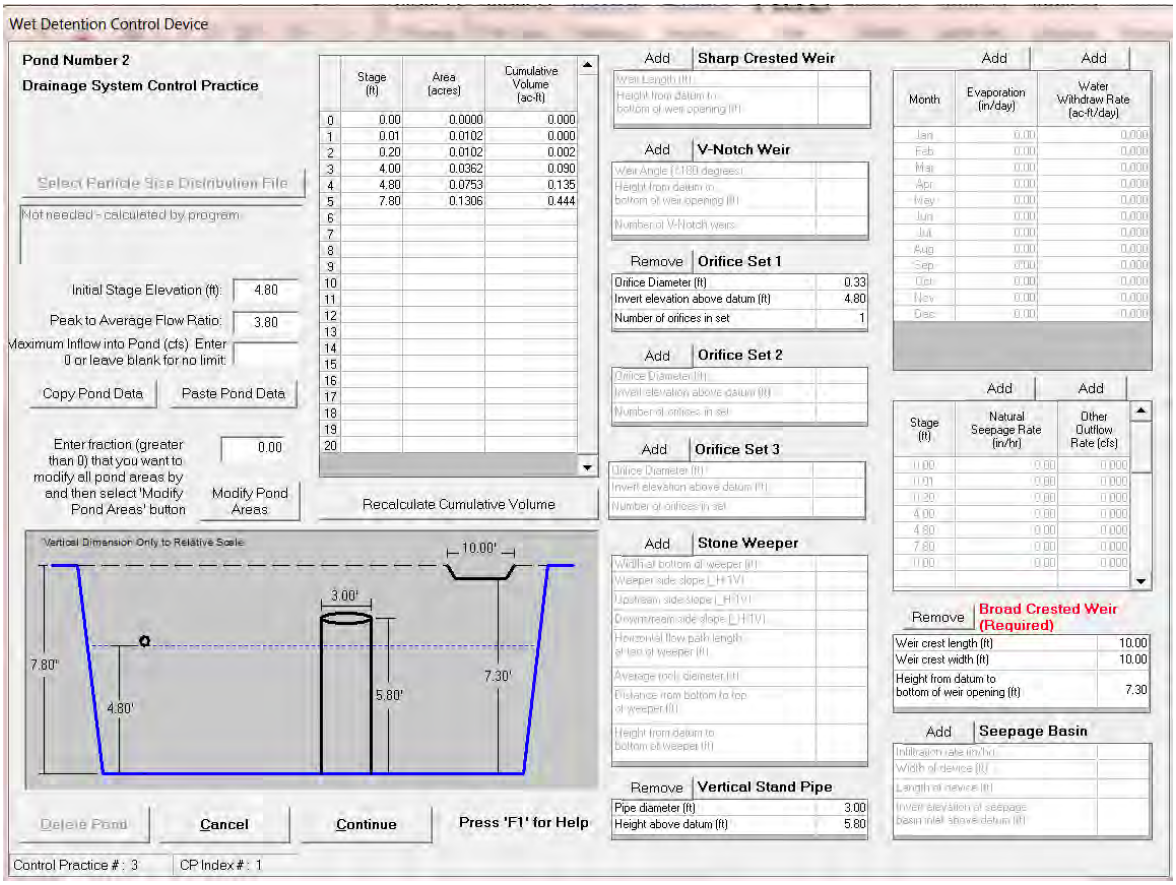
Fraction of drainage area served by device (ac) = 1.00
Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0



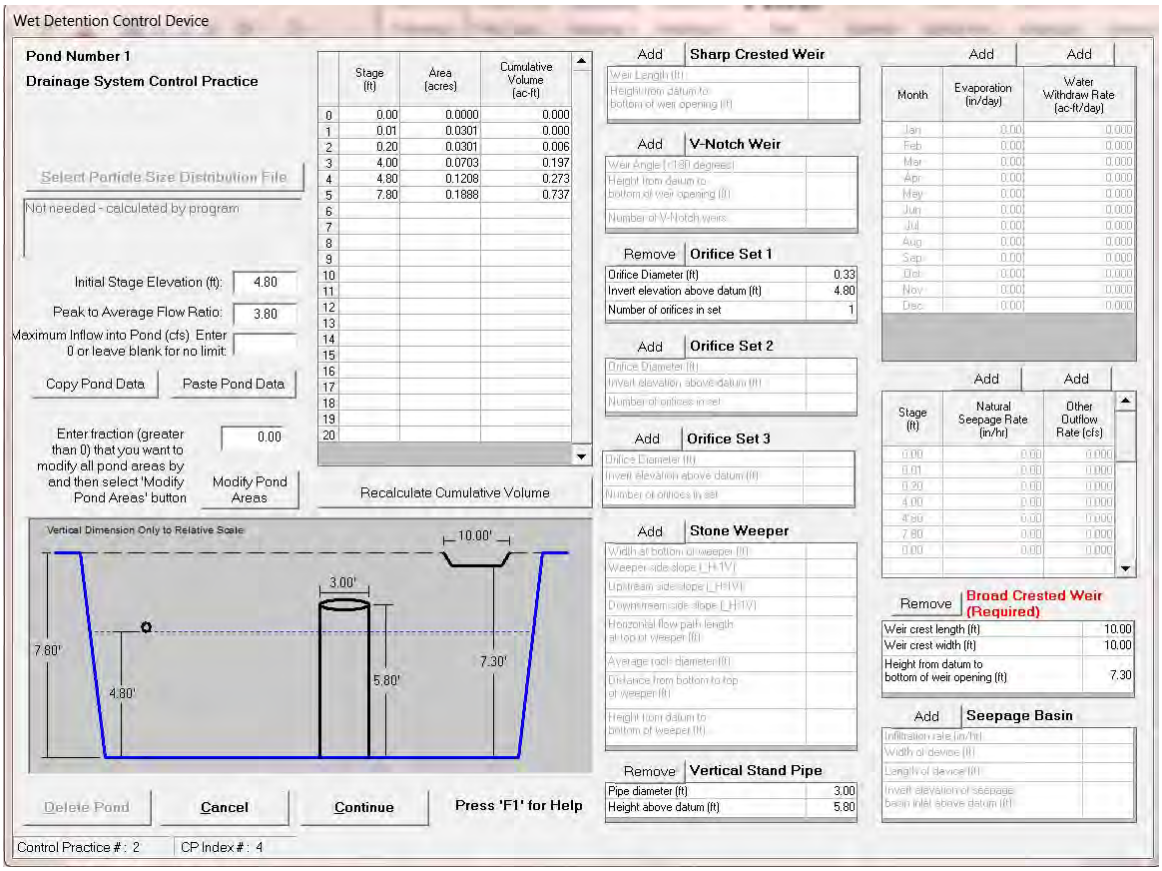
Waunakee Library
SLAMM Data and Outputs

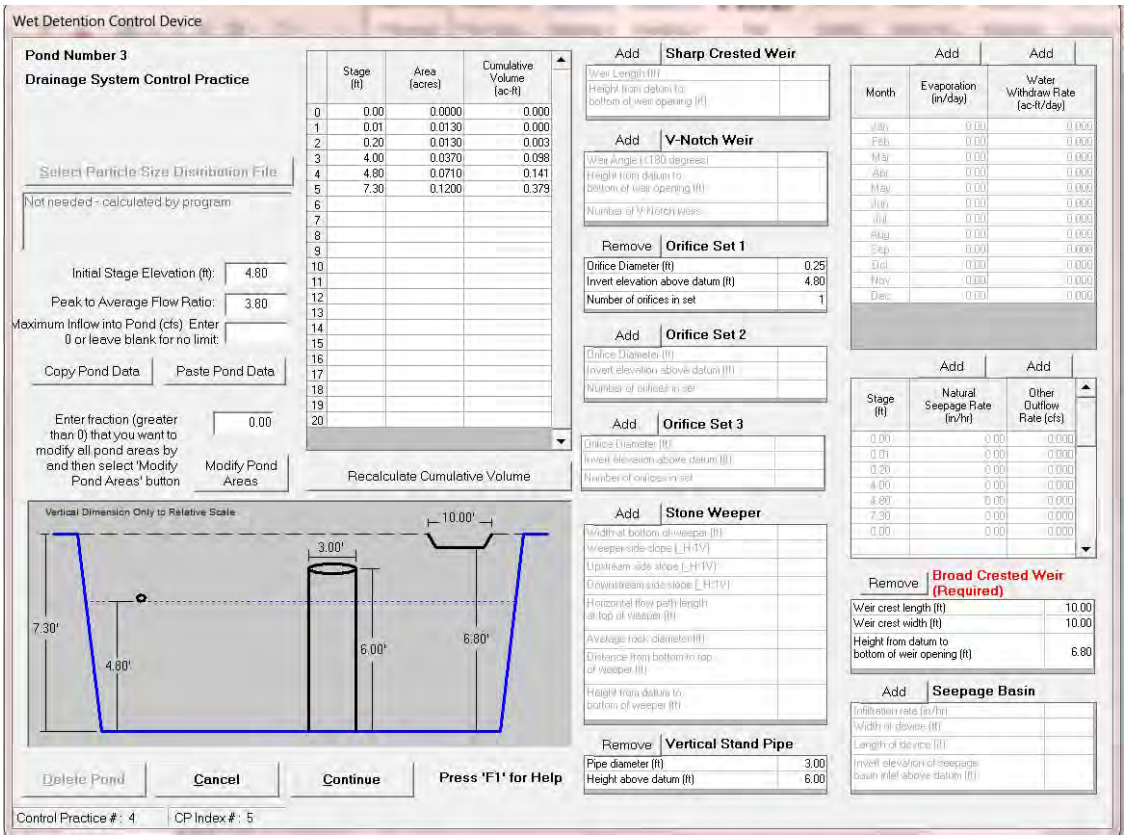
Land Use #	Land Use Type	Land Use Label	Land Use Area (acres)
1	Commercial	101	1.103
2	Commercial	200	0.063
3	Commercial	102	1.229
4	Commercial	100	0.411
5	Commercial	103	0.548
6	Commercial	201	0.159
7	Commercial	202	0.802
8	Commercial	203	0.404
9	Commercial	300	0.793
10	Commercial	Green Roof	0.095

CP #	Control Practice Type	Control Practice Name or Location
1	**Other Device**	**South Bioretention Area**
2	Wet Detention Pond	West Wet Pond
3	Wet Detention Pond	East Wet Pond
4	Wet Detention Pond	South Wet Pond

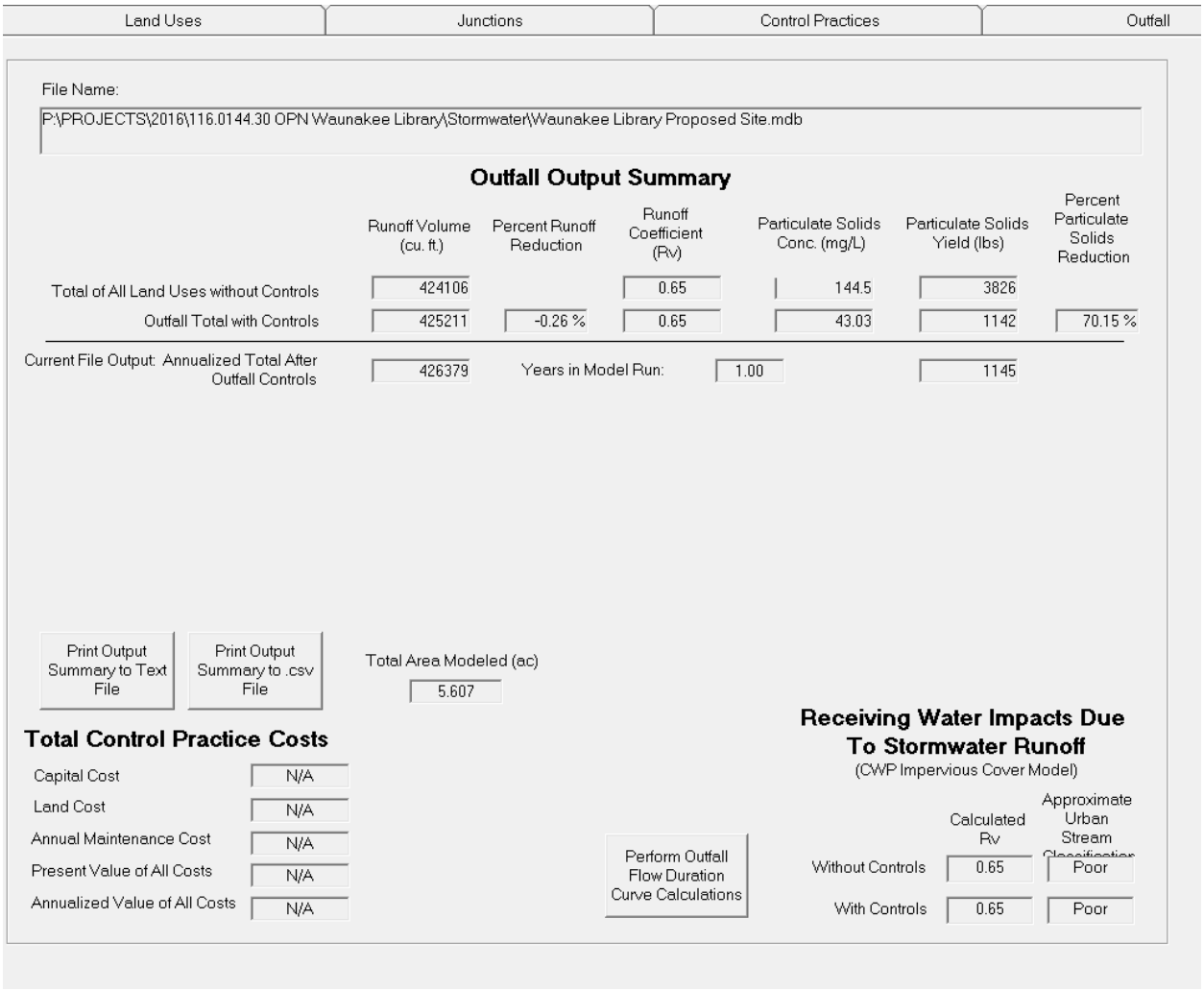


Waunakee Library
SLAMM Data and Outputs





Waunakee Library
SLAMM Data and Outputs



Land Uses | Junctions | Control Practices | Outfall

File Name:
P:\PROJECTS\2016\116.0144.30 OPN Waunakee Library\Stormwater\Waunakee Library Proposed Site.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	424106		0.65	144.5	3826	
Outfall Total with Controls	425211	-0.26 %	0.65	43.03	1142	70.15 %
Current File Output: Annualized Total After Outfall Controls	426379	Years in Model Run:	1.00		1145	

Print Output Summary to Text File
Print Output Summary to .csv File
Total Area Modeled (ac): 5.607

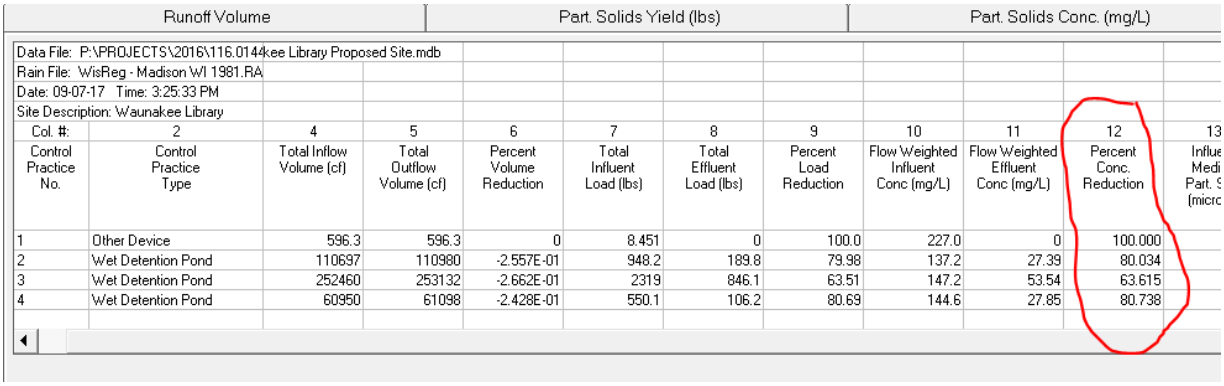
Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff
(CWP Impervious Cover Model)

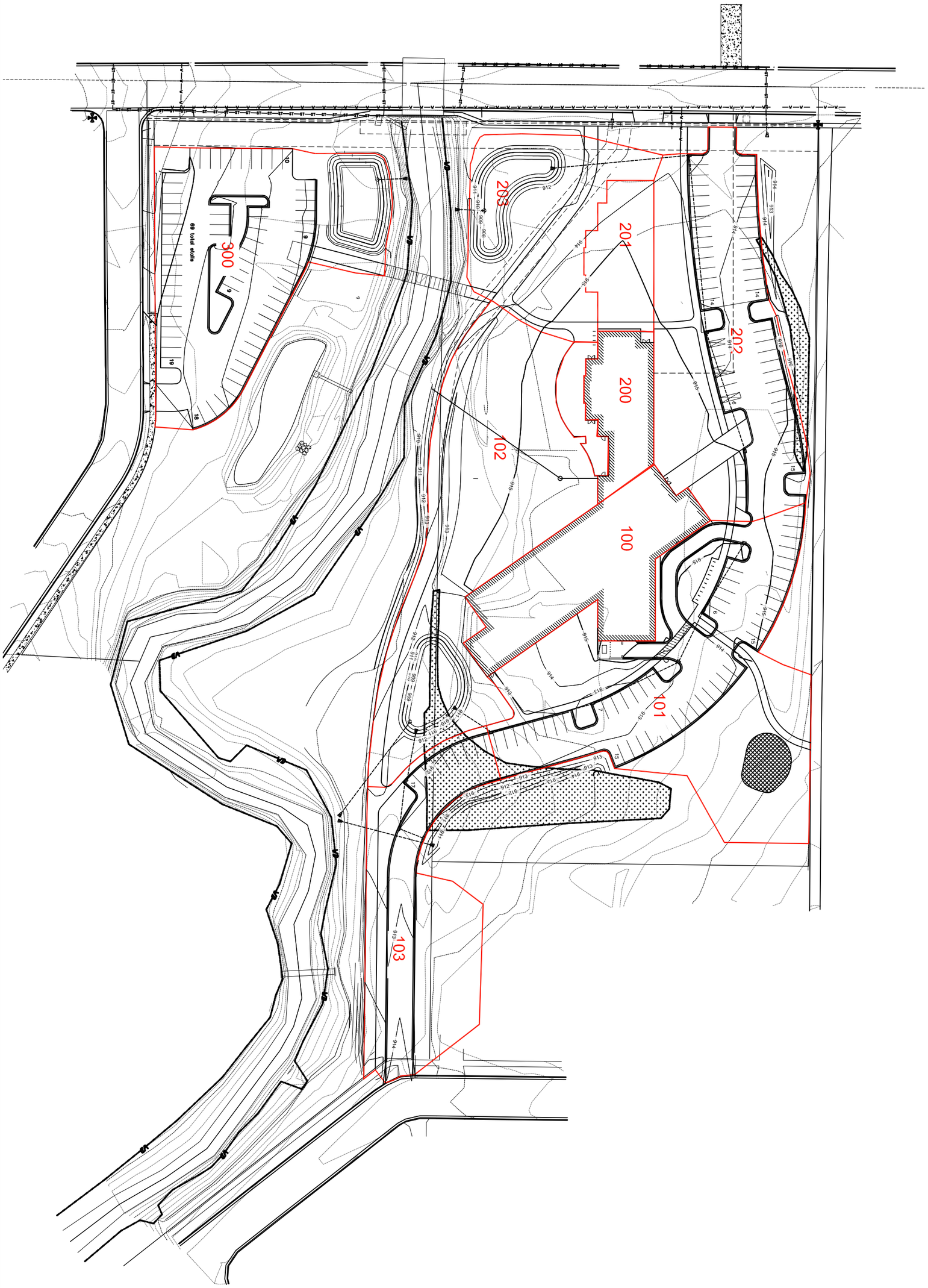
	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.65	Poor
With Controls	0.65	Poor



Runoff Volume | Part. Solids Yield (lbs) | Part. Solids Conc. (mg/L)

Data File: P:\PROJECTS\2016\116.0144kee Library Proposed Site.mdb
Rain File: WisReg - Madison WI 1981.RA
Date: 09-07-17 Time: 3:25:33 PM
Site Description: Waunakee Library

Col. #:	2	4	5	6	7	8	9	10	11	12	13
Control Practice No.	Control Practice Type	Total Inflow Volume (cf)	Total Outflow Volume (cf)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction	Flow Weighted Influent Conc (mg/L)	Flow Weighted Effluent Conc (mg/L)	Percent Conc. Reduction	Influe Medi Part. S (micro
1	Other Device	596.3	596.3	0	8.451	0	100.0	227.0	0	100.000	
2	Wet Detention Pond	110697	110980	-2.557E-01	948.2	189.8	79.98	137.2	27.39	80.034	
3	Wet Detention Pond	252460	253132	-2.662E-01	2319	846.1	63.51	147.2	53.54	63.615	
4	Wet Detention Pond	60950	61098	-2.428E-01	550.1	106.2	80.69	144.6	27.85	80.738	



116.0144.30

WAUNAKEE LIBRARY

WinSLAMM AREAS

CITY OF WAUNAKEE, DANE COUNTY, STATE OF WI

SNYDER & ASSOCIATES, INC.

5010 VOGES ROAD
MADISON, WISCONSIN 53718
608-838-0444 | www.snyder-associates.com

MARK	REVISION	DATE	BY

Engineer: ENG	Checked By: CHKD	Scale: 1" = 40'
Technician: TECH	Date: DATE	Field Bk: Pg:
Project_No:		C1.0

APPENDIX C

NUMMELIN TESTING SERVICES, INC.
3217 Whiting Avenue, P.O. 127, Stevens Point, WI 54481-0127
Office: (715) 341-7974 Fax: (715) 341-8654

CENTRAL WISCONSIN AREA:
3217 Whiting Avenue
P.O. Box 127
Stevens Point, WI 54481
(715) 341-7974 • Fax (715) 341-8654

MADISON AREA:
5620 Woodland Drive
Waunakee, WI 53597
(608) 849-9120 • Fax (608) 849-9122

July 27, 2017

Village of Waunakee Library
c/o Vine CM. LLC
105 4th Street
Waunakee, WI 53597

Project No. 7804101_rep

Attention: Mr. Geoff Vine
vinecmllc@gmail.com

Copy to: Scott Anderson
sanderson@snyder-associates.com

Re: Site Evaluation for Storm Water Infiltration
Soil Classification and Evaluation - Soil Borings
Waunakee Public Library
201 North Madison Street
Waunakee, WI

INTRODUCTION:

As requested, Nummelin Testing Services, Inc. has performed a subsurface soil investigation with soil borings to classify and evaluate the soil horizons in accordance with the USDA soil classification system. Soil samples were obtained from three (3) soil borings at the Waunakee Public Library site in Waunakee, WI.

The soil borings and soil observations were conducted to comply with the Wisconsin Department of Natural Resources Conservation Practice Standard for Site Evaluation for Storm Water Infiltration (1002), Section V. Criteria, Step B. Field Verification of the Initial Screening.

DISCUSSION:

On July 18, 2017, three (3) soil borings (SW10 through SW12) were performed at the approximate locations indicated on the attached soil boring location sketch. The soil borings were performed to a depth ranging from 6 feet to 10 feet each below the existing soil surface. The soils were continuously sampled using a 3" diameter split spoon sampler driven 24" using a 140 pound automatic hammer. Ground water was encountered in all three soil borings where saturation occurred. Mottling was also encountered in all three soil borings. Criteria used to determine Depth to Limiting Factor is bedrock, groundwater and mottling.

The enclosed Soil Evaluation Report form was written in accordance with descriptive procedures, terminology and interpretations found in the Field Book for Describing and Sampling Soil, USDA, NRCS, 1998.

Laboratory analyses were not performed on soil samples obtained from the soil borings.

Very strong petroleum odors were noted in SW 11 at 84 inches.

The benchmark used to determine boring elevations was the top nut of the fire hydrant located 15'N of the gate. An assigned elevation of 200.00 was used for the benchmark.

CLOSING:

Soil sample size and recovery when using the split spoon method can cause the recorded depths of soil horizons to vary from actual depth. Some variation can be expected.

If you have any questions please feel free to call our office at 715-341-7974.

Sincerely,

Bruce Nummelin, President
NUMMELIN TESTING SERVICES, INC.

Encl: Soil Evaluation - Storm
Soil Boring Location Sketch
Texture Class Code
Abandonment Forms

bn/mn

Wisconsin Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION -STORM

in accordance with Comm 82.365, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not be limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1)(m)).

County: Dane	
Parcel I.D.: 780.41	
Reviewed By:	Date: 7/28/2017
Property Owner: Village of Waunakee	Property Location: 201 N. Madison Street
Property Owner's Mailing Address: 105 4th Street	Govt Lot: 1/4 1/4 S T N R E (or) W; Lot #: Block #: Subdivision Name or CSM#: Library
City: Waunakee; State: WI; Zip Code: 53597; Phone Number:	☐ City ☑ Village ☐ Town: Waunakee; Nearest Road:

Drainage Area: _____ ☐ Sq Ft ☐ Acres
Optional

Test Site Suitable for (Check All That Apply)

☐ Irrigation ☐ Bioretention Trench ☐ Infiltration Trench
☐ Rain Garden ☐ Grassed Swale ☐ Reuse
☐ Trench(es) ☐ SDS (>15' Wide) ☐ Other _____

Hydraulic Application Test Method

☑ Morphological Evaluation
☐ Double-Ring Infiltrometer
☐ Other (Specify) _____

SW 10 Obs # ☑ Boring ☐ Pit

Ground Surface Elevation: 196.4 ft. Depth to Limiting Factor: 24 in.

Horizon	Depth (in)	Dominant Color (Munsell)	Redox Description (Qu. Sz. Cont. Color)	Texture	Structure (Gr.Sz.Sh.)	Consistency	Boundary	% Rock Frag.	Hydraulic App. Rate (in/hr)
1	0 - 6"	10YR 2/2		GRSIC	1msbk	mfr	CS	20	0.07
2	6 - 24"	10YR 2/1		SIC	2msbk	mfr	GS	4	0.07
3	24 - 44"	10YR 4/1	F1F 10YR 5/6	SCl	M		CS	0	0.07
4	44 - 72"	10YR 5/8, 6/4		LS	2mgr	mfr		4	1.63

SW 11 Obs # ☑ Boring ☐ Pit

Ground Surface Elevation: 195.9 ft. Depth to Limiting Factor: 48 in.

Horizon	Depth (in)	Dominant Color (Munsell)	Redox Description (Qu. Sz. Cont. Color)	Texture	Structure (Gr.Sz.Sh.)	Consistency	Boundary	% Rock Frag.	Hydraulic App. Rate (in/hr)
1	0 - 8"	10YR 2/1		SCL	1msbk	mfr	CS	10	0.11
2	8 - 12"	10YR 4/2		GRSCL	smsbk	mfr	CS	20	0.11
3	12 - 24"	10YR 3/2		SIC	M		CS	1	0.07
4	24 - 28"	10YR 2/1		SIC	2msbk	mfr	CS	0	0.07
5	28 - 48"	5YR 4/3		SIC	M		CS	0	0.07
6	48 - 84"	5GY 4/1	F1F 5Y 5/3	SIC	M		CS	0	0.07
7	84 - 120"	10YR 5/8, 5YR 4/3		GRLS	1mgr	mfr		20	1.63

CST Name: Bruce Nummelin	Signature:	CST Number: 241581
Address: P.O. Box 127 Stevens Point, WI 54481	Date Evaluation Conducted: 7/18/2017	Telephone Number: (715) 341-7974

SW 12 Obs # ☑ Boring ☐ Pit Ground Surface Elevation: 198.4 ft. Depth to Limiting Factor: 60 in.

Horizon	Depth (in)	Dominant Color (Munsell)	Redox Description (Qu. Sz. Cont. Color)	Texture	Structure (Gr.Sz.Sh.)	Consistency	Boundary	% Rock Frag.	Hydraulic App. Rate (in/hr)
1	0 - 8"	10YR 2/2		SIC	2msbk	mfr	GS	2	0.07
2	8 - 60"	10YR 4/4, 3/1		SIC	M		CS	8	0.07
3	60 - 64"	10YR 2/1	F1D 5YR 4/6	SICL	1msbk	mfr	CS	1	0.04
4	64 - 84"	10YR 6/3	C2D 7.5YR 5/6	SIC	M		GS	1	0.07
5	84 - 120"	10YR 5/4		SL	M			10	0.50

Obs # ☐ Boring ☐ Pit Ground Surface Elevation: _____ ft. Depth to Limiting Factor: _____ in.

Horizon	Depth (in)	Dominant Color (Munsell)	Redox Description (Qu. Sz. Cont. Color)	Texture	Structure (Gr.Sz.Sh.)	Consistency	Boundary	% Rock Frag.	Hydraulic App. Rate (in/hr)

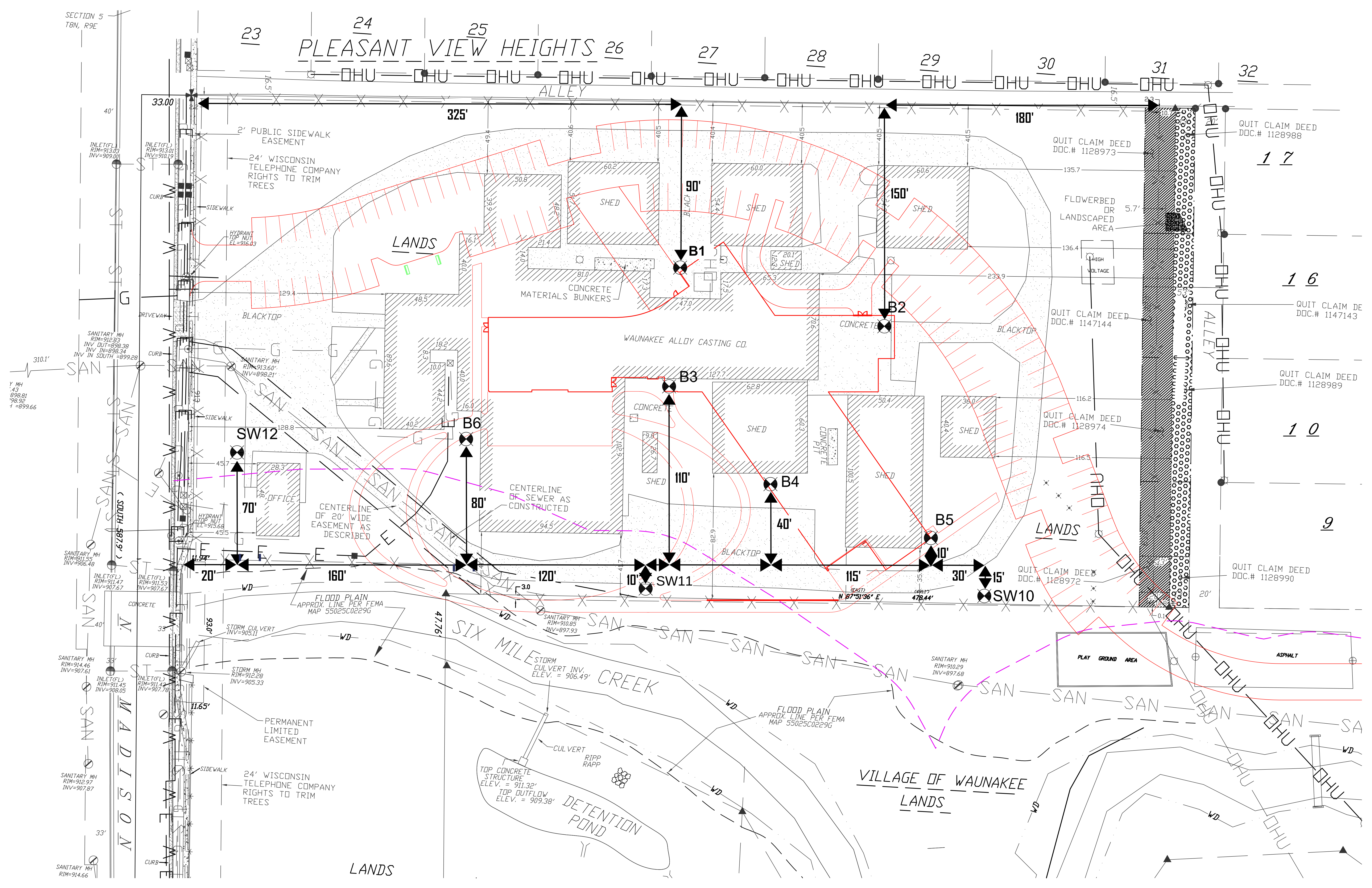
Test Results and/or Summary Comments

SW 10: Mottling was noted at 24 Inches, saturation occurred at 44 inches boring terminated at 72 inches due to saturation.

SW 11: Old fill noted to 24 inches, saturation occurred at 84 inches, very strong petroleum odor at 84 inches.

SW 12: Old fill noted to 60 inches, saturation occurred at 86 inches.

CST Name:	Signature:	CST Number:
Bruce Nummelin	Bruce Nummelin	241581
Address:	Date Evaluation Conducted:	Telephone Number:
P.O. Box 127 Stevens Point, WI 54481	7/18/2017	(715) 341-7974



SECTION 5
T8N, R9E
PLEASANT VIEW HEIGHTS
ALLEY
325'
180'
2' PUBLIC SIDEWALK EASEMENT
24' WISCONSIN TELEPHONE COMPANY RIGHTS TO TRIM TREES
90'
150'
B1
B2
B3
B4
B5
B6
SW10
SW11
SW12
SHED
CONCRETE MATERIALS BUNKERS
WAUNAKEE ALLOY CASTING CO.
CONCRETE
BLACKTOP
LANDS
QUIT CLAIM DEED DOC.# 1128973
QUIT CLAIM DEED DOC.# 1128988
QUIT CLAIM DEED DOC.# 1147144
QUIT CLAIM DEED DOC.# 1128989
QUIT CLAIM DEED DOC.# 1128974
QUIT CLAIM DEED DOC.# 1128972
QUIT CLAIM DEED DOC.# 1128990
FLOWERBED OR LANDSCAPED AREA
HIGH VOLTAGE
OFFICE
CENTERLINE OF SEWER AS CONSTRUCTED
CENTERLINE OF 20' WIDE EASEMENT AS DESCRIBED
70'
80'
110'
40'
20'
160'
120'
10'
115'
30'
15'
FLOOD PLAIN APPROX. LINE PER FEMA MAP 55025C0229G
SIX MILE CREEK
STORM CULVERT INV. ELEV. = 906.49'
PERMANENT LIMITED EASEMENT
CULVERT
RIPP RAPP
TOP CONCRETE STRUCTURE ELEV. = 911.32'
TOP OUTFLOW ELEV. = 909.38'
DETENTION POND
VILLAGE OF WAUNAKEE LANDS
PLAY GROUND AREA
ASPHALT
N. MADISON ST.
SOUTH 587.9'
24' WISCONSIN TELEPHONE COMPANY RIGHTS TO TRIM TREES

NOTE: **Soil Texture** encompasses only the fine earth fraction (<2mm). **Particle Size Distribution** (PSD) encompasses the whole soil, including both the fine earth fraction (<2mm) and rock fragments (>2mm).

TEXTURE CLASS -

Texture Class	Code	
	Conv.	NASIS
Coarse Sand	cos	COS
Sand	s	S
Fine Sand	fs	FS
Very Fine Sand	vfs	VFS
Loamy Coarse Sand	lcos	LCOS
Loamy Sand	ls	LS
Loamy Fine Sand	lfs	LFS
Loamy Very Fine Sand	lvfs	LVFS
Coarse Sandy Loam	cosl	COSL
Sandy Loam	sl	SL
Fine Sandy Loam	fsl	FSL
Very Fine Sandy Loam	vfsl	VFSL
Loam	l	L
Silt Loam	sil	SIL
Silt	si	SI
Sandy Clay Loam	scl	SCL
Clay Loam	cl	CL
Silty Clay Loam	sicl	SICL
Sandy Clay	sc	SC
Silty Clay	sic	SIC
Clay	c	C

Table 2: Design Infiltration Rates For Soil Textures Receiving Stormwater

Soil Texture [1]	Design Infiltration Rate Without Measurement inches / hour[2]
Coarse sand or coarser	3.60
Loamy coarse sand	3.60
Sand	3.60
Loamy Sand	1.63
Sandy loam	0.50
Loam	0.24
Silt Loam	0.13
Sandy clay loam	0.11
Clay loam	0.03
Silty clay loam	0.04 [3]
Sandy clay	0.04
Silty clay	0.07
Clay	0.07

[1] Use sandy loam design infiltration rates for fine sand, loamy fine sand, very fine sand, and loamy fine sand soil textures.

[2] Infiltration rates represent the lowest value for each textural class presented in Table 2 of Rawls, 1998.

[3] Infiltration rate is an average based on Rawls, 1982 and Clapp & Hornberger, 1978.

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295 and 299, Wis Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions for more information.

Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
SW 10		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township N	Range ☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/18/2017
If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	4

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Clay Sand Slurry (11lb/gal wt.)
☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
☐ Concrete ☑ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	6		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/18/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

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Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
SW 11		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N | Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/18/2017

If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	6

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Clay Sand Slurry (11lb/gal wt.)
☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
☐ Concrete ☑ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	10		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/18/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
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Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
SW 12		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township N	Range ☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/18/2017
If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	8

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
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☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
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For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	10		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/18/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

NUMMELIN TESTING SERVICES, INC.

An Equal Opportunity Employer

CENTRAL WISCONSIN AREA:
3217 Whiting Avenue
P.O. Box 127
Stevens Point, WI 54481
(715) 341-7974 • Fax (715) 341-8654

MADISON AREA:
5620 Woodland Drive
Waunakee, WI 53597
(608) 849-9120 • Fax (608) 849-9122

July 27, 2017

Vine CM, LLC
105 4th St
Waunakee, WI 53597

NTS Project No. 78041_STR

Attention: **Mr. Geoffrey Vine**
vinecmllc@gmail.com

Copy to: Scott Anderson
sanderson@snyder-associates.com

Subject: **Subsurface Soil Investigation Report**
New Waunakee Public Library
201 North Madison Street
Waunakee, WI

As requested, Nummelin Testing Services, Inc. has conducted a Geotechnical Engineering Subsurface Investigation and Report for the above named project. We enclose our report, "Subsurface Soil Investigation, New Waunakee Public Library, 201 North Madison Street, Waunakee, WI – NTS 780.41," which discusses our conclusions and recommendations.

If additional information or clarification is needed, or if we may be of further service during the construction phase of the project, please do not hesitate to contact our office.

The soil samples will be discarded after October 1, 2017, unless other instructions are received prior to that date.

Respectfully,

Benjamin K. Nummelin, P.E.
NUMMELIN TESTING SERVICES, INC.

bkn/bn

encl. report & boring logs
abandonment forms
location map

NUMMELIN TESTING SERVICES, INC.

An Equal Opportunity Employer

CENTRAL WISCONSIN AREA:
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P.O. Box 127
Stevens Point, WI 54481
(715) 341-7974 • Fax (715) 341-8654

MADISON AREA:
5620 Woodland Drive
Waunakee, WI 53597
(608) 849-9120 • Fax (608) 849-9122

SUBSURFACE SOIL INVESTIGATION

NEW WAUNAKEE PUBLIC LIBRARY
201 NORTH MADISON STREET
WAUNAKEE
WISCONSIN

NTS 780.41

PREPARED FOR:

VINE CM, LLC
105 4TH STREET
WAUNAKEE, WI 53597

ATTENTION: MR. GEOFFREY VINE

FIELD INVESTIGATION BY:

NUMMELIN TESTING SERVICES, INC.
STEVENS POINT / WAUNAKEE, WI

JULY 27, 2017

SUBSURFACE SOIL INVESTIGATION

NEW WAUNAKEE PUBLIC LIBRARY
201 NORTH MADISON STREET
WAUNAKEE
WISCONSIN

1. INTRODUCTION

Nummelin Testing Services, Inc. (NTS) performed this investigation to provide design information for the new library building to be built at 201 North Madison Street in the Village of Waunakee, Dane County, Wisconsin. The results and recommendations reported are based upon information obtained during a field investigation with borings and the geotechnical analysis of that information.

The conclusions and recommendations reported are based on our interpretation of available subsurface and project information. The report may not represent variations that occur between or away from boring locations.

Should the scope of this project be altered, or if subsurface variations become evident during construction, it may be necessary to modify our recommendations. See the attached Geotechnical Engineering Report Information sheet for general information on NTS's geotechnical reports.

2. PROJECT DESCRIPTION

The proposed project is the construction of a new public library. The library building is expected to be a one to two-story structure with slab-on-grade (no basement) supported by spread footings. The maximum column load is expected to be 275 kips. New parking lots, driveways, and storm water infiltration areas are also expected to be constructed. Demolition of the existing structures and some site grading is expected to be required to establish final grades for the new building.

At the time of the investigation, the site for the new building had multiple existing structures, including existing asphaltic concrete and Portland cement concrete parking and driveway areas. Debris occurred at the surface of the site in many areas.

3. FIELD INVESTIGATION

Six standard penetration borings (Borings 1 through 6) and three infiltration borings (Borings SW10 through SW12) were performed July 17, 2017, at the locations shown on the attached map. Vine CM, LLC determined the proposed boring locations and depths. NTS located the borings in the field. Some borings were moved a short distance from the proposed locations because debris blocked access to the proposed locations. Boring SW10 was moved north to the north side of the fence because access to the south side of the fence was blocked. Borings 1 through 6 were ended at the scheduled depth of 25 feet.

Borings SW10 through SW12 were scheduled to be drilled to a depth of 15 feet but were ended at depths of 6 to 10 feet after the depth-to-limiting factor had been determined.

Standard penetration sampling was performed in Borings 1 through 6 according to ASTM Test Procedure D1586 at the depths indicated on the boring logs. Drilling between samples in Borings 1 through 6 was by the hollow-stem-auger technique. Sampling in Borings SW10 through SW12 was continuous with a 3-inch-diameter spoon for infiltration purposes with no drilling between samples. The soil samples of Borings 1 through 6 have been examined in the lab by this writer to verify soil descriptions and classify the soils according to the USCS. Soils recovered from Borings SW10 through SW12 were examined by a soil scientist to classify the soils according to the USDA system. Soil classifications and parameters reported are based on field testing and soil descriptions. No lab tests were performed.

Ground elevations at boring locations were determined by NTS. The top nut of the fire hydrant on Madison Street, just north of the western access gate to the site, was used as a benchmark. An elevation of 200.0 was chosen for this benchmark.

After completion of the borings, the bore holes were backfilled with bentonite chips to comply with WDNR requirements, then topped-off with auger cuttings. Where borings were performed through pavement, the pavement was patched with cold-mix asphaltic concrete patch.

Copies of the soil boring logs and a location map are appended to this report.

4. SUBSURFACE CONDITIONS

4. 1. Area Geology

The subsoils in this area are mapped as ground moraine deposits, which typically consist of an unstratified mixture of clay, silt, sand, gravel, cobbles, and boulders (glacial till). The underlying bedrock is mapped as sandstone with some dolomite and shale that is present at widely varying depths below the average surface terrain, but generally at depths of greater than 100 feet along the Yahara River and related waterways and at depths of less than 50 feet elsewhere. The NRCS web soil survey maps the near surface soils at this site primarily as Plano silt loam and alluvial land, wet.

Note that mapped soil and bedrock conditions are provided for supplemental information only. Designing based only on mapped or assumed conditions is not recommended.

4. 2. Soils at the Boring Locations

A summary of soil conditions encountered in the borings is shown in Table 4.2.

At the surface, Borings 1 and 2 encountered 3.5 and 2.0 inches of asphaltic concrete pavement over 9.5 and 10 inches of sand and gravel base course. No pavement or topsoil was encountered at other boring locations. In general, the borings encountered loose sand and stiff clay from the surface to depths of 2.5 to 8 feet, most of which was fill or possible fill. Below the fill, the borings encountered loose silty sand with gravel and cobbles to the end-of-boring depth of 25 feet. The standard penetration test indicates some sands at the site are very loose. It is expected that the on-site sands are loose, but not very loose as the test indicates.

Table 4.2. Summary of soil conditions encountered in the borings.

Boring	***Surface Elevation***	***Water Depth***	***Asphalt / Base Course Thicknesses***	***Clay / Sand (Fill / Poss Fill)***	***Loose Sand / Gravel (Native)***
1	200.9	4’	3.5” / 9.5”	1.1’- 6’	6’- 25’
2	200.4	3’	2.0” / 10.0”	-	1’- 25’
3	200.1	7’	-	0’- 6’	6’- 25’
4	198.5	4’	-	0’- 3.5’	3.5’- 25’
5	197.6	2.5’	-	0’- 2.5’	2.5’- 25’
6	200.0	8’	-	0’- 8’	8’- 25’

Refer to the Storm Water Infiltration Report for soils information in Borings SW10 through SW12.

See the boring logs for more detailed soil descriptions.

4. 3. Water Level Measurements

The regional groundwater table was encountered in Borings 1 through 6 at depths of 2.5 to 8 feet. These moisture conditions should be considered as representative of the site at the time of boring only. Expect seasonal fluctuations in the water table of up to several feet.

5. DISCUSSION AND RECOMMENDATIONS

5. 1. Site Grading

The foundations of demolished structures should be completely removed, and the resulting voids filled with compacted fill. Any remnants of demolished structures should be removed from the site. Existing utilities which will no longer be used should be removed or properly abandoned. Strip the pavement and any topsoil/vegetation from the proposed structure footprint prior to further site grading.

Although the native sands would adequately support lighter structures such as single-family homes, some site improvements may be necessary to improve the soil bearing capacity for the proposed structure. The soil bearing capacity may be improved by replacing some of the very loose sands with compacted fill or preloading the site.

Fill was encountered to depths of 2.5 to 8 feet in most borings. Although this fill appeared suitable for support of light structures, uncontrolled fill often contains pockets of very loose, soft, or deleterious materials that will not adequately support structures. If documentation can be found that verifies the existing fill does not contain deleterious materials and that the fill was adequately compacted as it was placed, then the existing fill may be considered for structure support. Note that the very loose native soils may still control foundation design and site preparation methods even if the existing fill was inspected and compacted as it was placed. If no such documentation can be found, the existing fill should be considered as uncontrolled fill. It is recommended that uncontrolled fill be removed and replaced from below structures with compacted fill. If structures are built over uncontrolled fill, significant and uneven settlement may result.

Most on-site soils were likely too wet to be properly compacted. If the soils were dried to a moisture content appropriate for compaction, the soils should be suitable for reuse as structural fill. Be aware that obtaining adequate compaction of the on-site soils will be moisture-dependent and may be difficult to achieve if outside the optimum range of moisture content.

The surface soils encountered are likely to become soft if exposed to construction traffic when wet. Consider placing a layer of crushed rock or breaker run in driveways and staging areas to help prevent subgrade disturbance and to avoid construction delays because of muddy, impassible terrain.

5. 2. Foundations

A shallow foundation can be considered for structure support, though some site preparation may be required to reduce settlement. Pressure meter testing could be performed to more accurately determine soil bearing capacity for shallow foundations. An intermediate or deep foundation could also be considered instead of a shallow foundation. Additional investigation may be necessary to obtain information for an intermediate foundation, and additional investigation would be necessary for a deep foundation.

All strip footings should have a minimum width of 18 inches, and all square footings should have a minimum width of 30 inches. Any structures sensitive to frost movement should have foundations bearing below the frost line. According to the Wisconsin Administrative Code, this site is in Zone 'B', where the maximum frost protection depth in the soil type is approximately 4.5 feet. However, experience suggests that a bearing depth of 4 feet or more below the ground surface is typically sufficient to protect typical foundations for structures such as heated buildings.

It is recommended that any uncontrolled fill found at the base of foundation excavations be removed according to Section 5.4 of this report and replaced with compacted fill according to Section 5.5. If foundations are constructed over uncontrolled fill, be aware that significant settlement may occur if any pockets of very loose, soft, or deleterious materials occur in the fill.

Settlements of the proposed foundations have been estimated using the Hough Method. At the maximum column load of 275 kips, soils below the foundations are expected to compress. An allowable soil bearing capacity of 1,000 pounds per square foot (psf) is recommended for foundations bearing on the very loose sands to limit foundation settlement to one inch. Should a higher soil bearing capacity be needed, the soil bearing capacity may be increased by replacing some of the very loose soils with compacted fill or by preloading the site.

5. 2. 1. Pressure Meter Testing

Pressure meter testing is a more accurate way to determine soil bearing capacity and estimate settlement, and often results in an increased recommended soil bearing capacity. Though pressure meter testing is more expensive that the standard penetration test, it is our understanding that pressure meter testing typically provides a cost benefit for buildings with around three stories or more. Additional soil borings would be required to facilitate pressure meter testing.

5. 2. 2. Option to Undercut and Replace Very Loose Soils

To increase soil bearing capacity, some of the soils below the proposed foundations may be undercut from the zone of influence and replaced with compacted fill. Undercutting of soils below the foundations should be performed according to Section 5.4 of this report. Placement and compaction of fill in the undercut should be performed according to Section 5.5 of this report. An allowable soil bearing capacity of 2,000 psf may be used for design of foundations bearing on a layer of compacted fill that has a thickness of at least one-half the width of the footing to limit foundation settlement to one inch. An allowable soil bearing capacity of 3,000 psf may be used for design of foundations bearing on a layer of compacted fill that has a thickness of at least one footing's width to limit foundation settlement to one inch.

Undercutting below the foundations is likely to require dewatering to facilitate the undercut and backfilling operation.

5. 2. 3. Option to Preload the Very Loose Soils

As an alternative to undercutting, the soil bearing capacity may be increased by preloading the very loose soils. Preloading is often performed at sites where soft or very loose soils occur. During preloading, a pile of soil weighing substantially more than the proposed loads is placed as a surcharge in the area of the proposed loads to cause the very loose soils to compress at an accelerated rate. After the soils have been compressed, the surcharge is removed, and conventional construction typically follows. To determine when the surcharge may be removed and the amount of settlement as a result of the surcharge, settlement plates are used to monitor settlement. The settlement plates are placed after the site has been brought to final grade, but prior to the placement of the surcharge. The plates are monitored during and after surcharge placement to measure settlement.

The surcharge will likely need to remain at the site for weeks or months. The settlement plates would need to be monitored to determine a more accurate timeline. The recommended soil bearing capacity to limit foundation settlement to one inch will depend on the height of the surcharge, but a soil bearing capacity of around 2,000 to 3,000 psf should be achievable for a surcharge pile that was 15 to 20 feet high. The full height of the surcharge pile should occur over all proposed building areas. Consider retaining NTS to review preloading plans prior to surcharging and to review settlement plate data.

As soils compress below the weight of the surcharge, nearby structures and buried structures may be affected. Several inches of settlement of the surcharge pile are likely, and any buried utilities below the pile will move downward by the settlement amount. Structures within about 20 feet of the edges of the surcharge pile may also be affected. Structures nearest the pile will experience the most settlement, while structures farther away will experience less.

5. 2. 4. Intermediate Foundations

Rather than undercutting very loose soils or preloading the site, a Geopier foundation could be considered. Geopiers typically consist of very dense columns of aggregates that are capable of supporting relatively high loads and should be capable of supporting the proposed column loads for this building. In addition to providing a very high bearing capacity at the pier locations, Geopier installation often improves the soil bearing capacity of the surrounding soils. Contact Steve Weyda (262-628-1663) of Geopier for further information on Geopiers.

5. 2. 5. Deep Foundations

A deep foundation, such as a drilled shaft or driven pile foundation, could also be considered to transfer building loads to deeper, more competent soils or bedrock. Additional soil borings to deeper depths would be required to obtain sufficient information for a deep foundation design.

Regardless of site preparations, the base of all footing excavations should be inspected by NTS at the time of construction to verify that adequate soil bearing capacity is present. NTS will provide alternate

recommendations, including undercutting or compacting existing soils, if adequate bearing capacity is not present.

Foundations bearing on the native soils or on a layer of compacted fill placed directly on the native soils should be designed using an allowable soil bearing capacity of 2,500 pounds per square foot (psf). At this bearing pressure, total and differential settlements of the proposed foundations are expected to be limited to one-inch and one-half inch, respectively.

5. 3. Building Floors

The recommendations in this section apply to building floors and not to mat slabs or other foundation-type slabs.

A basement has not been proposed for this structure. Because of the shallow ground water table, a basement is not recommended at this site. Contact this writer for additional recommendations if a basement is to be constructed.

The native soils, though very loose, are expected to provide adequate support for lightly loaded structures such as the building floor. However, proof-rolling of the soils in the floor area is recommended to verify support prior to floor placement. Proof-rolling will increase the density of near surface soils and help to identify weak areas which are not suitable for floor support. Consider retaining NTS to observe the proof-rolling and help to identify weak areas. An acceptable proof-roller for granular soil would be a smooth-drum vibratory roller weighing at least 20,000 pounds. An acceptable proof-roller for clay soils would be a fully-loaded, tandem-axle dump truck. The proof-rolling should be performed after the floor area has been stripped but prior to the addition of grade-raising fill. At least four passes of the proof-roller should be performed over all areas. Any weak soils found should be either compacted or replaced with compacted fill.

A modulus of subgrade reaction of 150 pounds per cubic inch (pci) may be used for floor slab design over native soils which have been approved by proof-rolling or compacted fill which has been approved by proof-rolling. This modulus should not be used for the design of slabs supporting heavy loads, such as for a mat slab.

A layer of dense-graded base course, at least 8 inches in thickness, is recommended just below floors and slabs. The base course will provide some stability for the floors/slabs and help to prevent subgrade soils from rutting below construction traffic. The base course should meet the requirements of Section 305 of the Wisconsin DOT Standard Specifications for Highway and Structure Construction, and the base course should be compacted according to Section 5.5 of this report. The base grade should be unyielding below loaded dump-truck and ready-mix truck traffic.

Where moisture-sensitive floor coverings are to be used, a capillary break and waterproof membrane should be installed beneath the floor. At least 6 inches of clean sand (sand with less than 5 percent

passing the number 200 sieve) or equivalent should be used just below the floor or just below the base course beneath the floor as a capillary break. The capillary break layer should include drainage, such that water cannot remain in the capillary break layer. Drain tile spaced at intervals of no more than 15 feet and routed to a suitable outlet would serve as adequate drainage for the capillary break layer. The waterproof membrane should be placed just below the capillary break layer and should be a robust material capable of surviving installation without puncture or tear, such as the W. R. Meadows 'Perminator' or an equivalent vapor barrier. Where glued flooring is used, it is important to allow any recently poured slabs to cure and dry prior to glue placement.

5. 4. Excavation

All excavations should comply with OSHA standards. This includes reduction of excavation side slopes to 1.5 horizontal to 1 vertical or less. Where steeper slopes are necessary or more convenient, full excavation bracing should be used (not spaced braces). Design and implementation of temporary shoring is generally the responsibility of the excavating contractor.

Most common excavators (backhoes) are expected to be able to excavate to the terminal boring depths. Cobbles were found in all borings, and although no boulders were found, boulders typically occur in the soil type at this site. Cobbles and boulders may make excavation difficult. Any cobbles or boulders disturbed should be removed and the surrounding soil compacted.

Expect to encounter groundwater in excavations near or below a depth of 2.5 feet. Prior to excavating below the water table, dewatering is recommended. Dewatering should be performed using a system that draws down the water table from outside the structure excavation. If dewatering is performed from within the structure excavation such as with sump pumps, soils are likely to loosen as water flows upward to pumps. This loosening may not be obvious during construction and should be avoided because it can result in significant building settlement after construction. Where the base of the excavation or undercut is within roughly 6 inches of the water table elevation, a layer of crushed rock or breaker run may be placed and compacted into the soil at the base of the excavation to help to provide a stable working platform rather than dewatering the excavation.

Undercutting may be required to remove existing fill or unsuitable soils. When undercutting below structures, the sixty-degree approximation may be used to determine the resulting pressure at the base of the undercut. The recommended width of undercut is twice the undercut depth plus the width of the load-bearing area, measured at the bottom of cut. If the load-bearing area is accurately marked and centered in the base of the undercut, then the minimum width of the undercut is the depth of undercut plus the width of load-bearing area, measured at the base of the undercut. A good practice is to add at least one foot to this width. Replace all undercut soils with properly compacted fill (see section 5.5. "Compaction and Fill Requirements").

Excavations should be performed with a flat plate attached to the bucket teeth of the backhoe to minimize the disturbance at the base of the excavation. Where a toothed bucket is used, the last six

inches (roughly) should be excavated by turning the bucket so that the teeth are parallel to the proposed grade, thus minimizing the disturbance of footing-grade soils. Any soil loosened during excavation should be compacted.

5. 4. 1. Existing Structures

Use caution when excavating near existing structures. If possible, do the work when existing tanks are empty. Do not excavate soil under a line drawn out (away from existing structure) and down from the top of a footing at a 45-degree angle, unless proper precautions are taken. If excavations will extend below the elevation of the existing footings, the existing soil under the structure may have to be shored. This may be done using sheet piling, properly braced or tied back. Allow for imposed lateral loads from nearby footings in designing the system. Be aware that vibrations during driving of sheet piles may cause loose soils below the existing structure to settle. Monitor the existing structure for possible movement during the construction process. It may be possible to avoid the use of shoring if only small sections are excavated and then backfilled before further excavation.

5. 5. Compaction and Fill Requirements

Base course used below floor slabs and pavement should meet the requirements for dense-graded base course of Section 305 of the Wisconsin DOT Standard Specifications.

Most soils below the topsoil at the site were likely too wet to be properly compacted. If dried, the on-site sands should be suitable for reuse as structural fill. Structural fill is any fill that must support the load of a structure. Some cobbles were found in the borings. Particles larger than 6 inches should be removed from on-site soils prior to reuse as structural fill.

Where imported fill is required as structural fill, NTS recommends granular soil that is free of deleterious materials and at a moisture content appropriate for compaction. Free-draining sand, such as sand conforming to ASTM C33, is recommended as backfill against earth-retaining walls to prevent hydrostatic pressure from building up against the walls. A suitable outlet for water should be provided at the bottom of the sand layer against any retaining walls.

At the time of construction, NTS should verify that the proposed fill soils are acceptable. NTS will verify that the moisture content is appropriate for proper compaction and that the fill contains no deleterious materials. Frozen soil should not be used as structural fill.

Any required fill should be placed in lifts not exceeding 1 foot (uncompacted).

Compact all structural fill to at least 95 percent of the maximum density (modified Proctor - ASTM D1557). A somewhat lower compaction level may be acceptable for some soils, but this should be verified by an on-site inspection by NTS. Consider retaining NTS to verify the compaction level of all fill.

5. 6. Corrosion Potential

Any construction materials that will be placed in contact with organic soils should be protected against corrosion.

5. 7. Pavement Design

A prime requirement for successful pavement is preparation of the subgrade soil. Prior to pavement placement, the base grade should be proof-rolled. At least 4 passes of the proof-roller should be used over all areas proposed to be paved. An acceptable proof-roller for granular soil (sand and/or gravel) would be a smooth-drum vibratory roller. An acceptable proof-roller for clay soils and base course would be a fully-loaded, tandem-axle dump truck. The subgrade may yield slightly to the proof-roller, but prior to pavement placement, the base grade should be unyielding to fully-loaded, tandem-axle, dump trucks. This requirement also applies after the completion of any undercut. It may be necessary to stabilize the subgrade with crushed rock or breaker run rock to provide stability for pavement, depending on proof-rolling results. Any rock used to stabilize a soft subgrade should not be considered as part of the base course thickness.

The recommendations in this section also pertain to sidewalks where truck traffic may occur, such as plow trucks or delivery trucks.

Assuming a stable subgrade has been provided and verified by proof-rolling, pavement design is typically controlled by the near surface soils within the frost zone. Soil encountered in the frost zone was silty sand and lean clay. These soils are a poor soil type for pavement support because of high frost susceptibility. The recommended soil parameters for pavement design over the on-site soils are shown in Table 5.7, including Frost Group Designation (FGD), Design Group Index (DGI), Soil Support Value (SSV), California Bearing Ratio (CBR), and modulus of subgrade reaction (k).

Table 5.7. Estimated soil parameters for pavement design.

Subgrade	***FGD***	***DGI***	***SSV***	***CBR***	***k (pci)***
On-Site Soils	F-4	16	3.6	3	100

If flexible (asphaltic concrete) pavement is used, the following asphaltic concrete and crushed aggregate base course thicknesses from the “Wisconsin Asphalt Pavement Association Design Guide” are suggested. The thicknesses are based on the expected design daily ESALs (18,000 pound Equivalent Single Axle Loads) for pavement over a ‘poor’ subgrade (most on-site soils in the frost zone). Subgrades with CBRs of 2 to 5 are classified as ‘poor’ according to the Wisconsin Asphalt Pavement Association Design Guide. We recommend that the pavement construction meet the requirements of the Wisconsin

DOT Standard Specifications for Road and Bridge Construction. Dense-graded base course meeting the requirements of Section 305 of the Wisconsin DOT Standard Specifications should be used below pavement.

In general, traffic pavements experiencing loads around 1 design daily ESAL include car parking lots of 50 stalls or less, residential driveways, and similar traffic loads. Traffic pavements experiencing loads in the 2 to 5 design daily ESALs include car parking lots of more than 50 stalls, residential streets, and similar traffic loads. Traffic pavements experiencing loads in the 6 to 50 design daily ESALs include collector streets, bus driveways, loading zones, truck stalls, and similar traffic loads.

5. 7. 1. Flexible Pavement, 1 Design Daily ESALs

Use a minimum of 8 inches of crushed aggregate base course with a minimum of 3 inches of asphaltic concrete.

5. 7. 2. Flexible Pavement, 2 to 5 Design Daily ESALs

Use a minimum of 9 inches of crushed aggregate base course with a minimum of 4 inches of asphaltic concrete.

5. 7. 3. Flexible Pavement, 6 to 50 Design Daily ESALs

Use a minimum of 10 inches of crushed aggregate base course with a minimum of 6 inches of asphaltic concrete.

If the expected daily traffic loads are greater, plan to increase these thicknesses.

Rigid (Portland cement concrete) pavement may also be used and is recommended in areas where the pavement experiences high static shear stress, such as around trash dumpsters, at loading docks, and other areas where trucks make turns. A slab thickness of at least 8 inches is recommended in areas of high static shear stress. A slab thickness of at least 6 inches is recommended for other parking areas, unless a thinner slab has been shown to perform adequately in this area. A minimum of 8 inches of base course meeting the requirements for dense-graded base course of Section 305 of the Wisconsin Standard Specifications is recommended below all concrete pavement slabs.

5. 8. Site Classification for Seismic Design

All borings encountered over 10 feet of loose, saturated silty sand, which is a potentially liquefiable soil type during a seismic event. Because of these liquefiable soils, the seismic site class is ‘F’ according to the 2009 International Building Code (IBC).

5. 9. Soil Parameters

Table 5.9 shows the estimated soil parameters for the soils at the site based on field testing, including dry, moist, and submerged unit weights, internal friction angle, and cohesion. Soil parameters for compacted sand in Table 5.9 may also be used for imported sand fill when compacted.

Table 5.9. Estimated Soil Parameters for the Soils Encountered.

Soil Type	Estimated Unit Weights (pcf) Dry / Moist / Sbmg	Friction Angle (Deg)	Cohesion (psf)
Sand, Very Loose (On-Site)	100 / 115 / 60	28	0
Sand, Compacted (On-Site & Imported)	120 / 130 / 75	32	0
Clay, Stiff (On-Site)	115 / 130 / 70	20	> 500

Respectfully,

Benjamin K. Nummelin, P.E.
Nummelin Testing Services, Inc.
bkn/jn

NUMMELIN TESTING SERVICES, INC

GEOTECHNICAL ENGINEERING REPORT INFORMATION SHEET

Subsurface soil conditions are responsible for many of the construction problems encountered at building sites. In order to help you, our client, manage your risks, we offer you the following information and suggestions.

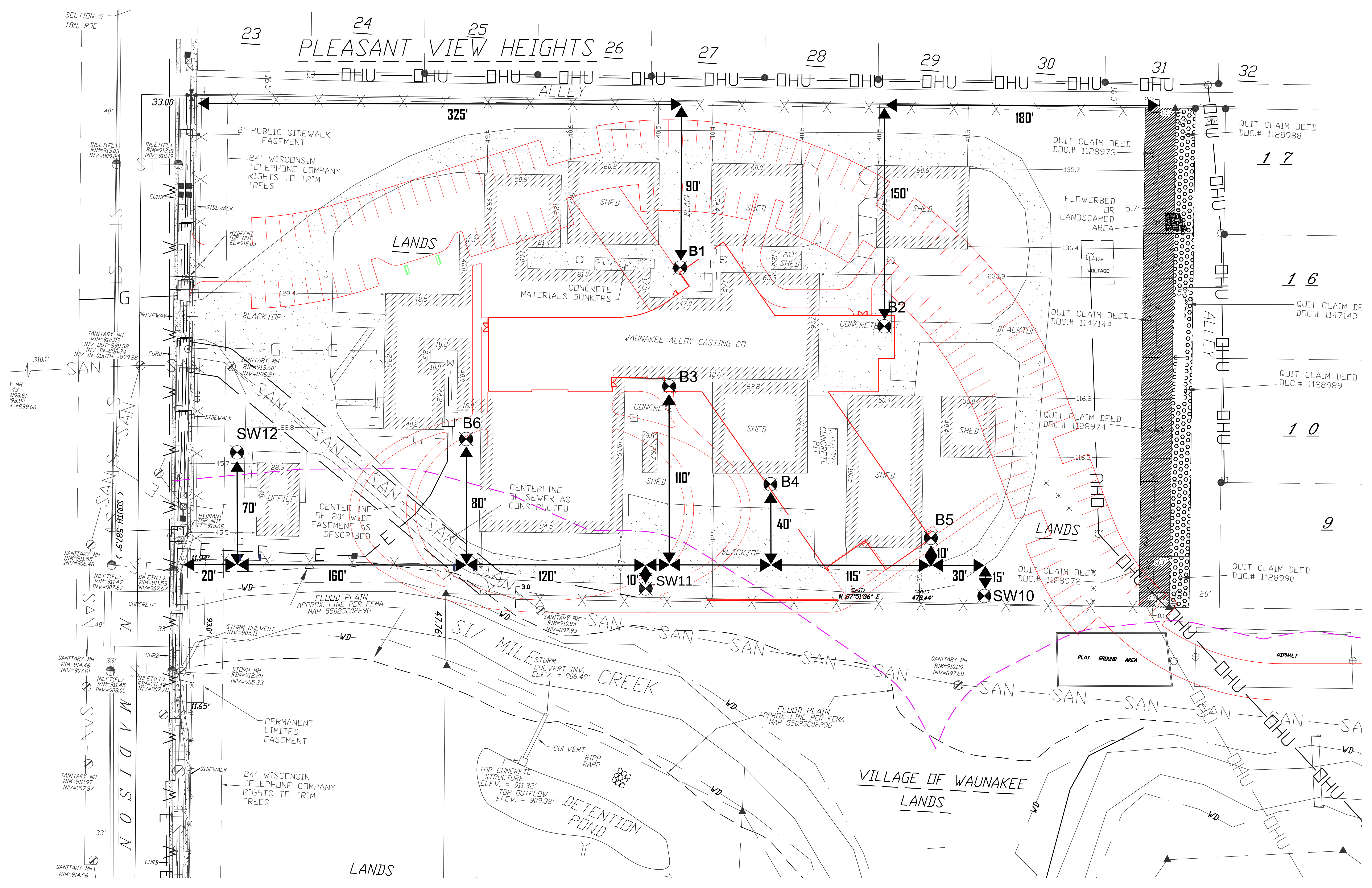
Geotechnical engineering reports are based on observations of specific soil conditions existing at the time of the subsurface soil investigation. As these conditions may change over time, construction decisions should be made with the timeliness of the report in mind. Further testing may be advisable if subsurface soil conditions are affected by natural events (flooding, spring thaws, etc.) and construction (drilling, blasting, surcharges, etc.) on-site or adjacent to it. Talking to your geotechnical professional before construction begins will help keep one informed if further tests are recommended.

The recommendations included in your geotechnical engineering report are based on a limited number of samples/tests. These recommendations assume that subsurface conditions throughout the site will be similar to those observed. As all recommendations are preliminary when based on limited testing, it is important to have your geotechnical professional observe the actual conditions during construction. This allows him/her to note any differences that may not have been revealed by the limited samples/tests and/or that are more abrupt than reported in the preliminary report. It is this geotechnical professional, using his/her knowledge and familiarity of site history, as well as construction observations, who will be able to determine if there is adequate and appropriate support to consider these recommendations final. He/she will also be able to document that the contractor is following these recommendations. Be aware that this geotechnical professional can not assume responsibility and/or liability for his/her recommendations based on observations and determinations by others.

Professional judgement, based on experience and observations, is at the heart of our geotechnical recommendations. Geotechnical reports use information from a limited number of samples/tests to predict conditions regarding your overall site. No one may say with certainty what subsurface conditions really exist without actual observation. The conditions away from sample/test areas may vary from what is predicted. It is important to identify variations as early as possible. This is why we encourage you to take advantage of our knowledge and experience during the construction phase of your project. Working together we can help minimize the impact when unexpected variations occur.

Geotechnical reports are written for a specific client, purpose, project and set of conditions. They are not intended to be a generalized, generic report for a proposed site. They are for the sole use of our client for the express purpose indicated to us. Should the scope of the project be altered, or if subsurface variations become evident during construction, it may be necessary to modify our recommendations. Early communication with your geotechnical professional can help you avoid expensive problems that may occur when changes to a project's purpose, structure, size, usage, site orientation, elevation, etc. are made after a report is written.

Following these guidelines, your geotechnical subsurface report should provide informed and accurate information to assist in the planning and construction of your project.



SECTION 5
T8N, R9E
PLEASANT VIEW HEIGHTS
23
24
25
26
27
28
29
30
31
32
OHU
ALLEY
33.00
325'
180'
90'
150'
2' PUBLIC SIDEWALK EASEMENT
24' WISCONSIN TELEPHONE COMPANY RIGHTS TO TRIM TREES
QUIT CLAIM DEED DOC.# 1128988
QUIT CLAIM DEED DOC.# 1128973
QUIT CLAIM DEED DOC.# 1147144
QUIT CLAIM DEED DOC.# 1147143
QUIT CLAIM DEED DOC.# 1128989
QUIT CLAIM DEED DOC.# 1128974
QUIT CLAIM DEED DOC.# 1128972
QUIT CLAIM DEED DOC.# 1128990
FLOWERBED OR LANDSCAPED AREA
HIGH VOLTAGE
17
16
10
9
LANDS
SHED
CONCRETE MATERIALS BUNKERS
WAUNAKEE ALLOY CASTING CO.
CONCRETE
BLACKTOP
CONCRETE PIT
OFFICE
B1
B2
B3
B4
B5
B6
SW10
SW11
SW12
110'
80'
70'
40'
10'
15'
20'
160'
120'
115'
30'
CENTERLINE OF SEWER AS CONSTRUCTED
CENTERLINE OF 20' WIDE EASEMENT AS DESCRIBED
HYDRANT TOP NUT EL=916.03
HYDRANT TOP NUT EL=915.68
SANITARY MH RIM=912.83 INV OUT=898.38 INV IN=898.34 INV IN SOUTH =899.28
SANITARY MH RIM=913.60' INV=898.21'
INLET(FL) RIM=913.03 INV=909.00
INLET(FL) RIM=913.01 INV=910.19
SAN
CURB
SIDEWALK
DRIVEWAY
FLOOD PLAIN APPROX. LINE PER FEMA MAP 55025C0229G
STORM CULVERT INV=905.11
STORM MH RIM=912.28 INV=905.33
STORM CULVERT INV. ELEV. = 906.49'
SANITARY MH RIM=910.85 INV=897.93
SANITARY MH RIM=910.29 INV=897.68
SIX MILE CREEK
PERMANENT LIMITED EASEMENT
24' WISCONSIN TELEPHONE COMPANY RIGHTS TO TRIM TREES
CULVERT
RIPP RAPP
TOP CONCRETE STRUCTURE ELEV. = 911.32'
TOP OUTFLOW ELEV. = 909.38'
DETENTION POND
VILLAGE OF WAUNAKEE LANDS
PLAY GROUND AREA
ASPHALT
N. MADISON ST.
N 87°51'36" E
478.44'
WD

NUMMELIN TESTING SERVICES, INC.

BORING LOG NOTES

DESCRIPTIVE TERM, GRANULAR SOIL (% BY DRY WEIGHT)

Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

Q_P = Estimated Unconfined Compressive Strength (by pocket penetrometer)
Expressed in tons per square foot (t/sf).

Q_U = Estimated Unconfined Compressive Strength (by ASTM 2166)
Expressed in tons per square foot (t/sf).

NM = Natural Moisture

M = MOISTURE

D = Dry	F = Frozen
M = Moist	W = Wet
S = Saturated	

LOI = Loss on Ignition (Organic Content)

N (Standard Blow Count) = blows per foot, as shown. Performed in general accordance with Standard Penetration Test Specifications (ASTM 1586).

NR = No Recovery **WOH** = Weight of Hammer **#** = Sample Number

SOIL CLASSIFICATION

F = Fine	LL = Liquid Limit, percent
M = Medium	PL = Plastic Limit, percent
C = Coarse	PI = Plasticity Index (LL - PL)
W.L. = Water Level	

SOIL STRENGTH CHARACTERISTICS

CONSISTENCY (Cohesive Soils)

Term	Q_U tons/sq ft
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

RELATIVE DENSITY (Granular Soils)

Term	"N" Value
Very Loose	0 - 4
Loose	4 – 10
Medium-Dense	10 – 30
Dense	30 - 50
Very Dense	Over 50

ORGANIC CONTENT BY COMBUSTION METHOD

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt / Clay	4 - 12%
Sedimentary Peat	12 - 50%
Fibrous & Woody Peat	More than 50%

PLASTICITY

Term	Plastic Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	Over 22

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 1
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 200.9

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
	-	3.5" of Asphaltic Concrete PAVEMENT	0	0 - 2	5	10	M		
1	-	9.5" of Brn SAND & GRAVEL (Base Course)							
	-								
2	-								
	-	Dark Brown Lean CLAY							
3	-	Little Gravel							Pushed
	-	(Fill) (USCS: CL)	2	3.5 - 5	11	NR			Stone
4	-								@ 3.5'
	-	(Water @ 4')							
5	-								
	-								
6	-	----- 6.0' -----	3	6 - 7.5	8	5	S		
	-								
7	-								
	-								
8	-								
	-		4	8.5 - 10	3	12	S		
9	-								
	-								
10	-								
	-								
11	-								
	-								
12	-								
	-								
13	-	Light Brown Silty Fine SAND							
	-	Some Gravel, Cobbles	5	13.5 - 15	4	12	S		
14	-	(USCS: SM)							
	-								
15	-								
	-								
16	-								
	-								
17	-								
	-								
18	-								
	-		6	18.5 - 20	4	12	S		
19	-								
	-								
20	-								
	-								
21	-								
	-								
22	-								
	-								
23	-								
	-		7	23.5 - 25	7	12	S		
24	-								
	-	------- E.O.B. 25.0' -------							
25	-	------- Backfilled with Bentonite Chips -------							

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 2
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 200.4

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
	-	2.0" of Asphaltic Concrete PAVEMENT	0	0 - 2	9	8	M		
1	-	10.0" of Brn SAND & GRAVEL (Base Course)							
	-								
2	-								
	-								
3	-	(Water @ 3')							
	-		2	3.5 - 5	2	12	S		
4	-								
	-								
5	-								
	-								
6	-		3	6 - 7.5	2	12	S		
	-								
7	-								
	-								
8	-								
	-		4	8.5 - 10	2	12	S		
9	-								
	-								
10	-								
	-								
11	-								
	-								
12	-								
	-								
13	-	Light Brown Silty Fine SAND							
	-	Some Gravel, Cobbles	5	13.5 - 15	4	12	S		
14	-	(USCS: SM)							
	-								
15	-								
	-								
16	-								
	-								
17	-								
	-								
18	-								
	-		6	18.5 - 20	8	12	S		
19	-								
	-								
20	-								
	-								
21	-								
	-								
22	-								
	-								
23	-								
	-		7	23.5 - 25	14	5	S		
24	-								
	-	------- E.O.B. 25.0' -------							
25	-	------- Backfilled with Bentonite Chips -------							

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 3
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 200.1

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
			0	0 - 2	7	18	M		
1		Dark Brown Sandy SILT							
2		w/ Organics							
		(Fill) (USCS: ML)							
3		----- 3.5' -----	2	3.5 - 5	7	12	M		
4		Gray / Brown Clayey SAND							
5		(USCS: SC)							
6		----- 6.0' -----	3	6 - 7.5	8	12	S		
7		(Water @ 7')							
8			4	8.5 - 10	2	12	S		
9									
10									
11									
12									
13			5	13.5 - 15	4	NR			Hit Cobble w/ Sampler @ 13.5'
14		Light Brown Silty Fine SAND							
		Some Gravel, Cobbles							
15		(USCS: SM)							
16									
17									
18			6	18.5 - 20	6	12	S		
19									
20									
21									
22									
23			7	23.5 - 25	7	10	S		
24		------- E.O.B. 25.0' -------							
25		------- Backfilled with Bentonite Chips -------							

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 4
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 198.5

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
			0	0 - 2	6	8	M		
1		Dark Brown Sandy CLAY							
		Little Gravel							
2		w/ Organics							
		(Fill) (USCS: CL)							
3									
		----- 3.5' -----	2	3.5 - 5	6	12	S		
4		(Water @ 4')							
5									
6			3	6 - 7.5	3	12	S		
7									
8									
			4	8.5 - 10	2	12	S		
9									
10									
11									
12									
13		Light Brown Silty Fine SAND							
		Some Gravel, Cobbles	5	13.5 - 15	5	12	S		
14		(USCS: SM)							
15									
16									
17									
18									
			6	18.5 - 20	3	12	S		
19									
20									
21									
22									
23									
			7	23.5 - 25	13	12	S		
24									
		------- E.O.B. 25.0' -------							
25		------- Backfilled with Bentonite Chips -------							

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 5
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 197.6

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
			0	0 - 2	8	12	M		
1		Brown Silty SAND & GRAVEL							
		(Fill) (USCS: SM)							
2									
		----- 2.5' -----							
3		(Water @ 2.5')							
			2	3.5 - 5	6	4	S		
4									
5									
6			3	6 - 7.5	6	4	S		
7									
8									
			4	8.5 - 10	9	10	S		
9									
10									
11									
12									
		Light Brown Silty Fine SAND							
13		Some Gravel, Cobbles							
		(USCS: SM)	5	13.5 - 15	15	10	S		
14									
15									
16									
17									
18									
			6	18.5 - 20	15	10	S		
19									
20									
21									
22									
23									
			7	23.5 - 25	22	2	S		
24									
		------- E.O.B. 25.0' -------							
25		------- Backfilled with Bentonite Chips -------							

Nummelin Testing Services, Inc. **NTS # 780.41**

SOIL BORING LOG

Boring By: Nummelin Testing Services, Inc.

Project: Waunakee Library
Location: As Proposed - See Map
201 North Madison Street, Waunakee, WI

Boring: 6
Auger: HSA
Page: 1 of 1
Drillers: BM / NH
Date: 7/17/17
Elevation: 200.0

Depth (ft.)		Classification/Description	#	Sample Depth (ft.)	N_{80}	Rec (in.)	M	Qp (tsf)	Notes
			0	0 - 2	7	14	M		
1									
2		Dark Brown Lean CLAY							
3		Little Gravel							
		(Fill) (USCS: CL)	2	3.5 - 5	6	10	W		
4									
5									
6		----- 6.0' -----	3	6 - 7.5	6	10	W	1.5	
		Brown / Gray Lean CLAY							
7		(USCS: CL)							
8		----- 8.0' -----							
		(Water @ 8')	4	8.5 - 10	6	12	S		
9									
10									
11									
12									
13									
			5	13.5 - 15	7	10	S		
14									
		Light Brown Silty Fine SAND							
15		Some Gravel, Cobbles							
		(USCS: SM)							
16									
17									
18									
			6	18.5 - 20	4	10	S		
19									
20									
21									
22									
23									
			7	23.5 - 25	9	10	S		
24									
		------- E.O.B. 25.0' -------							
25		------- Backfilled with Bentonite Chips -------							

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295 and 299, Wis Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions for more information.

Route To:

☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
1		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/17/2017

If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	4

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Clay Sand Slurry (11lb/gal wt.)
☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
☐ Concrete ☑ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	25		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/17/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

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Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
2		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/17/2017
If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	3

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Clay Sand Slurry (11lb/gal wt.)
☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
☐ Concrete ☑ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	25		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/17/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

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Route To:

☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
3		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4 | 1/4 | Section | Township N | Range E ☐ W ☐

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location — OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

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Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

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☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/17/2017

If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.): | Casing Diameter (in.):

Lower Drillhole Diameter (in.): | Casing Depth (ft.):

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)? | Depth to water (feet): 7

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

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☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
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For Monitoring Wells and Monitoring Well Boreholes Only:
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5. Material Used to Fill Well / Drillhole

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	25		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/17/17

Street or Route	Telephone Number
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received: | Noted By:

Comments:

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

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Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
4		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/17/2017
If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	4

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Clay Sand Slurry (11lb/gal wt.)
☐ Sand Cement (concrete) Grout ☐ Bentonite-Sand Slurry
☐ Concrete ☑ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	25		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/17/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

Well / Drillhole / Borehole Abandonment
Form 3300-005 (R 10/03) Page 1

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295 and 299, Wis Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions for more information.

Route To:
☐ Drinking Water ☐ Watershed Water ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other: _____

1. General Information

Boring Number	DNR Well ID No.	County
5		Dane

Common Well Name: | Gov't Lot # (if applic.):

1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

Latitude: DEG MIN SEC N — Longitude: DEG MIN SEC W

Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

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Facility Name: Waunakee Library

Facility ID	License/Permit No.	City, Village, or Town
780.41		Waunakee Village

Street Address of Well: 201 N. Madison Dr

Present Well Owner: | Original Well Owner:

Street Address or Route of Owner:

State: | ZIP Code:

3. Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☑ Borehole / Drillhole

Original Construction Date: 7/17/2017
If a Well Construction Report is available, please attach.

Construction Type:
☑ Drilled ☐ Driven (sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type
☑ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	2.5

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☑ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☐ Yes	☐ No	☑ N/A

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☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Screened and Poured (Bentonite Chips) ☐ Other (explain): _____

Sealing Materials
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For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite-Cement Grout
☐ Granular Bentonite ☐ Bentonite-Sand Slurry

5. Material Used to Fill Well / Drillhole	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	25		

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Sealing Work	Date of Abandonment
NTS, Inc.	07/17/17
Street or Route	**Telephone Number**
P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

State of Wisconsin- Dept of Natural Resources
P.O. Box 7921, Madison WI 53707-7921

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1/4 / 1/4	1/4	Section	Township	Range
			N	☐ E ☐ W

Grid Location: Feet ☐ N ☐ E ☐ S ☐ W — ☐ Local Grid Origin ☐ (estimated) ☐ Well Location OR

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Reason For Abandonment: | WI Unique Well No. of Replacement Well: ___ ___ ___ ___ ___

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Total Well Depth From Groundsurface (ft.)	Casing Diameter (in.)
Lower Drillhole Diameter (in.)	**Casing Depth (ft.)**

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to water (feet)
	8

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☑ N/A
Liner(s) removed?	☐ Yes	☐ No	☑ N/A
Screen removed?	☐ Yes	☐ No	☑ N/A
Casing left in place?	☐ Yes	☐ No	☑ N/A
Casing cut off below surface?	☐ Yes	☐ No	☑ N/A
Sealing material rise to surface?	☑ Yes	☐ No	☐ N/A
Material settle after 24 hrs?	☐ Yes	☐ No	☑ N/A
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Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
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P.O. Box 127	(715) 341-7974

City	State	ZIP Code
Stevens Point	WI	54481

Signature of Person Doing Work: | Date Signed:

DNR Use Only

Date Received	Noted By
Comments	

Wetland Delineation Report
~
Waunakee Public Library

Village of Waunakee, Dane County Wisconsin

June 30th, 2017

Prepared for:

Jean Elvekrog
Waunakee Library Board
710 South Street
Waunakee, WI 53597

Prepared by:

Mr. Scott O. Taylor
Taylor Conservation, LLC
3856 Schneider Dr.
Stoughton, WI. 53589
(608) 444-7483

Table of Contents

Wetland Delineator Qualifications

Scott Taylor holds a Master of Science degree in Forest Ecology and Management from the University of Wisconsin-Madison (1999). Taylor has attended the "Critical Methods in Wetland Delineation" training course annually since 2006. Taylor is an **Assured Wetland Delineator** under Wisconsin Department of Natural Resources guidelines. Taylor also completed the following courses that prepared him for performing wetland determinations and delineations in Wisconsin using the Army Corps of Engineers 1987 Manual Method:

- Wetland Plant Identification (July 2003, Delafield, WI. – Biotic Consultants, Inc.)
- Basic Wetland Delineation Training (August 2006, Cable, WI. – University of Wisconsin, La Crosse Continuing Education & Extension)
- Advanced Wetland Delineation Training (July 2012, LaCrosse, WI – University of Wisconsin, La Crosse Continuing Education & Extension).
- Hydric Soils Identification (June 2014, UW-Waukesha Field Station - University of Wisconsin, La Crosse Continuing Education & Extension).

Introduction

On April 19th and on June 9th of 2017, Scott Taylor of Taylor Conservation, LLC performed wetland determinations and delineations within a 10-acre area of land encompassing an old industrial site and a stretch of the Yahara River in the Village of Waunakee, Dane County, Wisconsin (Figures 1 & 2). The wetland investigation area consisted of old buildings surrounded by unmowed, grassy and brushy areas in the old industrial site; of wooded and grassy stream banks along the Yahara River; and of mowed turf areas above the banks of the river. It also contained a storm water basin just south of the river.

Four wetlands were identified: the low-lying margins of the stream banks; the storm water basin; and 2 depressions in the industrial site (Figure 2). In the investigator's opinion, the storm water basin, which was clearly constructed, was an artificial wetland. Two sample plots immediately outside of the basin (plots 1B & 1C, Figure 2) did not show wetland indicators. The Army Corps of Engineers and the Wisconsin Department of Natural Resources will decide whether to take jurisdiction over the storm water basin.

A total of approximately 1.75 acres (1.3-streamside wetlands; 0.2-storm water basin wetland; 0.25 acre in the industrial site depressions) of wetlands were delineated. The site is in Section 5 (SWSE) T8N, R9E.

The Waunakee Public Library is planning a new facility centered on the industrial area. It ordered a wetland delineation for planning purposes.

The purpose of this report is to explain the results of the wetland delineation and to describe the features of the wetlands and non-wetlands (uplands) in the project area.

Methods

The following reference materials were reviewed prior to performing fieldwork:

1) Natural Resource Conservation Service, Soil Survey.
2) Wisconsin Wetland Inventory (WDNR Surface Water Data Viewer – Wetlands & Wetland Indicators Theme).
3) United States Geological Survey 7.5-minute quadrangle map, Waunakee Quadrangle.
4) Natural Resource Conservation Service, hydric soils list for Dane County.

The wetland determinations and the delineations followed the procedures for the Routine Method set forth in The Corps of Engineers Wetlands Delineation Manual (US Army Corps of Engineers 1987) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast & Northcentral Region. They also followed the methods set forth in the Basic Guide to Wisconsin Wetlands and their Boundaries (WI Dept. of Administration 1995).

Method of Data Collection

Vegetation, hydrology and soil information were gathered in sample plots and recorded on U.S. Army Corps of Engineers "Wetland Determination Data Forms" for the appropriate region. At each plot, a plot center was established and the presence or absence of normal circumstances or disturbances was noted. Next, herbaceous vegetation was sampled within a circular 5-foot radius plot. After that, vines, shrubs and trees were sampled within a circular 30-foot radius plot, centered on the herbaceous plot. Next, a 20 inch-deep (at minimum) soil pit was dug at the plot center. The presence or absence of hydrology indictors in the soil pit and within the surrounding 30-foot circular plot was noted. Finally, the soil profile in the pit was examined and described. A determination was then made as to whether the site was wetland or upland.

Location of Transects

Transect beginning points (sample plots) were located inside of areas that appeared to have potential to be wetlands based on maps and field observations. These areas included mapped hydric soil locations, Wisconsin Wetland Inventory-mapped wetlands, and areas that showed pronounced wetland signatures on more than one year of aerial photography. They also included field observed plant communities typical of wetlands or field observed landscape features that collect water, like swales, depressions and drainage-ways.

If the sample plot data suggested that the location was inside of a wetland, a second plot was placed in an upslope location with a different plant community. If data collected at this plot suggested that the location was inside of the upland, no further plots were

sampled. Otherwise, the process was repeated. A total of 16 plots were sampled, 5 inside of wetlands and 11 on the uplands (Figure 2).

Procedure for Locating Wetland Boundaries

The wetland boundaries were located by observing increases in elevation and changes in plant community composition. The presence of healthy, dominant populations of upland plants, such as black raspberry (*Rubus occidentalis*-Upl), honeysuckle (*Lonicera X bella*-FacU), Queen Anne's lace (*Daucus carota*-Upl) or tall fescue (*Schedorus arundinaceus*-FacU), as one moved upslope, away from the wetland, was often considered a reliable indicator of the wetland boundary.

Results and Discussion

Soils of the Wetland Investigation Area

The Natural Resource Conservation Service-mapped soils of the wetland investigation area are (Figure 4):

Soil	Drainage class	Percent Hydric
Alluvial land, wet (Af)	Poorly Drained	100%
Elburn silt loam (EfB)	Somewhat Poorly Drained	5%
Griswold loam (GwC)	Well Drained	0%
Plano silt loam (PnB)	Well Drained	0%

Wisconsin Wetland Inventory Map of the Investigation Area

The Wisconsin Wetlands Inventory (W.W.I.) identifies tree-dominated wetlands (T3K) following the Yahara River. Mapped wetland boundaries matched the field-identified wetland boundaries along the river closely (Figure 5).

The industrial site wetlands were not identified on the W.W.I. map. Discrepancies between the W.W.I. and field-identified wetland boundaries reflect the greater accuracy of field methods over interpretation of wetland boundaries from aerial photographs, which is the method used in the W.W.I.

Wetlands

Overview of Wetlands

The industrial site wetlands occupied closed depressions. The riverside wetlands were the bottoms of steep stream banks and flat benches just above the ordinary high water mark

of the river. The storm water basin wetland was deep, steep-sided basin with inlet and outlet pipes.

The wetlands supported open grassy vegetation in some areas, and brush and trees in others. The storm water basin contained open water and cattails.

Wetland ID Number (Figure 2)	**Wetland Type**	**Wetland Quality** **(Susceptibility to Stormwater Runoff Impacts)**	**Approximate Area Delineated**
Wetlands 1, 3 & 4	Fresh (Wet) Meadow	Medium	0.55
Wetland 1	Floodplain Forest	Medium	1
Wetland 2	Shallow Marsh (storm water basin)	Poor	0.2
			Total: 1.75

	Wetlands (Plots 1A, 2A, 3A, 4A & 5A)
Normal Circumstances Present?	Yes
Significant Disturbance?	No
Naturally Problematic?	Yes, for all wetland plots since no hydric soil indicators were observed.

Wetland Boundary Characteristics

In many areas there were no strong vegetative transitions to mark the boundaries, however the distribution of upland plant populations, like honeysuckle and black cherry, delineated the boundaries.

In other areas the boundaries were marked by vegetative transitions from ground layer vegetation heavily dominated by reed canary grass (*Phalaris arundinacea*-FacW) among other species, in the wetlands to ground layer vegetation dominated by Kentucky blue grass (*Poa pratensis*-FacU), and tall fescue, among other species, in the uplands.

Wetland Vegetation

- The wetlands were dominated by broad-leaved catteails (*Typha latifolia*-Obl), reed canary grass (*Phalaris arundinacea*-FacW) in the ground layer; by red osier dogwood (*Cornus alba*-FacW), silver maple (*Acer saccharinum*-FacW), green ash (*Fraxinus pennsylvanica*-FacW) and box elder (*Acer negundo*-FacW) in the sapling/shrub layer; and by silver maple, box elder and black willow (*Salix nigra*-Obl) in the tree layer.

- ❖ Hydrophytic plant dominance was 100% in all wetland sample plots.

- ❖ All wetland sample plots met the FAC-Neutral Test.

Wetland Hydrology

- ❖ The industrial site and storm water basin wetlands' chief water source is surface runoff from surrounding developed areas. The streamside wetlands' chief water source is overspill from the Yahara River. All of the wetlands probably saturate in the spring and throughout the year following rainy periods.

- ❖ Rainfall for the preceding 3 months, for both fieldwork dates, was higher than normal (see analysis below). In addition, 2.6 inches of rain was recorded at the nearby Dane County Regional Airport weather station in the month of April prior to fieldwork. No rain was recorded in the month of June prior to fieldwork.

- ❖ As a result of higher than usual antecedent rainfall, the investigator did expect to directly observe a shallow water table and soil saturation in the wetlands. Accordingly, shallow soil saturation was observed in 4 of 5 wetland sample plots (1A, 2A, 4A & 5A).

- ❖ All wetland sample plots showed the two secondary hydrology indicators, "Geomorphic Position" (because plots were located on depressions, low benches and stream banks by the river) and "FAC Neutral Test".

Prior Rainfall Analysis:

(USDA Field Office Climate Data – WETS Station: Dane County Regional Airport, Wisconsin.)

For April Fieldwork:

	30% chance will have precipitation (inches)						
	less than:	more than:	**2017 precipitation:**	Condition	Condition value (Dry=1, Normal =2, Wet=3)	Month weight value	Product of previous two columns
January	0.81	1.51	**2.76**	**Wet**	**3**	**1**	**3**
February	0.69	1.56	**1.94**	**Wet**	**3**	**2**	**6**
March	1.28	2.77	**2.83**	**Wet**	**3**	**3**	**9**
						Sum:	**18**

For June Fieldwork:

	30% chance will have precipitation (inches)						
	less than:	more than:	**2017 precipitation:**	Condition	Condition value (Dry=1, Normal =2, Wet=3)	Month weight value	Product of previous two columns
March	1.28	2.77	**2.83**	**Wet**	**3**	**1**	**3**
April	2.58	3.89	**5.30**	**Wet**	**3**	**2**	**6**
May	2.11	3.91	**2.83**	**Normal**	**2**	**3**	**6**
						Sum:	**15**

(If sum is 6-9, prior period dry; 10-14, prior period normal; 15-18, prior period wet. From USDA, Natural Resource Conservation Service. 1997. Hydrology Tools for Wetland Determination. Part 650. Engineering Field Handbook.)

Wetland Soils

- The soil surface layers in the wetland sample plots were comprised of 10 YR 2/1 & 2/2-colored silt loam and silty clay loam.

- B-horizons in riverside wetlands were not observed at the soil depths (24-30 inches) examined because these sites occupied alluvial landforms comprised of deep, dark-colored sediments.

- Wetland soil profiles in the industrial site were only inspected to depths of 12-14 inches due to the abundance of rocks. These soils were probably disturbed during development of the site.

- None of the wetland plots showed hydric soil indicators but professional judgment was used to assume the soils were hydric based on hydrophytic vegetation and wetland hydrology indicators.

Uplands

Overview of Uplands

The uplands (non-wetlands) were the (1) old buildings and paved areas of the industrial site; (2) the un-mowed grassy and brushy areas surrounding the buildings and paved areas; (3) the upper riverbanks; and (4) the mowed turf areas on the high-lying grounds adjoining the stream bank (Figure 2).

	Uplands (Plots 1B, 1C, 1D, 2B, 2C, 3B, 3C, 4B, 4C, 5B & 5C)
Normal Circumstances Present?	Not for Plots 1C, 1D, 2B, 3B & 3C due to regular mowing.
Significant Disturbance?	Not for Plots 1C, 1D, 2B, 3B & 3C due to regular mowing.

Naturally Problematic?	Not applicable to uplands.

Upland Vegetation

- The un-mowed industrial site uplands were dominated by garlic mustard (*Alliaria petiolata*-FacU), Kentucky bluegrass (*Poa pratensis*-FacU), tall fescue (*Schedonorus arundinaceus*-FacU) and Canada goldenrod (*Solidago Canadensis*-FacU) in the ground layer, and by box elder and cottonwood (*Populus deltoides*-Fac) in the sapling and tree layers.

- The mowed turf uplands were dominated by Kentucky blue grass and tall fescue. The upper stream bank uplands were dominated by garlic mustard and white avens (*Geum canadense*-Fac) in the ground layer; by box elder and honeysuckle (*Lonicera X bella*-FacU) in the sapling/shrub layer; and by box elder and American elm (*Ulmus americana*-FacW) in the tree layer.

- Dominance values for hydrophytes were below 50% in most upland sample plots.

- Three of 11 upland sample plots (1B, 2C & 4B) showed dominance by hydrophytic vegetation (but they did not meet the FAC-Neutral test). However, the absence of hydric soil and wetland hydrology indicators at these sites strongly suggested they were capable of supporting upland vegetation.

Upland Hydrology

- No hydrology indicators were noted in any of the upland sample plots.

- All parts of the uplands occupied high-lying or sloping ground where water would be unlikely to linger for long periods.

Upland Soils

- The soil surface layers in the upland sample plots were comprised of 10 YR 2/2, 3/2 & 2/1-colored silt loam.

- B-horizons were not observed at the soil depths examined (24-30 inches) in most upland sample plots, probably because these sites occupied areas where fill was placed in the distant past. This would not be unusual in an area surrounded by urban development. The unusually high number of rocks observed in upland soil profiles also suggested the soils consisted of old fill.

- Soil subsurface layers (B-horizons), when observed, consisted of 10 YR 3/3-colored sandy or silty clay loam.

- No upland sample plot showed hydric soil indicators.

Conclusion

The wetland boundary marked in the field is the best estimate of the location of the boundary based on the available vegetation, hydrology and soil evidence on April 19th and June 17th of 2017. Wetland boundaries can change over time with changes in vegetation, precipitation, or regional hydrology. The wetlands identified for this report may be subject to federal regulation under the jurisdiction of the U.S. Army Corp of Engineers, state regulation under the jurisdiction of Wisconsin Department of Natural Resources, and local jurisdiction under your local county, town, city or village. The U.S. Army Corps of Engineers and/or the Wisconsin DNR have authority to make the final decision regarding the wetland boundary. Personnel from these agencies may adjust the boundary upon field inspection.

Activities within or close to the delineated wetland boundaries generally require permits from the Army Corps of Engineers, WDNR or local authorities. If the client proceeds with any work within or close to the delineated wetland boundaries without authorization or permits from the appropriate regulatory authorities, Scott Taylor or Taylor Conservation LLC shall not be responsible or liable for any resulting damages.

Scott Taylor is an **Assured Wetland Delineator** under Wisconsin Department of Natural Resources guidelines (http://dnr.wi.gov/topic/wetlands/assurance.html). Taylor's wetland delineations are considered dependable by the WDNR for purposes of Wisconsin wetland and waterway permits, shoreland-wetland zoning or other state-mandated local wetland programs. Therefore Taylor's clients do not require concurrence letters from WDNR before project planning or permit applications that are based on Taylor's wetland delineations. However, concurrence from the Army Corps of Engineers is still necessary. The WDNR and Army Corps have final authority over wetlands in Wisconsin. They may adjust Taylor's wetland boundaries. Assurance does not change decisions about wetland fill. Assurance is not a guarantee of accuracy or relief from landowner responsibility in the event an error occurs and wetlands are filled. While it is unlikely for a professional whose work is assured, inadvertent wetland fill that may result from errors must be remedied.

References

Hurt, G.W. & Vasilas, L.M. 2016. Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 8.1. Natural Resource Conservation Service, United States Department of Agriculture.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner, US Army Corp of Engineers, 2014. State of Wisconsin 2014 Wetland Plant List.

US Army Corps of Engineers, Waterways Experiment Station. 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1.

USDA, Natural Resource Conservation Service. 1997. Hydrology Tools for Wetland Determination. Part 650. Engineering Field Handbook.

Wisconsin Department of Administration, Coastal Management Program. 1995. Basic Guide to Wisconsin's Wetlands and their Boundaries.

Figures

Figure 1: Landscape Overview.

Source: Imagery - National Agricultural Imagery Program, 2013; Roads & Waters – Wisconsin Department of Natural Resources.

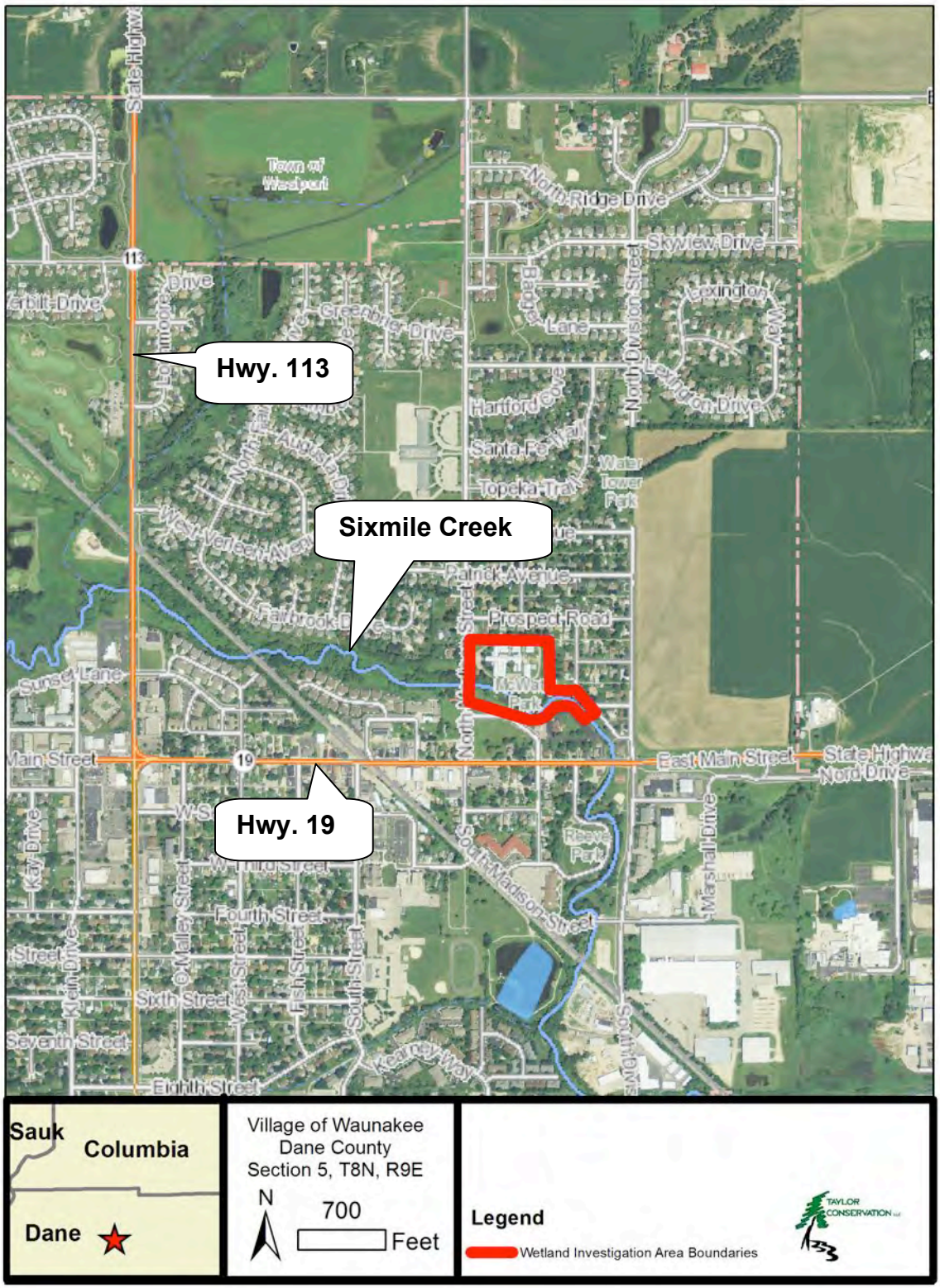


Figure 2: Investigation Area, Wetlands & Sample Plots.
Source: Wisconsin Regional Orthophotography Consortium, 2010.

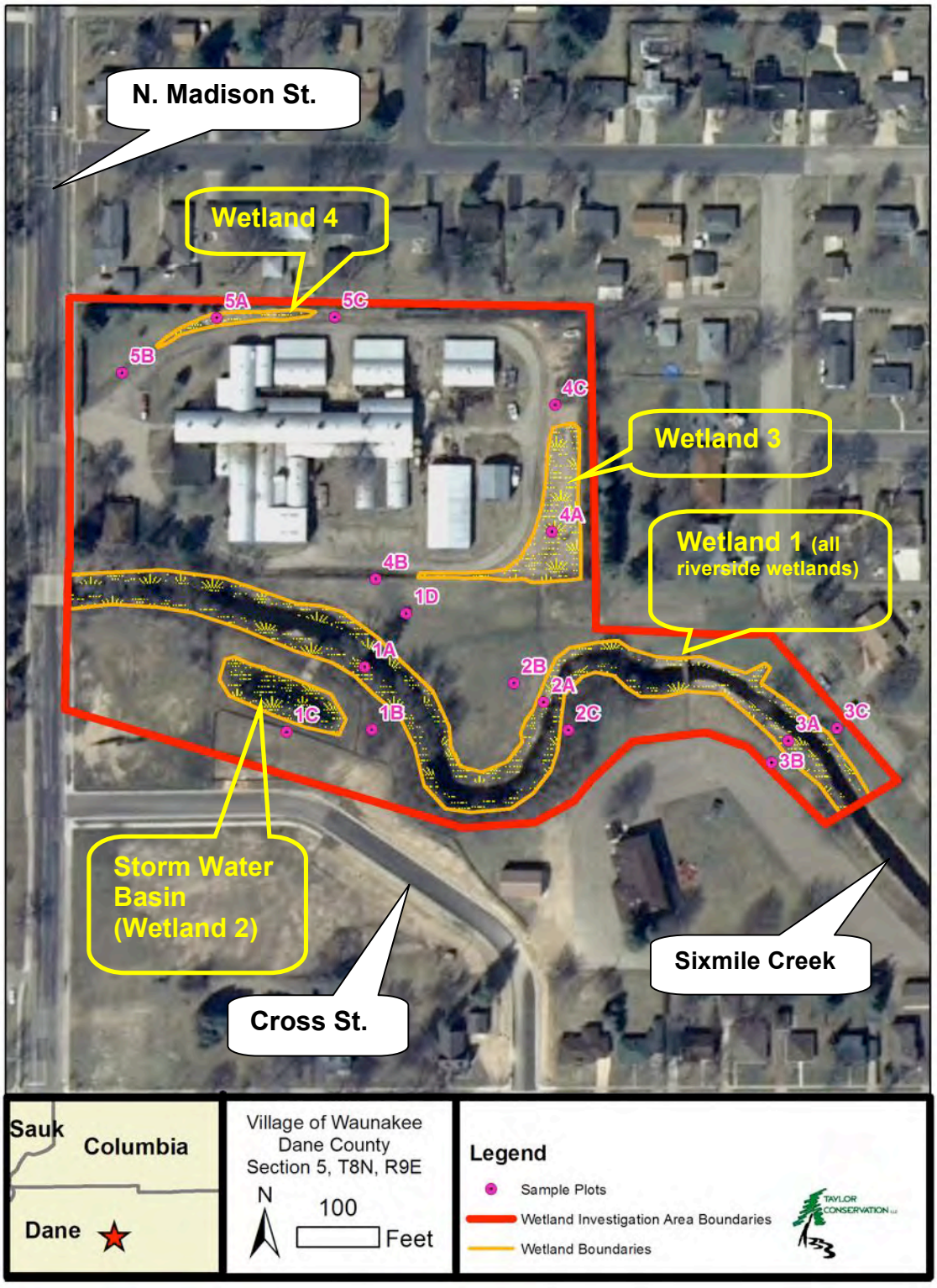


Figure 3: Topography.

Source: U.S. Geological Survey 7.5-Minute Quadrangle Map, Waunakee Quadrangle.

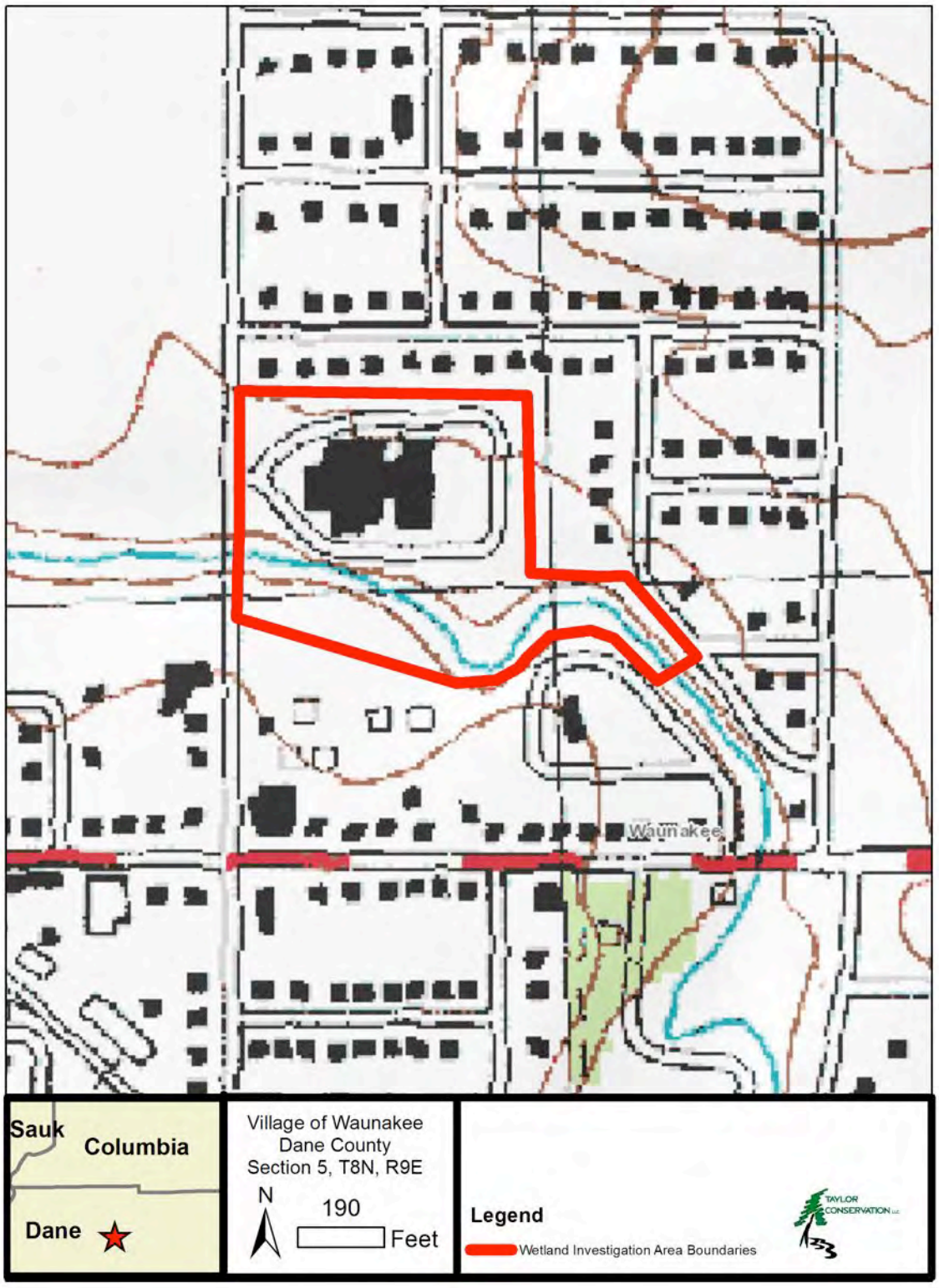


Figure 4: Soils.

Source: Natural Resource Conservation Service.

Soil	Drainage class	Percent Hydric
Alluvial land, wet (Af)	Poorly Drained	100%
Elburn silt loam (EfB)	Somewhat Poorly Drained	5%
Griswold loam (GwC)	Well Drained	0%
Plano silt loam (PnB)	Well Drained	0%

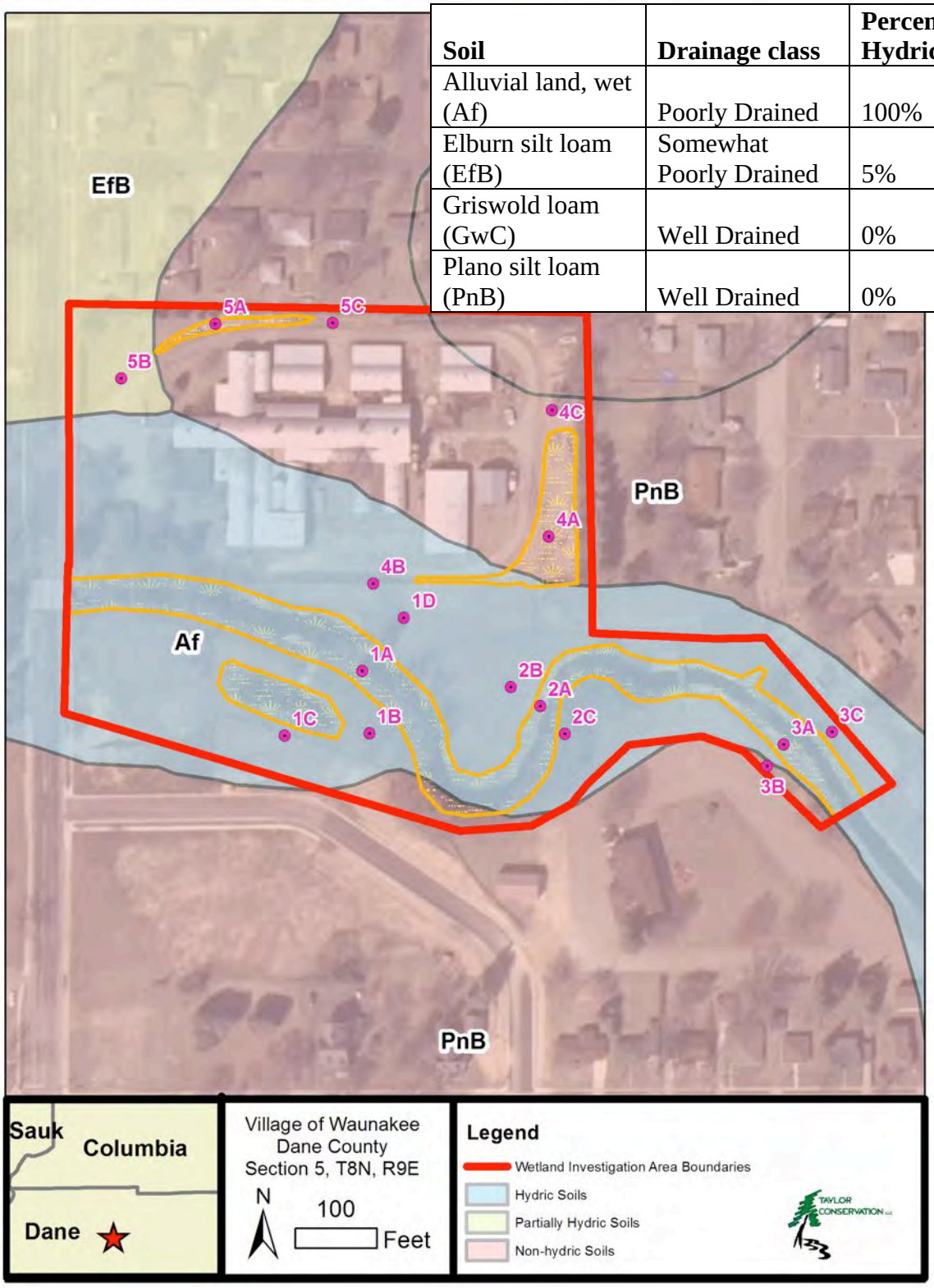
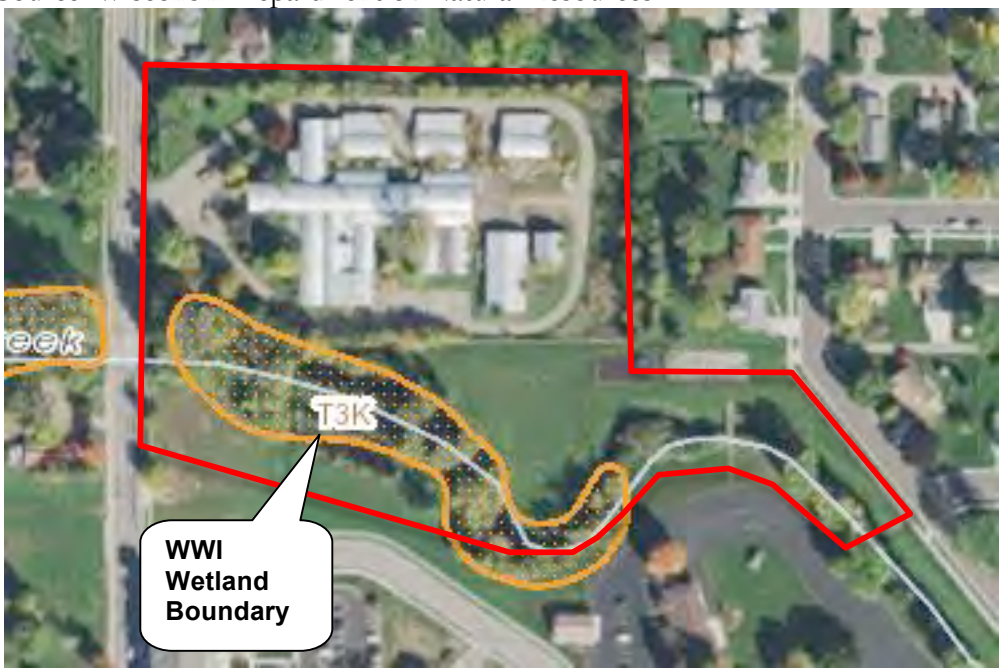
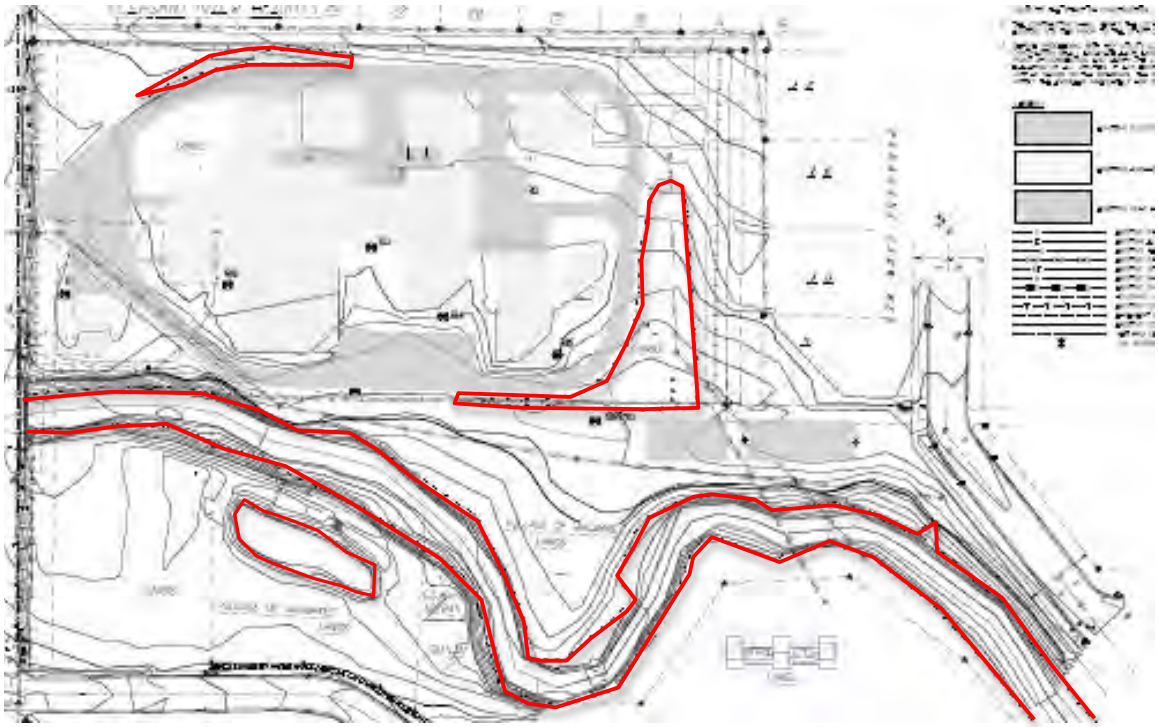


Figure 5: Wisconsin Wetland Inventory Map.

Source: Wisconsin Department of Natural Resources.



Appendix I: Survey Map of Wetland Boundary.



Appendix II: Investigation Area Photos

Sixmile Creek

Storm Water Basin

Wetland - Plot 1A

Upland Plot 1B

Upland Plot 1C

Wetland - Plot 2A

Upland - Plot 2B

Wetland-Plot 3A

Upland - Plot 3C

Wetland – Plot 4A

Upland – Plot 4C

Upland - Plot 5C

Appendix III: Data Sheets

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 01a

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** T3K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The soil was naturally problematic since it was judged hydric even though no hydric indicators were observed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ◉ No ○	Depth (inches):	8	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The plot met the criteria of Geomorphic Position since it occupied a low bench by a stream where prolonged, frequent saturation or inundation would be likely.

VEGETATION - Use scientific names of plants

Sampling Point: 01a

Tree Stratum (Plot size: 2826)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	20	☑	OBL
2. *Acer saccharinum*	10	☑	FACW
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Cornus alba*	15	☑	FACW
2. *Fraxinus pennsylvanica*	20	☑	FACW
3. *Viburnum opulus*	10	☐	FACW
4.		☐	
5. *Acer saccharinum*	20	☑	FACW
6. *Acer negundo*	10	☐	FAC
7. *Rhamnus cathartica*	5	☐	FAC
	80	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Phalaris arundinacea*	40	☑	FACW
2. *Hydrophyllum virginianum*	20	☑	FAC
3. *Impatiens capensis*	5	☐	FACW
4. *Acer saccharinum*	5	☐	FACW
5. *Lonicera x bella*	5	☐	FACU
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	75	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	20	x 1 =	20
FACW species	125	x 2 =	250
FAC species	35	x 3 =	105
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	185 (A)		395 (B)

Prevalence Index = B/A = 2.135

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a brushy, wooded area. Most of the herb layer species were green and growing and most of the woody species had begun leaf out, suggesting the growing season had begun. Since it was very early in the growing season, it is possible that some species were present but not observed.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 01a

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-30	10YR	2/1	100						Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

No hydric indicators observed however professional judgment was used to assume the soil was hydric based on the vegetation and hydrology indicators. No B-horizon was noted; the soil consisted of deep alluvial deposits.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 01b

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Summit **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** T3K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0	
Water Table Present?	Yes ○	No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot sat on a high bench and was well elevated above the nearby wetland sample plot 1A.

VEGETATION - Use scientific names of plants

Sampling Point: 01b

Tree Stratum (Plot size: 2826)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus pumila*	5	☑	FACU
2. *Salix nigra*	5	☑	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	10	= Total Cover	

Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Acer negundo*	60	☑	FAC
2. *Lonicera x bella*	15	☐	FACU
3. *Fraxinus pennsylvanica*	10	☐	FACW
4. *Rubus occidentalis*	5	☐	UPL
5.		☐	
6.		☐	
7.	0	☐	
	90	= Total Cover	

Herb Stratum (Plot size: 78.5)			
1. *Geum canadense*	15	☑	FAC
2. *Alliaria petiolata*	30	☑	FACU
3. *Rubus occidentalis*	5	☐	UPL
4. *Glechoma hederacea*	5	☐	FACU
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	55	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	10	x 2 =	20
FAC species	75	x 3 =	225
FACU species	55	x 4 =	220
UPL species	10	x 5 =	50
Column Totals:	155 (A)		520 (B)

Prevalence Index = B/A = 3.355

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a brushy, wooded area. Most of the herb layer species were green and growing and most of the woody species had begun leaf out, suggesting the growing season had begun. Since it was very early in the growing season, it is possible that some species were present but not observed. Although the site was dominated by hydrophytic vegetation, the absence of hydric soil indicators and the absence of wetland hydrology indicators strongly suggest this site would be capable of supporting upland vegetation. Also note the FAC Neutral Test was not met and the P-Index was > 3.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 01b

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-14	10YR	3/2	100						Silt Loam	many rocks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators. The unusual abundance of rocks suggests the soil might have formed in artificial fill material. The soil pit was only dug to 14 inches due to a dense layer of rocks.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 01c

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Summit **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ○ No ◉

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Plot was in a mowed turf area. Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The vegetation was significantly disturbed and normal circumstances were not present since the site was regularly mowed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a high bench, well elevated above the nearby wetland sample plot 1A.

VEGETATION - Use scientific names of plants

Sampling Point: 01c

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Poa pratensis*	95	☑	FACU
2. *Elymus repens*	20	☐	FACU
3. *Taraxacum officinale*	10	☐	FACU
4. *Plantago major*	5	☐	FACU
5. *Trifolium pratense*	5	☐	FACU
6. *Viola sororia*	5	☐	FAC
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	140	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	5	x 3 =	15	
FACU species	135	x 4 =	540	
UPL species	0	x 5 =	0	
Column Totals:	140	(A)	555	(B)

Prevalence Index = B/A = 3.964

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a mowed turf area. It is possible some plant species were present but not observed due to close mowing. All of the herb layer species noted were green and growing, suggesting the growing season had begun.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 01c

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-24	10YR	2/2	100						Silt Loam	many rocks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators. The unusual abundance of rocks suggests the soil might have formed in artificial fill material.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** **01d**

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Backslope **Local relief (concave, convex, none):** convex **Slope:** 2.0 **%** / 1.1 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ○ No ◉

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Plot was in a mowed turf area. Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The vegetation was significantly disturbed and normal circumstances were not present since the site was regularly mowed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot was well elevated above the nearby wetland sample plot 1A.

VEGETATION - Use scientific names of plants

Sampling Point: 01d

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Poa pratensis*	95	☑	FACU
2. *Schedonorus arundinaceus*	10	☐	FACU
3. *Glechoma hederacea*	5	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	110	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	110	x 4 =	440
UPL species	0	x 5 =	0
Column Totals:	110 (A)		440 (B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a mowed turf area. It is possible some plant species were present but not observed due to close mowing. All of the herb layer species noted were green and growing, suggesting the growing season had begun.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 01d

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-30	10YR	2/1	100						Silt Loam	many rocks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators. The unusual abundance of rocks suggests the soil might have formed in artificial fill material.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 02a

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** T3K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The soil was naturally problematic since it was judged hydric even though no hydric indicators were observed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0	
Water Table Present?	Yes ◉	No ○	Depth (inches):	20	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	10	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The plot met the criteria of Geomorphic Position since it occupied a low bench by a stream where prolonged, frequent saturation or inundation would be likely.

VEGETATION - Use scientific names of plants

Sampling Point: 02a

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Phalaris arundinacea*	100	☑	FACW
2. *Glechoma hederacea*	10	☐	FACU
3. *Alliaria petiolata*	2	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	112	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	100	x 2 =	200	
FAC species	0	x 3 =	0	
FACU species	12	x 4 =	48	
UPL species	0	x 5 =	0	
Column Totals:	112	(A)	248	(B)

Prevalence Index = B/A = 2.214

Hydrophytic Vegetation Indicators:

- ☑ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in an open, grassy area. All of the herb layer species were green and growing, suggesting the growing season had begun. Since it was very early in the growing season, it is possible that some species were present but not observed.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 02a

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-16	10YR	2/1	100						Silt Loam	
16-30	10YR	2/1	95	7.5YR	4/6	5	C	PL	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

No hydric indicators observed (the redox concentrations began too deep to meet the criteria of a hydric indicator) however professional judgment was used to assume the soil was hydric based on the vegetation and hydrology indicators. No B-horizon was noted; the soil consisted of deep alluvial deposits.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 02b

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Backslope **Local relief (concave, convex, none):** convex **Slope:** 2.0 % / 1.1 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ○ No ◉

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

The plot was in a mowed turf area. Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The vegetation was significantly disturbed and normal circumstances were not present since the site was regularly mowed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a gentle slope, well elevated above the nearby wetland sample plot 2A.

VEGETATION - Use scientific names of plants

Sampling Point: 02b

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Poa pratensis*	95	☑	FACU
2. *Schedonorus arundinaceus*	60	☑	FACU
3. *Glechoma hederacea*	10	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	165	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

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

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	165	x 4 =	660	
UPL species	0	x 5 =	0	
Column Totals:	165	(A)	660	(B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a mowed turf area. It is possible some plant species were present but not observed due to close mowing. All of the herb layer species noted were green and growing, suggesting the growing season had begun.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 02b

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-13	10YR	2/2	100						Silt Loam	Many rocks
13-24	10YR	3/3	100						Silty Clay Loam	Many rocks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators. The unusual abundance of rocks suggests the soil might have formed in artificial fill material.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 02c

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Shoulder **Local relief (concave, convex, none):** convex **Slope:** 5.0 % / 2.9 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** T3K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a steep slope, well elevated above the nearby wetland sample plot 2A.

VEGETATION - Use scientific names of plants

Sampling Point: 02c

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Acer negundo*	60	☑	FAC
2. *Ulmus americana*	30	☑	FACW
3. *Lonicera x bella*	10	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	100	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Alliaria petiolata*	50	☑	FACU
2. *Phalaris arundinacea*	10	☐	FACW
3. *Viola sororia*	5	☐	FAC
4. *Leonurus cardiaca*	5	☐	UPL
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	70	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

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

Percent of dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	65	x 3 =	195
FACU species	60	x 4 =	240
UPL species	5	x 5 =	25
Column Totals:	170 (A)		540 (B)

Prevalence Index = B/A = 3.176

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a brushy, wooded area. Most of the herb layer species were green and growing and most of the woody species had begun leaf out, suggesting the growing season had begun. Since it was very early in the growing season, it is possible that some species were present but not observed. Although the site was dominated by hydrophytic vegetation, the absence of hydric soil indicators and the absence of wetland hydrology indicators strongly suggest this site would be capable of supporting upland vegetation. Also note the FAC Neutral Test was not met and the P-Index was > 3.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 02c

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-20	10YR	2/2	100						Silt Loam	
20-30	10YR	3/3	100						Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 03a

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The soil was naturally problematic since it was judged hydric even though no hydric indicators were observed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	16	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The plot met the criteria of Geomorphic Position since it occupied a low bench by a stream where prolonged, frequent saturation or inundation would be likely.

VEGETATION - Use scientific names of plants

Sampling Point: 03a

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Fraxinus pennsylvanica*	5	☑	FACW
2. *Rhamnus cathartica*	2	☑	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	7	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Phalaris arundinacea*	90	☑	FACW
2. *Urtica dioica*	10	☐	FAC
3. *Impatiens capensis*	5	☐	FACW
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	105	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	100	x 2 =	200	
FAC species	12	x 3 =	36	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column Totals:	112	(A)	236	(B)

Prevalence Index = B/A = 2.107

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a predominantly open, grassy area. The herb layer species were green and growing and the woody species had begun leaf out, suggesting the growing season had begun. Since it was very early in the growing season, it is possible that some species were present but not observed.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 03a

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type [1]	Loc²	Texture	Remarks
0-30	10YR 2/1	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains ²Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

No hydric indicators observed however professional judgment was used to assume the soil was hydric based on the vegetation and hydrology indicators. No B-horizon was noted; the soil consisted of deep alluvial deposits.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 03b

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Shoulder **Local relief (concave, convex, none):** convex **Slope:** 1.0 % / 0.6 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ○ No ◉

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

The plot was in a mowed turf area. Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The vegetation was significantly disturbed and normal circumstances were not present since the site was regularly mowed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a high bench, well elevated above the nearby wetland sample plot 3A.

VEGETATION - Use scientific names of plants

Sampling Point: 03b

Tree Stratum (Plot size: 2826)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	40	☑	FACW
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Poa pratensis*	100	☑	FACU
2. *Viola sororia*	5	☐	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	105	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	40	x 2 =	80	
FAC species	5	x 3 =	15	
FACU species	100	x 4 =	400	
UPL species	0	x 5 =	0	
Column Totals:	145	(A)	495	(B)

Prevalence Index = B/A = 3.414

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a mowed turf area. The silver maples were planted. It is possible some plant species were present but not observed due to close mowing. All of the herb and tree layer species noted were green and growing, suggesting the growing season had begun.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 03b

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-14	10YR	2/2	100						Silt Loam	
14-24	10YR	3/3	100						Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 19-Apr-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 03c

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Backslope **Local relief (concave, convex, none):** convex **Slope:** 5.0 % / 2.9 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** -89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ○ No ◉

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

The plot was in a mowed turf area. Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (January-Wet; February-Wet; March-Wet), was found to be above average. In the month of fieldwork (April), total precipitation was 2.6 inches to date. The vegetation was significantly disturbed and normal circumstances were not present since the site was regularly mowed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a steep slope, well elevated above the nearby wetland sample plot 3A.

VEGETATION - Use scientific names of plants

Sampling Point: 03c

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5)			
1. *Poa pratensis*	95	☑	FACU
2. *Schedonorus arundinaceus*	20	☐	FACU
3. *Viola sororia*	5	☐	FAC
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	120	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	5	x 3 =	15	
FACU species	115	x 4 =	460	
UPL species	0	x 5 =	0	
Column Totals:	120	(A)	475	(B)

Prevalence Index = B/A = 3.958

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a mowed turf area. It is possible some plant species were present but not observed due to close mowing. All of the herb layer species noted were green and growing, suggesting the growing season had begun.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 03c

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-18	10YR	2/2	100						Silt Loam	flecks 10yr3/3 material & many rocks
18-24	10YR	2/2	95	10YR	4/6	5	C	PL	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators (the redox concentrations began too deep to meet the criteria of a hydric indicator). The unusual abundance of rocks suggests the soil might have formed in artificial fill material.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 04a

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date. The soil was naturally problematic since it was judged hydric even though no hydric indicators were observed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ◉ No ○	Depth (inches):	8	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The soil was saturated to the surface. The plot met the criteria of Geomorphic Position since it occupied the bottom of a closed basin where prolonged, frequent saturation or inundation would be likely.

VEGETATION - Use scientific names of plants

Sampling Point: 04a

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Cornus alba*	15	☑	FACW
2. *Viburnum dentatum*	5	☑	FAC
3. *Salix babylonica*	5	☑	FAC
4. *Salix discolor*	5	☑	FACW
5. *Fraxinus pennsylvanica*	5	☑	FACW
6.	0	☐	
7.	0	☐	
	35	= Total Cover	
Herb Stratum (Plot size: 78.5 sf)			
1. *Typha latifolia*	60	☑	OBL
2. *Symphyotrichum puniceum var. puniceum*	40	☑	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	100	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	100	x 1 =	100	
FACW species	25	x 2 =	50	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column Totals:	135 (A)		180	(B)

Prevalence Index = B/A = 1.333

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a cattail marsh surrounded by patchy brush.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 04a

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-6	10YR	2/2	100						Silt Loam	
6-14	10YR	4/3	95	10YR	4/6	5	C	PL	Sandy Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

The plot was only dug to 14 inches due to the abundance of rocks. No hydric indicators observed however professional judgment was used to assume the soil was hydric based on the vegetation and hydrology indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** **04b**

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 **%** / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Alluvial land, wet (Af) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ○	No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○	No ◉	

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0	
Water Table Present?	Yes ○	No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The lack of wetland hydrology indicators suggested the swale does not collect large volumes of surface runoff water.

VEGETATION - Use scientific names of plants

Sampling Point: 04b

Tree Stratum (Plot size: 78.5 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	100	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	

Herb Stratum (Plot size: 78.5 sf)			
1. *Alliaria petiolata*	70	☑	FACU
2. *Solidago gigantea*	25	☐	FACW
3. *Geum canadense*	5	☐	FAC
4. *Viola sororia*	10	☐	FAC
5. *Acer negundo*	5	☐	FAC
6. *Glechoma hederacea*	15	☐	FACU
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	130	= Total Cover	

Woody Vine Stratum (Plot size: 78.5 sf)			
1. *Vitis riparia*	20	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
	20	= Total Cover	

Dominance Test worksheet:

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

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

Percent of dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	25	x 2 =	50	
FAC species	140	x 3 =	420	
FACU species	85	x 4 =	340	
UPL species	0	x 5 =	0	
Column Totals:	250	(A)	810	(B)

Prevalence Index = B/A = 3.240

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a wooded area with an herbaceous groundlayer. Although the site was dominated by hydrophytic vegetation, the absence of hydric soil indicators and the absence of wetland hydrology indicators strongly suggest this site would be capable of supporting upland vegetation. Also note the FAC Neutral Test was not met and the P-Index was > 3.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 04b

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type [1]	Loc²	Texture	Remarks
0-30	10YR 2/1	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains ²Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 04c

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** convex **Slope:** 2.0 % / 1.1 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ○ No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot was well elevated above the nearby wetland sample plot 4A.

VEGETATION - Use scientific names of plants

Sampling Point: 04c

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Populus deltoides*	10	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	10	= Total Cover	
Herb Stratum (Plot size: 78.5 sf)			
1. *Poa pratensis*	90	☑	FACU
2. *Schedonorus arundinaceus*	30	☑	FACU
3. *Solidago canadensis*	25	☐	FACU
4. *Viola sororia*	5	☐	FAC
5. *Daucus carota*	5	☐	UPL
6. *Parthenocissus quinquefolia*	10	☐	FACU
7. *Acer negundo*	5	☐	FAC
8. *Juglans nigra*	5	☐	FACU
9. *Phalaris arundinacea*	5	☐	FACW
10.	0	☐	
11.	0	☐	
12.	0	☐	
	180	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	20	x 3 =	60
FACU species	160	x 4 =	640
UPL species	5	x 5 =	25
Column Totals:	190 (A)		735 (B)

Prevalence Index = B/A = 3.868

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in an open, grassy area with scattered tree saplings.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 04c

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-6	10YR	2/2	100						Silt Loam	chunks 10YR 4/1
6-14	10YR	4/1	90	10YR	4/6	10	C	PL	Silty Clay Loam	
14-24	10YR	2/1	100						Silt Loam	flecks 4/1

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

The unusual sequence of soil horizons suggests this soil profile may have been disturbed. This would be expected since the site occupied an industrial area.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 05a

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date. The soil was naturally problematic since it was judged hydric even though no hydric indicators were observed.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0	
Water Table Present?	Yes ◉ No ○	Depth (inches):	6	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The soil was saturated to the surface. The plot met the criteria of Geomorphic Position since it occupied the bottom of a closed depression where prolonged, frequent saturation or inundation would be likely.

VEGETATION - Use scientific names of plants

Sampling Point: 05a

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Acer saccharinum*	10	☑	FACW
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	10	= Total Cover	
Herb Stratum (Plot size: 78.5 sf)			
1. *Phalaris arundinacea*	80	☑	FACW
2.	0	☐	
3. *Glechoma hederacea*	10	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	90	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	90	x 2 =	180	
FAC species	0	x 3 =	0	
FACU species	10	x 4 =	40	
UPL species	0	x 5 =	0	
Column Totals:	100	(A)	220	(B)

Prevalence Index = B/A = 2.200

Hydrophytic Vegetation Indicators:

- ☑ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in an open, grassy area with scattered tree saplings.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 05a

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type [1]	Loc[2]	Texture	Remarks
0-14	10YR 2/2	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

The plot was only dug to 14 inches due to the abundance of rocks. No hydric indicators observed however professional judgment was used to assume the soil was hydric based on the vegetation and hydrology indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 05b

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0	
Water Table Present?	Yes ○	No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot occupied a shallow swale, but it was still moderately well elevated above nearby wetland sample plot 5A.

VEGETATION - Use scientific names of plants

Sampling Point: 05b

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Herb Stratum (Plot size: 78.5 sf)			
1. *Poa pratensis*	40	☑	FACU
2. *Schedonorus arundinaceus*	40	☑	FACU
3. *Glechoma hederacea*	5	☐	FACU
4. *Rumex crispus*	5	☐	FAC
5. *Taraxacum officinale*	5	☐	FACU
6. *Solidago canadensis*	5	☐	FACU
7. *Elymus repens*	10	☐	FACU
8. *Dactylis glomerata*	10	☐	FACU
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	120	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

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

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	5	x 3 =	15	
FACU species	115	x 4 =	460	
UPL species	0	x 5 =	0	
Column Totals:	120	(A)	475	(B)

Prevalence Index = B/A = 3.958

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in an open, grassy area.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 05b

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-9	10YR	2/2	100						Silt Loam	
9-20	10YR	3/3	100						Sandy Loam	flecks dark material

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric soil indicators.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Waunakee Library **City/County:** Waunakee, Dane Co. **Sampling Date:** 09-Jun-17

Applicant/Owner: Waunakee Library Board **State:** Wisconsi **Sampling Point:** 05c

Investigator(s): Scott Taylor **Section, Township, Range:** **S.** 5 **T.** 8N **R.** 9E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** 43.193247 **Long.:** 89.449872 **Datum:** NAD83

Soil Map Unit Name: Plano silt loam (PnB) **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ○ No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Using the Natural Resource Conservation Service weighted-month method, antecendent moisture, based on total precipitation for the previous 3 months (March-Wet; April-Wet; May-Normal), was found to be above average. In the month of fieldwork (June), there was no precipitation to date.

Hydrology

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0	
Water Table Present?	Yes ○	No ◉	Depth (inches):	0	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. The plot was well elevated above the nearby wetland sample plot 5A.

VEGETATION - Use scientific names of plants

Sampling Point: 05c

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 2,826 sf)			
1. *Populus deltoides*	20	☑	FAC
2. *Morus alba*	15	☑	FACU
3. *Acer negundo*	20	☑	FAC
4. *Acer saccharinum*	10	☐	FACW
5.	0	☐	
6.	0	☐	
7.	0	☐	
	65	= Total Cover	
Herb Stratum (Plot size: 78.5 sf)			
1. *Poa pratensis*	80	☑	FACU
2. *Solidago canadensis*	70	☑	FACU
3. *Schedonorus arundinaceus*	10	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
12.	0	☐	
	160	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0	= Total Cover	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 40.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	40	x 3 =	120
FACU species	175	x 4 =	700
UPL species	0	x 5 =	0
Column Totals:	225 (A)		840 (B)

Prevalence Index = B/A = 3.733

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

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

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

The plot was in a brushy area with a grassy ground layer.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 05c

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc[2]	Texture	Remarks
0-12	10YR	3/2	100						Sandy Loam	many rocks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

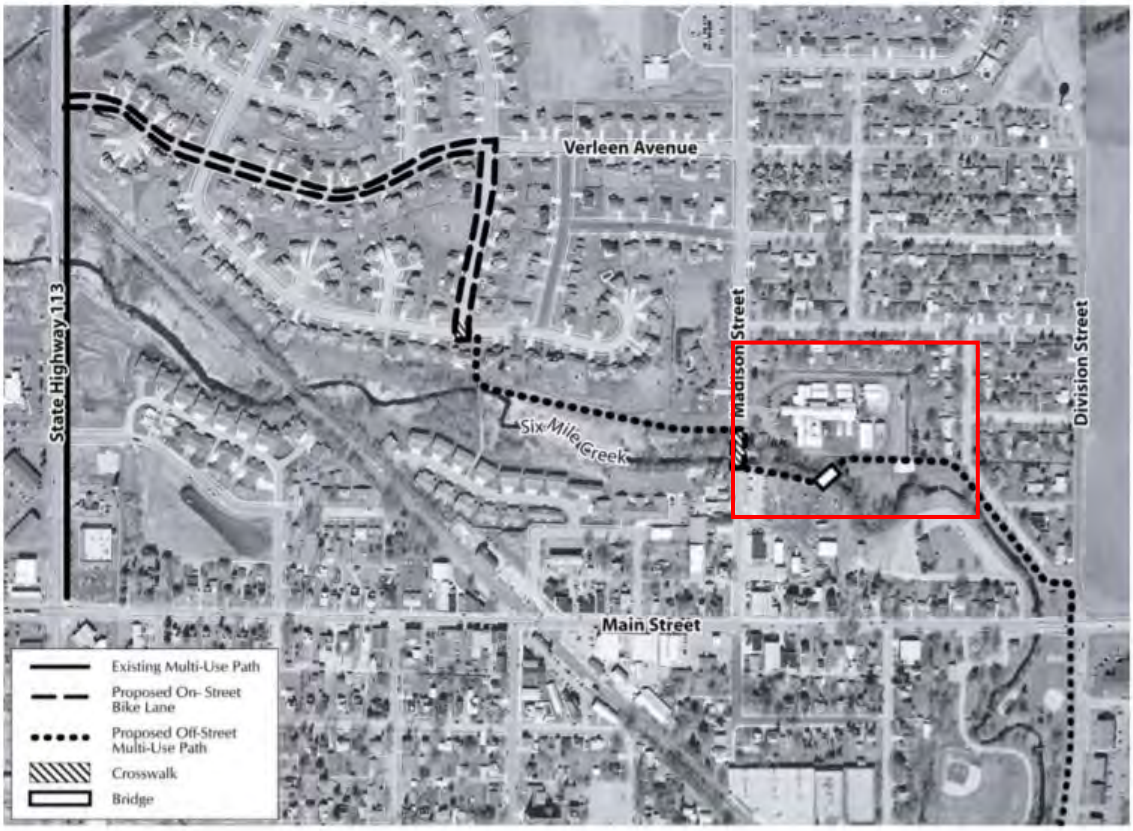
No hydric soil indicators. The plot was only dug to 12 inches due to the abundance of rocks.

TRAIL CONNECTIVITY

This project will fulfill objectives set forth by planning documents for bike trails in the area.

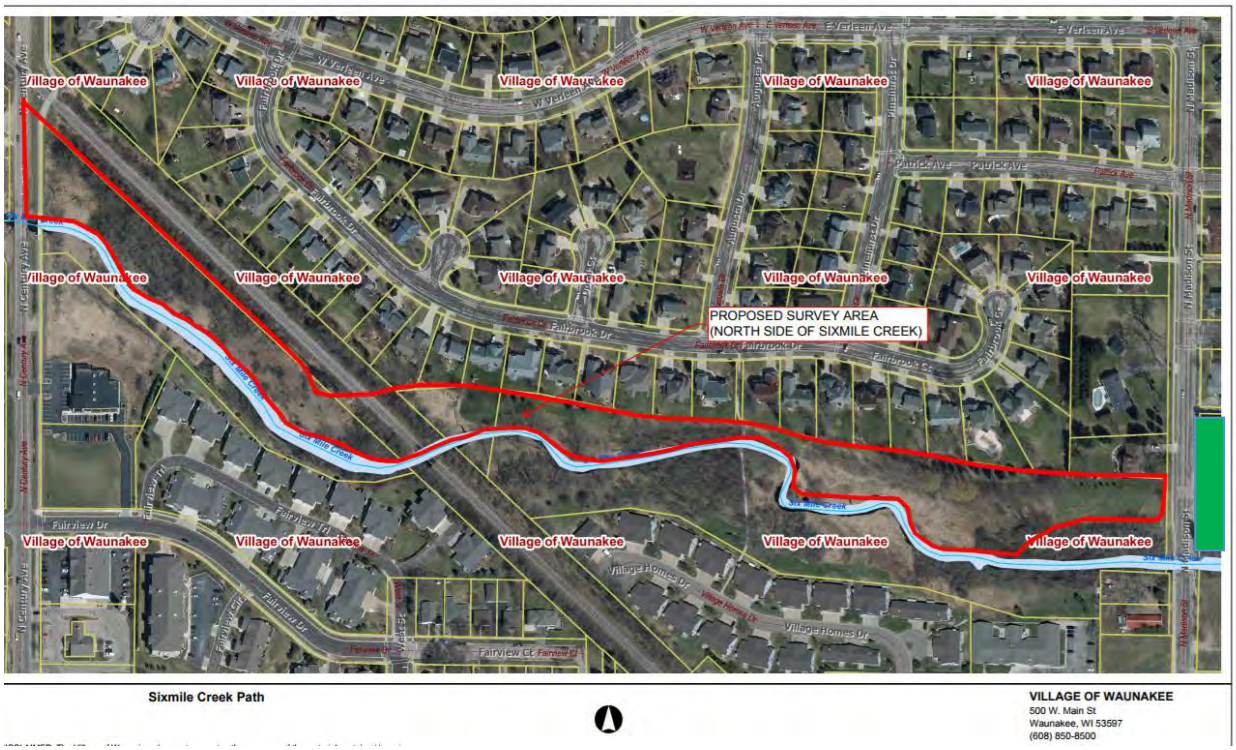
Please see the excerpt from the "Waunakee-Westport Bicycle and Pedestrian Plan" which was adopted by Waunakee in February of 2005. It shows the desire for trail connectivity from STH 113 to Division Street. Our project site is highlighted by the red box. Our proposed design keeps the trail on the north side of Six Mile Creek from Madison Street to Pleasant Drive. This helps fill the objective plan for that was highlighted twelve years ago.

Map 6: North Six Mile Creek Path and Lanes Concept



Waunakee Library
Trail Connectivity

In May of 2018, the Village commissioned Strand to investigate the feasibility of a trail along the Six Mile Creek Corridor. This would shift the previously planned out bike path from residential streets to the Six Mile Creek corridor. The Library site is in the far east of this map as shown in the green box and would provide the connection piece for this project.



New Public Library
Waunakee, WI

Narrative Description

Please find below a narrative description of the project that contains the requested information for the WisDNR wetland fill permitting.

The proposed project is to construct a new public library. The site consists of a new two story library building, parking lot, multi-use trail, stormwater management features, pedestrian bridge, and landscaping. The site also encompasses underground utilities, outside patios, and sidewalks. The purpose and need of the project is to construct a new public library for the Village of Waunakee. The existing Library is outdated, undersized, and land locked. This project will allow the Village of Waunakee to serve its residents for decades to come.

The exiting abandoned factory that sits at the current site will be demolished during the month of September. Construction procedures will be the following: First the topsoil will be stripped within the grading limits of the project site, clean well drained soils will be imported and compacted until the desired subgrade elevation is met. The driveway to Pleasant Drive will then be installed to ensure that offsite drainage will be routed through the site with the proper erosion control. This will be critical to avoid offsite stormwater from entering and creating more erosion of the disturbed soils. Next, the proposed wet ponds will be installed, and then the installation of underground utilities will start. Once utilities are complete, the building foundation footings and walls will be poured. All areas that have pavement will have aggregate base course installed and fine graded. Concrete curb & gutter will be poured first, then asphalt pavement will be installed. Landscape areas will then be topsoiled, seeded, and erosion mat applied.

Materials that will be used onsite will include, clean well drained fill, aggregate base course, concrete, asphalt pavement, steel reinforcement, HDPE pipe, concrete pipe, ductile iron pipe, copper pipe, building materials, topsoil, erosion control products, fencing, geotextile fabric, and landscape rock.

The long term site management responsibilities will include a recorded maintenance agreement for the wet pond, oil and grease water treatment, storm sewer inlets, manholes, and piping. Items will be checked at least on an annual basis if not semi-annually.

Once all permits have been obtained, we anticipate the project starting in March of 2018. The schedule and sequence of work anticipates being the following:

Install erosion control, strip topsoil, build pond	March 2018
Import fill, underground utilities	April 2018
Foundations and Building Construction	May 2018
Concrete curb & gutter and pavement	Fall 2018
Spread topsoil, seed, mulch	Spring 2018
Landscape trees, shrubs, rock	Spring 2019
Facility Open	May 2019

During construction activities erosion control will be a key element in protecting the local Six Mile Creek watershed and the existing wetlands onsite. Erosion control to be used on the site, include the following.

New Public Library
Waunakee, WI

Narrative Description

Temporary – Silt Fence, Type D Inlet Protection, Erosion Mat, Staged Construction, Sedimentation Basin, Rock Construction Entrance, Culvert Inlet Protection

Permanent – Wet pond, sumps in stormwater catch basin manholes, rip rap pads

Temporary stockpiles of topsoil will be stored onsite with silt fence encompassing the piles. The grading on site requires fill, so excess soil will not occur.

Disturbances and wetland fill occur in three distinct areas of the site. The first area is to the north where an existing ditch wetland will be filled in as the parking lot is constructed. The second area is where the majority of the wetland fill will take place, this is located on the east side of the property. As the road is constructed through this area, the wetland will be filled. The last wetland fill area will be with the construction of two bridge abutments. This fill area will be relatively small. Please see the attached plan sheets showing the exact areas and locations of the wetland fill. This fill will consist of well drained soils, aggregate base course, asphalt pavement, storm pipe, and topsoil.

A breakdown of the wetland fill areas are as follows:
Area #1 – 200 sq. ft. (Sheet C4.1)
Area #2 – 535 sq. ft. (Sheet C4.1)
Area #3 – 146 sq. ft. (Sheet C4.2)
Area #4 – 6,284 sq. ft. (Sheet C4.2)
Area #5 – 57 sq. ft. (Sheet C4.3)
Area #6 – 98 sq. ft. (Sheet C4.3)
Total Fill = 7,320 sq. ft.

Vegetation along the creek will be cut, cleared, and replanted with native vegetation. No wetland disturbance will be a part of this activity. Please see Sheet C4.6 for more information.

There are no temporary wetland fills planned for this project. Wetland areas that are not being filled will be protected with silt fence and other barriers to protect the wetlands from being accidently filled in or disturbed during construction.

New Library
Waunakee, WI

Alternatives Analysis

Describe in detail the purpose and need for the project, and explain why the project must impact wetlands

- The purpose of the project is to construct a new library to serve the residents of Waunakee. The current library is too small and outdated to meet the needs of the community. The existing building was constructed in 1985 to serve a community of 5,000 people. Today the current population is 13,000 people and growing. The existing building is landlocked; it can't grow horizontally or vertically. The building is overcrowded and uninviting, there is no reason for patrons to stay around and linger. The existing infrastructure within library is not current and up to date with today's high tech world. There is insufficient space for staff to perform efficiently. There is a shortage of parking stalls for staff and patrons.

  Due to the amount of traffic, location, fire protection needs, and connectivity to the community, wetlands must be crossed in two different areas on the site. A connect through road must be constructed to construct the new library at this location.

Explain if the project an expansion of existing work or is it new construction

- The project is new construction. The proposed site is a contaminated foundary/factory site that the Village is currently in the process of cleaning up and demolition.

Describe in detail any alternative locations or designs to avoid wetland impacts.

1. <u>Relocate the building to the far north of the site, connect to Pleasant Drive with a straight connection. (Sheet A1)</u>

   The proposed building and parking as it is shown is pushed to the northern edge of the site. To gain connectivity, the Village would need to perform an involuntary taking of the single family home located on lot 17. This would add approximately $400,000 to the project and have a very negative perception to the project.

2. <u>Change the secondary driveway location to come from the south. (Sheet A2)</u>

   Changing the driveway to cross Six Mile Creek to the south instead of across the wetland to the east. This will still result in some wetland fill, just not as much. This will have impact on the creek and floodplain. These impacts might be the same or worse than the original wetland fill. The second driveway location also doesn't accomplish the intended desire of a true second entrance as it is on the south side of the creek. The cost of a full 2 lane traffic loaded bridge would add at least $500,000 to the project.

3. <u>Move the site; investigate purchasing a different piece of property nearby.</u>

   The village conducted a study of sites in 2006 and 2007. Some results of that study are attached to this report. The library is needed and wanted near the newly redeveloping downtown of Waunakee. A new Greenfield site near the edges of Waunakee are not in the best interest of the community.

New Library
Waunakee, WI

Alternatives Analysis

4. Move the site outside the area to a different community.
   This can't happen as it is a Village owned library.

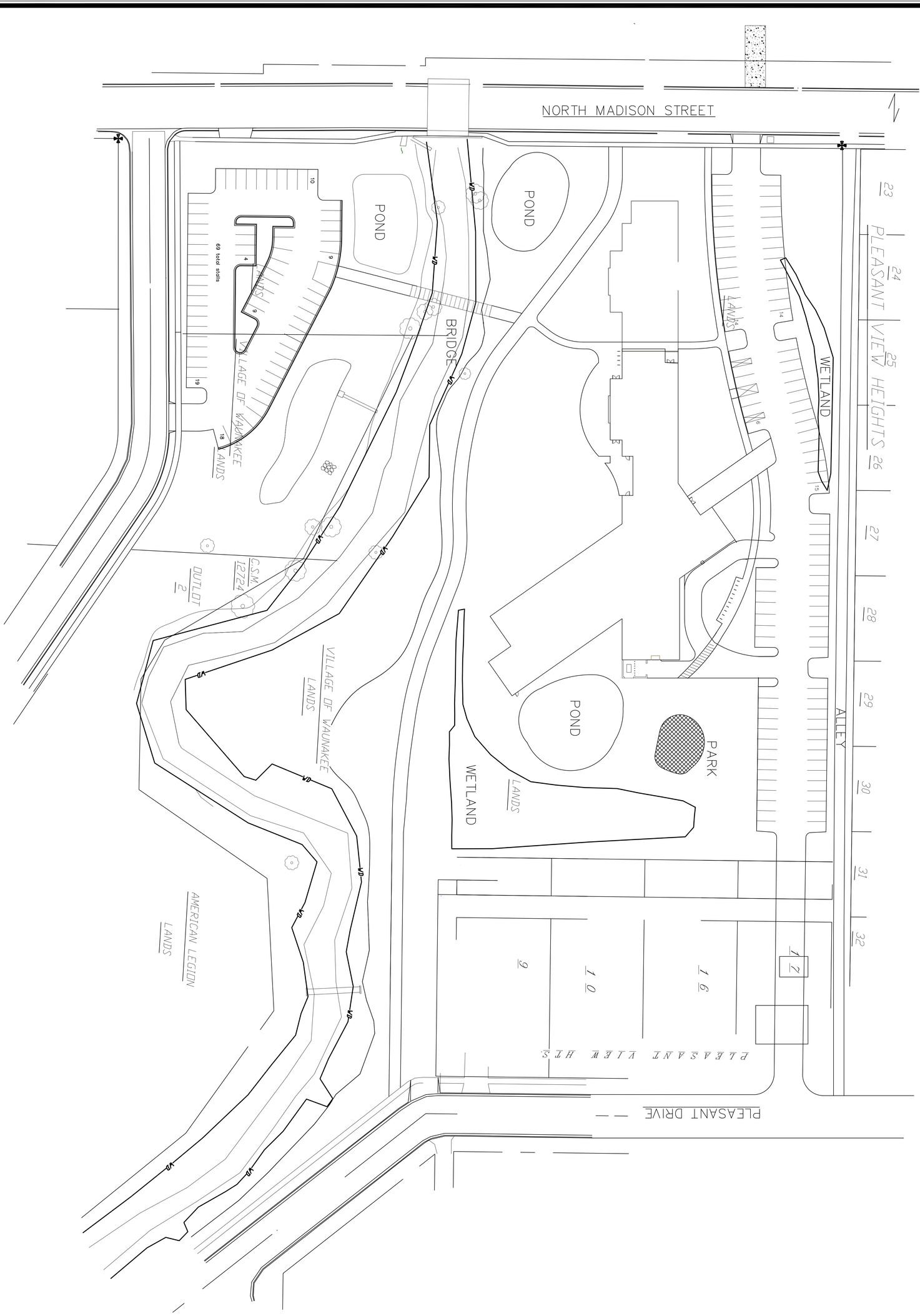
5. Tear down the existing Library, Rebuild at the existing site.
   The cost to house and rent out the existing library books and equipment, while to be continually serving the community from a library standpoint would be very cost prohibitive. The existing site is also short on parking, as it is adjacent to the existing high school.

Explain what you plan to do to minimize adverse effects on the wetlands during your project

During construction the delineated wetland area will be encompassed in silt fence to protect from erosion, unintentional rutting from construction vehicle traffic, and unintentional grading. The wet ponds will be over excavated and used as a sedimentation basin during construction activities.

Design elements that are included in the plan to help minimize the wetland disturbance include:

- Parking on the east side of the project site was eliminated to avoid more wetland fill. A second parking lot is being added to the project south of the creek. This will help make up for the lost parking stalls that were taken from wetland avoidance.
- Side slopes were graded out to the maximum extent at a 3:1 slope around any wetland fill.



WAUNAKEE LIBRARY

ALTERNATIVE ANALYSIS SITE PLAN 1

VILLAGE OF WAUNAKEE, DANE COUNTY, STATE OF WI

SNYDER & ASSOCIATES, INC.

5010 VOGES ROAD
MADISON, WISCONSIN 53718
608-838-0444 | www.snyder-associates.com

MARK	REVISION	DATE	BY

Engineer: ENG	Checked By: CHKD	Scale: 1" = SCALE	
Technician: TECH	Date: 8/9/2017	Field Bk:	Pg:
Project_No:		A1	

Project_No:
A1

WAUNAKEE LIBRARY

ALTERNATIVE ANALYSIS SITE PLAN 2

VILLAGE OF WAUNAKEE, DANE COUNTY, STATE OF WI

SNYDER & ASSOCIATES, INC.

5010 VOGES ROAD
MADISON, WISCONSIN 53718
608-838-0444 | www.snyder-associates.com

MARK	REVISION	DATE	BY

Engineer: ENG	Checked By: CHKD	Scale: 1" = SCALE	
Technician: TECH	Date: 8/9/2017	Field Bk:	Pg:
Project_No:		A2	

Project_No:
A2

LIBRARY SITE EVALUATION STUDY

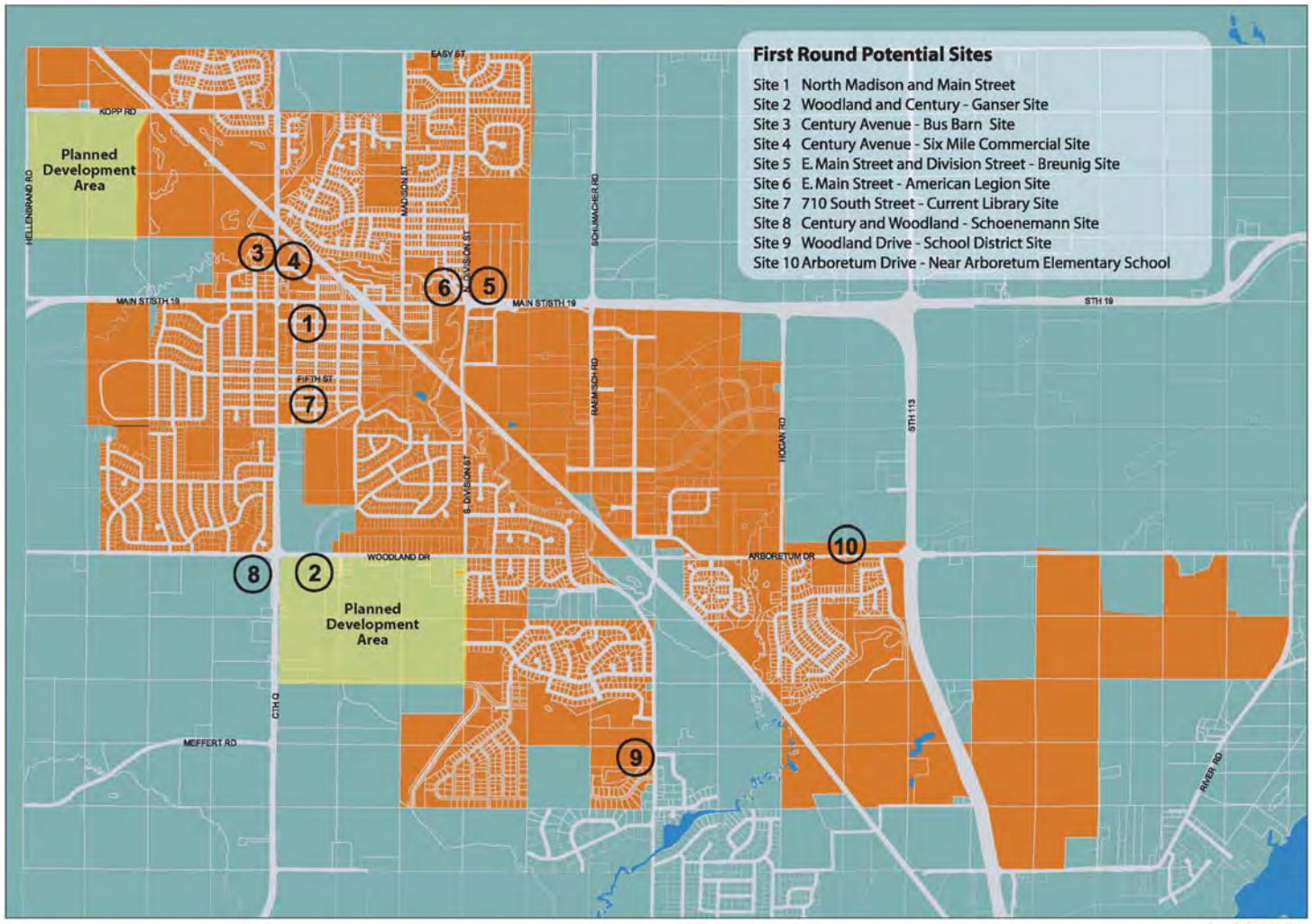
AD HOC LIBRARY STUDY COMMITTEE
WAUNAKEE PUBLIC LIBRARY

November 13, 2007

Status Report

- Completed Round 1 and 2 Evaluations (Sites 1-11)
- Evaluated Supplemental Sites (Sites 12-15)
- Detailed Site Analysis:
  - Site 1 Downtown Site
  - Site 2 Ganser Site
  - Site 5 Breunig Site
- Conducting Land Value Appraisals

Round 1 and 2 Process



Sites Recommended for Further Evaluation

- Site 1 Downtown
  - Free-Standing Building
  - Mixed-Use Project
- Site 2 Ganser
- Site 5 Breunig
- Site 7 Existing Library

Supplemental Sites Identified by Ad Hoc Library Committee

- Site 12 Waunakee Alloy Site
- Site 13 Village Hall Site
- Site 14 Kennedy Hahn Site
- Site 15 Waunakee School Playfields

Waunakee Library Site Evaluation
Site 12 - Waunakee Alloy

October 30, 2007

1 inch equals 100 feet

N

StockhamConsulting
Urban Planning & Development Services

Waunakee Library Site Evaluation
Site 13 - Village Hall

October 30, 2007

1 inch equals 125 feet

N

StockhamConsulting
Urban Planning & Development Services

Waunakee Library Site Evaluation
Site 14 - Kennedy Hahn

October 30, 2007

1 inch equals 125 feet

N

StockhamConsulting
Urban Planning & Development Services

Waunakee Library Site Evaluation
Site 15 - Waunakee Schools Practice Field

November 5, 2007

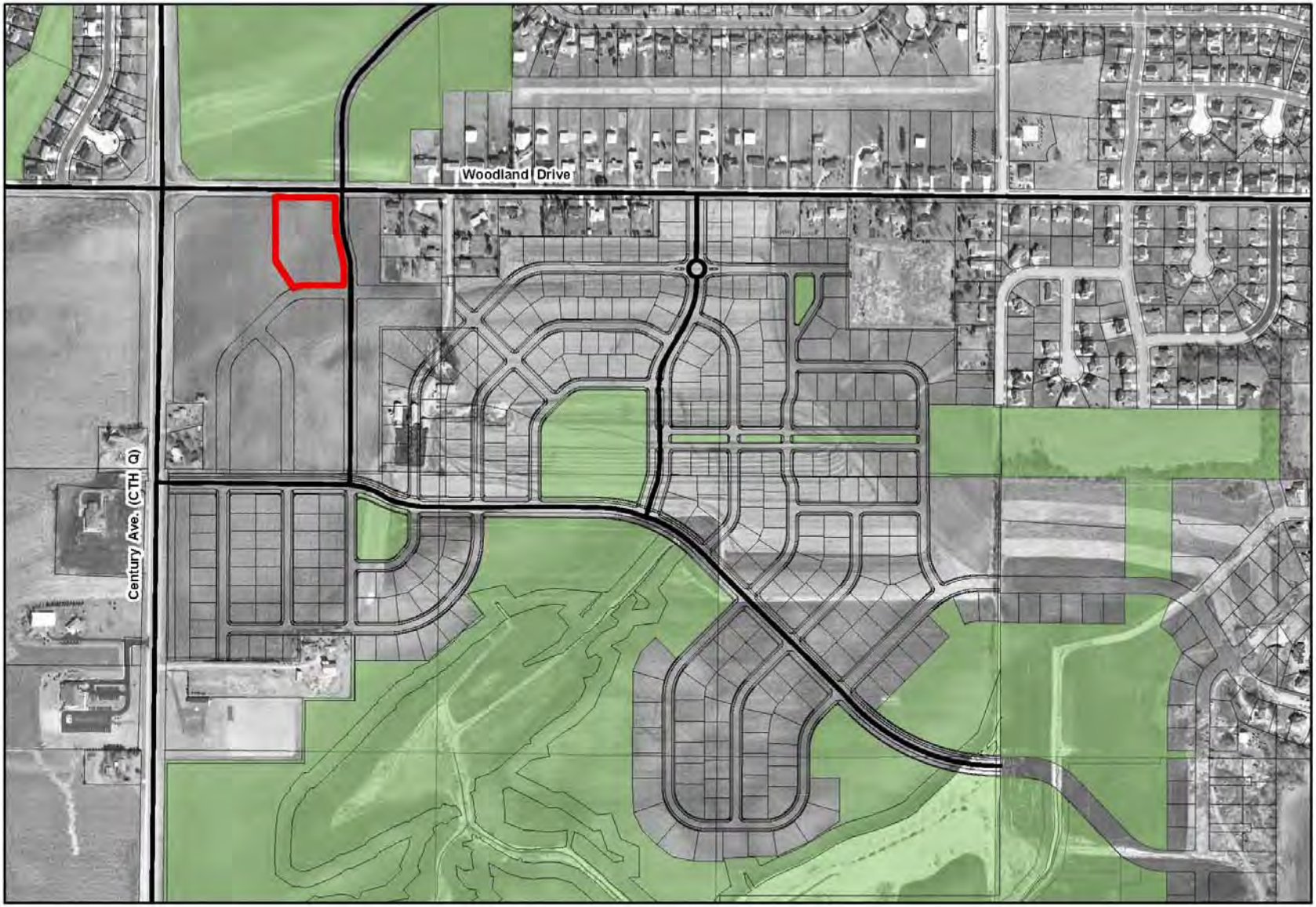
1 inch equals 125 feet

N

StockhamConsulting
Urban Planning & Development Services

Detailed Site Plans

- Site 1 Downtown Site
  - Mixed-Use Building
  - Free-Standing Building
- Site 2 Ganser Site
- Site 3 Bruenig Site



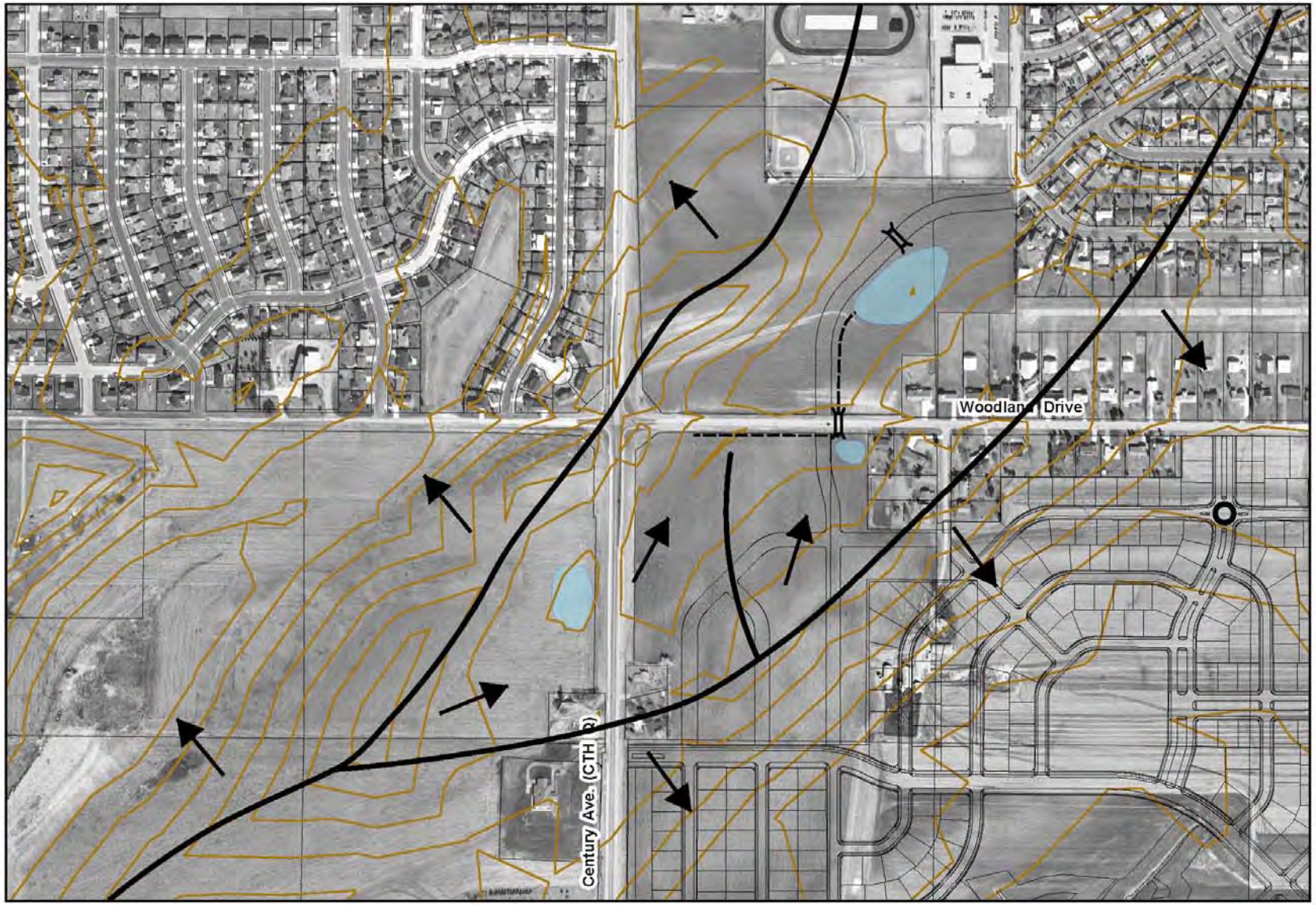
Waunakee Library Site Evaluation
Site 2 - Southwest Area Plan

November 13, 2007

0 125 250 500 750 1,000 Feet

N

StockhamConsulting
Urban Planning & Development Services



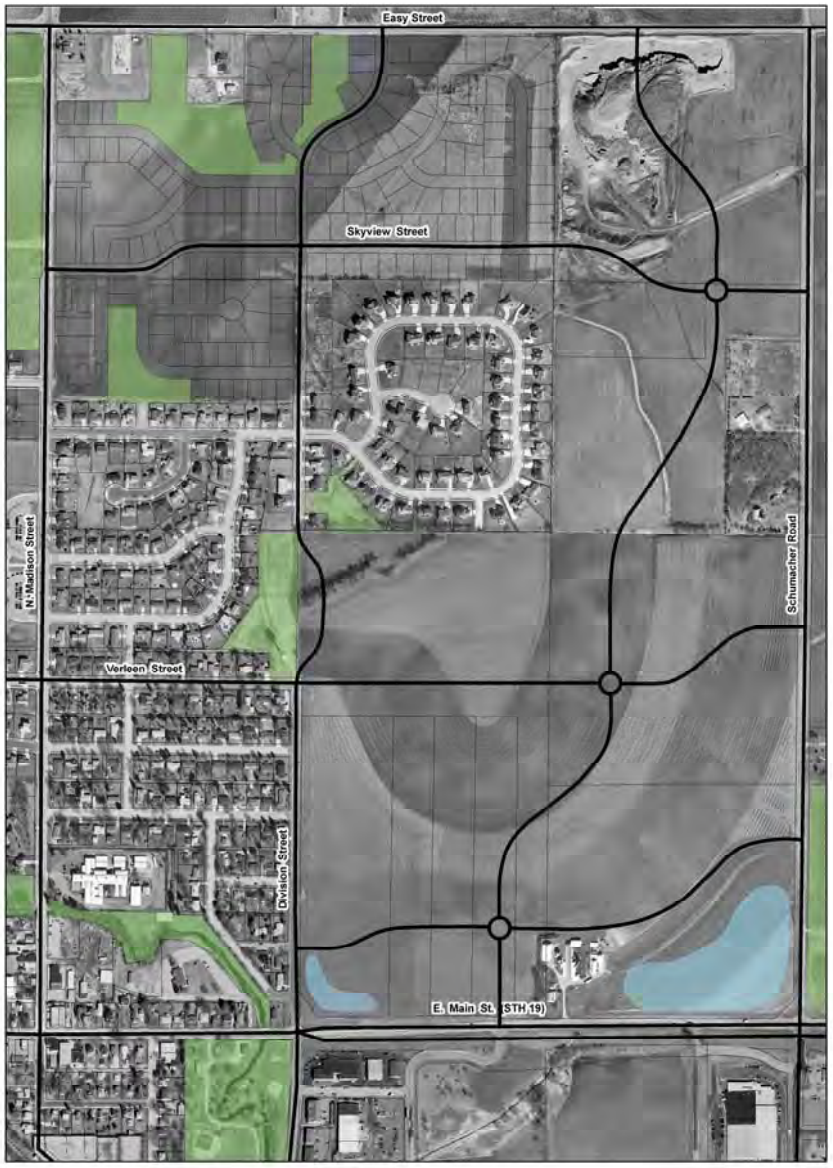
Drainage
Waunakee Library Site Evaluation
Site 2 - Ganser

November 13, 2007

0 115 230 460 690 920 Feet

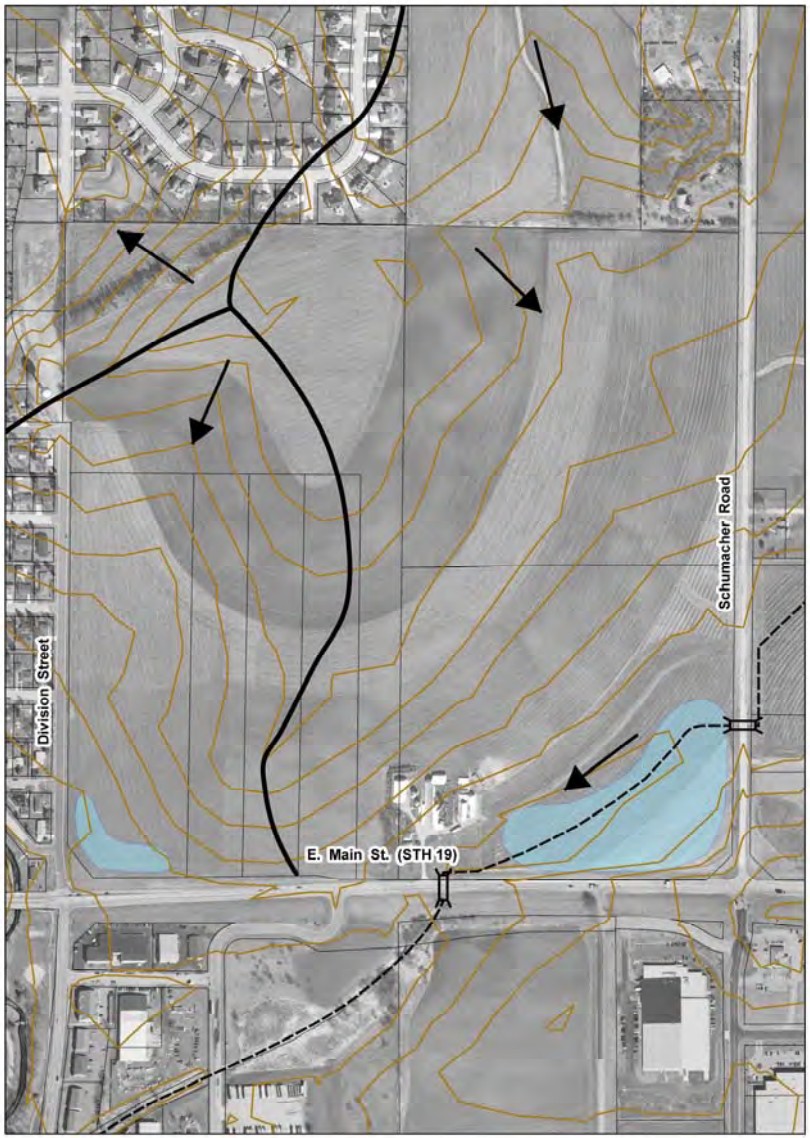
N

StockhamConsulting
Urban Planning & Development Services



Waunakee Library Site Evaluation
Site 5 - Northeast Area Plan
November 12, 2007

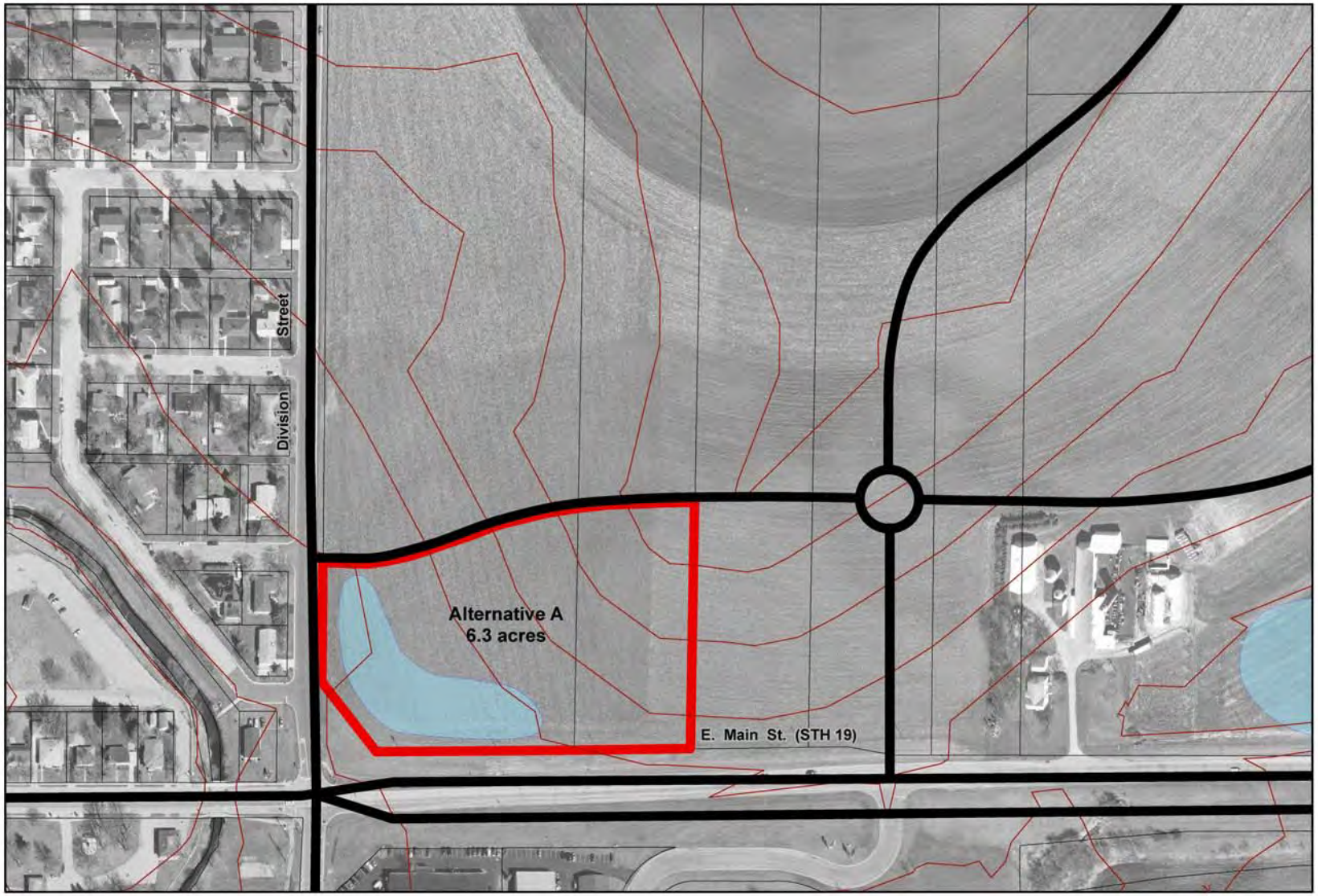
Stockham Consulting



Drainage
Waunakee Library Site Evaluation
Site 5
November 12, 2007

0 75 150 300 450 600 Feet

StockhamConsulting



Waunakee Library Site Evaluation
Site 5 - Alternative A

November 12, 2007

0 125 250 500 Feet

StockhamConsulting
Urban Planning & Development Services

Staff Recommendation for Nov. 28th Public Info Meeting

- Document 15 Site Evaluation Process
- Provide Detailed Site Plans:
  - Site 1 Downtown Site
    - Free-standing Alternative
    - Mixed Use Alternative
  - Site 2 Ganser Site
  - Site 5 Breunig Site

The Rusty Patched Bumble Bee (*Bombus affinis*)

Interagency Cooperation under Section 7(a)(2) of the Endangered Species Act
Voluntary Implementation Guidance

Version 1.1
U.S. Fish & Wildlife Service, Regions 3, 4, 5 and 6

March 21, 2017

Contents

Background and Purpose

On January 11, 2017, the U.S. Fish and Wildlife Service (FWS) published the final rule to list the rusty patched bumble bee (*Bombus affinis*) as an endangered species under the Endangered Species Act (ESA) (U.S. Fish and Wildlife Service 2014). The listing becomes effective on March 21, 2017.

In accordance with ESA section 7(a)(2), federal agencies must consult with FWS on any proposed or ongoing action that may affect the species to ensure that actions do not jeopardize the species' continued existence. This consultation may also facilitate the development of conservation actions that would allow federal agencies to meet the purposes of section 7(a)(1) of the ESA.

The purpose of this document is to provide voluntary guidance to help FWS and action agency biologists to determine which ongoing or proposed federal actions may affect the rusty patched bumble bee and to analyze those potential effects to ensure that section 7(a)(2) consultation requirements are met efficiently. The suggestions and alternatives provided in this document are subject to continual improvement and modification and agencies may use any approach or methodology that ensures compliance with ESA Section 7 and implementing regulations at 50 CFR Part 402. In addition, we encourage and expect deviation from these recommendations whenever appropriate to respond to distinct or differing conditions in areas that may be affected by federal actions. Finally, we note that any use of mandatory language throughout this guidance refers to lawful obligations present in statute or regulation. This guidance does not bind agency personnel and does not create any new mandatory procedure or requirement for the public.

Current Versions of this Guidance

Check to make sure that you have the most recent version by comparing to the guidance version number at the following website – http://www.fws.gov/midwest/endangered/insects/rpbb/guidance.html.

Range of Rusty Patched Bumble Bee

The rusty patched bumble bee inhabits various habitat types in the United States and southern Canada (Fig. 1). The species was broadly distributed historically across the eastern United States, upper Midwest, and southern Quebec and Ontario, an area comprising 31 states or provinces and 394 U.S. counties and 38 county-equivalents in Canada. Since about 2007, the species' distribution has declined across its range in the U.S.; current records and associated high potential zones (defined below) occur only in 9 states and 49 counties (Fig. 1). Similar declines have occurred in Canada where it was listed as Endangered on Schedule 1 of the Species at Risk Act in 2012 (Szymanski et al. 2016).

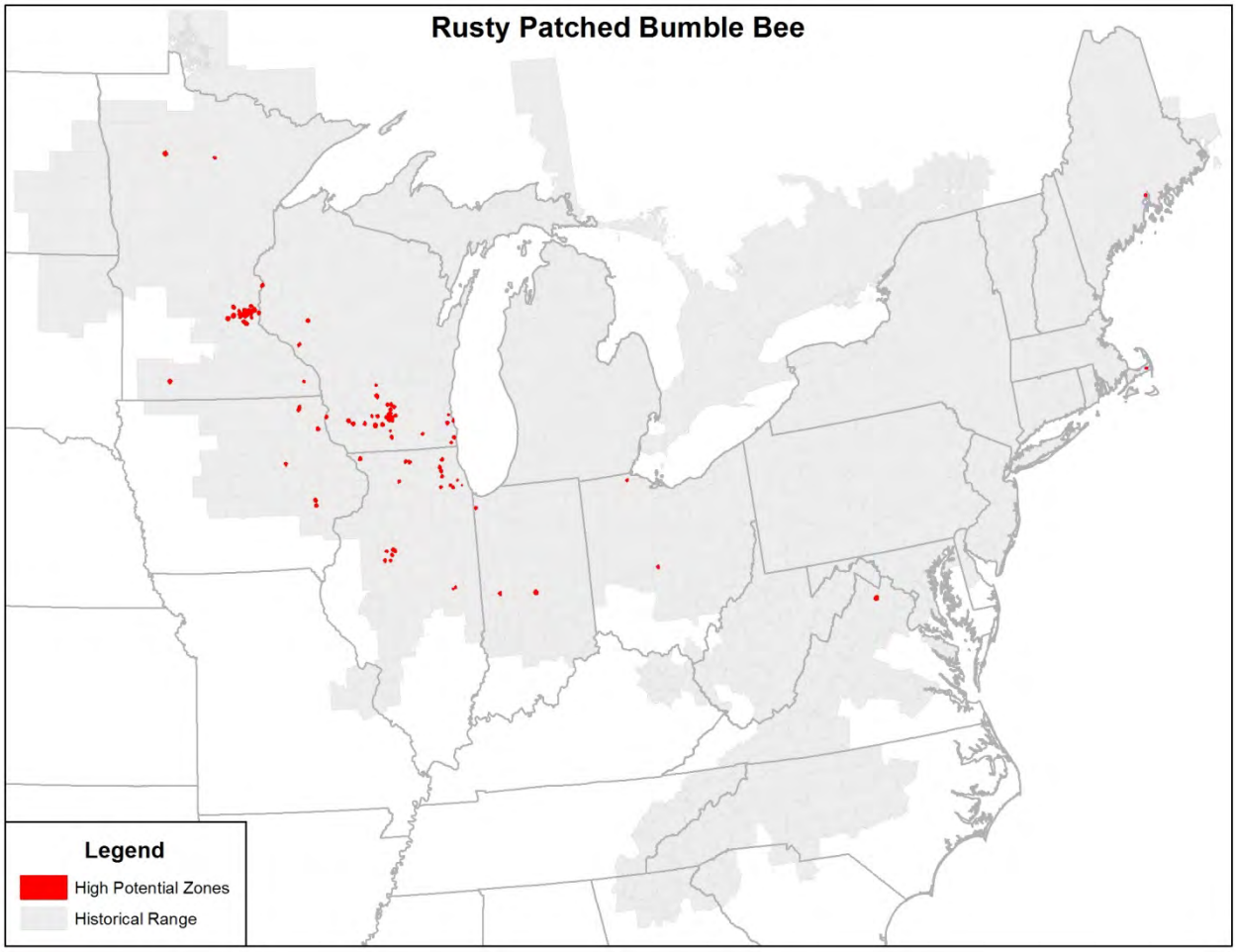


Figure 1. Areas where there is evidence for the likely persistence of the rusty patched bumble bee in the United States (highlighted in **red** to increase visibility), based on the habitat model (described below) and on species survey data compiled from 2007 through 2016 (U.S. Fish and Wildlife Service Rusty Patched Bumble Bee Unpublished Geodatabase). The approximate historical range of the species is shown in light gray.

Brief Description of the Habitat Model

The Minnesota/Wisconsin FWS Field Office has adapted a habitat connectivity model to identify the zones around current (2007-2016) records where there is a high potential for the species to be present. This model allows us to assess the likelihood of bumble bee movement away from the locations of known records based on the manner in which various land uses and conditions may affect those movements. Land classes are based on the National Land Cover Database and are grouped as having strong, moderate, weak, or no limits on rusty patched bumble bee movement based on the best available information for this species or similar bumble bee species. This methodology was adapted from a model created to examine movement of the yellow-faced bumblebee (*B. vosnesenskii*, *i.e.*, Jha and Kremen 2013, entire). The zones generated from the rusty patched bumble bee model identify areas with high potential for the species to be present.

The model produces a series of irregular rings or strata around each record that represent successively decreasing likelihoods of movement by a bumble bee away from the point of observation. We have adapted the innermost 'ring' around each rusty patched bumble bee record, dated 2007-2016, to produce discrete zones where there is a high potential for the species to be present. Due to the variations in land condition around each record, the area of high potential averages about 2.5 miles (about 4 km) from observation points and together comprises only about 0.1% of the species' historical range (Fig. 1).

With respect to typical foraging distances and potential dispersal movements of rusty patched bumble bees, the high potential zones provide a reasonable basis for describing where the species is likely to be present for the purposes of section 7 consultation. Studies of other bumble bee species typically exhibit foraging distances of less than 0.6 mile (1 km) from their nesting sites (Knight et al. 2005, p. 1816; Wolf and Moritz 2008, p. 422; Dramstad 1996, pp. 163-182; Osborne et al. 1999, pp. 524-526; Rao and Strange 2012, pp. 909-911). In addition to typical foraging distances, however, we should also consider movements that rusty patched bumble bees may make to establish new home ranges – that is, dispersal. Based on studies of a closely related species,the buff-tailed bumble bee (*B. terrestris*), the maximum dispersal distance of the rusty patched bumble bee is likely about 0.6 to 6 miles (1-10 km, Kraus et al. 2009, p. 249; Lepais et al. 2010, pp. 826-827). Therefore, the high potential zones include the areas within which rusty patched bumble bees would move from the point of observation to forage and cover almost half of the area to which they may disperse.

In summary, the FWS concludes that the rusty patched bumble bee is likely to be present within "high potential" zones around each recent (2007-2016) record. These zones, although not of uniform size, have discrete boundaries that will be used by FWS field offices and served online via the FWS Information for Planning and Conservation website (IPaC, https://ecos.fws.gov/ipac/) to help action agencies determine when consultation under ESA section 7(a)(2) may be necessary.

Section 7 of the Endangered Species Act and the Rusty Patched Bumble Bee

Screening and Evaluation of Federal Agency Actions – A Stepwise Approach

Under section 7(a)(2) of the ESA, federal agencies, or their designated non-federal representatives, must consult with FWS on any action that may affect a species listed as threatened or endangered. Below we provide options for meeting this requirement for the rusty patched bumble bee. We invite agencies to use any alternative methodologies that meet these same ends.

Step 1. Determine whether the rusty patched bumble bee is likely to be present in the action area.

Due to the species' restricted distribution (Fig. 1), agencies should first determine whether an action area overlaps with locations where the species is likely to be present – high potential zones. The action area is not only the immediate area involved in the action, but includes all areas to be affected directly or indirectly by the Federal action (50 CFR § 402.02). The action area is not always limited to the "footprint" of the action, but encompasses the biotic, chemical, and physical impacts to the environment resulting directly or indirectly from the action.

For those actions that affect all or part of any high potential zones, additional analysis should be conducted to determine whether the species may be exposed to stressors associated with the action and, if necessary, how they will respond. Below we provide two options for completing the first step. Option 1 involves the use of the IPaC website (https://ecos.fws.gov/ipac/) and is useful for discrete action areas or for simply determining whether the rusty patched bumble bee is likely to be present in any county. The second option may be preferred by agencies that want to review discrete actions areas that span large geographic areas or have an established process for screening projects with a FWS field office that does not involve the use of IPaC. Action agencies are free to use any alternative approach that accurately assesses whether the species is likely to be present in the action area.

Regardless of which option or approach is followed, the FWS will rely on information in its rusty patched bumble bee database and the results of a habitat connectivity model as a starting point to determine where the species is likely to be present. As described above, the high potential zones developed with this model will be based on 2007-2016 records for the species. Action agencies may look for overlaps between the action area and the modeled high potential zones to determine which actions should be reviewed more closely for effects to the rusty patched bumble bee. This screening may be done either automatically – by using IPaC (Option 1, below) – or by working directly with a FWS field office (Option 2, below), or with another approach that provides reliable information.

Option 1 – Use the FWS Information for Planning and Conservation website (IPaC, https://ecos.fws.gov/ipac/).

Preliminary/Coarse Screening at the County Level

A precise analysis of the action area will be needed for some actions, but agencies may first want to determine if a listed species is likely to be present in the county or counties that the action will affect. To obtain a list of endangered species that could be affected by activities in any county, use the IPaC website (https://ecos.fws.gov/ipac/). If the rusty patched bumble bee is on the list of endangered species generated in IPaC for the county, refer to the instructions immediately below – ***Screening Precisely Described Action Areas***.

If the rusty patched bumble bee is *not* on the list of endangered species you generate in IPaC by selecting one or more counties, the species is not likely to be present in those counties. Consultation under section 7(a)(2) is not required for federal actions that will not affect listed species. In this event, the action agency is advised to document this finding for its administrative record (Fig. 2).[1]

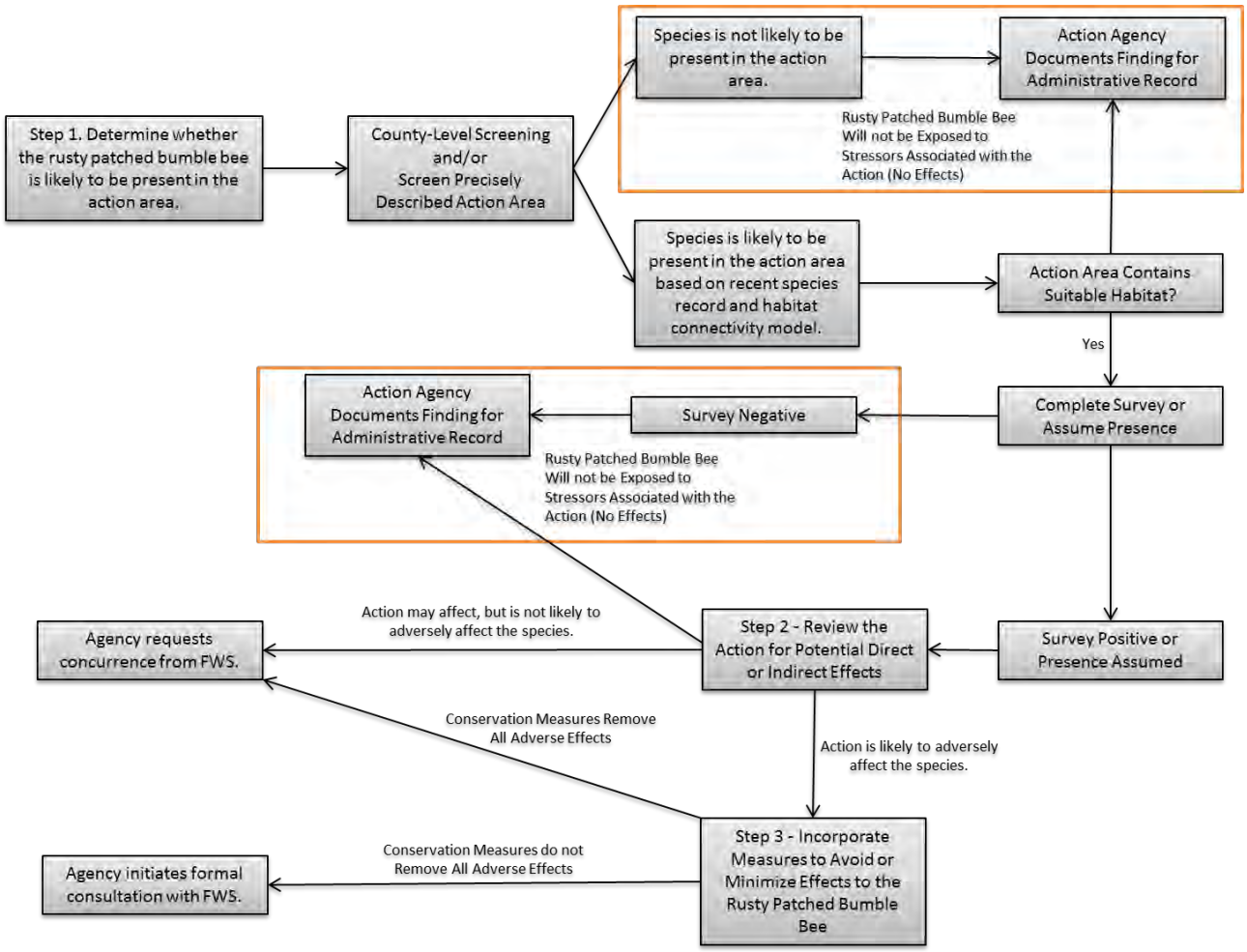


Figure 2. Consultation flow chart with specific reference to the rusty patched bumble bee. This flow chart follows a process that is laid out in the FWS guidance, but may not capture every possible avenue by which agencies could appropriately meet their section 7(a)(2) consultation requirements.

[1] Each Federal agency shall review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. (50 CFR 402.14).

Screening Precisely Described Action Areas

As an alternative or follow-up to a screening at the county level, you may define the action area in IPaC more precisely by using a sketch, polygon, or line or by uploading a shapefile.[2] If the resulting IPaC query generates a list of endangered species that includes the rusty patched bumble bee, the action area overlaps with one or more high potential zones where activities could affect the species. The action agency may contact the FWS field office to obtain further details regarding the nature of overlap with the high potential zone(s) (see **Step 2)**.

If the species is not on the list of endangered species generated for the action area by IPaC, it is unlikely to be present in the action area. Consultation under section 7(a)(2) is not required for federal actions that will not affect listed species. In this event, the action agency is advised to document this finding for its administrative record (Fig. 2).

Option 2 – Work directly with the FWS field office.

When agencies want to determine simply whether the rusty patched bumble bee is likely to be present in any county, they may use IPaC or other methods that may be established with particular FWS field offices. Due to limits on the nature and size of files that may be uploaded[2], however, IPaC may not work well for reviews of some precisely described action areas that cover large geographic areas. In addition, some agencies may prefer to work directly with FWS field offices or have established methods for screening projects that do not include the use of IPaC. In those cases, agencies may work with the FWS field office (https://www.fws.gov/offices/) directly to determine where their action area may overlap with any rusty patched bumble bee high potential zone.

Surveys

If the action area overlaps with a high potential zone (Fig. 1) and contains suitable habitat for the rusty patched bumble bee, the agency may assume that the species is present and proceed to Step 2 or it may complete a survey for the species. The results of a survey, if they are negative and are carried out in accordance with FWS-recommended survey protocol, would indicate that the species would not be exposed to stressors associated with the action (Fig. 2). Consultation is not required for actions that will not result in effects to listed species. In this situation, the action agency should document this finding for its administrative record (Fig. 2).

The action agency may, of course, conclude for any documented reason that the species is not likely to be present in the action area so long as the basis for its conclusion is supported in its administrative record. In other words, surveys are not required but represent one way to confirm the presence or absence of the species. Alternatively, for example, an agency may find that their action area does not contain suitable habitat for the species even when it overlaps with a high

[2] IPaC does not allow the uploading of shapefiles that consist of multiple line segments, but line segments may be converted to polygons in GIS by buffering the line segments and then uploading the polygon shapefile to IPaC. There is a 500 kB limit to file sizes uploaded to IPaC, but you may upload zipped shapefiles.

potential zone. When that is the case, surveys would not be necessary because the species would not be exposed to stressors associated with the action. Some areas within high potential zones do not contain suitable habitat for the species (Fig. 3).

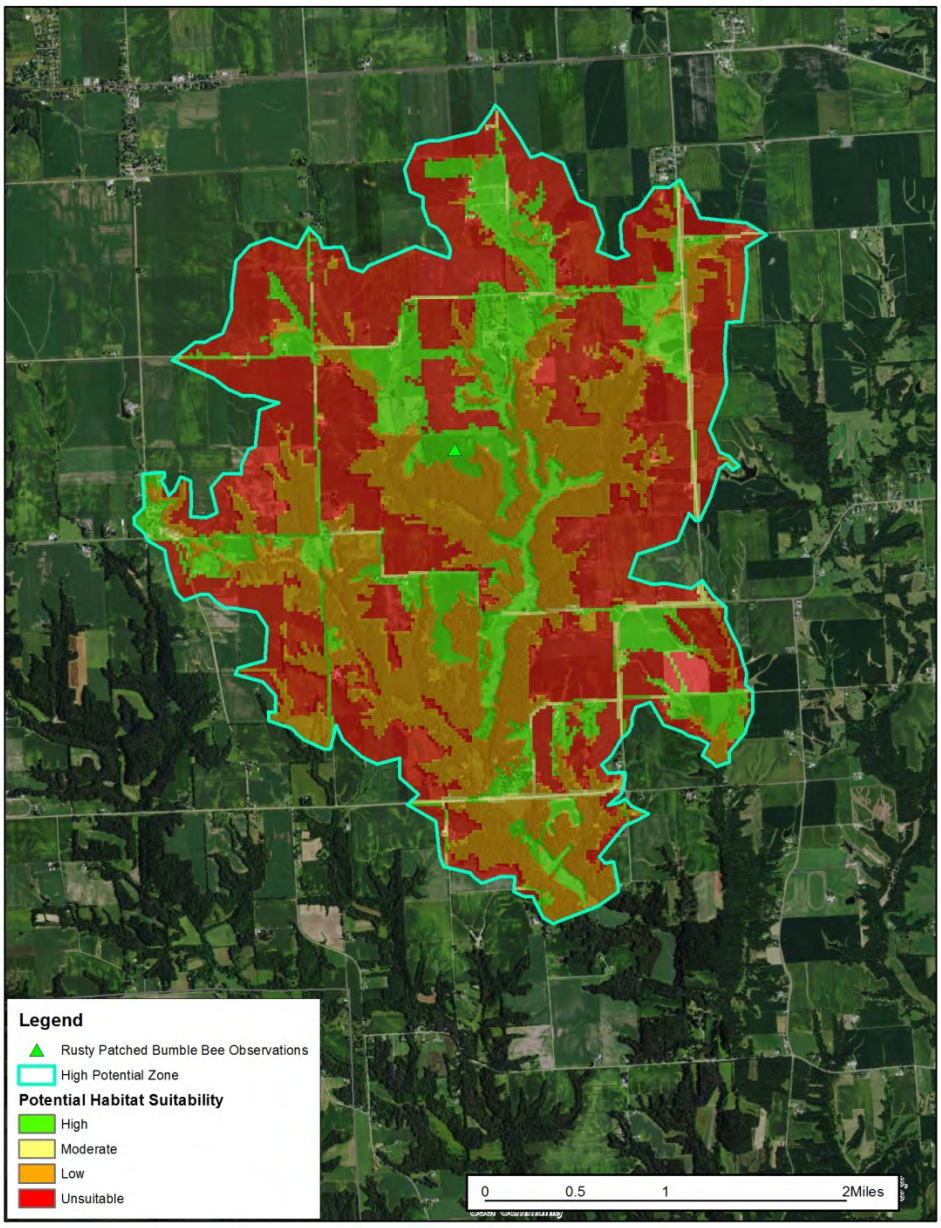


Figure 3. An example of one high potential zone for rusty patched bumble bee (outlined in light blue), based on the habitat model (described above) and on species survey data compiled from 2007 through 2016 (U.S. Fish and Wildlife Service Rusty Patched Bumble Bee Unpublished Geodatabase). For the purposes of section 7 consultation, the rusty patched bumble bee is likely to be present in suitable habitat within the high potential zone.

The FWS-recommended survey methods are provided in "Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*)" (protocol, www.fws.gov/midwest/endangered/insects/rpbb/guidance.html). The protocol recommends one sampling season of surveys with sufficient effort[3] to support a finding that the species would not be exposed to stressors associated with the federal action in the area surveyed. Note that surveys should be conducted within a year before the project is initiated for negative survey results to remain valid throughout the duration of the project unless new information (*e.g.*, new positive surveys) suggests that the species is likely to be present in the action area. In that case, action agencies and the FWS field office (https://www.fws.gov/offices/) should work together to ensure that the best available information is considered and that the appropriate consultation is carried out.

Step 2 - Review the Action for Potential Direct or Indirect Effects

If Step 1 indicates that the rusty patched bumble bee likely occurs in the action area based on the habitat model, the proximity of the action to one or more recent species records, surveys, or another method, the action agency should determine whether the species may be affected by the ongoing or proposed action. This is typically a two-step analysis to address: 1) will the species be exposed to one or more stressors associated with the action; and, 2) how will the species respond to the relevant stressors. FWS is available to assist with this process. In addition, the following information on the rusty patched bumble bee's life cycle and key habitat features will help assess the potential for effects.

Rusty Patched Bumble Bee Life Cycle - In Brief

The rusty patched bumble bee occurs in underground habitats throughout the year as solitary queens or in colonies that the queen initiates in the spring. During its active season, which is atypically long compared to other bumble bee species, access to diverse and abundant floral resources is essential. The rusty patched bumble bee's annual cycle begins in early spring with colony initiation by solitary queens and progresses with the production of workers throughout the summer (Fig. 4). Reproductive individuals (males and potential queens) are produced in mid- to late summer and early fall (Macfarlane *et al.* 1994, p. 4; Colla and Dumesh 2010, p. 45; Plath 1922, p. 192). The males and new queens (gynes, or reproductive females) disperse to mate and the original founding queen, males, and workers die. Colony sizes of the rusty patched bumble bee are considered large compared to other bumble bees, and healthy colonies may consist of up to 1000 individual workers in a season (Macfarlane et al. 1994, pp. 3-4). The new queens enter a form of hibernation to overwinter. The following spring, the queens (foundresses) emerge and

[3] Sufficient effort would consist of four approximately equally spaced sampling periods during the the sampling season (early June to mid-August); one-person hour of search time per three acres of suitable habitat using non-lethal netting techniques. The survey protocol provides further details on methods, techniques, and best practices (www.fws.gov/midwest/endangered/insects/rpbb/guidance.html) and is subject to continual improvement and modification.

search for suitable nest sites and collect nectar and pollen from flowers to support the production of eggs, which are fertilized by sperm she has stored since mating the previous fall. The queen is solely responsible for establishing the colony.

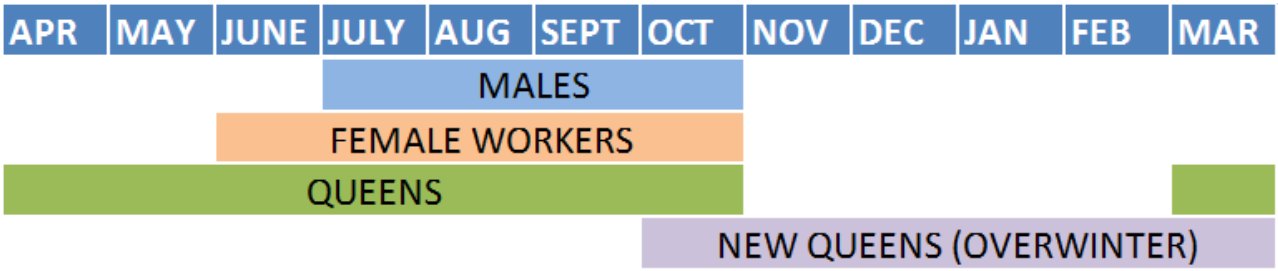


Figure 4. Phenology of the rusty patched bumble bee (modified from Colla *et al.* 2011, p. 46). The active season is roughly from mid- March through mid- October. The overwintering season is roughly mid-October through mid-March.

As the workers hatch and the colony grows, the workers assume the responsibility of food collection, colony defense, and care of the young, while the foundress remains within the nest and continues to lay eggs. During later stages of colony development, in mid-July, August, or September, the new queens and males hatch from eggs, disperse, and mate with individuals from other colonies. The newly mated queens overwinter for several months before emerging in the spring to start the cycle over. In Minnesota, for example, queens typically overwinter from October through March (E. Evans, U MN pers. comm. 2017) although they could remain active until November (Colla *et al.* 2011, p. 46, Figure 4).

Rusty Patched Bumble Bee Habitat – Key Features

The rusty patched bumble bee has been observed and collected in a variety of habitats, including prairies, woodlands, marshes, and gardens in parks and residential areas (Colla and Packer 2008, p. 1381; Colla and Dumesh 2010, p. 46; USFWS rusty patched bumble bee unpublished geodatabase 2016). It is a generalist forager for pollen and nectar like other bumble bees (Xerces 2013, pp. 27–28), but relies on diverse and abundant flowering plant species in proximity to areas that are predominantly free from ground-disturbing activities that may function as overwintering sites for hibernating queens (Goulson *et al.* 2015, p. 2; Potts *et al.* 2010, p. 349). Due to the early emergence of rusty patched bumble bees, woodlands and other habitats that support diverse early blooming spring flowers are likely important habitats, especially when they are near open areas utilized for summer foraging.

Active season habitat use (mid-March through mid-October) Rusty patched bumble bee nests are typically in abandoned rodent nests or other similar underground cavities (Plath 1922, pp. 190–191; Macfarlane *et al.* 1994, p. 4). Foraging rusty patched bumble bees utilize open areas containing nectar and pollen sources that are nearby their colony nest site. The rusty patched bumble bee requires floral resources near its nest sites. Studies of other bumble bee species found that those species typically forage less than 0.6 miles (1 km) from their nests (Knight *et al.* 2005, p. 1816; Wolf and Moritz 2008, p. 422; Dramstad 1996, pp. 163-182; Osborne *et al.* 1999,

pp. 524-526; Rao and Strange 2012, pp. 909-911). The rusty patched bumble bee is one of the first bumble bees to emerge early in the spring and among the last to go into hibernation. To meet its nutritional needs, therefore, the species requires a constant and diverse supply of flowers that bloom throughout the colony's long life cycle, at least from April through September (MacFarlane *et al.* 1994, p. 5), perhaps longer. The rusty patched bumble bee may be dependent on woodland spring ephemeral flowers because of their early emergence (Colla and Dumesh 2010, p. 45-46).

Overwintering habitat use (mid- October through mid-March) - Characteristics of rusty patched bumble bee overwintering habitats have been described only anecdotally. Other species of bumble bees typically form a chamber in soft soil, a few centimeters deep and sometimes use compost or mole hills to overwinter (Goulson 2010, p. 11). In November of 2016, a rusty patched bumble bee queen was observed a few centimeters deep in soft soil under a layer of leaf litter (B. Herrick, UW- Madison Arboretum, pers. comm. Dec. 15, 2016). Overwintering sites may typically be in uncompacted and often sandy, moss-covered soils on northwest exposures (E. Evans, University of Minnesota, pers. comm. 2017). When first emerging in the spring, rusty patched bumble bee queens likely rely on early blooming spring ephemerals and they may overwinter in woodland areas near these important foraging resources.

For a more complete description of rusty patched bumble bee habitat and life history, see information available on the USFWS website, https://www.fws.gov/midwest/endangered/insects/rusty patched bumble bee/.

Habitats Where the Rusty Patched Bumble Bee is Unlikely to be Present

Areas that meet the following descriptions are not suitable for the rusty patched bumble bee for nesting, overwintering, or foraging:

- permanently flooded areas/open water;
- paved areas;
- areas planted to annual row crops, such as corn and soybeans;
- forest where invasive shrubs are dominant and spring ephemeral flowers are absent; and,
- areas mowed too frequently to allow development of diverse wildflower resources (e.g., road shoulders).

In addition to the above, wetlands, where standing water may be absent but near the ground surface, are unsuitable for nesting or overwintering. Some wetland areas, however, could function as important foraging habitat.

Timing of Habitat Use

Rusty patched bumble bee habitat needs may be divided roughly into two broad categories – *underground habitats* for overwintering queens and active-season nesting; and, nearby areas supporting *diverse floral resources* to ensure season-long access to pollen and nectar. In the

spring, queens rely heavily on woodlands that support a variety of wildflowers before trees leaf-out and the canopy closes. After that, the species primarily uses open areas with floral resources through mid-October and nearby underground habitats (Fig. 4).

The species uses underground habitats throughout its life cycle. Due to the difficulty in finding the species when underground, nesting and overwintering habitats may only be described in a limited fashion (see above). Loose soils along forested edges and near open fields, however, may be especially important for overwintering habitat. During the active season (mid-March through mid-October, see Fig.4), however, the species searches actively for flowers. That drives its selection of habitats throughout the active season as the location and concentration of floral resources and their relative proximity to nests changes. As we state above, woodland habitats are especially important in the spring due to the blooming of spring ephemeral plants. When the forest canopy closes and floral resources decrease in late spring and summer, the species is dependent on flowers in forest openings, grasslands, and similar habitats.

Will the Species Be Exposed to Project-Related Stressors?

In some cases, action areas may overlap with areas where the habitat connectivity model indicates the likely presence of the rusty patched bumble bee, but may not contain suitable habitat for the species upon closer inspection. Within these modeled high potential zones, there are areas that are both suitable and not suitable for the species (e.g., Fig. 3). If the action area contains only areas that are not suitable for the rusty patched bumble bee, the species is unlikely to be exposed to stressors associated with the action and the action agency should document this finding for its administrative record (Fig. 2).[1] When making this determination, action agencies are cautioned to be careful to define the full extent of the action area to ensure that they consider any effects of the action that may extend outside of the immediate project footprint.[1]

Rusty Patched Bumble Bee - Potential Stressors

Evaluating Habitat-Related Stressors

For any action that will affect an area where the rusty patched bumble bee is likely to be present, the action agency can work with FWS (https://www.fws.gov/offices/) to assess whether – and how – the action is likely to affect key habitat features. Those features are summarized above. These stressors are only described here very briefly. For a thorough description of each stressor, refer to the *Rusty Patched Bumble Bee (Bombus affinis) Species Status Assessment* (https://www.fws.gov/midwest/endangered/insects/rusty patched bumble bee/pdf/SSAReportrusty patched bumble bee.pdf).

Land Management Activities

The timing, intensity, duration, and extent of land management activities likely play critical roles in determining the persistence of the rusty patched bumble bee within habitat patches. Haying, grazing, and fire, for example, maintain open meadows that may be suitable for foraging in the summer and fall, but may also degrade habitats or harm individuals if ill-timed, too intense,

carried out over too broad of an area, or uninterrupted by periods of rest that facilitate diverse and abundant floral resources. Due to the low number of rusty patched bumble bees and the isolation of populations, it is essential that these practices are carried out in ways that minimize adverse impacts to early queens and that maintains a diversity of wildflowers throughout the period when the species is active (Fig. 4).

Development and Land Clearing Activities

Ground disturbing activities could affect the rusty patched bumble bee in any season except in areas where they are unlikely to nest or overwinter. (See **Habitats Where the Rusty Patched Bumble Bee is Unlikely to be Present**, above). The associated habitat loss could affect the rusty patched bumble bee indirectly, but would depend on the timing, intensity, location and nature of the action.

Bee species diversity is strongly linked to floral diversity and abundance over their entire active season (Hines and Hendrix 2005; others). This seems particularly relevant for short-tongued species like the rusty patched bumble bee, as they have limitations on the types of flowers they can access. Thus, the greatest impact of habitat loss on bees is the loss of floral resources necessary as food and nectar. Loss or degradation of floral resources has occurred primarily through conversion of lands to agriculture and urbanization, but also from factors such as suppression of natural fire regimes. Conversion of natural habitat that is rich in flowers to farmlands, urban and suburban areas, and other uses is the primary cause of bumble bee habitat loss (Goulson et al. 2015, p. 2). Ongoing urbanization also contributes to the loss and fragmentation of natural habitats. Bees, however, may be more resilient to loss due to urbanization, as many urban areas have gardens that provide floral resources for bees (Goulson et al. 2010, p. 1207; Goulson et al. 2015, p. 2; Frankie et al. 2005, entire).

Evaluating Insecticide & Herbicide Stressors

Here we present only a very brief summary with regard to the potential roles that pesticides may play as stressors for the rusty patched bumble bee. For a thorough review of the potential effects of pesticides on the species, please refer to the *Rusty Patched Bumble Bee (Bombus affinis) Species Status Assessment* (https://www.fws.gov/midwest/endangered/insects/rusty patched bumble bee/pdf/SSAReportrusty patched bumble bee.pdf).

In areas where the rusty patched bumble bee is likely to be present, agencies should assess carefully and consider implementing conservation measures referenced below (in the **Conservation Measures** section) and other appropriate protective measures relative to the use of pesticides. Consideration should also be given to the potential for pesticides to extend beyond the footprint of the area where they are being applied.

A variety of pesticides are widely used in agricultural, urban, and even natural environments, and native bumble bees are often exposed to multiple agents, including insecticides, fungicides, and herbicides. Moreover, there is recent evidence that the interactive effects of pesticides and

pathogens could be particularly harmful for bumble bees (Fauser-Misslin et al. 2014, pp. 453-455; Baron et al. 2014, pp. 463-465) and other bees (Alaux et al. 2010, pp. 775-777; Pettis et al. 2012, pp. 155-156; Vidau et al. 2011, pp. 3-5; Aufavre et al. 2012, pp. 2-3). A better understanding of how these interactions may affect bumble bees in the environment is needed.

Although the toxicity of insecticides alone does not describe fully the potential harm that pesticides may cause, laboratory studies of pesticides have documented both lethal and sublethal effects to other bumble bee species (primarily *B. terrestris* and *B. impatiens*) and to European honey bees (*e.g*., Bortolotti *et al.* 2002, pp. 68-70; Gill *et al.* 2012, p. 107; Marletto *et al.* 2003, pp. 156-157; Mommaerts *et al.* 2006, pp. 3-4; Sanchez-Bayo and Goka 2014, pp. 7-8; Scott-Dupree *et al.* 2009, p. 179). Sublethal effects included reduced male production or no male production; reduced or no egg hatch; and, reduced queen production and longevity (*e.g.*, Gill *et al.* 2012, p. 107; Mommaerts *et al.* 2006, pp. 3–4; Fauser-Misslin *et al.* 2014, pp. 453–454).

Herbicides, when they may affect areas that are used by bumble bees for pollen or nectar gathering, could reduce available floral resources and may affect the rusty patched bumble bee indirectly. Therefore, any use of herbicides in a manner that may affect the rusty patched bumble bee should be assessed carefully to determine the species could be exposed to the effects of herbicide use.

Commercial Bumble Bees

Although cause and effect remain uncertain there is reason to think that the spread of one or more pathogens from commercial bumble bees may have played a role in the near disappearance of the previously widespread rusty patched bumble bee. Despite the uncertainty with regard to this association, agencies should carefully assess any role that their actions may play with regard to commercial bumble bee use and consider implementing conservation measures referenced below in the Conservation Measures section (or others) relative to commercial bee use.

Honey Bees

Honey bees can compete with native bees for resources (*e.g.*, Goulson and Sparrow 2009; Thompson 2004). We recommend that managers discourage the placement of honey bee hives in natural areas with high quality habitat (abundant and diverse floral resources) where rusty patched bumble bees are likely to be present. We are not discouraging the use of honey bees in agricultural fields, but encourage landowners to plant native flowers and to try to keep their honey bee hives disease and pest free.

Effects of the Action on the Species - Evaluating the Species Response to Stressors

After identifying the stressors that the rusty patched bumble bee will be exposed to, the action agency should determine the species' likely response to each relevant stressor - that is, the likely effects of the action on the species. This analysis of effects is the primary responsibility of the action agency, but FWS field office personnel may assist with this analysis.

Step 3 - Incorporate Measures to Avoid or Minimize Effects to the Rusty Patched Bumble Bee

When the rusty patched bumble bee is likely to respond negatively to one or more stressors associated with the action, the action agency should implement measures to avoid or minimize the adverse effects. Below, in the section Conservation Measures, we provide a variety of actions that could be used to avoid or minimize the effects of exposure to stressors.

Concluding Section 7(a)(2) Consultation

Below we describe briefly the two primary and typical outcomes of section 7 consultation (Fig. 2). If the action agency determines that its action will have no effects on the rusty patched bumble bee, consultation is not required. Note also that conservation measures may be applied to remove adverse effects altogether (see below and Fig. 2).

When Adverse Effects are Likely

The agency should enter into formal consultation with FWS if its analysis indicates that the rusty patched bumble bee is likely to experience adverse effects from one or more stressors associated with the action and any conservation measures do not fully remove likely adverse effects. Consultation is concluded for actions that are likely to adversely affect when the FWS issues its biological opinion. If the Service anticipates that the action will result in the incidental take of the species and will not jeopardize the species continued existence, it will include an incidental take statement to the biological opinion that will include measures to follow to exempt the action agency from the ESA's section 9 take prohibitions.

When Adverse Effects are not Likely

When the analysis indicates that the action may affect the rusty patched bumble bee, but is not likely to adversely affect the species, the action agency requests concurrence on that determination from the FWS. Consultation would conclude with the written concurrence of the FWS [50 CFR 402.13(a)].

Conservation Measures

Since the late 1990s, marked and precipitous declines have been recorded in spatial extent and in the number of extant populations of the rusty patched bumble bee. Although the ultimate source of the acute and widespread decline is debated, and despite that the relative role and synergistic effects of the primary stressors are unknown, the decline in the species is undisputable. Therefore, actions to avoid and reduce stressors to the species are needed urgently.

Section 7(a)(1) of the ESA directs each federal agency to carry out programs for the conservation of threatened and endangered species in consultation with the Service. The guidance described above is intended to assist action agencies to fulfill their section 7(a)(2) mandate to avoid jeopardizing the continued existence of the rusty patched bumble bee. Action agencies may have significant opportunities under their authorities, however, to use their programs to proactively

contribute to the conservation of the rusty patched bumble bee in cooperation with the FWS. In addition, conservation measures may be incorporated into actions to remove or reduce adverse effects.

Opportunities to conserve the rusty patched bumble bee may be most beneficial in the high potential zones where the species' presence should be initially assumed (Fig. 1), but there is significant likelihood that certain actions may benefit the species when implemented outside of these zones. We recommend that agencies look for opportunities anywhere within about 6 miles (10 km) of recent rusty patched bumble bee records. Ten kilometers is the approximate maximum dispersal distance for the species, based on studies of a closely related species, *B. terrestris* (Kraus et al. 2009, p. 249; Lepais et al. 2010, pp. 826-827). The FWS can provide action agencies with maps or GIS data to help identify opportunities and to plan activities in these areas (*e.g.*, see Fig. 5).

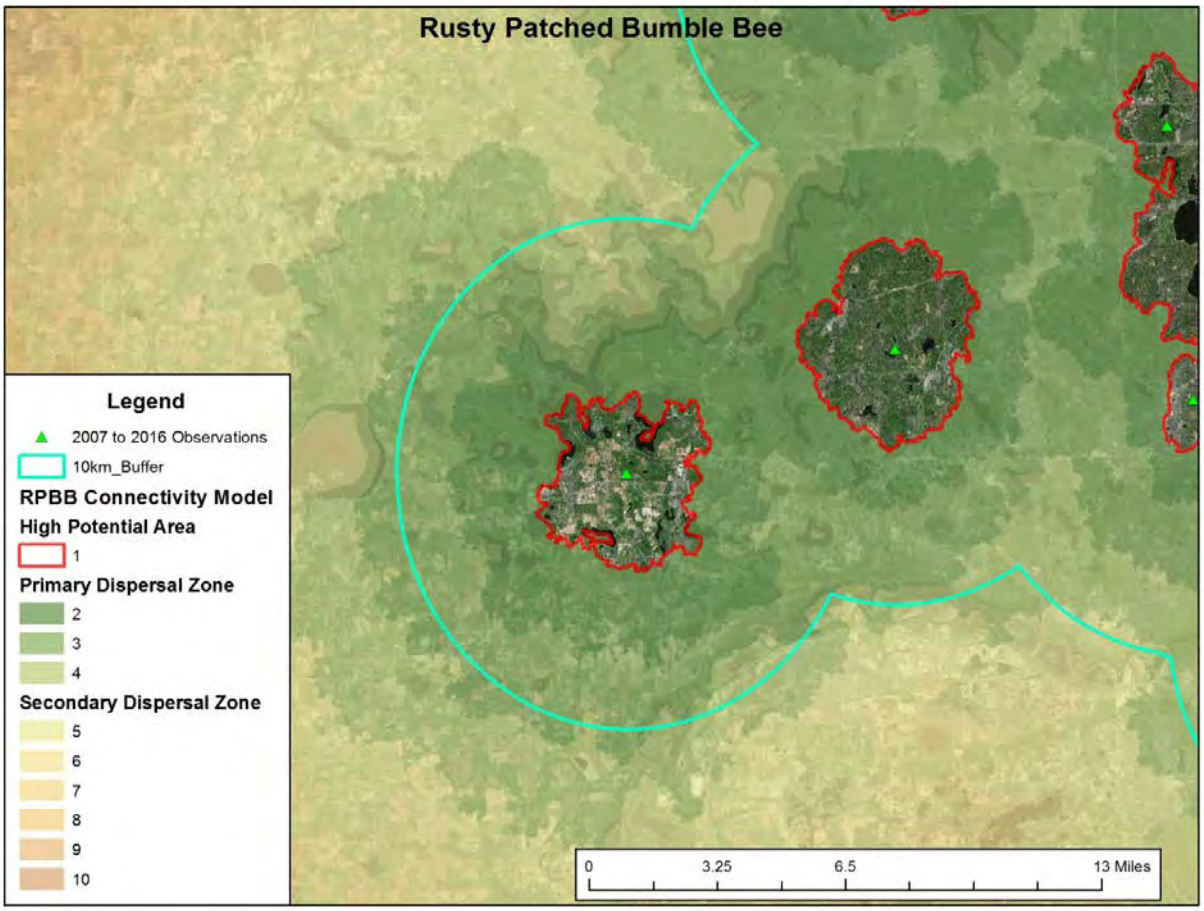


Figure 5. An example of high potential zones for rusty patched bumble bee (outlined in red), based on the habitat model described above and on species survey data compiled through 2016 (U.S. Fish and Wildlife Service Rusty Patched Bumble Bee Unpublished Geodatabase). The shaded connectivity model highlights additional areas with potential to connect existing populations; the areas with the highest potential for connectivity/suitable habitat are shown in shades of green and the least suitable areas shown in shades of brown and red.

Actions that benefit bumble bees, in general, are likely to benefit the rusty patched bumble bee when they are carried out in areas where the species is likely to be present (Fig. 1) or within potential dispersal distances (Fig. 5). The Xerces Society's, *Conserving Bumble Bees* (http://www.xerces.org/bumblebeeguidelines/) provides a variety of options for actions to conserve the rusty patched bumble bee when implemented in these areas.

Restore and Maintain High Quality Habitat

As stated above, bee diversity is strongly linked to floral diversity and abundance over their entire active season (*e.g.*, Hines and Hendrix 2005; for others, see USFWS 2016). Actions to restore or maintain landscapes and habitats that contain a high diversity and abundance of wildflowers are likely to benefit bees and pollinators, in general, and would benefit the rusty patched bumble bee when implemented in and around extant populations (see Figs. 1 and 5).

Actions to restore or maintain high quality habitats include the control of invasive species to maintain or restore native plant diversity and the restoration of natural habitats by planting species that are appropriate for the geographic region and local characteristics of each site.

Carefully Plan and Implement Land Management

Where the rusty patched bumble bee is likely to occur, vegetation management (haying, mowing, grazing, and burning) should be limited in high quality habitat during the active season (March through September) to minimize adverse effects to rusty patched bumble bee populations. For example, we recommend that managers leave one or more areas of unmowed habitat for the entire year in management areas. If mowing during the active flight season, create a mosaic of patches with variable vegetation structure, which have been found to support a diverse suite of bumble bees (Mader et al. 2011). If possible, use a high cutting height to prevent the disturbance of overwintering queens or nesting sites. We recommend a minimum of 8-10 inches, but 12-16 inches is ideal. In habitats managed with fire, prescribed burns should be rotated to ensure that there are substantial unburned refugia every year.

The Xerces Society's, Conserving Bumble Bees (http://www.xerces.org/bumblebeeguidelines/) provides useful information to help plan and implement land management actions to facilitate conservation of bumble bees.

Address Pesticide Use

Careful and targeted pesticide use can be a useful management tool to control pests and invasive species, but pesticide use – especially insecticides – can adversely affect the rusty patched bumble bee if used improperly. In addition, other significant and interacting stressors can compound the effects of pesticides, as detailed in the species status assessment (USFWS 2016; https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/SSAReportRPBB.pdf). This includes increased toxicity due to exposure to multiple agents; decreased resistance to disease; and, increased vulnerability to toxins due to food shortages that may result habitat degradation and a shortage of wildflower resources.

When pesticides must be used, we recommend the following measures:

- Follow the label and manufacturer's directions and use the least toxic options. Use low concentrations, if possible. Following label directions is required by law and is necessary to ensure safe use.
- Apply the pesticide as locally and directly as possible. Avoid broadcast applications of insecticides or herbicides that may be harmful to rusty patched bumble bee or their nectar plants in areas where the species is likely to be found.
- Ensure that field crews recognize target weeds to avoid adverse effects to important native species.

Rusty patched bumble bees can fly at relatively cold temperatures and are active in early spring (late March or April) and during the morning hours. It is essential to consider this period of activity when assessing the potential effects of any pesticide use, including herbicides that may affect the species indirectly by decreasing the abundance or diversity of wildflower resources.

Prevent Release of Commercial Bumble Bees into the Wild

Because of the potential for pathogen transmission, the use of commercial bumble bees should be carried out in a manner that minimizes exposure to rusty patched bumble bee populations. The following recommendations will help minimize exposure.

- Do not release commercially acquired bumble bees into the wild after use.
- If possible, use commercial bumble bees only in greenhouses and take preventative measures to minimize escape, such as installing screens over windows, vents and other openings.

Minimize Competition from Non-native honey bees

Honey bees can compete with native bees for resources (e.g., Goulson and Sparrow 2009; Thompson 2004). We recommend that managers discourage the placement of honey bee hives in natural areas with high quality habitat (abundant and diverse floral resources) where rusty patched bumble bees are likely to be present. We are not discouraging the use of honey bees in agricultural fields, but encourage landowners to plant native flowers; to try to keep their honey bee hives disease and pest free; and, to avoid placing honey bee hives in areas where the rusty patched bumble bee is likely to be present (Fig. 1 and see the section, Screening and Evaluation of Federal Agency Actions – A Stepwise Approach).

Conduct Surveys to Locate Unknown Colonies

Identifying the areas where the rusty patched bumble bee occurs is important to our efforts to prevent the species' extinction. The FWS survey protocol (http://www.fws.gov/midwest/endangered/insects/rpbb/guidance.html) explains how surveys in areas outside of the known high potential zones may be used to find unknown occurrences of the

species whose conservation could contribute to efforts to prevent the extinction of the rusty patched bumble bee.

Literature Cited

Alaux, C., J. Brunet, C. Dussaubat, F. Mondet, S. Tchamitchan, M. Cousin, J. Brillard, A. Baldy, L. P. Belzunces, and Y. Le Conte. Interactions between Nosema microspores and a neonicotinoid weaken honey bees (*Apis mellifera*). Environmental Microbiology. 12(3): 774-782.

Aufauvre, J., D. G. Biron, C. Vidau, R. Fontbonne, M Roudel, M Diogon, B Viguès, L P. Belzunces, F. Delbac and N. Blot.2012. Parasite-insecticide interactions: A case study of *Nosema ceranae* and fipronil synergy on honey bee. Scientific Reports. 2 (326) 1-7.

Baron, G. L, N. E. Raine, and M. J. F. Brown. 2014. Impact of chronic exposure to a pyrethroid pesticide on bumble bees and interactions with a trypanosome parasite. Journal of Applied Ecology. 51: 460–469.

Bortolotti, L. , E. Grazioso, C. Porrini, G. Sbrenna. 2001.- Effect of pesticides on the bumble bee, Bombus terrestris L. in the laboratory.- In: Proceedings of the 7th International Symposium "Hazards of pesticides to bees", September 7-9, 1999, Avignon, France (BELZUNCES L. P., PÉLISSIER C., LEWIS G. B., Eds). Les Colloques de l'INRA, 98: 217-225.

Colla S.R. and S. Dumesh. 2010. The bumble bees of southern Ontario: Notes on natural history and distribution. Journal of the Ecological Society of Southern Ontario 141:39–68.

Colla, S.R. and L. Packer. 2008. Evidence for decline in eastern North American bumblebees (Hymenoptera: Apidae), with special focus on *Bombus affinis* Cresson. Biodiversity Conservation 17:1379–1391.

Colla, S., L. Richardson, and P. Williams. 2011. Bumblebees of the Eastern United States. USDA Forest Service and the Pollinator Partnership. Forest Service No. FS-972:1–103.

Dramstad, W.E. 1996. Do bumblebees (Hymenoptera: Apidae) really forage close to their nests? Journal of Insect Behavior. 9:163–182.

Fauser-Misslin, A., B.M. Sadd, P. Neumann, and C. Sandrock. 2014. Influence of combined pesticide and parasite exposure on bumblebee colony traits in the laboratory. Journal of Applied Ecology 51:450–459.

Frankie, G. W., R.W. Thorp, M. Schindler, J. Hernandez, B. Ertter, and M. Rizzardi. 2005. Ecological patterns of bees and their host ornamental flowers in two northern California cities. Journal of the Kansas Entomological Society. 78: 227–246.

Gill, R.J., O. Ramos-Rodriguez, and N.E. Raine. 2012. Combined pesticide exposure severely affects individual- and colony-level traits in bees. Nature 491, 105–108. doi:10.1038/nature11585; pmid: 23086150

Goulson, D. 2010. Bumblebees: Behaviour, ecology and conservation. Second edition. Oxford University Press. 317 pp.

Goulson, D. and K.R. Sparrow. 2009. Evidence for competition between honeybees and bumblebees; effects on bumblebee worker size. Journal of Insect Conservation. 13: 177–181.

Goulson, D., O. Lepais, S. O'Connor, J.L. Osborne, R.A. Sanderson, J. Cussans, L. Goffe, and B. Darvill. 2010. Effects of land use at a landscape scale on bumblebee nest density and survival. Journal of Applied Ecology 46: 1207–1215.

Goulson, D., E. Nicholls, C. Bouias, and E.L. Rotheray. 2015. Bee declines driven by combined stress from parasites, pesticides, and lack of flowers. Science 347: 1255957-1–1255957-9.

Hines, H.M. and S.D. Hendrix. 2005. Bumble bee (Hymenoptera: Apidae) diversity and abundance in tallgrass prairie patches: Effects of local and landscape flora resources. Environmental Entomology 34(6): 1477–1484.

Jha, S. and C. Kremen. 2013. Urban land use limits regional bumble bee gene flow. Molecular Ecology 22:2483–2495.

Knight M.E., A.P. Martin, S. Bishop, J.L. Osborne, R.J. Hale, A. Sanderson, and D. Goulson. 2005. An interspecific comparison of foraging range and nest density of four bumblebee (*Bombus*) species. Molecular Ecology 14:1811–1820.

Kraus, F.B., S. Wolf, and R.F.A. Mortiz. 2009. Male flight distance and population substructure in the bumblebee *Bombus terrestris*. Journal of Animal Ecology. 78:247–252.

Lepais, O., B. Darvil, S. O'Connor, J.L. Osborne, R.A. Sanderson, J. Cussans, L. Goffe, and D. Goulson. 2010. Estimation of bumblebee queen dispersal distances using sibship reconstruction method. Molecular Ecology. 19: 819–831.

Macfarlane, R.P., K.D. Patten, L.A. Royce, B.K.W. Wyatt, and D.F. Mayer. 1994. Management potential of sixteen North American bumble bee species. Melanderia. 50:1–12.

Mader, E., M. Shepherd, M. Vaughan, S.H. Black, and G. LeBuhn. 2011. Attracting Native Pollinators. The Xerces Society. Storey Publishing, North Adams, MA.

Marletto F, A Patetta, and A Manino. 2003. Laboratory assessment of pesticide toxicity to bumble bees. Bulletin of Insectology 56:155-158.

Megachilidae). Journal of Economic Entomology 102:177-182.Mommaerts V., G. Sterk, and G. Smagghe. 2006. Hazards and uptake of chitin synthesis inhibitors in bumblebees *Bombus terrestris*. Pest Management Science 62:752–758.

Osborne, J.L., S.J. Clark, R.J. Morris, I.H. Williams, J.R. Riley, A.D. Smith, D.R. Reynolds, and A.S. Edwards. 1999. A landscape-scale study of bumble bee foraging range and constancy, using harmonic radar. Journal of Applied Ecology 36:519–533.

Pettis, J. S., D. vanEngelsdorp, J. Johnson, and G. Dively. 2012. Pesticide exposure in honey bees results in increased levels of the gut pathogen Nosema. Naturwissenschaften 99, 153–158.

Plath, O.E. 1922. Notes on the nesting habits of several North American bumble bees. Psyche 29(5-6): 189–202.

Potts, S.G., J.C. Biesmeijer, C. Kremen, P. Neumann, O. Schweiger, and W.E. Kunin. 2010. Global pollinator declines: Trends, impacts and drivers. Trends in Ecological Evolution 25:345–353.

Rao, S. and J.P. Strange. 2012. Bumble bee (Hymenoptera: Apidae) foraging distance and colony density associated with a late-season mass flowering crop. Environmental Entomology, 41(4):905–915.

Sanchez-Bayo, F., and K. Goka. 2014. Pesticide residues and bees – a risk assessment. PLOS ONE 9 e94482. Doi: 10.1371/journal.pone.00094482; pmid:2478419.

Scott-Dupree CD, L Conroy, and CR Harris. 2009. Impact of currently used or potentially useful insecticides for canola agroecosystems on Bombus impatiens (Hymenoptera: Apidae), Megachile rotundata (Hymenoptera: Megachilidae), and Osmia lignaria (Hymenoptera: Szymanski, J. T. Smith, A. Horton, M. Parkin, L. Ragan, G. Masson, E. Olson, K. Gifford, and L. Hill. 2016. Rusty Patched Bumble Bee (*Bombus affinis*) Species Status Assessment. USFWS. 94 pp.

Thompson, D. 2004. Competitive Interactions between invasive European honey bee and native bumble bees. Ecology 85:458–470.

U.S. Fish and Wildlife Service (USFWS). 2016. Rusty Patched Bumble Bee (*Bombus affinis*) Species Status Assessment. USFWS. 94 pp.

Vidau C., Marie Diogon, Julie Aufauvre, Régis Fontbonne, Bernard Viguès, Jean-Luc Brunet, Catherine Texier, David G. Biron, Nicolas Blot, Hicham El Alaoui, Luc P. Belzunces, and Frédéric Delbac. 2011. Exposure to sublethal doses of fipronil and thiacloprid highly increases mortality of honey bees previously infected by Nosema ceranae. PLOS ONE 6, e21550.

Wolf, S. and R.F.A. Moritz. 2008. Foraging distance in *Bombus terrestris* (Hymenoptera: Apidae). Apidologie 38:419–427.

Xerces Society for Invertebrate Conservation. 2013. Petition to list the rusty patched bumble bee. 42 pp.

Document Number

State Bar of Wisconsin Form 3 - 2003

QUIT CLAIM DEED

Document Name

9134914
Tx:8846650

KRISTI CHLEBOWSKI
DANE COUNTY
REGISTER OF DEEDS

DOCUMENT #
5319682
04/19/2017 3:33 PM
Trans. Fee:
Exempt #: 4
Rec. Fee: 30.00
Pages: 2

THIS DEED, made between COUNTY OF DANE

("Grantor," whether one or more),

and VILLAGE OF WAUNAKEE

("Grantee," whether one or more).

Grantor, quit claims to Grantee the following described real estate, together with the rents, profits, fixtures and other appurtenant interests, in DANE County, State of Wisconsin ("Property") (if more space is needed, please attach addendum):

SEE ATTACHED ADDENDUM A MADE A PART HEREOF

EXEMPT FROM FEE PER WISCONSIN STATE STATUTE 77.25(4).

Recording Area

Name and Return Address

VILLAGE OF WAUNAKEE
500 W MAIN STREET
WAUNAKEE WI 53597

191/0809-054-9200-2
Parcel Identification Number (PIN)

This IS NOT homestead property.
(is) (is not)

Dated _____

_____ (SEAL)
*

Scott McDonell (SEAL)
* Scott McDonell
DANE COUNTY CLERK

_____ (SEAL)
*

_____ (SEAL)
*

AUTHENTICATION

Signature(s) _____

authenticated on _____.

*

TITLE: MEMBER STATE BAR OF WISCONSIN
(If not, authorized by Wis. Stat. § 706.06)

THIS INSTRUMENT DRAFTED BY:

JANIS L. ZIMMERMANN, COUNTY OF DANE

ACKNOWLEDGMENT

STATE OF WISCONSIN)
) ss.
DANE COUNTY)

Personally came before me on April 19, 2017,
the above-named Scott McDonell
to me known to be the person(s) who executed the foregoing instrument and acknowledged the same.

*T Chrismore

Notary Public, State of Wisconsin
My Commission (is permanent) (expires: 12-18-18)

(Signatures may be authenticated or acknowledged. Both are not necessary.)

NOTE: THIS IS A STANDARD FORM. ANY MODIFICATIONS TO THIS FORM SHOULD BE CLEARLY IDENTIFIED.

QUIT CLAIM DEED **STATE BAR OF WISCONSIN** **FORM No. 3-2003**

*Type name below signatures.

ADDENDUM "A"

LEGAL DESCRIPTION

Part of the Southwest 1/4 of the Southeast 1/4 of Section Five (5), Township Eight (8) North, Range Nine (9) East, in the Village of Waunakee, Dane County, Wisconsin, more fully described as follows:

Commencing at the Southwest corner of the Southwest 1/4 of the Southeast 1/4 of said Section 5; thence North along the West line of said Southwest 1/4 of the Southeast 1/4, 399.5 feet to the point of beginning of this description; thence East at right angles 201.9 feet; thence North 257.9 feet; thence East 491.1 feet; thence North 330.0 feet; thence West 693.0 feet; thence South 587.9 feet to the point of beginning, EXCEPTING therefrom that portion conveyed in Deeds recorded as Document No. 1128988, Document No. 1128989, Document No. 1128990 and Document No. 1147143, being approximately the East 13' of above description.

Tax ID: 191/0809-054-9200-2

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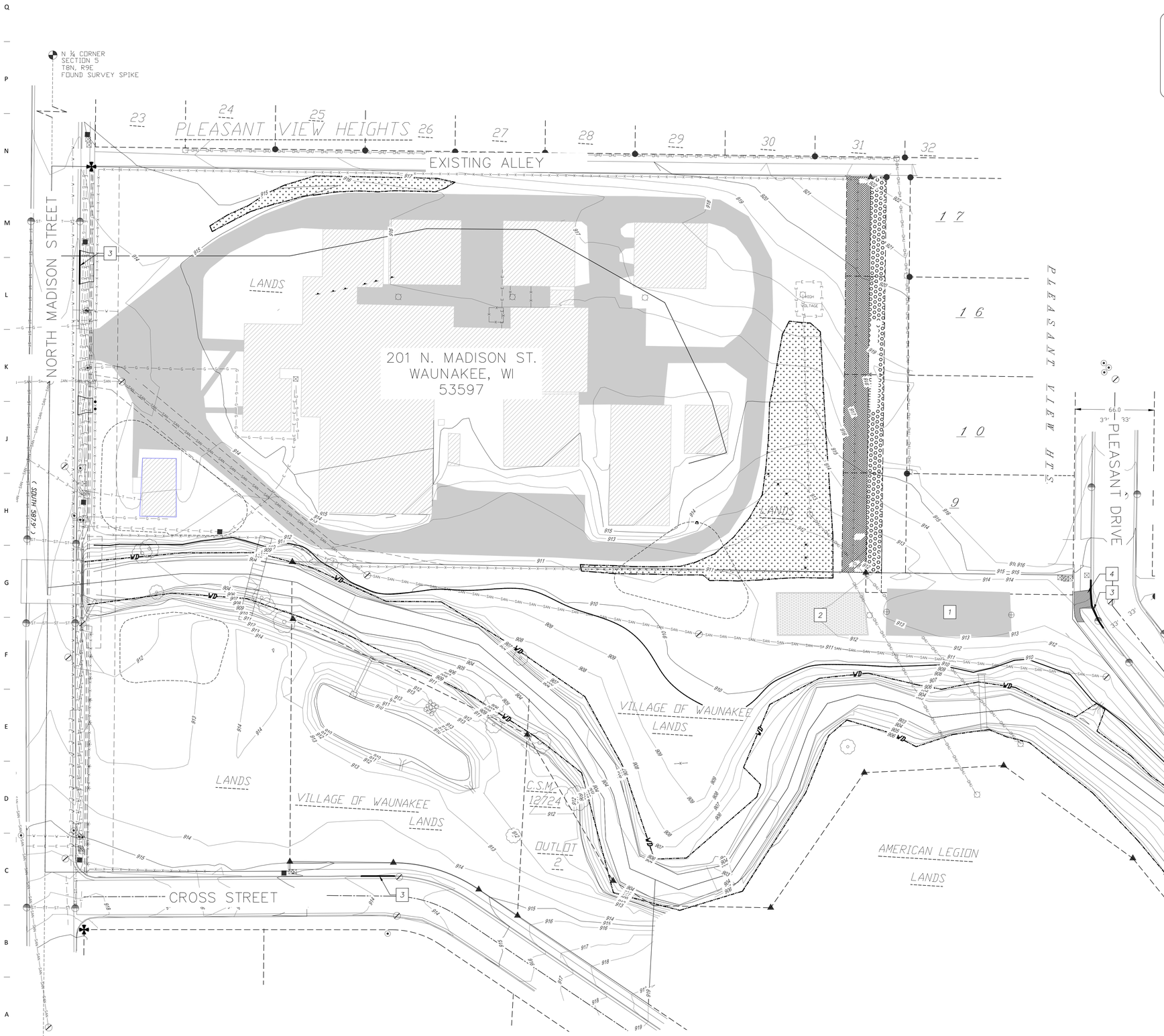

TO OBTAIN LOCATION OF PARTICIPANTS' UNDERGROUND FACILITIES BEFORE YOU DIG IN WISCONSIN

CALL DIGGERS HOTLINE
1-800-242-8511
TOLL FREE

WIS. STATUTE 182.0175 (1974) REQUIRES MIN. OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE

NORTH

0 40 80 120

SCALE: 1" = 40'

NOTES:

1. EXISTING SURVEY COMPLETED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR EXAMINING ALL EXISTING SITE CONDITIONS PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION.
3. BEFORE PROCEEDING WITH ANY UTILITY CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE EACH EXISTING LATERAL OR POINT OF CONNECTION AND VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES. IF ANY EXISTING UTILITIES ARE NOT AS SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY FOR POSSIBLE REDESIGN.
4. CONTRACTOR SHALL NOTIFY THE VILLAGE OF WAUNAKEE DEPARTMENT OF PUBLIC WORKS AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION.

LEGEND

- EXISTING BUILDINGS REMOVED
- EXISTING ASPHALT REMOVED
- EXISTING PLAY AREA REMOVED
- EXISTING WETLAND AREA
- EXISTING GAS
- EXISTING ELECTRIC
- EXISTING FENCLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATER
- EXISTING OVERHEAD UTILITIES
- ADJOINING PROPERTY LINE
- EXISTING COMMUNICATIONS
- EASEMENT LINE
- EXISTING CONTOUR LINE
- SOIL BORING LOCATION

KEY NOTES

1. EXISTING BASKETBALL COURT TO BE REMOVED
2. EXISTING PLAYGROUND TO BE REMOVED
3. EXISTING CONCRETE CURB & GUTTER TO BE REMOVED AT NEAREST JOINT
4. EXISTING CONCRETE TO BE REMOVED AT NEAREST JOINT

PRELIMINARY. NOT FOR CONSTRUCTION.

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Waunakee Library Board

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Revision Date

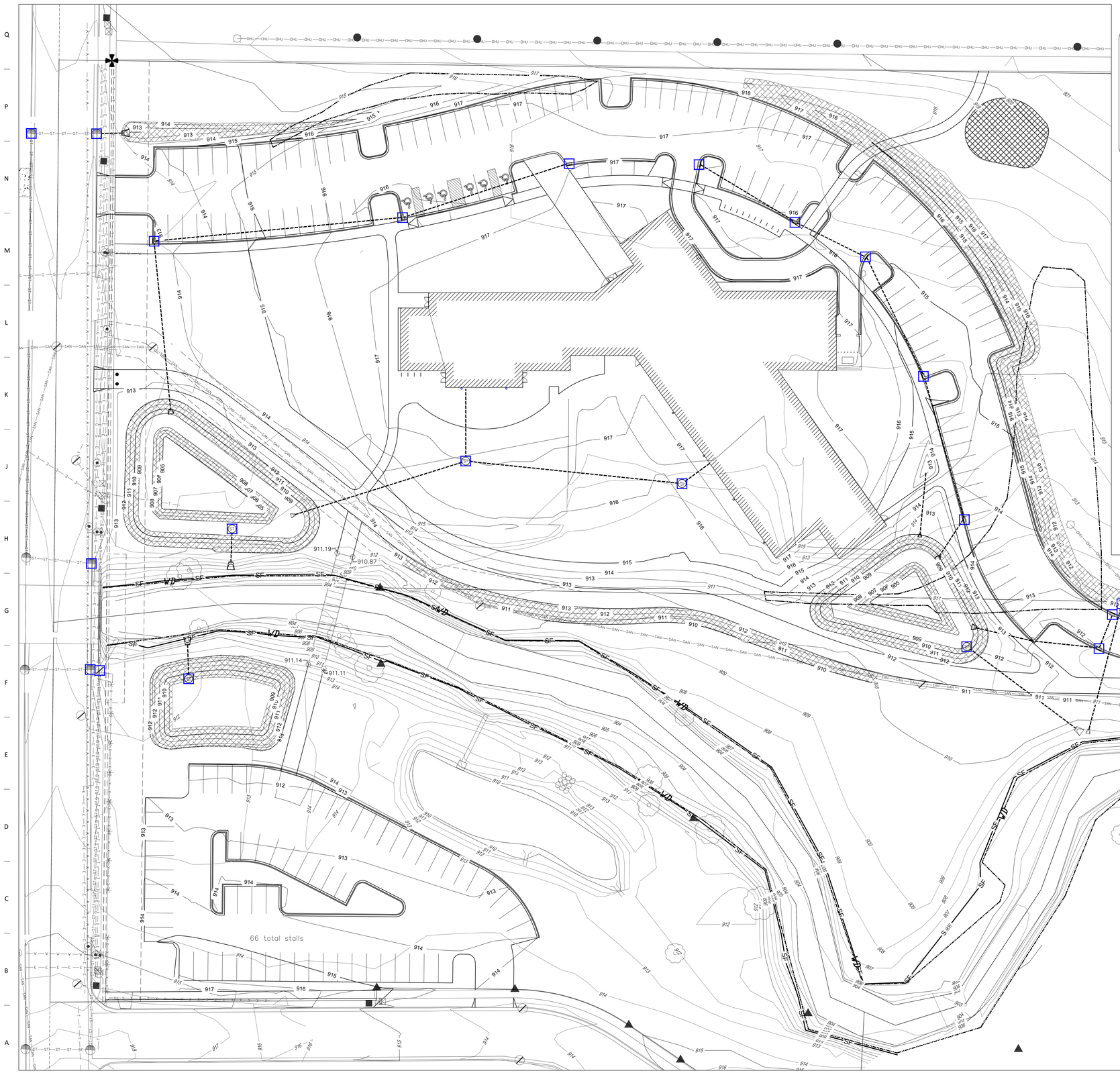
OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Existing Site Conditions/Demo Plan

Sheet Number
C1.0

PRINTED:



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CALL DIGGERS HOTLINE
1-800-242-8511
TOLL FREE

WIS. STATUTE 182.0175 (1974) REQUIRES MIN. OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE

NORTH

0 30 60 90

SCALE: 1" = 30'

NOTES:

1. ALL SILT FENCE MUST BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE CITY PRIOR TO ANY SITE WORK.
2. SITE EROSION CONTROL MEASURES MUST BE IN PLACE AT ALL TIMES. SHOULD DEVICES BE REMOVED FOR WORK ACCESS, THEY SHALL BE REINSTALLED AT THE END OF EACH WORK DAY UNTIL PAVEMENTS HAVE BEEN INSTALLED AND ALL LANDSCAPE AREAS HAVE BEEN MULCHED AND SODDED. SEEDED AREAS MUST EXHIBIT MINIMUM OF 70% SOIL COVERAGE.
3. BIORETENTION BASINS SHALL BE OVER EXCAVATED AND USED FOR SEDIMENTATION BASINS DURING CONSTRUCTION. ALL SEDIMENT AND DEBRIS SHALL BE REMOVED PRIOR TO SAND, ROCK, AND ENGINEERED SOIL INSTALLATION. THE CONTRIBUTING WATERSHED TO THE BIORETENTION BASIN SHALL BE STABILIZED PRIOR TO BRINGING THE BASIN ONLINE.
4. DISTURBED AREAS TO BE GRADED AND SEEDED BEFORE PROJECT END.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING AND MAINTAINING ALL EROSION CONTROL PRACTICES AS NEEDED DURING THE DURATION OF THE PROJECT.

EROSION MATTING
SF SILT FENCE
WD WETLAND DELINEATION LINE
INLET PROTECTION

PRELIMINARY. NOT FOR CONSTRUCTION.

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Revision	Date

OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Erosion Control Plan

Sheet Number
C3.0

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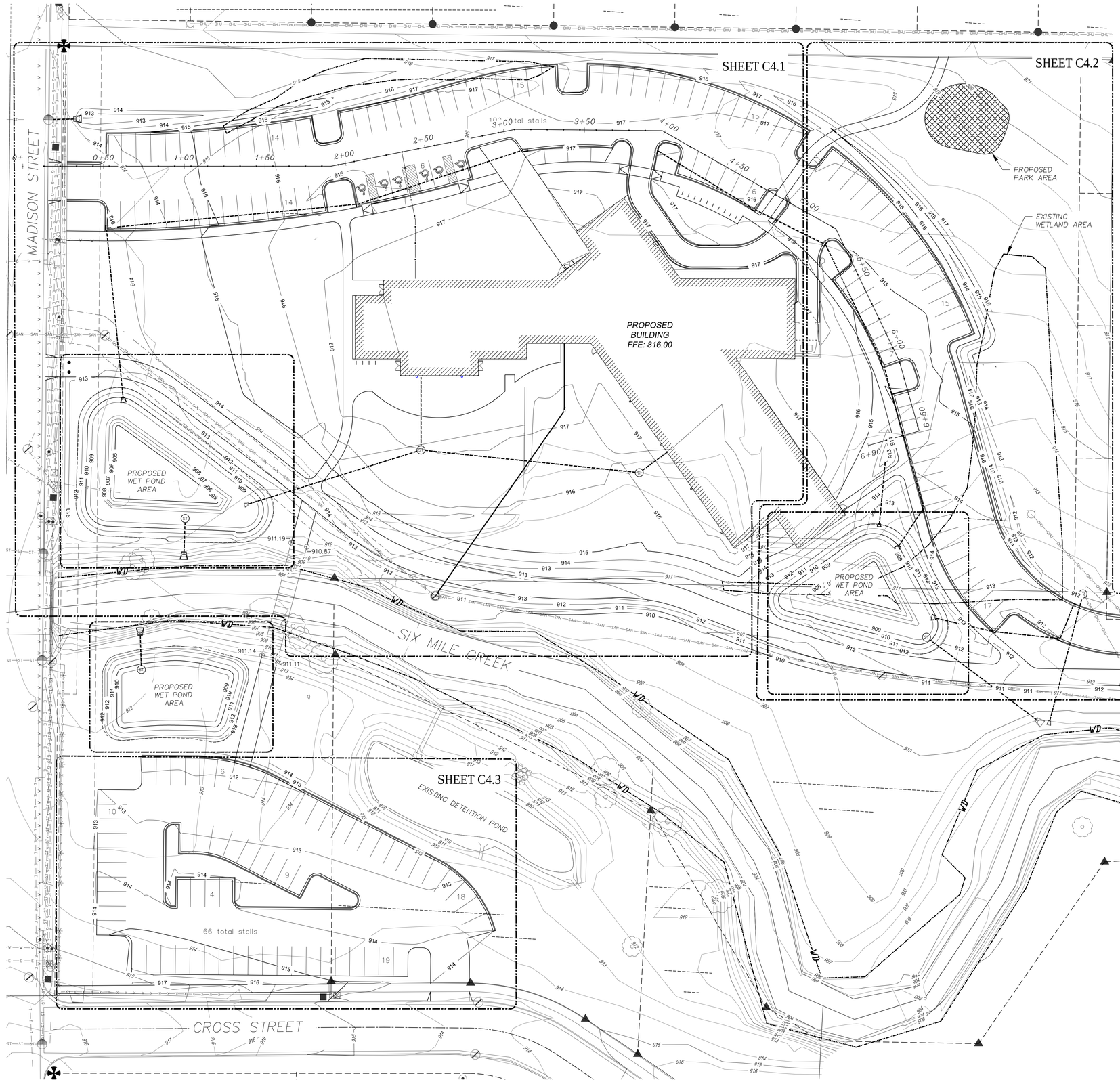

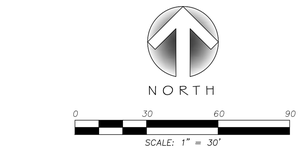

NOTES:

104 – PARKING STALLS SHOWN

6 – ADA ACCESSIBLE STALLS SHOWN

14 – BICYCLE PARKING STALLS

= EXISTING TREES TO BE SAVED

PRELIMINARY. NOT FOR CONSTRUCTION.

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Revision	Date

OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Proposed Grading Plan

Sheet Number
C4.0

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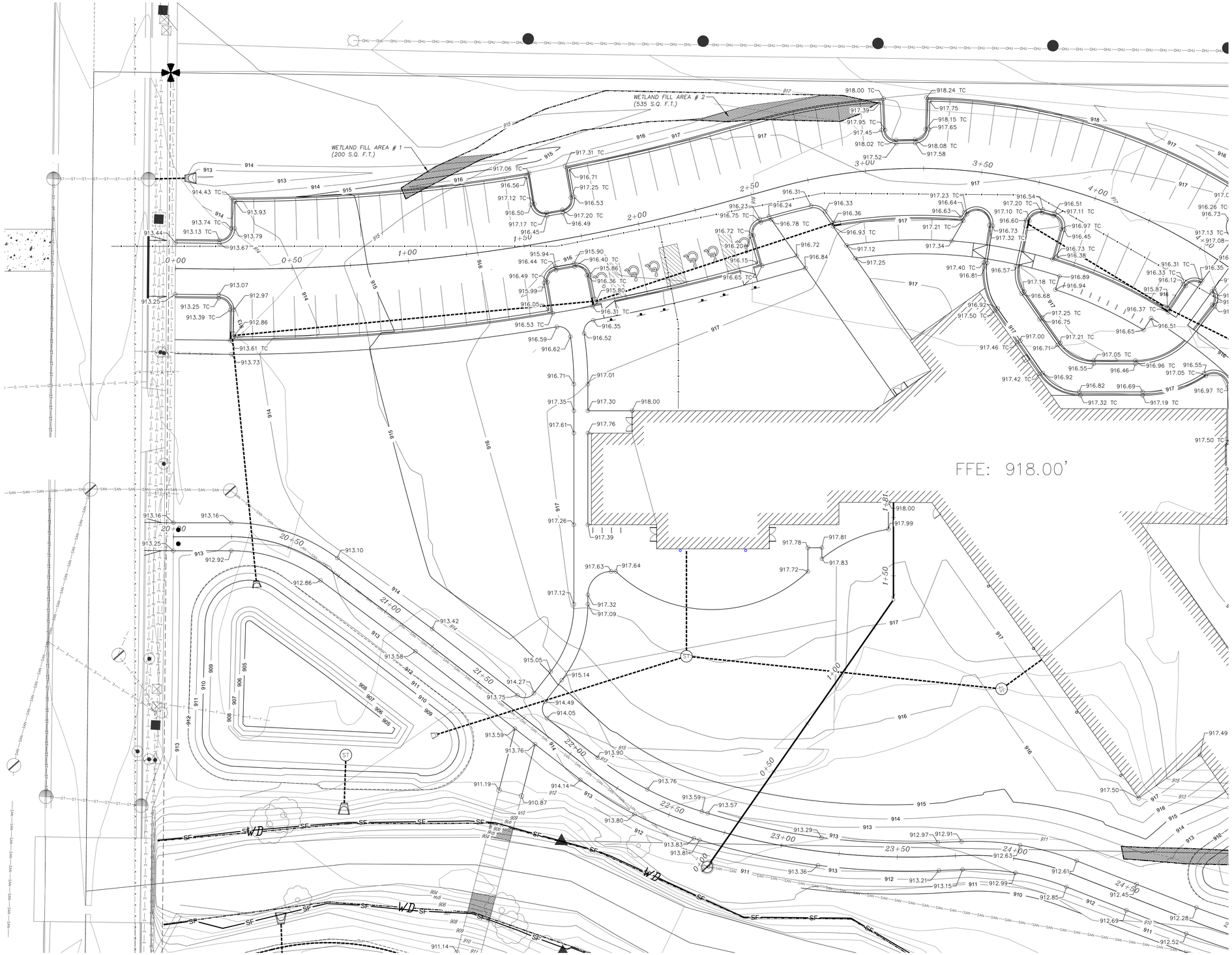

NORTH

0 10 20 40 60

SCALE: 1" = 20'

LEGEND

999.99	FLOWLINE ELEVATION
999.99 TC	TOP OF CURB ELEVATION
	REJECT CURB & GUTTER
	PROPOSED WETLAND FILL AREA

PRELIMINARY. NOT FOR CONSTRUCTION.

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Revision Date

OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Proposed West Grading Plan

Sheet Number
C4.1

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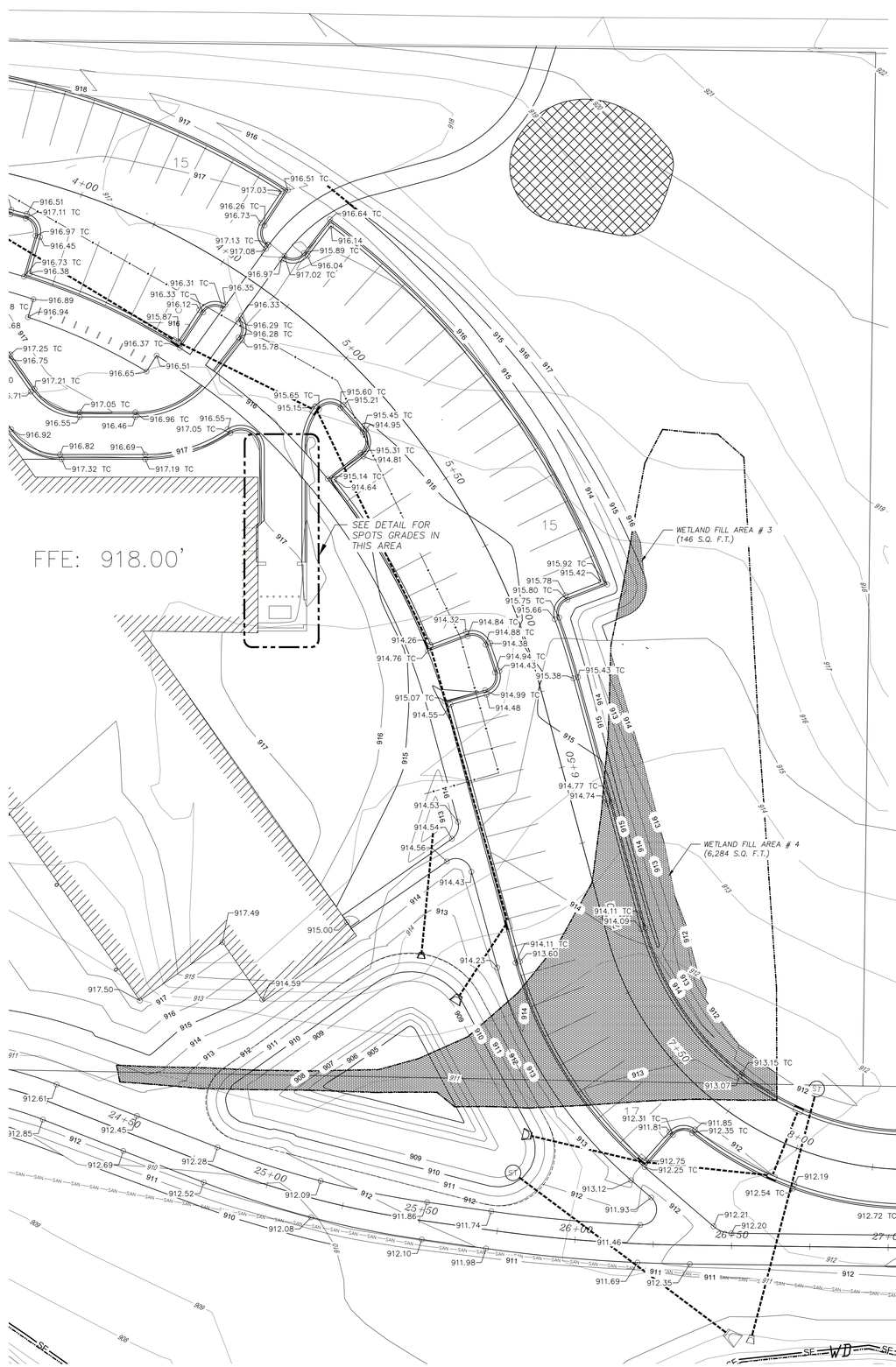

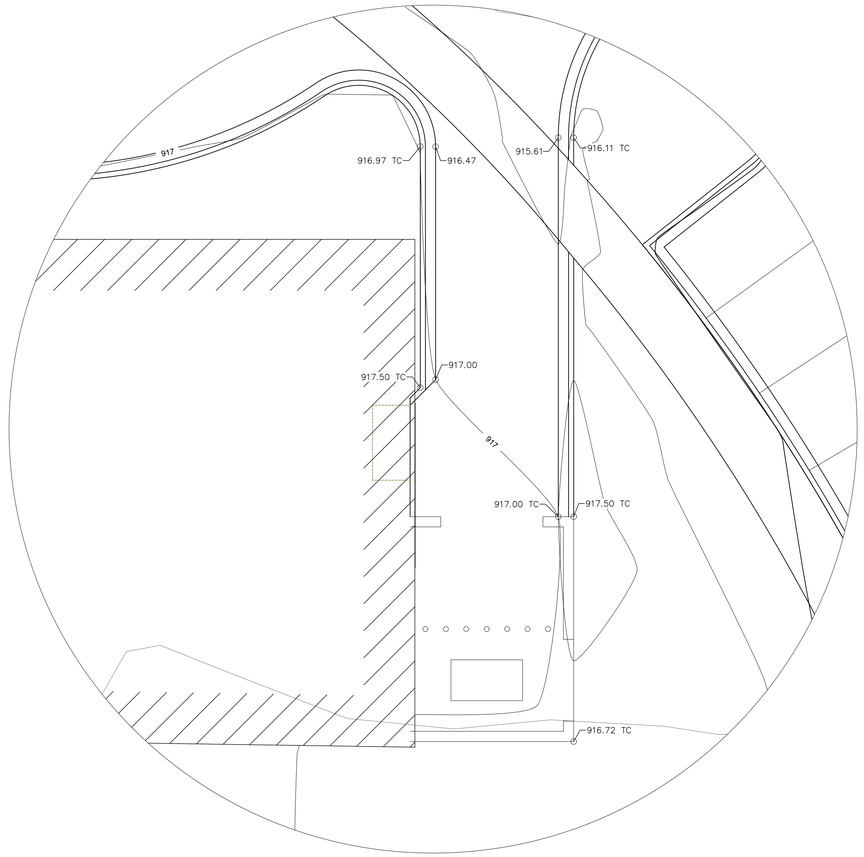

GRADING DETAIL
N.T.S.

LEGEND

999.99	FLOWLINE ELEVATION
999.99 TC	TOP OF CURB ELEVATION
	REJECT CURB & GUTTER
	PROPOSED WETLAND FILL AREA

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Revision | Date

OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Proposed East Grading Plan

Sheet Number
C4.2

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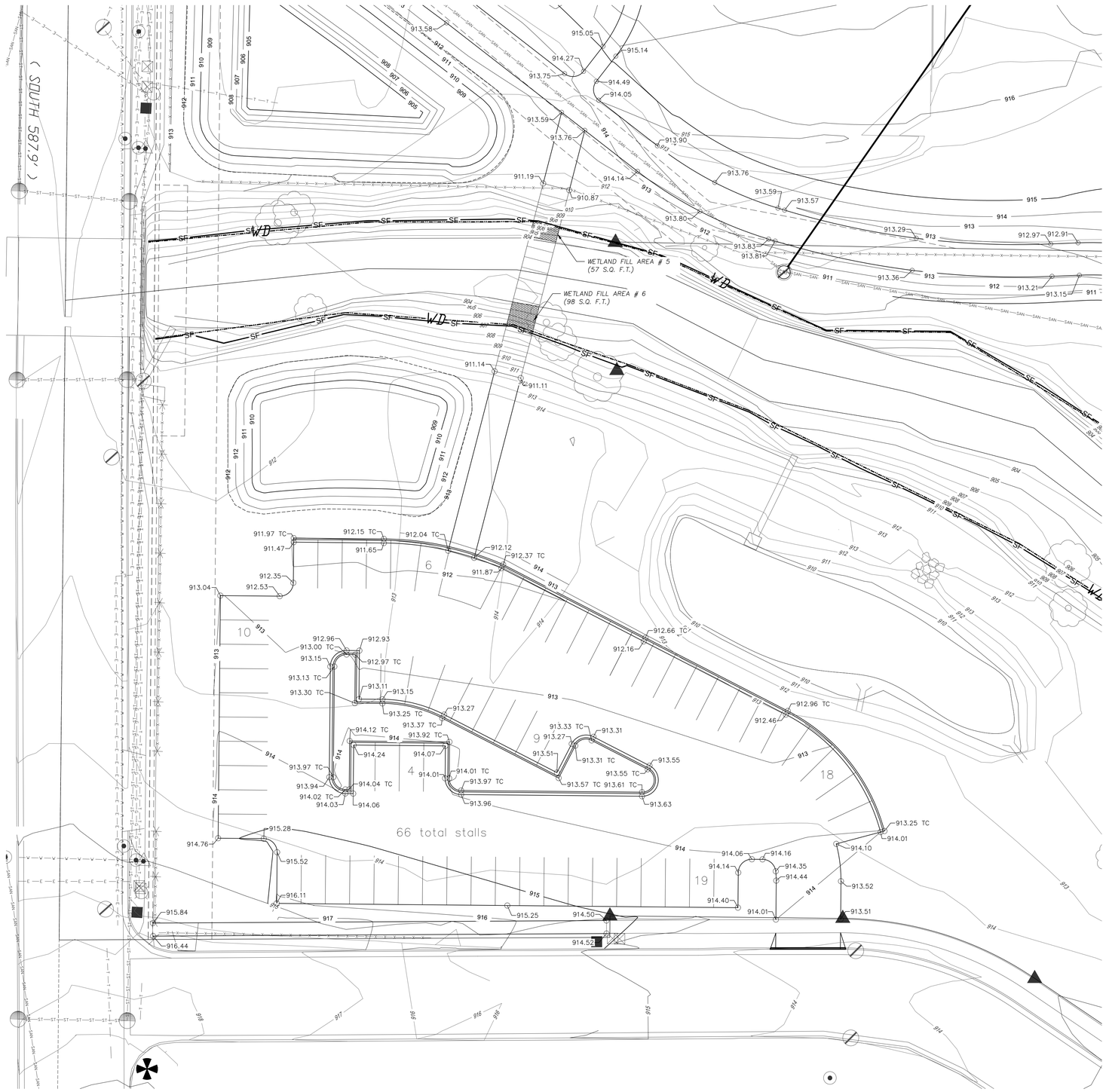

NORTH

0 10 20 40 60

SCALE: 1" = 20'

LEGEND

999.99	FLOWLINE ELEVATION
999.99 TC	TOP OF CURB ELEVATION
	REJECT CURB & GUTTER
	PROPOSED WETLAND FILL AREA

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OPN Project No.
Project Number

Sheet Issue Date
Permitting **09/06/2017**

Sheet Name
Alternate Site Grading Plan

Sheet Number
C4.3

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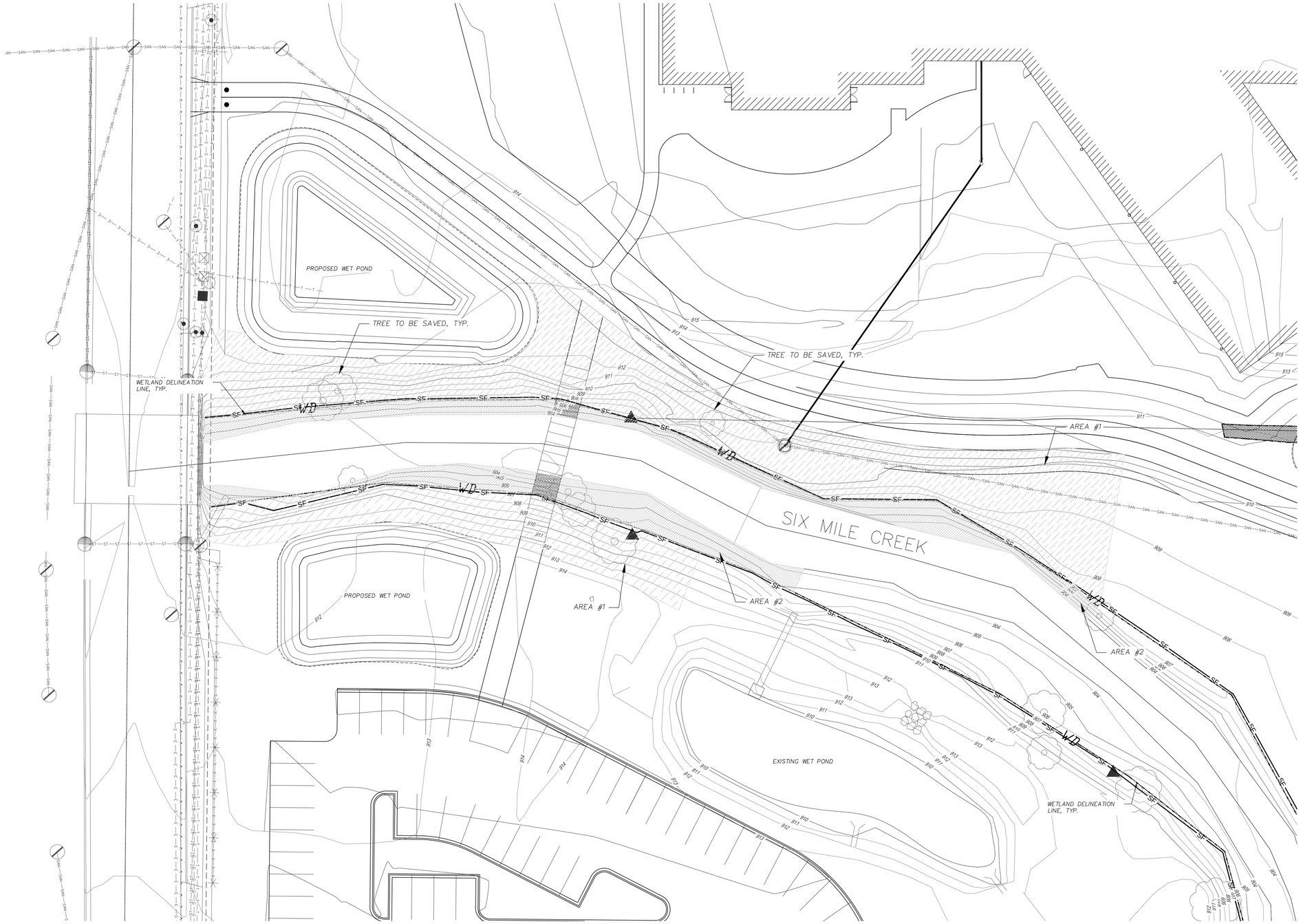

NORTH

0 10 20 40 60

SCALE: 1" = 20'

AREA #1
NORTH OF SIX MILE CREEK: 10,623 SQ FT
SOUTH OF SIX MILE CREEK: 3,910 SQ FT
TOTAL AREA: 14,533 SQ FT

AREA #2
NORTH OF SIX MILE CREEK: 2,343 SQ FT
SOUTH OF SIX MILE CREEK: 1,979 SQ FT
TOTAL AREA: 4,322 SQ FT

AREA #1

AREA BETWEEN WETLAND DELINEATION LINE AND GRADING LIMITS.

ALL WOODY VEGETATION, SHRUBS, AND TREES (EXCEPT NOTED) WILL BE CUT AND STUMPS REMOVED. AREA WILL BE PREPPED AND PLANTED WITH NATIVE VEGETATION.

AREA #2

AREA BETWEEN ORDINARY HIGH WATER MARK AND WETLAND DELINEATION LINE

ALL WOODY VEGETATION, SHRUBS, AND TREES (EXCEPT NOTED) WILL BE CUT OFF AT GROUND. NO GRUBBING, STUMPS WILL BE LEFT IN GROUND. NO DISTURBANCE OF WETLAND AS A PART OF THESE ACTIVITIES.

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Revision Date

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Project Number

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Creek Vegetation Plan

Sheet Number
C4.6

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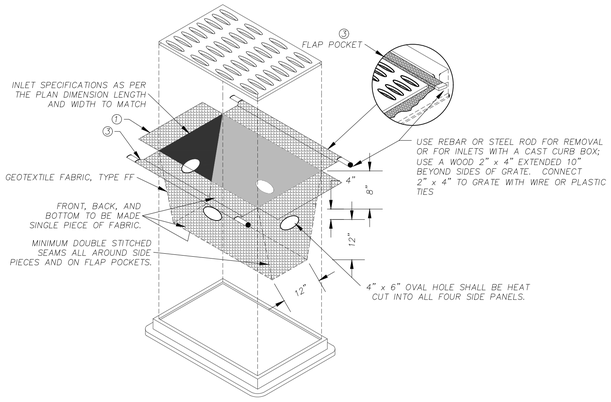
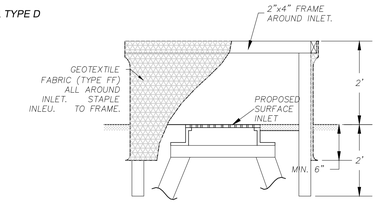


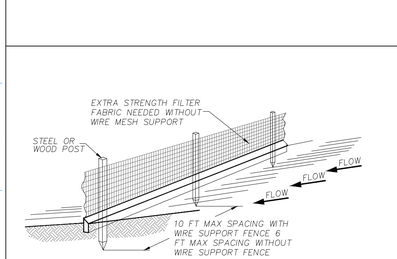
INLET PROTECTION, TYPE D



INLET PROTECTION, TYPE A

1 C 6.0 **STORM WATER INLET PROTECTION**

NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

THE HEIGHT OF A SILT FENCE SHALL NOT EXCEED 36 INCHES. STORAGE HEIGHT SHALL NEVER EXCEED 18".

THE FENCE LINE SHALL FOLLOW THE CONTOUR AS CLOSELY AS

IF POSSIBLE, THE FILTER FABRIC SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED ONLY AT A SUPPORT POST, WITH A MINIMUM 6—INCH OVERLAP AND BOTH ENDS SECURELY FASTENED TO THE POST.

POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES). WHEN EXTRA STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET.

THE ENDS OF THE FENCE SHALL BE TURNED UPHILL.

A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE

WHEN STANDARD—STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.

THE STANDARD—STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 6 INCHES OF THE FABRIC SHALL EXTEND INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.

WHEN EXTRA—STRENGTH FILTER FABRIC AND CLOSER POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS.

THE TRENCH SHALL BE BACKFILLED AND/OR THE SOIL COMPACTED OVER THE TOE OF THE FILTER FABRIC. THE FILTER FABRIC SHALL NOT BE SECURED BY SAND BAGS.

SILT FENCES PLACED AT THE TOE OF A SLOPE SHALL BE SET AT LEAST 6 FEET FROM THE TOE IN ORDER TO INCREASE PONDING

SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED, AND ANY SEDIMENT STORED BEHIND THE SILT FENCE HAS BEEN REMOVED.

INSPECTION AND MAINTENANCE

SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED WEEKLY AND AFTER EACH SIGNIFICANT STORM (1" IN 24 HR.). ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

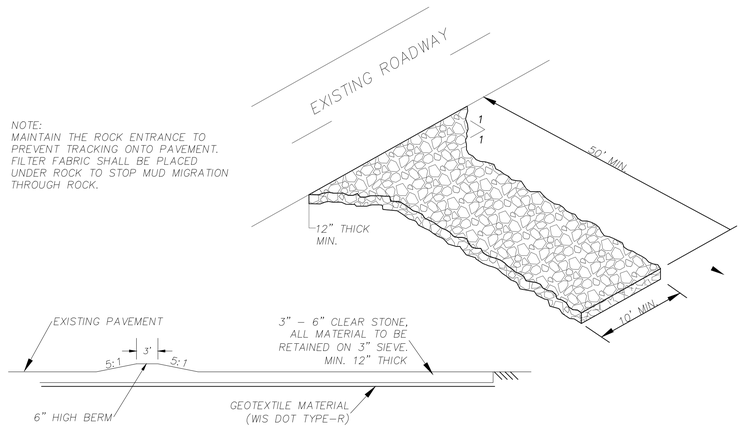
SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 HEIGHT OF THE FENCE OR 9 INCHES MAXIMUM.

THE REMOVED SEDIMENT SHALL BE VEGETATED OR OTHERWISE STABILIZED. VOLUME.

2 C 6.0 **SILT FENCE INSTALLATION DETAILS**

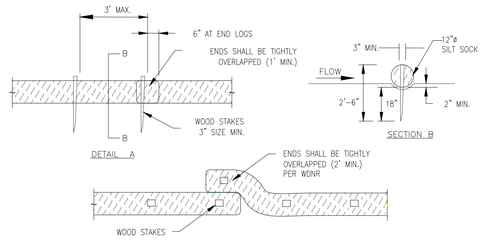
NOT TO SCALE

NOTE:
MAINTAIN THE ROCK ENTRANCE TO PREVENT TRACKING ONTO PAVEMENT. FILTER FABRIC SHALL BE PLACED UNDER ROCK TO STOP MUD MIGRATION THROUGH ROCK.



3 C 6.0 **CONSTRUCTION ENTRANCE DETAIL**

NOT TO SCALE

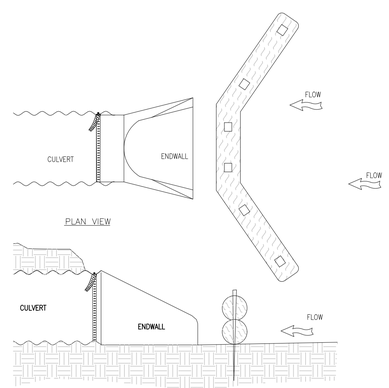


SILT SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR THE LOCATION AND LENGTH OF SILT SOCK.
2. SILT SOCK INDICATED ON INITIAL PLAN SHALL BE INSTALLED PRIOR TO ANY LAND—DISTURBING ACTIVITIES.
3. SILT SOCK SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
4. NOT FOR USE IN CONCENTRATED FLOW AREAS.
5. THE SILT SOCK SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF ⅓ OF THE DIAMETER OF THE SILT SOCK.
6. SILT SOCK SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH WDNR TECHNICAL STANDARDS 1071

SILT SOCK MAINTENANCE NOTES

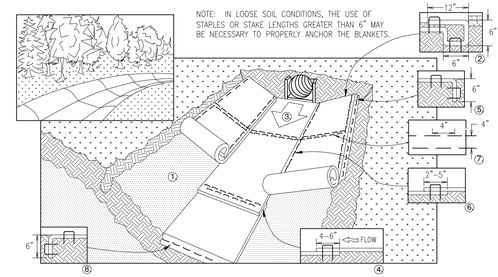
1. THE CONTRACTOR SHALL INSPECT SILT SOCKS DAILY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
2. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT SOCKS SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN ½ THE HEIGHT OF THE CREST OF LOG.
3. SILT SOCKS SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF ANY DISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED.



TYPICAL SECTION

4 C 6.0 **SILT SOCK DETAIL**

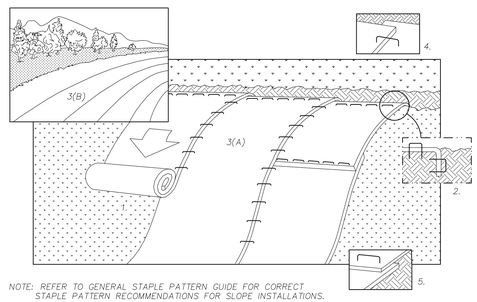
NOT TO SCALE



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UP—SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE BLANKET
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS RECOMMENDED BY THE MANUFACTURER.
4. PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4—6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPE MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
7. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
8. EROSION MAT SHALL EXTEND FOR WHICHEVER IS GREATER: UPSLOPE ONE FOOT MIN. VERTICALLY FROM DITCH BOTTOM OR 6" HIGHER THAN DESIGN FLOW DEPTH.
9. EROSION MAT SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH WDNR TECHNICAL STANDARDS 1053.

5 C 6.0 **EROSION CONTROL MAT - CHANNEL INSTALLATION**

NOT TO SCALE



NOTE: REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR SLOPE INSTALLATIONS.

1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF FERTILIZER AND SEED. NOTE: WHEN USING CELL—O—SEED DO NOT SEED PREPARED AREA. CELL—O—SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 4" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SLOPE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS RECOMMENDED BY THE MANUFACTURER.

6 C 6.0 **EROSION CONTROL MAT - SLOPE DETAILS**

NOT TO SCALE

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Erosion Control Details

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